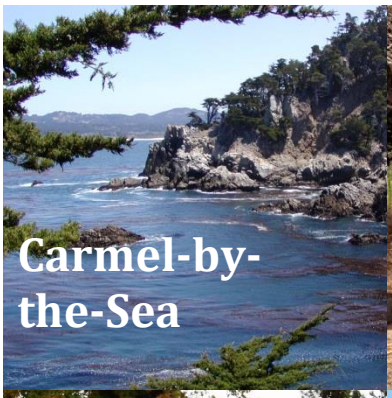
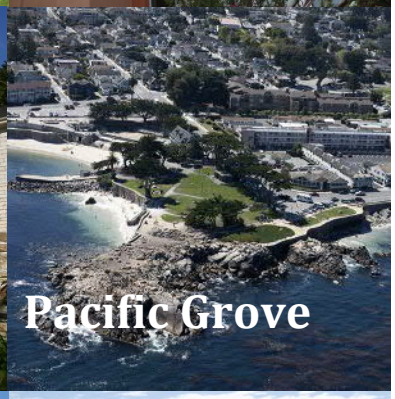
Exhibit B

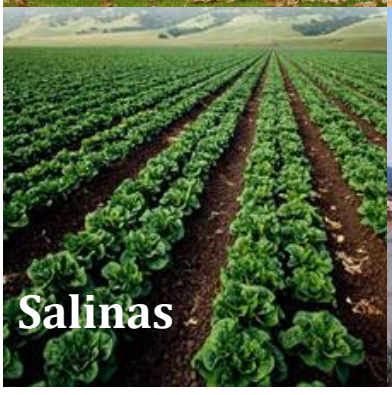
This page intentionally left blank.

Monterey County

Multi-Jurisdictional Hazard Mitigation Plan







FINAL

June 2015

Prepared by: The Monterey County Hazard Mitigation Planning Team with Professional Planning Assistance from AECOM

Table 4-1 lists the full range of 22 hazards identified and screened for further consideration in the plan update process. Of these, 13 hazards were determined by the Planning Team to pose the greatest risk to Monterey County and should be further described and evaluated through hazard profiles. The remaining 9 hazards excluded through the screening process were considered to pose a lower threat to life and property in Monterey County due to the low likelihood of occurrence or the low probability that life and property would be significantly affected. Should the risk from these hazards increase in the future, the MJHMP can be updated to incorporate vulnerability analyses for these hazards.

Table 4-1
Identification and Screening of Hazards

Hazard Type	Should It Be Profiled?	Explanation
Agricultural Emergencies	Yes	Monterey County's economy is heavily based on agricultural production in the Salinas Valley which is susceptible to a range of hazards.
Avalanche	No	Monterey County is not located in area prone to frequent or significant snowfall.
Coastal Erosion	Yes	Several participating jurisdictions and areas of the unincorporated county are located along the Pacific Coast.
Coastal Storm	Yes (See Flood)	Several participating jurisdictions and areas of the unincorporated county are located along the Pacific Coast. This hazard will be addressed in the flood hazard profile.
Dam Failure	Yes	Several State-sized dams are located within Monterey County.
Drought	Yes	Whereas existing local plans and policies (including water conservation activities of the Monterey Peninsula Water Management District Law, landscaping plans, and existing development and new construction water conservation requirements) help diminish the effects of this hazard, recent drought conditions have placed high local attention on this hazard as a hazard that should be addressed in the Plan.
Earthquake	Yes	Several active faults, including the San Andreas Fault, run through Monterey County.
Expansive Soils	No	No historic events have occurred in Monterey County.
Extreme Heat	No	While extreme temperatures are known to occur, prolonged heat waves are rare.
Flood	Yes	History of flooding is associated with coastal storms and heavy rainfall.
Hailstorm	No	No significant historic events have occurred in Monterey County.
Hurricane	No	No significant historic events have occurred in Monterey County.
Land Subsidence	No	No historic events have occurred in Monterey County.
Landslide	Yes	Monterey County is vulnerable to slope instability in the Santa Lucia Mountain Range and fault zones, especially after prolonged rainfalls, and particularly in areas recently burned by wildland fire.
Sea Level Rise	Yes	Several participating jurisdictions and areas of the unincorporated county are located along the Pacific Coast and considered susceptible to future sea level rise inundation.
Severe Winter Storm	No	Whereas there have been a number of disaster declarations related to winter storm conditions in Monterey County, in most

