SANTA BARBARA COUNTY
MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN (MJHMP)

County of Santa Barbara, City of Buellton, City of Carpinteria, City of Goleta, City of Guadalupe, City of Lompoc, City of Santa Barbara, City of Santa Maria, City of Solvang, Cachuma Operations and Maintenance Board, Carpinteria Valley Water District, Montecito Fire Protection District, Montecito Water District, Santa Maria Valley Water Conservation District, Goleta Water District

February 2023





Prepared by:
County of Santa Barbara Office of Emergency Management (OEM)
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With Assistance from:
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104 West Anapamu Street, Suite 204A
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Table of Contents

SECTION	TITLE	PAGE
	LIST OF ACRONYMS AND ABBREVIATIONS	XI
1.0	INTRODUCTION	1-1
1.1	BACKGROUND ON MITIGATION PLANNING IN SANTA BARBARA COUNTY	1-2
1.2	WHAT'S NEW IN THE PLAN UPDATE	1-2
2.0	PLAN PURPOSE AND AUTHORITY	2-1
2.1	LOCAL COMPLIANCE WITH THE DISASTER MITIGATION ACT (DMA)	2-1
3.0	PLANNING PROCESS	3-1
3.1	OVERVIEW	3-1
3.2	MITIGATION ADVISORY COMMITTEE (MAC)	3-3
3.2.1	MAC Members	3-3
3.2.2	Overview of MAC Meetings	3-3
3.3	LOCAL PLANNING TEAM (LPT)	3-7
3.3.1	Local Planning Team Planning Process	3-7
3.3.2	Local Planning Team Members	3-8
3.3.3	Overview of Local Planning Team Efforts	3-8
3.4	PUBLIC OUTREACH AND ENGAGEMENT	3-9
3.4.1	Community Survey	3-10
3.4.2	Project Website	3-13
3.4.3	Press Releases and Media Coverage	3-13
3.4.4	Public Workshops and Draft Plan Review	3-13
4.0	COMMUNITY PROFILE & CAPABILITY ASSESSMENT	4-1
4.1	SANTA BARBARA COUNTY COMMUNITY PROFILE	4-1
4.1.1	Cities, Communities, and Special Districts	4-3
4.1.2	Population and Demographics	4-6
4.1.3	Environmental Justice and Social Vulnerability	4-9
4.1.4	Economy	4-10
4.1.5	Climate	4-14
4.1.6	Geography and Physical Features	4-15
4.1.7	Infrastructure	4-17
4.1.8	Land Use	4-24
4.2	COUNTY OF SANTA BARBARA MITIGATION CAPABILITIES	4-35
4.2.1	Overview	4-35
4.2.2	County Administrative and Technical Capabilities	4-35

SECTION	TITLE	PAGE
4.2.3	County Regulatory Mitigation Capabilities	4-58
4.2.4	County Fiscal Mitigation Capabilities	4-80
4.2.5	County Education and Outreach Capabilities	4-86
4.3	Opportunities for Mitigation Capability Improvements	4-88
5.0	HAZARDS ASSESSMENT	5-1
5.1	Overview	5-1
5.2	Hazard Assessment	5-1
5.2.1	Hazard Identification	5-1
5.2.2	Hazard Screening/Prioritization	5-3
5.2.3	Approach and Methodology	5-7
5.3	Natural and Destructive Hazards	5-8
5.3.1	Wildfire	5-8
5.3.2	Drought & Water Shortage	5-22
5.3.3	Earthquake & Liquefaction	5-38
5.3.4	Flood	5-46
5.3.5	Mudflow & Debris Flow	5-59
5.3.6	Coastal Hazards	5-64
5.3.7	Landslide	5-75
5.3.8	Geologic Hazards	5-83
5.3.9	Tsunami	5-86
5.4	Severe Weather and Storm Events	5-92
5.4.1	Extreme Heat/Freeze	5-94
5.4.2	Windstorm	5-97
5.4.3	Hailstorm	5-99
5.4.4	Tornado	5-101
5.4.5	Hurricane	5-103
5.5	Urban and Human-Caused Hazards	5-105
5.5.1	Pandemic/Public Health Emergency	5-105
5.5.2	Cyber Threat	5-111
5.5.3	Invasive Species	5-114
5.5.4	Civil Disturbance	5-117
5.5.5	Agricultural Pests	5-121
5.5.6	Terrorism	5-124
5.5.7	Well Stimulation & Hydraulic Fracturing	5-125
5.6	Infrastructure Failures	5-128
5.6.1	Energy Shortage & Resiliency	5-128
5.6.2	Hazardous Materials Release	5-131
5.6.3	Dam Failure	5-135
5.6.4	Natural Gas Pipeline Rupture & Storage Facility Incidents	5-139
5.6.5	Train Accident	5-142
5.6.6	Aircraft Crash	5-144
5.6.7	Oil Spill	5-151
5.6.8	Levee Failure	5-156
5.6.9	Radiological Accident	5-160

SECTION	TITLE	PAGE
6.0	VULNERABILITY ASSESSMENT	6-1
6.1	PURPOSE & METHODOLOGY	6-1
6.1.1	Scientific Loss Estimation Models	6-1
6.1.2	Approach to Earthquake Vulnerability Assessment	6-2
6.1.3	Approach to Flood Vulnerability Assessment	6-3
6.1.4	Approach to Analysis of Exposure of Critical Facilities to Hazards	6-4
6.1.5	Approach to Qualitative Estimate of Impacts	6-6
6.2	SCIENTIFIC LOSS ESTIMATION (HAZUS) ANALYSIS	6-7
6.2.1	Earthquake (Ground shaking)	6-7
6.3	NATURAL AND DESTRUCTIVE HAZARDS	6-32
6.3.1	Wildfire	6-32
6.3.2	Drought & Water Shortage	6-46
6.3.3	Liquefaction (Earthquake)	6-49
6.3.4	Flood	6-53
6.3.5	Mudflow & Debris Flow	6-64
6.3.6	Coastal Hazards	6-68
6.3.7	Landslide	6-77
6.3.8	Geologic Hazards	6-84
6.3.9	Tsunami	6-85
6.4	SEVERE WEATHER AND STORM EVENTS	6-88
6.4.1	Extreme Heat/Freeze	6-88
6.4.2	Windstorm	6-91
6.4.3	Hailstorm	6-93
6.4.4	Tornado	6-93
6.4.5	Hurricane	6-94
6.5	URBAN AND HUMAN-CAUSED HAZARDS	6-94
6.5.1	Pandemic/Public Health Emergency	6-94
6.5.2	Cyber Threat	6-96
6.5.3	Invasive Species	6-97
6.5.4	Civil Disturbance	6-99
6.5.5	Agricultural Pests	6-100
6.5.6	Terrorism	6-102
6.5.7	Well Stimulation & Hydraulic Fracturing	6-102
6.6	INFRASTRUCTURE FAILURES	6-103
6.6.1	Energy Shortage & Resiliency	6-103
6.6.2	Hazardous Materials Release	6-105
6.6.3	Dam Failure	6-106
6.6.4	Natural Gas Pipeline Rupture & Storage Facility Incident	6-110
6.6.5	Train Accident	6-111
6.6.6	Aircraft Crash	6-112
6.6.7	Oil Spill	6-112
6.6.8	Levee Failure	6-114
6.6.9	Radiological Accident	6-115
7.0	MITIGATION PLAN	7-1
7.1	MITIGATION GOALS AND OBJECTIVES	7-1

SECTION	TITLE	PAGE
7.2	STATUS REVIEW & ASSESSMENT OF PREVIOUS MITIGATION ACTIONS	7-4
7.3	ADDITIONAL MITIGATIONS IMPLEMENTED SINCE 2017	7-23
7.4	PRIORITIZATION PROCESS	7-26
7.5	MITIGATION IMPLEMENTATION PLAN	7-30
8.0	PLAN MAINTENANCE	8-1
8.1	MONITORING, EVALUATING, AND UPDATING THE PLAN	8-1
8.2	IMPLEMENTATION THROUGH EXISTING PLANS AND PROGRAMS	8-2
8.3	ONGOING PUBLIC OUTREACH AND ENGAGEMENT	8-2
8.4	POINT OF CONTACT	8-3
9.0	REFERENCES	9-1