The hazard with the potentially most severe and widespread destructive impact on crops in Monterey County is a prolonged multi-year drought. According to historical data prepared by the National Drought Mitigation Center, Monterey County experienced severe to extreme drought conditions from 5 to 10 percent of the time between 1895 and 1995. Monterey County's agricultural sector is particularly vulnerable to these types of conditions, with consequences that directly relate to the water available to farmers for irrigation purposes. In the Salinas Valley this water is made available from groundwater sources that are recharged by the Salinas River, which relies on releases from the Nacimiento and San Antonio reservoirs as controlled by the Monterey County Water Resources Agency.

Another significant and growing threat to crops in Monterey County is the destructive potential for a major flood event along the Salinas River. Due to environmental regulations, no clearing of the river channel has occurred since 2008 which has resulted in the accumulation of brush, vegetation, sediment, and debris that severely limits the channel's ability to adequately convey flood waters downstream during a major event. This could result in the destruction and potential soil contamination of all those lands currently used for crop production in the adjacent floodplains.

It is anticipated that the effects of climate change will result in an increase in the frequency, duration, and extent of agricultural emergencies in Monterey County. Data and tools made available through Cal Adapt project the following relevant impacts for agriculture along the California Central Coast: increased temperatures, reduced precipitation, and reduced agricultural productivity. The projected change in annual average temperature for Monterey County is between 2.9 and 4.9 degrees Fahrenheit by the year 2100 depending on low versus high emissions scenarios, respectively. The projected number of extreme heat days for Monterey County is also anticipated to sharply increase from a historical average of 4 days per year to as high as between 50 and 90 more days by the year 2100. These changes along with the expected increase in severe drought and wildfire occurrences make the probability of future agricultural emergencies in Monterey County highly likely.

4.3.2 Coastal Erosion

Nature

Erosion is a process that involves the wearing away, transportation, and movement of land. Erosion rates can vary significantly, occurring rather quickly after a flash flood, coastal storm, or other event or slowly as the result of long-term environmental changes. Erosion is a natural process, but its effects can be exacerbated by human activity.

Coastal erosion is sometimes referred to as cliff, bluff, or beach erosion. However, other times these erosion types encompass different categories of erosion altogether. For this profile, tidal, bluff, and beach erosion will be nested within the term coastal erosion.

Coastal erosion is the attrition of land resulting in loss of beach, shoreline, dune, or cliff material from natural activity or human influences. Coastal erosion occurs over the area roughly from the edge of a cliff and the top of the bluff out into the near-shore region to about a depth of 30 feet. It is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. Bluff recession is the most visible aspect of coastal erosion because of the dramatic change it causes to the landscape. As a result, this aspect of coastal erosion usually receives the most attention.

suggest cliff retreats within this area average about 7 inches per year; however, failure can be much greater in weakened, fractured, or faulted areas.

For coastal management purposes, average annual coastal erosion retreats have been projected over a 100-year period (as shown in Figure E-3 [Appendix E]). Although coastal erosion can occur with any annual winter storm, damage is more likely to occur during El Niño events. Ocean storms that have some amount of coastal impact can be expected every year. El Niño events occur about every 5 to 7 years and typically last 16 to 18 months. Historically, strong El Niño conditions have only occurred every 20 to 40 years.