List of Appendices

A –Plan Update Guides From Participating Jurisdictions

B – Public Outreach Materials

C – Data and Models

List of Figures

Number	Title	Page
Figure 4-1.	Santa Barbara County Regional Location Map	4-2
Figure 4-2.	Participating Agencies	4-4
Figure 4-3.	Overall Social Vulnerability in Santa Barbara County based on the SoVI, by Census Tracts	4-11
Figure 4-4.	County Land Use Map	4-27
Figure 4-5.	County Organization	4-38
Figure 4-6.	Evacuations Routes	4-66
Figure 4-7.	Operating Revenue by Category, FY 2020-21	4-82
Figure 5-1.	Santa Barbara County Fire Hazard Severity Zones	5-11
Figure 5-2.	Wildland-Urban Interface (WUI)	5-12
Figure 5-3.	Santa Barbara County Fire Responsibility Areas and Communities at Risk	5-15
Figure 5-4.	Santa Barbara County Fire History (1970-2021)	5-16
Figure 5-5.	Santa Barbara County Wildfire Threat	5-20
Figure 5-6.	Santa Barbara County SGMA Basin (2020)	5-29
Figure 5-7.	Santa Barbara County Drought Related Tree Mortality (2019)	5-35
Figure 5-8.	Santa Barbara County Probability of Shaking 2% in 50 Years	5-40
Figure 5-9.	Santa Barbara County Liquefaction Severity	5-41
Figure 5-10.	Historic Earthquake Epicenters	5-45
Figure 5-11.	Santa Barbara County FEMA 100-Year (1% Annual Chance) and 500-Year (0.2% Annual Chance) Flood Hazards plus Zone D areas	5-57
Figure 5-12.	Santa Barbara County DWR Awareness 100-Year Flood BAM	5-58
Figure 5-13.	Debris Flow Risk in Santa Barbara County	5-61
Figure 5-14.	Santa Barbara County Sea Level Rise Projections (200cm) Tidal Inundations: No Flood Event	5-68
Figure 5-15.	Santa Barbara County Sea Level Rise Projections (200cm) Tidal Inundations: No Flood Event Zoom	5-69
Figure 5-16.	Santa Barbara County Sea Level Rise Projections (2030, 2060, 200cm) Tidal Inundations 100-Year Flood Event	5-70
Figure 5-17.	Santa Barbara County Sea Level Rise Projections (2030, 2060, 200cm) Tidal Inundations: 100-Year Flood Event Zoom	5-71
Figure 5-18.	Santa Barbara County Soil Types	5-78
Figure 5-19.	Santa Barbara County Deep-Seated Landslide Susceptibility	5-82
Figure 5-20.	Santa Barbara County Tsunami Hazard Area	5-88
Figure 5-21.	South Coast Tsunami Hazard Area	5-89
Figure 5-22.	Santa Barbara County Severe Weather Events	5-93
Figure 5-23.	Santa Barbara County State Important Farmland (2018)	5-122
Figure 5-24.	Hazardous Sites (Envirostor/Geotracker)	5-133
Figure 5-25.	Santa Barbara County Dam Inundation	5-138
Figure 5-26.	Natural Gas Pipeline in Santa Barbara County	5-141
Figure 5-27.	Santa Barbara Airport Influence Zone	5-145
Figure 5-28.	Santa Ynez Airport Influence Zone	5-146
Figure 5-29.	Lompoc Airport Influence Zone	5-147
Figure 5-30.	Santa Maria Public Airport Influence Zone	5-148
Figure 5-31.	New Cuyama Airport Influence Zone	5-149
Figure 5-32.	Oil Platform Map of Santa Barbara Coast	5-153
Figure 5-33.	Santa Maria River Levee	5-158
Figure 5-34.	Emergency Planning Zone (EPZ) for Diablo Canyon Nuclear Facility	5-164

Number	Title	Page
Figure 6-1.	Santa Barbara County Hazus 2,500-year Probabilistic Scenario Total Building Loss	6-12
Figure 6-2.	Santa Barbara County Red Mountain Fault 7.4 Magnitude ShakeMap	6-21
Figure 6-3.	Santa Barbara County San Luis Range 7.2 Magnitude ShakeMap	6-22
Figure 6-4.	Santa Barbara County Red Mountain Fault ShakeMap Scenario Total Building Loss	6-25
Figure 6-5.	Santa Barbara County San Luis Range ShakeMap Scenario Total Building Loss	6-26
Figure 6-6.	Critical Facilities in Fire Hazard Severity Zone	6-42
Figure 6-7.	Critical Facilities in Wildland Urban Interface (WUI)	6-43
Figure 6-8.	Critical Facilities in Fire Threat Zones	6-44
Figure 6-9.	Evacuation Routes, Residential Areas with Single Access, and Critical Facilities	6-45
Figure 6-10.	Groundwater Liquefaction Severity Zones	6-50
Figure 6-11.	Critical Facilities in FEMA and DWR Flood Hazard Zones	6-62
Figure 6-12.	Repetitive Loss Areas of Santa Barbara County	6-63
Figure 6-13.	Debris Flow Storm Impact Consideration	6-65
Figure 6-14.	Critical Facilities and Sea Level Rise Projections Tidal Inundations: No Flood Event	6-67
Figure 6-15.	Critical Facilities and Sea Level Rise Projections Tidal Inundations: No Flood Event Zoom	6-73
Figure 6-16.	Critical Facilities and Sea Level Rise Projections Tidal Inundations: 100-Year Flood Event	6-74
Figure 6-17.	Critical Facilities and Sea Level Rise Projections Tidal Inundations: 100-Year Flood Event Zoom	6-75
Figure 6-18.	Critical Facilities and Landslide Incidence	6-78
Figure 6-19.	Critical Facilities and Tsunami Inundation Areas	6-86
Figure 6-20.	Critical Facilities and Tsunami Inundation Areas Zoom	6-87
Figure 6-21.	Areas at Risk of Public Safety Power Shutoff	6-104
Figure 6-22.	Critical Facilities and Dam Failure Inundation Areas	6-108

List of Tables

NUMBER	TITLE	PAGE
Table 1-1.	Santa Barbara County Multi-Jurisdiction Hazard Mitigation 2022 Plan Update Highlights	1-3
Table 4-1.	Key Special Districts in Santa Barbara County	4-5
Table 4-2.	Projected Population Growth Across Communities in Santa Barbara County	4-6
Table 4-3.	Employment by Industry, March 2021	4-12
Table 4-4.	Top Ten Crops in Santa Barbara County (2020)	4-13
Table 4-5.	Watersheds in Santa Barbara County	4-16
Table 4-6.	Surface Waters in Santa Barbara County	4-16
Table 4-7.	Status of Groundwater Basins in the County	4-22
Table 4-8.	Multi-Jurisdictional Summary of Staff and Administrative Capabilities	4-36
Table 4-9.	Multi-jurisdictional Capability Summary of Relevant Plans, Ordinances, and Program	4-59
Table 4-10.	Groundwater Sustainability Planning in Santa Barbara County	4-68
Table 4-11.	NFIP Participation Status by Agency	4-69
Table 4-11.	Santa Barbara County Fire Development Standards 1-7	4-77
Table 4-12.	County of Santa Barbara Fiscal Mitigation Capabilities Summary	4-80
Table 4-13.	FEMA Hazard Mitigation Grants Awarded in Santa Barbara County	4-83
Table 5-1.	Hazard Screening and Scoring	5-3
Table 5-2.	Hazard Priority Ranking in Santa Barbara County	5-5
Table 5-3.	Fire Loss (in Dollars) Within the County of Santa Barbara in 2020	5-10
Table 5-4.	Major Wildfires in Santa Barbara County	5-17
Table 5-5.	U.S. Drought Monitor Drought Condition Levels	5-26
Table 5-6.	Summary of Reservoirs in Santa Barbara County	5-31
Table 5-7.	Historical and Projected Annual Average Precipitation (in/year)	5-37
Table 5-8.	Richter Scale	5-39
Table 5-9.	Historic Earthquakes in Santa Barbara County (1970-2020)	5-44
Table 5-10.	Southern California Region Earthquake Likelihoods	5-46
Table 5-11.	Projected State and Local Sea Level Rise Scenarios (inches)	5-74
Table 5-12.	Common Areas of Recent Historic Landslides in Santa Barbara County	5-79
Table 5-13.	Land Subsidence for Groundwater Basins in Santa Barbara County (2018)	5-84
Table 5-14.	Enhanced Fujita Tornado Scale Classification	5-102
Table 5-15.	Hurricane Stages	5-104
Table 5-16.	Saffir-Simpson Hurricane Scale Classification	5-104
Table 5-17.	Comment Invasive Plant Species in Santa Barbara County	5-115
Table 5-18.	Hazardous Materials Incidents in Santa Barbara County by Location and Type	5-134
Table 5-19.	Santa Barbara County Dams Summary	5-136
Table 5-20.	Diablo Canyon Nuclear Power Plant Emergency Planning Zones	5-163
Table 6-1.	Santa Barbara County Community Information System Policies in Force by Flood Zone and Jurisdiction	6-3
Table 6-2.	Critical Facilities in Santa Barbara County by Jurisdiction and FEMA Lifeline	6-6
Table 6-3.	Expected Building Damage by Occupancy Class	6-9
Table 6-4.	Expected Building Damage by Building Material (All Design Levels)	6-10
Table 6-5.	Shelter Requirements for 2,500-year Probabilistic Scenario	6-13
Table 6-6.	Hazus Earthquake Casualty Estimates from Santa Barbara County	6-14
Table 6-7.	Essential Facility Inventory and Expected Damage	6-16
Table 6-8.	Transportation Systems Inventory and Expected Damage by Number of Locations	6-16

NUMBER	TITLE	PAGE
Table 6-9.	Transportation System Economic Losses in Millions of Dollars	6-17
Table 6-10.	Expected Utility System Facility Inventory and Damages	6-18
Table 6-11.	Utility System Economic Losses in Millions of Dollars	6-18
Table 6-12.	Expected Utility System Pipeline Damage (Site Specific)	6-19
Table 6-13.	Expected Potable Water and Electric Power System Performance	6-19
Table 6-14.	Business-Related Economic Loss Estimates in Millions of Dollars	6-20
Table 6 15.	Expected Building Damage by Occupancy -Red Mountain Fault ShakeMap Scenario	6-23
Table 6-16.	Expected Building Damage by Occupancy - San Luis Range ShakeMap Scenario	6-23
Table 6-17.	Expected Potable Water and Electric Power System Performance - Red Mountain Fault ShakeMap Scenario	6-24
Table 6-18.	Expected Potable Water and Electric Power System Performance - San Luis Range ShakeMap Scenario	6-24
Table 6-19.	Shelter Requirements for Red Mountain Fault and San Luis Range ShakeMap Scenarios	6-27
Table 6-20.	Casualty Estimates - Red Mountain Fault ShakeMap Scenario	6-28
Table 6-21.	Casualty Estimates - San Luis Range ShakeMap Scenario	6-28
Table 6-22.	Economic Losses (Millions of Dollars)	6-29
Table 6-23.	Lifeline System Losses - Transportation and Utility (Millions of Dollars)	6-30
Table 6-24.	Expected Damage to Critical Facilities - Red Mountain Fault ShakeMap Scenario	6-31
Table 6-25.	Expected Damage to Critical Facilities - San Luis Range ShakeMap Scenario	6-31
Table 6-26.	Fire Threat by Planning Region	6-33
Table 6-27.	Fire Threat in Unincorporated Areas	6-34
Table 6-28.	Fire Threat by City	6-34
Table 6-29.	Santa Barbara County Properties at Risk to Fire Threat	6-35
Table 6-30.	Critical Facilities with Very High Fire Threat by Planning Region	6-38
Table 6-31.	Critical Facilities with Very High Fire Threat by Jurisdiction	6-38
Table 6-32.	Critical Facilities with High Fire Threat by Planning Region	6-39
Table 6-33.	Facilities with High Fire Threat by Jurisdiction	6-39
Table 6-34.	Facilities with Moderate Fire Threat by Planning Region	6-40
Table 6-35.	Facilities with Moderate Fire Threat by Jurisdiction	6-40
Table 6-36.	High Liquefaction Hazard Vulnerabilities by Jurisdiction	6-51
Table 6-37.	Moderate Liquefaction Hazard Vulnerabilities by Jurisdiction	6-52
Table 6-38.	Low Liquefaction Hazard by Jurisdiction	6-53
Table 6-39.	DWR Awareness 100-Year Flood Acreage Inundated by Planning Region	6-54
Table 6-40.	FEMA Riverine 100-Year (1% Annual Chance) Flood Acreage Inundation by Planning Region	6-54
Table 6-41.	Riverine 100-Year (1% Annual Chance) Floodplain Exposure and Loss by Jurisdiction	6-55
Table 6-42.	Riverine 500-Year (0.2% Annual Chance) Floodplain Exposure and Loss by Jurisdiction	6-56
Table 6-43.	Coastal 100-Year (1% Annual Chance) Floodplain Exposure and Loss by Jurisdiction	6-58
Table 6-44.	Santa Barbara County Population Living in the Flood Hazard Zones	6-58
Table 6-45.	Critical Facilities within 100-Year (1% Annual Chance) Flood Hazard by Planning Region and FEMA Lifeline	6-58
Table 6-46.	Critical Facilities within 100-Year (1% Annual Chance) Flood Hazard by Jurisdiction and FEMA Lifeline	6-59

NUMBER	TITLE	PAGE
Table 6-47.	Critical Facilities within Coastal 100-Year (1% Annual Chance) Flood Hazard by Planning Region and FEMA Lifeline	6-59
Table 6-48.	Critical Facilities within Coastal 100-Year (1% Annual Chance) Flood Hazard by Jurisdiction and FEMA Lifeline	6-59
Table 6-49.	Critical Facilities within 500-Year (0.2% Annual Chance) Flood Hazard by Planning Region and FEMA Lifeline	6-60
Table 6-50.	Critical Facilities within 500-Year (0.2% Annual Chance) Flood Hazard by Jurisdiction and FEMA Lifeline	6-60
Table 6-51.	Critical Facilities within DWR Awareness 100-Year Flood Hazard by Planning Area and FEMA Lifeline	6-60
Table 6-52.	Sea Level Rise (2030) by Planning Region	6-70
Table 6-53.	Sea Level Rise (2030) by Jurisdiction	6-70
Table 6-54.	Sea Level Rise (2060) by Planning Region	6-70
Table 6-55.	Sea Level Rise (2060) by Jurisdiction	6-71
Table 6-56.	Santa Barbara County at Risk to the 2030 Sea Level Rise Hazard by Jurisdiction	6-71
Table 6-57.	Santa Barbara County at Risk to the 2060 Sea Level Rise Hazard by Jurisdiction	6-72
Table 6-58.	Critical Facilities in 2030 Sea Level Rise Zones by Planning Region	6-72
Table 6-59.	Critical Facilities in 2030 Sea Level Rise Zones by Jurisdiction	6-76
Table 6-60.	Critical Facilities in 2060 Sea Level Rise Zones by Planning Region	6-76
Table 6-61.	Critical Facilities in 2060 Sea Level Rise Zones by Jurisdiction	6-76
Table 6-62.	Sand Barbara County Improved Properties at Risk to Landslide Summary	6-79
Table 6-63.	Critical Facilities in Landslide Zones by Planning Region	6-80
Table 6-64.	Critical Facilities in Landslide Zones by Jurisdiction	6-82
Table 6-65.	Tsunami Hazard Vulnerabilities by Jurisdiction	6-88
Table 6-66.	Crop Loss Due to Extreme Heat/Freeze, USDA RMA Crop Indemnity Reports, 2007-2020	6-91
Table 6-67.	Crop Loss Due to Excessive Winds, USDA RMA Crop Indemnity Reports, 2007-2020	6-92
Table 6-68.	Critical Facilities by Category in Dam Inundation Zones	6-107
Table 6-69.	Santa Barbara County at Risk to Dam Inundation Hazard by Jurisdiction Summary	6-110
Table 7-1.	Status of Previous Mitigation Actions	7-4
Table 7-2.	Additional Mitigation Actions Implemented by County (2017 – 2021)	7-23
Table 7-3.	2022 Mitigation Actions and Prioritization	7-27
Table 7-1.	Status of Previous Mitigation Actions	7-4
Table 7-2.	Additional Mitigation Actions Implemented by County (2017 - 2021)	7-24
Table 7-3.	2022 Mitigation Actions and Prioritization	7-28

List of Charts

Number	**Title**	**Page**
Chart 4-1.	Age Distribution in Santa Barbara County	4-8
Chart 4-2.	Median Ages in Santa Barbara County Communities	4-8
Chart 4-3.	Employment by Industry, March 2021	4-12
Chart 6-1.	Earthquake Losses by Loss Type and Occupancy Type (in Millions of Dollars)	6-8
Chart 6-2.	Hazus 2,500 Probabilistic Earthquake Scenario Structure Damage by Occupancy Type	6-9
Chart 6-3.	Debris Generation in Millions of Tons and by Material Type	6-11

List of Acronyms and Abbreviations

AADT	average annual daily trips
AB	Assembly Bill
ALERT	Automated Local Evaluation in Real Time
ARES	Amateur Radio Emergency Services
ATSDR	Agency for Toxic Substances and Disease Registry
BFE	base flood elevation
CAER	Community Awareness and Emergency Response
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Governor's Office of Emergency Services
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CASGEM	California Statewide Groundwater Elevation Monitoring
CBWD	Cuyama Basin Water District
CCR	California Code of Regulations
CCSD	Cuyama Community Services District
CDC	Center for Disease Control
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Teams
cfs	cubic-feet-per-second
CIASO	Chief Information Security Officer
CIP	Capital Improvement Plan
County OEM	Santa Barbara County Office of Emergency Management
CRS	Community Rating System
CSDs	Community Service Districts
CWPP	Community Wildfire Protection Plans
CWPP	Community Wildfire Protection Plan
DOC	Department Operations Center
DRM	Office of the Disaster Recovery Manager
DSOD	Division of Safety of Dams
DWR	State Department of Water Resources
EDD	State of California Employment Development Department
EDRN	Existing Developed Rural Neighborhood
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FIRM	Flood Insurance Rates Map
FMMP	Farming Mapping and Monitoring Program
FY	Fiscal Year
GIS	geographic information systems

GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
Highway 101	U.S. Highway 101
ICT	Information and Communications Technology
LPT	Local Planning Team
LRA	Local Responsibility Area
MAC	Mitigation Advisory Committee
MERRAG	Montecito Emergency Response & Recovery Action Group
MW	mega-watts
NFIP	National Flood Insurance Program
NWS	National Weather Service
OWTS	Onsite Wastewater Treatment Systems
PG&E	Pacific Gas & Electric Company
PV	photovoltaic
PXP	Plains Exploration and Production Company
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SBCAG	Santa Barbara County Association of Governments
SBIA	Santa Barbara Industrial Association
SCE	Southern California Edison Company
SEMS	California Standardized Emergency Management System
sf	square feet
SFHA	special flood hazard area
SGMA	Sustainable Groundwater Management Act
SoCalGas	Southern California Gas Company
SoVI	social vulnerability index
SR	State Route
SRA	state responsibility area
SWRCB	State Water Resources Control Board
SYWCD	Santa Ynez River Water Conservation District
TIP	transportation improvement plan
UCSB	University of California, Santa Barbara
UPRR	Union Pacific Railroad
USBR	U.S. Bureau of Reclamation
Vandenberg SFB	Vandenberg Space Force Base
VMT	vehicle miles traveled
VOAD	Voluntary Organizations Active in Disasters
WUI	wildland-urban interface
WWTP	wastewater treatment plants

1.0 INTRODUCTION

Natural and human-caused disasters can lead to death, injury, property damage, and interruption of business and government services. When they occur, the time, money, and effort to respond to and recover from these disasters divert public resources and attention from other important programs and problems.

However, the impact of foreseeable yet often unpredictable natural and human-caused events can be reduced through mitigation planning. History has demonstrated that it is less expensive to mitigate against disaster damage than to repeatedly repair damage in the aftermath. A mitigation plan states the aspirations and specific courses of action jurisdictions intend to follow to reduce vulnerability and exposure to future hazard events.

The County of Santa Barbara (County) recognizes the consequences of disasters and the need to reduce the impacts of all hazards, natural and human-caused. The County has prepared this update to its Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) to comprehensively identify, evaluate, and mitigate the known hazards that Santa Barbara County faces.

The 2022 MJHMP Update was prepared and formulated with input and coordination from each of the county's eight incorporated cities, six special districts, the County, citizen participation, responsible officials, and support from the State of California Governor's Office of Emergency Services (CalOES) and the Federal Emergency Management Agency (FEMA). The process to update the MJHMP included over a year of coordination with representatives from all of the incorporated cities and six special districts within the County and County representatives who comprised the Mitigation Advisory Committee (MAC) (described further in Section 3.2 below).