It is anticipated that the effects of climate change, including sea level rise, will result in an increase in the frequency and extent of coastal erosion. Higher sea levels will expose larger areas of the coast to more persistent erosional forces. It has been estimated that a 1.4 meter rise in sea level (the upper bound estimate used by the State of California for coastal adaptation purposes) has the potential to erode 41 square miles of California's coastline by 2100. According to a statewide study by the California Energy Commission, a total of 4.4 square miles of coastline is susceptible to erosion and the maximum distances coastal dunes and sea cliffs are expected to retreat in this region are approximately 1,300 and 720 feet, respectively. Overall, the probability of coastal erosion occurring within the county is considered highly likely.

4.3.3 Dam Failure

Nature

A dam failure is the structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity, or structural damage caused by an earthquake or flood. Failures due to prolonged periods of rainfall can result in overtopping (the most common cause), and total failure occurs if internal erosion, overtopping, or damage results in a complete structural breach. The sudden release of water has the potential to cause human casualties, economic loss, and environmental damage. This type of disaster is dangerous because it can occur rapidly, providing little warning and evacuation time for people living downstream. The flows resulting from dam failure generally are much larger than the capacity of downstream channels and can therefore lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment-laden water, flooding over the channel banks, and impact of debris carried by the flow.

History

Four major dams and reservoirs, as well as several small dams, are located in and within the vicinity of Monterey County. The four largest dams, the Nacimiento Dam, San Antonio Dam, San Clemente Dam, and Los Padres Dam, have never failed or been subject to significant damage. However, Lake Nacimiento (Nacimiento Dam) has spilled over three times (1958, 1969, and 1983) over the last 50 years, and Lake San Antonio (San Antonio Dam) has spilled twice (1982 and 1983) over the past 40 years. There is no record of any damages, fatalities, or injuries associated with dam failure in the planning area.

Location, Extent, and Probability of Future Events

As shown in Figure E-4 (Appendix E), four state-size dams and reservoirs in and near Monterey County pose the risk of inundation within the county. State-size dams, which are regulated by the California Division of Safety of Dams (DSOD), are more than 25 feet in height and hold back more than 15 acre-feet of water or are more than 6 feet in height and hold more than 50 acre-feet of water. The four state-size dams are as follows:

exposed to the frequency and severity of coastal flood and storm surge inundation. Such communities may also be at greater risk to increased coastal erosion and the intrusion of saltwater into groundwater aquifers which can lead to contamination of sources of freshwater for drinking or agricultural use, and other consequences including the loss of critically important habitat.

History

According to NOAA, while studies show that historic global sea levels changed little until 1900, sea levels began to climb in the 20th century. Records and research show that global sea level has been steadily rising at a rate of 1 to 2.5 millimeters (0.04 to 0.1 inches) per year since 1900, and this rate may be increasing. Since 1992, new methods of satellite altimetry indicate a rate of rise of 3 millimeters (0.12 inches) per year.

According to the California Climate Change Center's Third Assessment report (2012), sea levels along California's coast have increased a total of approximately 18 centimeters (7 inches) since 1900, for an average of 1.7 millimeters (0.07 inches) per year. The tide gauge station at Monterey County was installed in 1973, so more locally relevant and reliable long-term trend data on sea levels specific to Monterey County is not available. However the tide gauge data collected since 1973 suggests a sea level rise trend similar to the statewide average, at approximately 1.34 millimeters (0.05 inches) per year.

Location, Extent, and Probability of Future Events

Global sea level change is typically measured using satellite altimetry, and while these measurements are important, local measurements and projections for various scenarios are required for local vulnerability assessments and planning efforts. Figures E-16 (Appendix E) illustrate potential sea level rise inundation areas for Monterey County based on expected 2100 conditions assuming the following scenarios, which are consistent with the upper bound estimates of global sea level rise used by the State of California for coastal adaptation purposes under Executive Order S-13-08, and within the range of projections most recently recommended by the State's Climate Action Team for the Central Coast. These scenarios reflect an accelerated rate of sea level rise in comparison to historical measurements.