The MJHMP is used by local emergency management teams, decision-makers, and agency staff to implement needed mitigation to address known hazards. The MJHMP can also be used as a tool for all stakeholders to increase community awareness of local hazards and risks

Key Terms

Mitigation. Sustained actions taken to reduce or eliminate long-term risk to life and property from hazards. *

Prevention. Actions necessary to avoid, prevent, or stop an imminent threat or actual act of terrorism. **

Protection. Actions necessary to secure the homeland against acts of terrorism and manmade or natural disasters. **

Preparedness. Actions taken to plan, organize, equip, train, and exercise to build and sustain the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation. **

Response. Actions necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred. **

Recovery. Actions necessary to assist communities affected by an incident to recover effectively. **

* Source: 44 CFR §201.2 Mitigation Planning - Definitions.

** Source: National Preparedness Goal, First Edition. September 2011, FEMA. http://www.fema.gov/pdf/prepared/npg.pdf and provide information about options and resources available to reduce those risks. Informing and educating the public about potential hazards helps all county residents and visitors protect themselves against their effects.

Risk assessments were performed that identified and evaluated priority natural and human-caused hazards that could impact the County and its jurisdictions. The MJHMP describes historical hazard events and the future probability of these hazards and their impact on communities within the County. Vulnerability assessments summarize the identified hazards' impact on critical infrastructure, populations, and future development. Estimates of potential dollar losses to vulnerable structures are presented. The risk and vulnerability assessments were used to determine mitigation goals and objectives to minimize near-term and long-term vulnerabilities to the identified hazards. These goals and objectives are the foundation for a comprehensive range of specific attainable mitigation actions (see Chapter 7.0).

1.1 BACKGROUND ON MITIGATION PLANNING IN SANTA BARBARA COUNTY

The updated MJHMP complies with Federal Emergency Management Agency (FEMA) guidance and California Office of Emergency Services guidelines for Local Hazard Mitigation Plans. The update followed the requirements noted in the Disaster Mitigation Act (DMA) of 2000 and FEMA's 2013 Local Hazard Mitigation Planning Handbook (described further in Section 2.0 below). The primary purpose of the MJHMP Update is to reduce or eliminate long-term risk to people and property from natural hazards and their effects on Santa Barbara County. Santa Barbara County recognized the need for and importance of a Hazard Mitigation Plan and initiated its development in 2006 after receiving a grant from the Federal Emergency Management Agency (FEMA), which also served as the primary funding source for this plan update. A Hazard Mitigation Plan was originally developed in 2006, updated in 2011 and 2017, and has undergone a comprehensive update for 2022. These updates occur every five years, consistent with FEMA requirements.

1.2 WHAT'S NEW IN THE PLAN UPDATE

This MJHMP Update for 2022 involved a comprehensive review and update of each section of the 2017 MJHMP and includes an assessment of the progress in evaluating, monitoring, and implementing the mitigation strategy outlined in the former plan. The County Office of Emergency Management worked closely with Wood Environment & Infrastructure, Inc., a hazard mitigation consultant team based in Santa Barbara, to assist with developing the MJHMP Update. The planning process provided an opportunity to review jurisdictional priorities related to hazard significance and mitigation actions, and revisions were made wherever applicable to the MJHMP and its annexes for each participating agency. Only the information and data still valid from the 2017 plan were carried forward as applicable to this update.

One major change from 2017 was the desire to expand the participating agencies. In past plans, the participating agencies included the County and the eight incorporated cities. For this plan update, six special districts were added as participating agencies: Cachuma Operation and Maintenance Board (COMB), Carpinteria Valley Water District (CVWD), Montecito Fire Protection

District (MFPD), Montecito Water District (MWD), Goleta Water District (GWD), and Santa Maria Valley Water Conservation District (SMVWCD).

In addition to additional agencies, the 2022 MJHMP provides a more in-depth review of hazards that have particularly impacted the county in the last five years, such as wildfires, pandemics, and debris flows. The 2022 MJHMP also provides expanded analysis on hazards that were included but not fully addressed in past plans, such as drought, energy shortages, extreme heat, and agricultural pests. The following table provides a summary of highlights in this plan update.

Table 1-1. Santa Barbara County Multi-Jurisdiction Hazard Mitigation 2022 Plan Update Highlights

Plan Section	Summary of Plan Review, Analysis, and Updates
1. Introduction	Provides an overview of the MJHMP's purpose, adds the history of mitigation planning within the county, and summarizes plan updates since 2017.
2. Plan Purpose and Authority	Summarizes key hazard mitigation legislation, explains collaboration and compliance of the project, and displays adoption resolutions.
3. Planning Process	Explains how the COVID-19 pandemic affected the MJHMP's development, summarizes mitigation advisory committee and local planning team participants and meetings, and outlines the public outreach approach.
4. Community Profile and Capability Assessment	Provides an overview of the county, including its communities, demographics, social vulnerabilities, economy, climate, geography, infrastructure, and land use. Explains the administrative, technical, regulatory, fiscal, and outreach capabilities of the County.
5. Hazards Assessment	Refreshes geographic extent and descriptions of all hazards and updates maps, and adds new hazards and events of the past five years.
6. Vulnerability Assessment	Updates critical facilities list and maps, and recalculates models for quantifiable hazards.
7. Mitigation Plan	Updates status of all pending 2017 mitigation strategies, provides new goals and objectives, adds new mitigation strategies for key hazards, and refreshes mitigation priorities
8. Plan Maintenance	Refreshes requirements for monitoring, reporting, and annual review and updates for the MJHMP and annexes
Jurisdictional Annexes	Updates to annexes for each participating agency, and provides annexes for new participating jurisdictions in 2022.
Appendices	Compiled appendices for technical data outputs and community outreach.

2.0 PLAN PURPOSE AND AUTHORITY

2.1 LOCAL COMPLIANCE WITH THE DISASTER MITIGATION ACT (DMA)

Federal legislation has historically provided funding for disaster preparedness, response, recovery, and mitigation. The Disaster Mitigation Act (DMA) of 2000, also commonly known as “The 2000 Stafford Act Amendments” (the Act), constitutes an effort by the Federal government to reduce the rising cost of disasters. The legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Section 322 of the DMA requires local governments to develop and submit mitigation plans to qualify for the Federal Emergency Management Agency’s (FEMA) Hazard Mitigation Assistance (HMA) grant program funds. This Multi-Jurisdiction Hazard Mitigation Plan (MJHMP) is written to meet the statutory requirements of DMA 2000 (P.L. 106-390), enacted October 30, 2000, and 44 CFR Part 201 – Mitigation Planning, Interim Final Rule, published February 26, 2002. The HMA grants include the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, and the Flood Mitigation Assistance (FMA) program. Additional FEMA mitigation funds include the HMGP Post Fire funding associated with Fire Management Assistance Grant (FMAG) declarations and the Building Resilient Infrastructure and Communities (BRIC) funding associated with the 2018 Disaster Recovery Reform Act (DRRA).

DMA 2000 specifically addresses mitigation planning at the state and local levels. It identifies requirements that allow HMGP funds to be used for planning activities and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan before a disaster. State, county, and local jurisdictions must have an approved mitigation plan in place before receiving post-disaster HMGP funds. These mitigation plans must demonstrate that their proposed projects are based on a sound planning process that accounts for the local risks and the capabilities of the individual communities.

Local governments have certain responsibilities for implementing Section 322, including:

- Preparing and submitting a local mitigation plan;
- Reviewing and updating the plan every five years; and
- Monitoring Projects.

To facilitate implementation of the DMA 2000, FEMA created an Interim Final Rule (the Rule), published in the Federal Register in February of 2002 in section 201 of 44 CFR. The Rule spells out the mitigation planning criteria for states and local communities. Specific requirements for local mitigation planning efforts are outlined in section §201.6 of the Rule.

In March 2013, FEMA released The Local Mitigation Planning Handbook (Handbook) as the official guide for local governments to develop, update and implement local mitigation plans. The Handbook complements and references the October 2011 FEMA Local Mitigation Plan Review Guide (Guide) to help “Federal and State officials assess Local Mitigation Plans in a fair and consistent manner.” Local jurisdictions must demonstrate that proposed mitigation actions are based upon a sound planning process that accounts for the inherent risk and capabilities of the individual communities as stated in section §201.5 of the Rule. The 2022 – 2026 FEMA Strategic Plan outlines a bold vision and three goals to address key challenges, including instilling equity as a foundation of emergency management, leading communities in climate resilience, and promoting and sustaining readiness and preparedness nationwide. Throughout the 2022 update of the MJHMP, the Handbook and Guide were consulted to ensure thoroughness, diligence, and compliance with the DMA 2000 planning requirements. The MJHMP also aspires to the goals outlined in FEMA's Strategic Plan.

DMA 2000 is intended to facilitate cooperation between state and local authorities, prompting them to work together. It encourages and rewards local and state pre-disaster planning and promotes sustainability as a strategy for disaster resistance. This enhanced planning network is intended to enable local and state governments to articulate accurate needs for mitigation, resulting in a faster allocation of funding and more effective risk reduction projects. As such, the MJHMP was prepared jointly by the County of Santa Barbara (County); the cities of Buellton, Carpinteria, Goleta, Guadalupe, Lompoc, Santa Barbara, Santa Maria, and Solvang; and special districts Cachuma Operation and Maintenance Board (COMB), Carpinteria Valley Water District (CVWD), Montecito Fire Protection District (MFPD), Montecito Water District (MWD), Goleta Water District (GWD), and Santa Maria Valley Water Conservation District (SMVWCD). The risk assessment and mitigation strategies within the MJHMP and its annexes were developed jointly to benefit all of the above jurisdictions and make them more resilient to future disasters.

The following pages show the County resolutions that adopted the 2022 MJHMP.

RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SANTA BARBARA, STATE OF CALIFORNIA

A RESOLUTION IN THE MATTER OF THE ADOPTION OF THE SANTA BARBARA COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN	**Resolution No.** 23-71

WHEREAS, the Federal Disaster Mitigation Act of 2000 ("Act"), as described in Title 44 of the Code of Federal Regulations Section 201.6 (44 CFR § 201.6) mandates local governments to submit and maintain a Federal Emergency Management Agency ("FEMA") approved local hazard mitigation plan to maintain eligibility for future mitigation grant opportunities; and

WHEREAS, the County of Santa Barbara Office of Emergency Management, working with the Public Works Department and other County departments, has coordinated the hazard mitigation planning efforts among the incorporated cities and participating special districts; and

WHEREAS, the Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan, ("Plan") identifies a county-wide risk assessment and mitigation strategies to reduce the impacts of natural, technological, and human caused disasters on the public and local government; and

WHEREAS, identification of hazards in the county assists with response planning, exercise development, public education and awareness, and other emergency management functions; and

WHEREAS, the County and participating agencies prepared a multi-hazard mitigation plan, hereby known as the Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan (February 2023) in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS, the Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan (February 2023) identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property within the County of Santa Barbara from the impacts of future hazards and disasters; and

WHEREAS, the Santa Barbara County Board of Supervisors last adopted the revised Safety Element to the Comprehensive Plan February 3, 2015; and

A Resolution in the Matter of the Adoption of the 2022 Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan

WHEREAS, the Safety Element of the Comprehensive Plan currently integrates the 2017 Multi-Jurisdictional Hazard Mitigation Plan, in accordance with California Government Code Sections 8685.9, 65302, and 65302.6; and

WHEREAS, adoption by the County of Santa Barbara demonstrates its commitment to hazard mitigation and achieving the goals outlined in the Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Office of Emergency Management will coordinate the incorporated cities and participating special districts respective Annexes submitted to FEMA for inclusion in the Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan after they are adopted by their City Councils or respective governing bodies.

NOW, THEREFORE, BE IT RESOLVED, that the County of Santa Barbara Board of Supervisors hereby adopts the Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan (February 2023). While content related to the Plan may require revisions to meet the plan approval requirements, changes occurring after adoption will not require the County of Santa Barbara to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

The County of Santa Barbara Board of Supervisors also directs the Office of Emergency Management to continue its work with the incorporated cities to include their respective Annexes to the Plan, and resolves to integrate the updated Plan by reference into the Safety Element of the Comprehensive Plan with the next Safety Element update in accordance with the requirements of Government Code sections 65302, 65302.6 and 8685.9.

PASSED AND ADOPTED by the Board of Supervisors of the County of Santa Barbara, State of California this 4th day of April, 2023 by the following vote:

AYES: Supervisors Williams, Capps, Hartmann, Nelson and Lavagnino

NOES: None

ABSTAIN: None

ABSENT: None

DAS WILLIAMS, CHAIR
BOARD OF SUPERVISORS

A Resolution in the Matter of the Adoption of the 2022 Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan

ATTEST:
MONA MIYASATO
CLERK OF THE BOARD

By Sheila dela Guerra
Deputy

APPROVED AS TO FORM:
RACHEL VAN MULLEM
COUNTY COUNSEL

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By
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Deputy

APPROVED AS TO FORM
GREG MILLIGAN, ARM
RISK MANAGEMENT

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By: Gregory Milligan
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Date: 3/22/2023 | 3:26 PM PDT

APPROVED AS TO FORM
BETSY M. SCHAFFER, CPA
AUDITOR-CONTROLLER

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APPROVED AS TO FORM
PLANNING & DEVELOPMENT
LISA PLOWMAN, DIRECTOR

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Date: 3/22/2023 | 3:22 PM PDT

APPROVED AS TO FORM
OFFICE OF EMERGENCY
MANAGEMENT
KELLY HUBBARD, DIRECTOR

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3.0 PLANNING PROCESS

3.1 OVERVIEW

The planning process implemented for the 2022 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update utilized two different planning teams to review progress, inform and guide the County of Santa Barbara (County) and the consultant team, and directly review and prepare portions of the plan, including each jurisdictional annex. The first team is the Mitigation Advisory Committee (MAC) and the second is the Local Planning Team (LPT).

All eight incorporated cities and the six special districts joined the County as participating agencies in the preparation of this MJHMP update, including the cities of Buellton, Carpinteria, Goleta, Guadalupe, Lompoc Santa Barbara, Santa Maria, and Solvang; and special districts Cachuma Operation and Maintenance Board (COMB), Carpinteria Valley Water District (CVWD), Montecito Fire Protection District (MFPD), Montecito Water District (MWD), Goleta Water District (GWD), and Santa Maria Valley Water Conservation District (SMVWCD). Each of the participating agencies had representation on the MAC and was responsible for the administration of their own LPT. In addition, the MAC included representatives from other state and local agencies with an interest in hazard mitigation in Santa Barbara County, including local non-profit organizations, special districts, and state and federal agencies. This composition ensures diverse input from an array of voices representing all communities within Santa Barbara County.

Both the MAC and the LPTs focused on these underlining philosophies, adopted from the FEMA Local Mitigation Plan Review Guide:

- **Focus on the mitigation strategy**

  The mitigation strategy is the plan's primary purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation actions.

- **Process is as important as the plan itself**

  In mitigation planning, as with most other planning efforts, the plan is only as good as the process and people involved in its development. The plan should also serve as the written record, or documentation, of the planning process.

- **This is the community's plan**

  To have value; the plan must represent the current needs and values of the community and be useful for local officials and stakeholders. Develop the mitigation plan in a way that best serves your community's purpose and people.

- **Intent is as important as Compliance**

  Plan reviews will focus on whether the mitigation plan meets the intent of the law and regulation; and ultimately that the plan will make the community safer from hazards.

As a result, the planning process incorporated the following steps:

- **Plan Preparation**
  - Form/validate planning team members
  - Establish common project goals
  - Set expectations and timelines
- **Plan Development**
  - Validate and revise the existing conditions/situation within the planning area;
    - Chapter 4.0, *Community Profile and Capabilities Assessment*, and Chapter 5.0, *Hazard Assessment*
  - Develop and review the risk to hazards (exposure and vulnerability) within the planning area;
    - Chapter 6.0, *Vulnerability Assessment*
  - Review and identify mitigation actions and projects within the planning area;
    - Chapter 7.0, *Mitigation Plan,* and Chapter 8.0, *Plan Maintenance*
- **Finalize the Plan**
  - Review and revise the plan
  - Approve the plan locally and with state and federal reviewers
  - Adopt and disseminate the plan

During the 2022 MJHMP Update, the MAC, Office of Emergency Management, and consultant reviewed several other plans, utilized the information provided, and cross-referenced where applicable; including:

- 2017 Santa Barbara County MJHMP
- 2013 Santa Barbara County Emergency Management Plan
- 2015 Santa Barbara County Comprehensive Plan - Safety Element (undergoing update)
- 2018 California Enhanced Hazard Mitigation Plan
- 2015 Ventura County Hazard Mitigation Plan
- 2019 San Luis Obispo County LHMP
- 2021 County of Santa Barbara Climate Change Vulnerability Assessment

For a complete list of applicable plans and policies, see Chapter 4.0.

Throughout this process, and through other standard practices, opportunities for public involvement were offered and encouraged. More details about public engagement are provided under Section 3.4. Outside of the MJHMP Update process, the County utilizes several platforms to educate the public about hazards in the community, relevant programs to safeguard and protect themselves from disaster, and actions they can take to prepare themselves for events. Below is a list of the different platforms used; for a complete description of outreach capabilities, see Chapter 4.0:

- County ReadySBC.org Website
- Social Media (Facebook, Twitter)
- Meetings, workshops, festivals, and fairs (virtual and in-person)
- Press Releases
- Public Service Announcements and Interviews- radio and television
- Public Surveys
- Community Emergency Response Team Training (CERT)
- Defensible Space Education
- Evacuation training for Schools and Communities
- Drought Education
- Seasonal hazard emergency awareness, including flooding

3.2 MITIGATION ADVISORY COMMITTEE (MAC)

3.2.1 MAC Members

The MAC is a standing committee that works together throughout the year to discuss and provide input on a variety of activities. The MAC is led by the Santa Barbara County Office of Emergency Management and has representation from all of the participating agencies, as well as relevant County departments, CalOES, and key advisory members, including the Santa Barbara County Association of Governments (SBCAG), American Red Cross, representatives for the groundwater basins, Santa Ynez Band of Chumash Indians, Independent Living Resource Center, Volunteer Organizations Active in Disaster (VOAD), Los Padres National Forest, and Santa Barbara County Air Pollution Control District (SBCAPCD). These members were invited to serve on the MAC for the 2022 MJHMP update to provide a wide range of input and perspectives for the mitigation strategies. Table 3-1 provides the names, agencies, departments, titles, and returning status of each MAC member.

To assist with this effort, the County Office of Emergency Management and hazard mitigation consultant supported and assisted each participating agency with its Local Hazard Mitigation Plan, include as an annex in the 2022 MJHMP.

3.2.2 Overview of MAC Meetings

The MAC meetings were arranged and scheduled to follow the planning process steps outlined in Section 3.1. Each meeting was designed to discuss each component of the MJHMP with MAC members and foster interactive discussion and direct input to ensure updates were timely, relevant, and reflective of the current priorities in the county. In addition to reviewing and validating material, the intent was to also educate MAC members on the planning process and purpose of each section. By taking this step, each MAC member brought this knowledge back to their LPT members and local decision-makers. Table 3-2 provides a list and the main purpose and topics of each of the MAC meetings.