- Monterey County – Approximate 5-foot rise in sea level.
- Northern Monterey County (Moss Landing) – Approximate 5-foot rise in sea level.

Unlike most other natural hazards, sea level rise is a slow onset event, and the extent (severity or magnitude) of which is measurable only over long periods of time. Of greater immediate concern to Monterey County is the influence sea level rise will have on the severity of episodic hazard events such as coastal flooding and long-term coastal erosion. It is expected that sea level rise will be an amplifier of the magnitude for these other coastal hazards, which in all likelihood will require cost-effective hazard mitigation strategies that also take into account long-term adaptation to projected levels of gradual sea level rise inundation. Data and tools made available through Cal Adapt project an increase in land vulnerable to the 100-year coastal flood for Monterey County will increase by 11 percent by the year 2100.

5.2.3 Data Limitations

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, critical facilities, and infrastructure to the identified hazards. It was beyond the scope of this MJHMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the MJHMP.

5.3 Exposure Estimates

The results of the exposure analysis for loss estimations in Monterey County are summarized in **Tables 5-3, 5-4,** and **5-5** and in the following discussion. The results of the exposure analysis for the participating communities (including the Special Districts) are located in Tables H-3, H-4, and H-5 through Tables T 3, T-4, and T-5 in Appendices H through T, respectively.

Table 5-3
Countywide Potential Hazard Vulnerability Analysis: Population and Buildings

		Population	SoVI	Buildings			
				Residential		Nonresidential	
Hazard Type	Methodology	Number		Number	Value ($)[1]	Number	Value ($)[1]
Agricultural Emergency	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coastal Erosion	100-year erosion zone	752	N/A	445	112,766	100	144,715
Dam Failure	Inundation area	72,926	N/A	15,304	3,411,892	1,114	2,169,999
Earthquake	Extreme	12,251	N/A	3,357	590,989	129	260,579
	High	295,032	N/A	73,116	15,519,401	2,826	5,330,438
	Moderate	93,431	N/A	29,736	6,472,890	1,255	2,335,072
Flood	100-year flood zone	18,819	N/A	4,886	948,519	607	875,611
Hazardous Materials Event	1-mile buffer mobile	263,681	0.17	46,826	8,078,419	12,523	4,977,242
	1-mile buffer fixed	54,659	0.87	7,566	1,002,522	2,445	994,990
Landslide	High	5,083	-0.31	1,059	308,606	297	59,382
	Moderate	19,389	0.12	5,748	1,614,545	948	231,340
Sea Level Rise	Inundation Area	3,918	-0.02	305	47,496	116	69,179
Tsunami	Inundation Area	1,965	-0.08	312	91,504	194	263,987
Wildland Fire	Very high	3,423	1.43	770	575,131	213	57,124
	High	16,750	0.25	3,532	144,215	1,150	300,476
	Moderate	348,375	0.40	68,006	12,571,027	16,316	5,831,432
Windstorm	Prevailing wind zone	112,466	N/A	19,949	3,691,210	643	1,299,328

[1] Value = Estimated tax assessor structural value (x1000)

Table 5-5
Countywide Potential Hazard Vulnerability Analysis – Critical Infrastructure