Table 3-1. Members of the Mitigation Advisory Committee 2022

Names	Participating Agency	Department	Title	MAC Member Status
Kelly Hubbard	County of Santa Barbara	Office of Emergency Management	Director	New Member
Michael Dyer	County of Santa Barbara	Office of Emergency Management	Technical Specialist	Returning Member
J.D. Saucedo	County of Santa Barbara	Office of Emergency Management	Emergency Manager	New Member
Fred Tan	County of Santa Barbara	Fire Department	Chief	New Member
Rob Hazard	County of Santa Barbara	Fire Department	Fire Marshal/Division Chief	Returning Member
Darin Fotheringham	County of Santa Barbara	Sheriff's Office	Commander	New Member
Brian Olmstead	County of Santa Barbara	Sheriff's Office	Lieutenant	New Member
David Lackie	County of Santa Barbara	Planning & Development	Supervising Planner, Long Range Planning	New Member
Whitney Wilkinson	County of Santa Barbara	Planning & Development	Planner, Long Range Planning	New Member
Julie Harris	County of Santa Barbara	Planning & Development	Planner, Long Range Planning	New Member
Tom Fayram	County of Santa Barbara	Public Works, Flood Control	Deputy Director, Water Resources	New Member
Jon Frye	County of Santa Barbara	Public Works, Flood Control	Engineering Manager	Returning Member
Olga Ready	County of Santa Barbara	Public Works, Flood Control	Civil Engineering Associate	New Member
Scott McGolpin	County of Santa Barbara	Public Works	Department Director	New Member
Charlie Elbert	County of Santa Barbara	Public Works	Transportation Division	New Member
Ashley Watkins	County of Santa Barbara	Community Services, Sustainability Division	Division Chief	New Member
Jeff Lindgren	County of Santa Barbara	Community Services, Parks Division	Parks Superintendent	New Member
Scott Wolfe	City of Buellton	City Administration	City Manager	New Member
Linda Reid	City of Buellton	City Administration	City Clerk / Emergency Coordinator	New Member
Andrea Keefer	City of Buellton	Planning	Department Director	New Member
Rose Hess	City of Buellton	Public Works	Department Director	New Member
Olivia Mutal	City of Carpinteria	Emergency Preparedness Program	Emergency Services Program Manager	New Member
Dave Durflinger	City of Carpinteria	City Administration	City Manager	New Member

Table 3-1. Members of the Mitigation Advisory Committee 2022 (Continued)

Names	Participating Agency	Department	Title	MAC Member Status
Michelle Greene	City of Goleta	City Administration	City Manager	New Member
Michael Baris	City of Goleta	Emergency Preparedness Program	Emergency Services Coordinator	New Member
Zach Jones	City of Guadalupe	City Administration	Emergency Preparedness Coordinator	New Member
Michael Cash	City of Guadalupe	Emergency Preparedness Program	Chief	New Member
Steve Terrones	City of Lompoc	Fire Department	Battalion Chief	New Member
Jim Throop	City of Lompoc	City Administration	City Manager	New Member
Yolanda McGlinchey	City of Santa Barbara	Office of Emergency Services	Emergency Services Manager	Returning Member
Liliana Encinas	City of Santa Barbara	Fire Department	Outreach Coordinator	New Member
Jason Stilwell	City of Santa Maria	City Administration	City Manager	New Member
Roy Dugger	City of Santa Maria	Fire Department/Emergency Management	Emergency Services Specialist	Returning Member
Xenia Bradford	City of Solvang	City Administration	City Manager	New Member
David Packard	City of Solvang	City Administration	Assistant to the City Manager	New Member
Edward Lyons	Cachuma Operations and Maintenance Board		Administrative Manager	New Member
Elijah Papen	Cachuma Operations and Maintenance Board		Program Analyst	New Member
Robert McDonald	Carpinteria Valley Water District		General Manager	New Member
Norma Rosales	Carpinteria Valley Water District		Assistant General Manager	New Member
Maso Motlow	Carpinteria Valley Water District		Management Analyst	New Member
Aaron Briner	Montecito Fire Protection District		Fire Marshal/Battalion Chief	New Member
David Neels	Montecito Fire Protection District		Division Chief - Operations	New Member
Adam Kanold	Montecito Water District		Engineering Manager	New Member
David Wong	Montecito Water District		Engineering Assistant	New Member
Doug Pike	Santa Maria Valley Water Conservation District		Contract Staff	New Member

Table 3-1. Members of the Mitigation Advisory Committee 2022 (Continued)

Names	Participating Agency	Department	Title	MAC Member Status
KK Holland	Goleta Water District		Principal Policy Analyst	New Member
David Matson	Goleta Water District		Assistant General Manager	New Member
Daniel Brooks	Goleta Water District		Engineering and Infrastructure Manager	New Member
Mike Becker	Santa Barbara County Association of Governments		Director of Planning	New Member
Andrew Orfila	Santa Barbara County Association of Governments		Principal Transportation Planner	New Member
Erick McCurdy	American Red Cross		Volunteer Disaster Program Manager Counterpart	New Member
Jessica Hodge	American Red Cross		Disaster Program Manager	New Member
Matt Young	Groundwater Basin Rep		Water Agency Manager	New Member
Matt Scrudato	Groundwater Basin Rep		Senior Hydrologist	New Member
Daune Dowell	Santa Ynez Band of Chumash Indians		Director of Risk Management, Chumash Casino	New Member
Willie Wyatt	Santa Ynez Band of Chumash Indians		Tribal Administrator	New Member
Jamie Zimmerman	Independent Living Resource Center		Program Manager	New Member
Alexa Martin	Independent Living Resource Center		Program Director	New Member
Jenni Griffin	Independent Living Resource Center			New Member
Alexis Nshamamba	Volunteer Organizations Active in Disaster (VOAD)		Co-Chair	New Member
Jimmy Harris	Los Padres National Forest		Forrest Fire Chief	New Member
Elise Arata	CalOES		Emergency Services Coordinator, Santa Barbara County	New Member
Aeron Arlin Genet	Santa Barbara County Air Pollution Control Board		Director	New Member
Lyz Bantilan	Santa Barbara County Air Pollution Control Board		Public Information Officer	New Member

Table 3-2. Mitigation Advisory Committee (MAC) Meetings Summary

Date	Purpose
March 2021	**MAC Meeting #1 (virtual)** Provided an overview of the project and why the plan is being revised Reviewed FEMA guidance and processes Discussed roles and responsibilities of the participating jurisdictions
September 2021	**MAC Meeting #2 (virtual)** Reviewed goals of the project, role of the MAC Summarized public outreach results Presented hazards assessment and displayed select draft hazard maps Conducted interactive exercise to rank hazards
October 2021	**MAC Meeting #3 (virtual)** Provided results of hazard ranking methodology Presented vulnerabilities assessment Discussed mitigation goals, objectives, and strategies Reviewed County goals from 2017 and compared them to new goals Conducted interactive exercise on potential mitigation goals and strategies
October 2021	**MAC Meeting #4 (virtual)** Collected feedback on 2017 mitigation strategies Conducted interactive exercise on mitigation strategies for key hazards unaddressed in previous MJHMP Discussed annex updates
January 2022	**MAC Meeting #5 (virtual)** Presented draft plan Discussed key MAC/LPT review needs and key issues Discussed annex updates to dovetail with plan update
March 2022	**MAC Meeting #6 (virtual)** Review and discuss public comments received on the draft plan Coordinate annex preparation Recommend a revised draft plan to decision-makers

3.3 LOCAL PLANNING TEAM (LPT)

3.3.1 Local Planning Team Planning Process

While the MAC provided feedback and guidance for the MJHMP, the LPT was crucial for reviewing data, informing the update of the annexes, and working towards local adoption. The MAC served as a liaison between the County and the LPTs for each participating agency, and then the LPTs of each participating agency would work independently on their local annexes and mitigation strategies. This MJHMP was developed as a countywide hazard mitigation plan focusing on collaboration to implement mitigation strategies throughout the county while maintaining accountability within each participating agency to identify and track specific mitigation actions.

The LPT reviewed the previous *Mitigation Strategy* and reported on progress made in implementing the listed actions. In addition, based on updates to the hazard identification, profiles, vulnerability assessments, and capability assessment, new mitigation actions were identified. The progress report and new mitigation actions are presented in the updated *Mitigation Plan* (Chapter 7.0).

3.3.2 Local Planning Team Members

Table 3-3 lists the members of the County LPT. These individuals collaborated to identify/validate the unincorporated County's critical facilities, provide relevant information/material (i.e., plans), review/update sections, report on progress, and suggest new mitigation actions.

Table 3-3. Members of the Local Planning Team 2022

Department	Name	Title
Office of Emergency Management	Michael Dyer	Technical Specialist
Office of Emergency Management	J.D. Saucedo	Emergency Manager
Fire Department	Fred Tan	Chief
Fire Department	Rob Hazard	Fire Marshal/Division Chief
Sheriff's Office	Darin Fotheringham	Commander
Sheriff's Office	Brian Olmstead	Lieutenant
Agricultural Commissioner/Weights & Measures Department	Cathy Fisher	Agricultural Commissioner/W&M Sealer
Agricultural Commissioner/Weights & Measures Department	Stephanie Stark	Deputy Agricultural Commissioner
Planning & Development	David Lackie	Supervising Planner, Long Range Planning
Planning & Development	Whitney Wilkinson	Planner, Long Range Planning
Planning & Development	Julie Harris	Planner, Long Range Planning
Public Health	Stacey Rosenberger	Disaster Planner
Public Health	Nick Clay	EMSA Director
Public Works, Flood Control	Jon Frye	Engineering Manager
Public Works	Chris Sneddon	Deputy Director of Transportation
Public Works	Scott McGolpin	Department Director
Public Works	Charlie Elbert	Transportation Division
Community Services	Jill Van Wie	Capital Projects Manager
Community Services	Dinah Lockhart	Deputy Director, Housing and Community Development

3.3.3 Overview of Local Planning Team Efforts

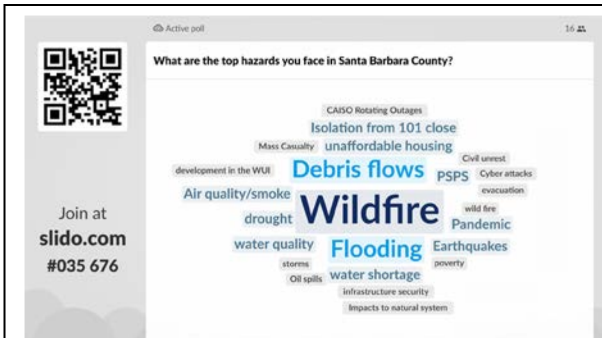
The County LPT members worked directly with the County Office of Emergency Management, the consultant team, and each other to provide data, recommended changes, and continually work on the MJHMP Update throughout the planning process. The County LPT coordinated and consulted with other entities and stakeholders to identify and delineate natural hazards within the County to assess the risks and vulnerable property in identified hazard areas. From the start, every attempt was made to establish an open public process to provide an opportunity for all sectors of the community to be involved in the planning process. In some cases, direct public input was successful and in others, the residents were represented in the process by their jurisdictions staff, by necessity. The County LPT met virtually as needed during the planning process to discuss data needs and organize data collection. Table 3-4 below outlines a timeline of the LPT's activities throughout the planning process.

Table 3-4. Local Planning Team Activity Summary

Meeting Dates	Summary of Activity
April 2021	Meeting hosted by County Office of Emergency Management and consultant. Provided an overview of the project, discussed the FEMA process, and reviewed steps to updating the plan. LPT provided direct input to the hazard mitigation planning team
April to August 2021	LPT collated data to share with the hazard mitigation planning team, including hazard identification, refreshed data layers for maps, and geographic settings. LPT completed Plan Update Guides to directly inform hazard priorities and mitigation capabilities (Appendix A)
August to September 2021	Reviewed new maps, and discussed local vulnerabilities. Developed data for new or expanded hazards, including debris flows, pandemics, and sea level rise.
October 2021	Provided input on the status of 2017 MJHMP mitigation strategies.
December 2021 to April 2022	Reviewed draft mitigation strategies and provided direct feedback on the draft plan.

3.4 PUBLIC OUTREACH AND ENGAGEMENT

The County Office of Emergency Management and the consultant worked together on public outreach throughout 2021 and early 2022. The Public Outreach Plan (POP) for the MJHMP Update employed a diversity of tools to maximize notification and participation from communities throughout the county. The POP was responsive to limitations presented by the COVID-19 pandemic and focused on direct bilingual outreach using a variety of digital tools, including a fact sheet, social media posts, emails, a public survey, and press releases. Multiple platforms and tools were used to publicize the project and opportunities to participate. All written notices were made available in English and Spanish. Throughout the process, emails were sent to the Office of Emergency Management's master contact list, which includes federal, state, and local government representatives, neighboring counties, and relevant local organizations, all of whom were made aware of the survey and public workshops multiple times via initial outreach and various reminders. The consultant also collected emails from interested members of the public and notified them of the survey and public workshops. Below is a summary of the components of the POP. See also, Appendix B for outreach materials and results.

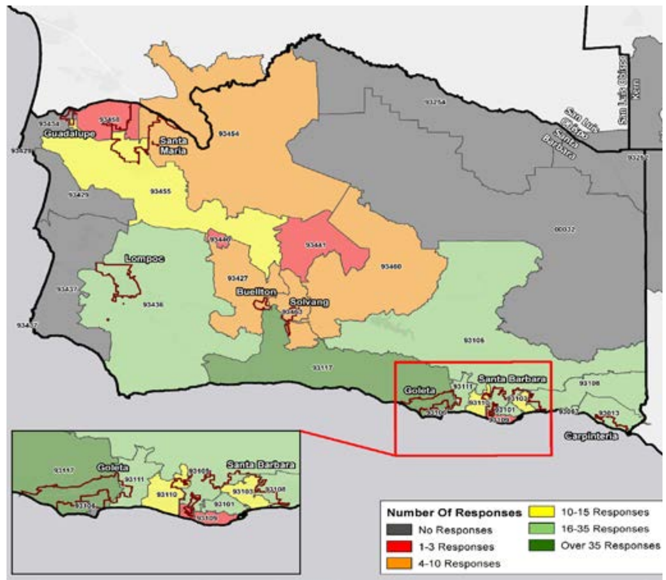


Slido is an interactive tool utilized during stakeholder and public meetings to collect feedback. During the presentation, audience members could provide live feedback and watch it be displayed on the screen, prompting further discussion.

The 2022 MHMP update built on the County's existing techniques and adapted to the limitations imposed by the COVID-19 pandemic. All public and stakeholder meetings were hosted virtually through Microsoft Teams or Zoom, and all outreach completed for the project was conducted via electronic communications. Many of the meetings used an interactive tool called Slido to collect feedback during meetings. Slido allows audience members to answer questions during presentations, helping the County collect direct detailed feedback and facilitate discussion.

3.4.1 Community Survey

The Office of Emergency Management, in partnership with the consultant, released a bilingual (English/Spanish) community hazards survey on March 25, 2021, to garner public input on hazards and mitigation strategies. The survey was publicized via email to the Office of Emergency Management master list, social media, posts on the project website, and press releases. The survey was open until September 15, 2021, and received 320 responses from across the county. The southern half of the county received the largest number of responses, particularly in the areas surrounding the cities of Goleta, Lompoc, and Carpinteria (Appendix B).



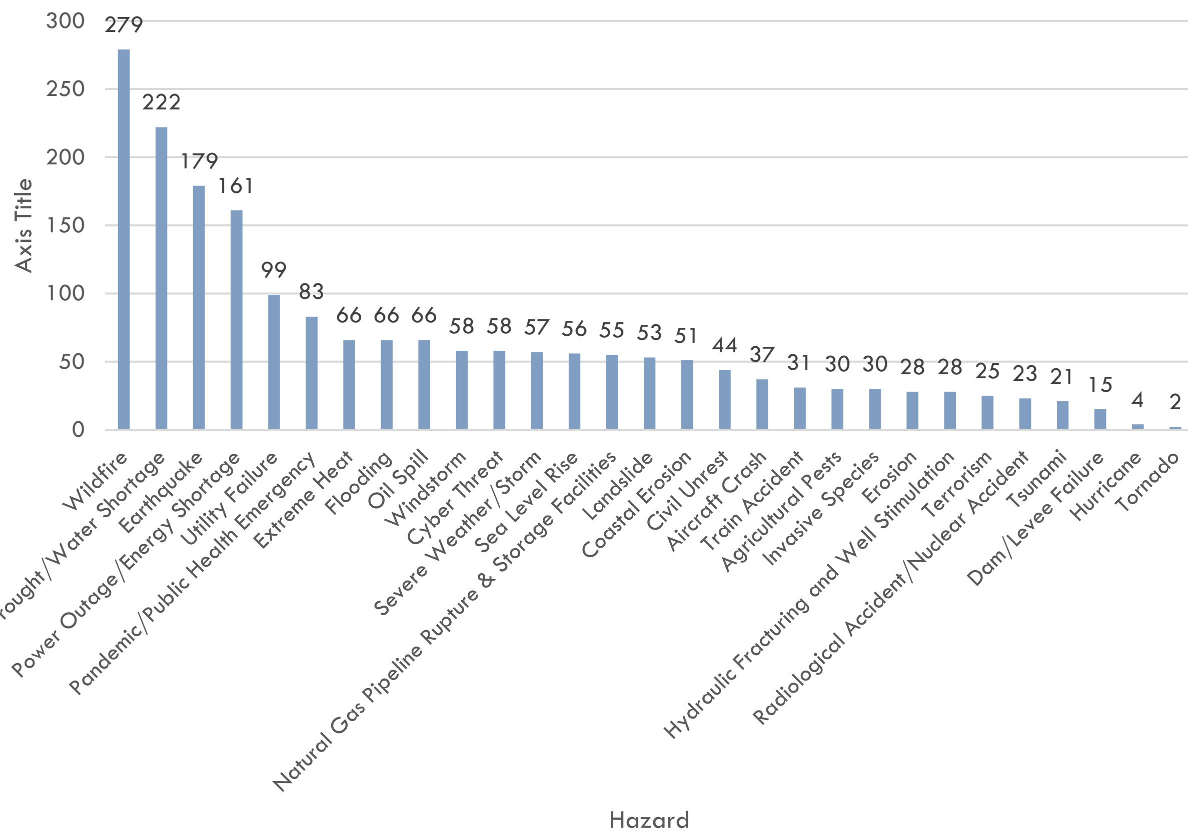
This is a map showing the zip codes that had the highest number of responses. Most respondents live in the southern part of the County from Lompoc to Carpinteria.

The survey asked respondents to share which hazards had caused them personal or economic loss, and what they would consider the most threatening hazards. For both questions, the most popular answers were power outages/energy shortages, wildfires, droughts/water shortages, pandemics, and earthquakes. Then, the survey asked a multiple-choice question about mitigation strategies. The most popular mitigation strategies were providing training and outreach, employing natural resources to reduce hazards, such as riparian buffers, and adjusting zoning laws to limit development in disaster-prone areas.