		Highways		Railroads		Bridges		Airport	
Hazard	**Methodology**	**Miles**	**Value ($)[1]**	**Miles**	**Value ($)[1]**	**No.**	**Value ($)[1]**	**No.**	**Value ($)[1]**
Agricultural Emergency	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Coastal Erosion	100-year erosion zone	10.0	51,750	0.0	0	0	0	0	0
Dam Failure	Inundation area	82.0	552,745	67.0	92,510	108	265,383	0	0
Earthquake	Extreme	16.1	96,008	9.3	12,833	22	10,503	0	0
	High	174.3	1,129,465	54.7	75,524	167	272,059	2	12,862
	Moderate	292.9	1,797,304	51.9	71,660	129	197,353	1	6,431
Flood	100-year flood zone	43.6	270,332	15.6	21,552	92	223,124	0	0
Hazardous Materials Event	1-mile buffer mobile	382.0	2,262,957	137.8	160,017	198	408,347	10	6,431
	1-mile buffer fixed	25.9	0	15.8	0	14	0	2	0
Landslide	High	40.6	287,390	2.5	2,748	18	30,269	0	0
	Moderate	22.4	235,944	3.1	2,889	5	8,616	0	0
Sea Level Rise	Inundation Area	6.2	0	8.4	0	6	0	0	0
Tsunami	Inundation Area	5.6	68,852	4.4	10,546	8	68,531	0	0
Wildland Fire	Very high	9.3	56,038	0.0	0	4	7,993	1	0
	High	82.6	758,489	13.9	16,034	33	75,712	16	0
	Moderate	151.5	1,249,652	57.6	53,164	119	299,285	20	12,862
Windstorm	Prevailing wind zone	141.7	1,053,539	77.3	106,724	55	152,534	1	6,431

[1] Value = Assessed structural value (x1000)

5.3.6 Hazardous Materials Event

Over half of the countywide total population resides in the 1-mile buffer of transportation corridors. This includes 263,681 people (approximately 66 percent of the population), 46,826 residential buildings (worth $8.1 billion), 607 nonresidential buildings (worth $875.6 million), and 299 critical facilities (worth $808.3 million). These figures are for the entirety of the transportation corridors and, therefore, overstate the exposure since a single hazardous material event at a specific point along one of these corridors is unlikely to affect all of the buffered areas throughout the county.

Approximately 14 percent of the countywide total population resides within a 1-mile buffer around fixed hazardous materials site locations (based on EHS data provided by the U.S. Environmental Protection Agency). This includes 54,659 people, 7,566 residential buildings (worth $1.0 billion), 2,445 nonresidential buildings (worth $995 million), and 44 critical facilities (worth $11.0 million). These figures are for the entirety of the transportation corridors and, therefore, overstate the exposure since a hazardous material event along the corridors is unlikely to affect all of the buffer area.

5.3.7 Landslide

The areas of highest susceptibility to earthquake-induced large landslides include Carmel Valley, the southern Big Sur coast, the Arroyo Seco district, and the foothills of southern Salinas Valley. Within the high landslide hazard area are 5,165 people (1 percent of the total population), 2,495 residential buildings (worth $522.4 billion), 31 nonresidential buildings (worth $72.2 million), and 3 critical facilities (worth $1.9 million). Approximately 55.0 miles of highway and 2.0 miles of railroad tracks are located in this high hazard area. Within the moderate landslide hazard area (lower foothills, Monterey coastal bluffs) are 19,473 people (5 percent of the total population), 7,973 residential buildings (worth $1.6 billion) and 132 nonresidential building (worth $296.6 million), and 6 critical facilities (worth $5.1 million). Approximately 43.1 miles of highway and 2.1 miles of railroad tracks are located in this moderate hazard area.

5.3.8 Sea Level Rise

The potential for sea level rise is present along the entire coast of Monterey County. However, less than 4 percent of the county's population resides in this hazard zone. This includes approximately 3,918 people, 305 residential buildings (worth $47.5 million), 116 nonresidential buildings (worth $69 million), and 3 critical facilities. Additionally, 6.2 miles of highway, 8.4 miles of railroad, 6 bridges, and 0 airports are located in this hazard area.

5.3.9 Tsunami

While the entire coastal area of Monterey County is susceptible to a tsunami, the coastal low-lying areas and riverine valleys are the most susceptible. Using the New Tsunami Inundation Map data (Cal EMA, CGS, USC), it is estimated that 1,965 people, 312 residential buildings (worth $91.5 million), and 194 nonresidential buildings (worth $264 million), and 3 critical facilities (worth $2 million) are located in this hazard area. Approximately 5.6 miles of highway and 4.4 miles of railroad tracks are located in this hazard area.