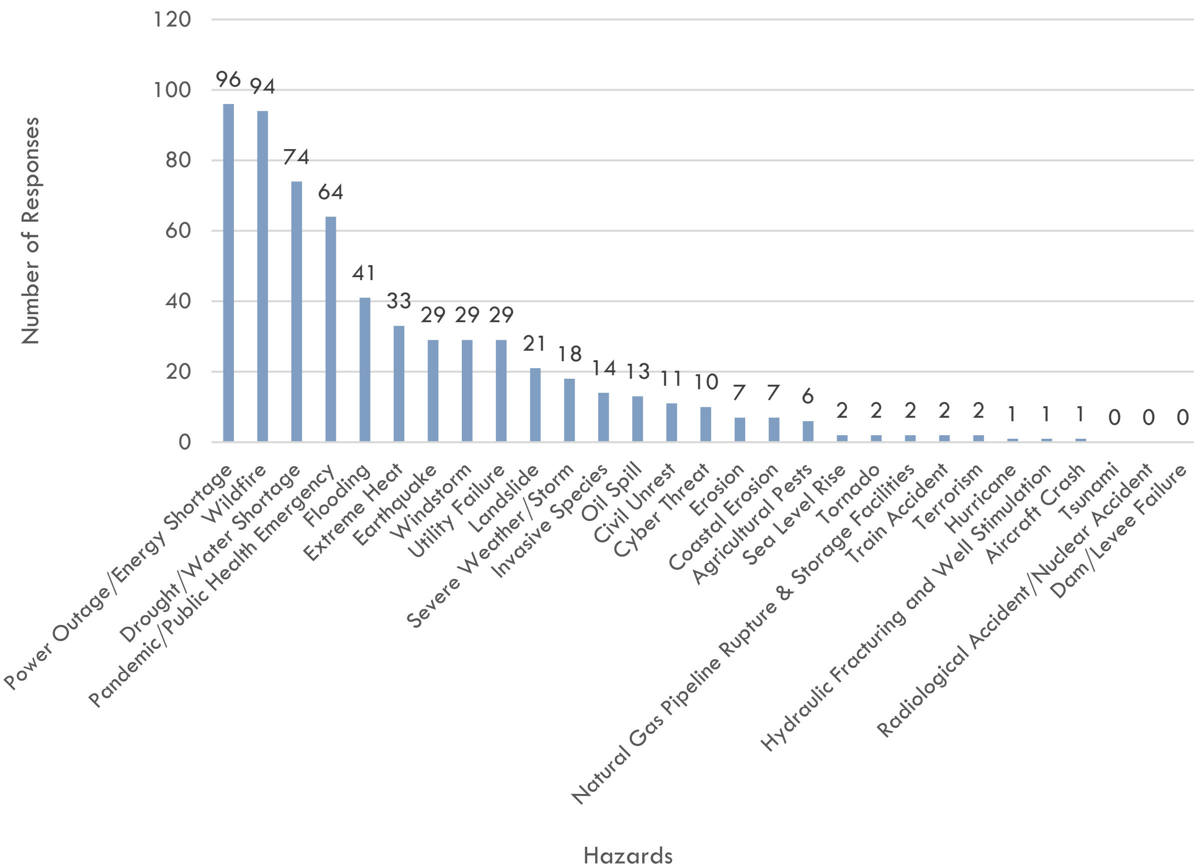
Of the 320 respondents, 263 (82 percent) reported that they had registered to receive emergency alerts, 213 (67 percent) had identified utility shutoffs, and 210 (65 percent) had prepared a disaster supply kit. The most popular resources for getting information about hazards were the County website, online news sources such as local papers, and County email alerts.

The survey asked a few open response questions, starting with asking respondents to identify areas in their community that are vulnerable to hazards. The most popular responses were homeless encampments, foothill areas, and coastal areas. Most of the responses focused on areas at high risk of wildfire. The survey also asked respondents to identify vulnerable community members, and the most common responses were the elderly, disabled, homeless, and non-English speakers. The last question asked respondents to brainstorm resources that could help assist vulnerable community members. The most common suggestions were community education and outreach, neighborhood cohesion, providing materials and training, and increasing shelter capacity. Key survey results are presented below; see Appendix B for complete survey results. All survey results were reviewed by the MAC and helped inform the mitigation strategies chosen in Chapter 7.0.

Which of the following would you consider to be the most threatening hazard(s) to your community? Check all that apply.



Have you experienced personal or economic loss from any of the following hazards? Check all that apply.



What do you think could be done to minimize the risks of the most threatening hazards you identified above? Select your three preferred options:

Strategy Suggested	Number of Responses
Provide training, education, and outreach to prepare citizens for disasters and local hazards.	147
Employ natural resources to reduce hazards (e.g., wetland protection, riparian buffers, low impact developments).	125
Adjust zoning laws to limit development in disaster-prone areas (e.g., floodplains).	125
Improve agency coordination to respond to disasters more effectively.	119
Improve hazards policies and programs for the most vulnerable County areas.	116
Install new or improved early warning systems for disasters (e.g., sirens or cell phone messaging services).	115
Construct physical infrastructure projects (e.g., levees, stormwater, water and sewer upgrades, reinforcing critical buildings).	105
Provide more emergency preparedness infrastructure (e.g. designated shelters).	81

3.4.2 Project Website

The County Office of Emergency Management launched a project webpage in February 2021. The site provided a project description, a link to join an email list about project updates, a project timeline, and details for participating in the survey and public workshops. Links to recorded project public workshops were also posted on the project webpage for the public to view. The webpage was updated frequently throughout the project (Appendix B).

3.4.3 Press Releases and Media Coverage

In March 2021, the County Office of Emergency Management issued a press release (in Spanish and English) announcing the commencement of the hazard mitigation planning process and encouraging participation in the public survey. The press release also directed the public to frequently check the project website for updates on upcoming public workshops. The press release was covered in the Santa Barbara Independent.

In October 2021, a second press release was published to publicize the second public workshop. The press release was covered in Noozhawk, Lompoc Record/Santa Maria Times/Santa Ynez Valley News, and Edhat. The public workshop was highlighted in the Santa Maria Times.

A third press release was devised in March 2022 to announce a public draft plan, inviting the public to review the plan, provide comments, and attend a public workshop (Appendix B). The press release was covered in the Independent, Reddit, Carpinteria Facebook, and Santa Barbara Facebook.

3.4.4 Public Workshops and Draft Plan Review

The first public workshop was hosted on April 7, 2021, focusing on hazard identification. The presenters provided an overview of the project and process for updating the MJHMP, and then provided time for the public to comment on hazard prioritization. During this workshop, the County contracted a Spanish interpreter to provide real-time Spanish interpretation using the "language interpretation" feature of Zoom; those who wished to listen in Spanish were able to use that feature to toggle into another Zoom room where the interpreter was actively translating the meeting.

The second public workshop was hosted on November 4, 2021, focusing on mitigation strategies. During the workshop, the presenters summarized the results of the public survey, provided an overview of the hazards and vulnerability analysis, and then provided an overview of how the team would prepare the mitigation chapter. The workshop featured real-time Spanish transcription to maximize public participation and inclusivity in the planning process. Presenters showed the draft mitigation goals and provided example mitigation strategies for each one. Then, the team used the interactive tool Slido to collect feedback from the audience about what mitigation strategies they would support. There were 21 participants at the meeting, 82 percent of whom were from the south coast, including Gaviota, Goleta, Isla Vista, Santa Barbara, Montecito, and Carpinteria. Representatives from local agencies such as the City of Santa Barbara and organizations such as the Coastal Conservancy and Community Environmental Council were present and engaged. The participants identified their top three hazards as wildfire, flooding, and debris flows, and multiple people said that in the past five years they had personally experienced drought, power outages, and wildfire, echoing the results of the survey. Some of the mitigation strategies supported by the audience included training, better outreach and communication, expansion of internet access, increased shade cover for heat events, multi-lingual outreach, and vegetation management for fires.

The draft MJHMP was published for public review on March 1, 2022, and written comments were accepted by the County until March 15, 2022. The County received 6 comment letters addressing coastal hazards, climate change, commercial cannabis, and wildfire (Table 3-5).

A third public workshop was hosted virtually in March 2022 to announce the draft plan, share the key changes in the assessment of hazards and vulnerabilities compared to the 2017 MJHMP, and described key new mitigation strategies. The workshop featured real-time Spanish transcription to maximize public participation and inclusivity in the planning process. Verbal and written (virtual chatbox) public comments were taken. Commenters addressed climate change effects on hazards countywide and interest in energy resilience planning (Table 3-5).

Table 3-5. Summary of Public Comments Received on the Draft MJHMP (March 2022)

ID No.	Date Received	Method	Hazards Addressed in Comments
1	3/2/22	Email	Coastal hazards and sea level rise
2	3/13/22	Email	Bluff erosion in Isla Vista
3	3/3/22	Email	Accessibility of hazard information for the public
4	3/3/22	Email	Hazardous materials related to commercial cannabis
5	3/14/22	Email	Wildfire mitigation programs
6	3/9/22	Workshop No. 3	Energy shortage and resiliency
7	3/9/22	Workshop No. 3	Climate changes and debris flow hazards

All comments received through the public review period for the draft 2022 MJHMP were considered by County OEM and the MAC and incorporated as deemed feasible and appropriate into the final 2022 MJHMP.

4.0 COMMUNITY PROFILE & CAPABILITY ASSESSMENT

In planning for hazard mitigation, it is critical to establish goals, objectives, and actions that are feasible based on the organizational capacity of agencies and departments tasked with their implementation. This section provides a community profile summarizing the characteristics of Santa Barbara County, then assesses the capabilities within Santa Barbara County to implement hazard mitigation activities. The purpose is to determine the capability of the local jurisdiction to implement a comprehensive mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, fiscal resources, and current political climate.

The capability assessment completed for Santa Barbara County serves as a critical planning step toward developing an effective mitigation strategy. Coupled with the hazard assessment presented in Chapter 5.0, the capability assessment helps identify and target effective goals, objectives, and mitigation actions that are realistically achievable under current local conditions.

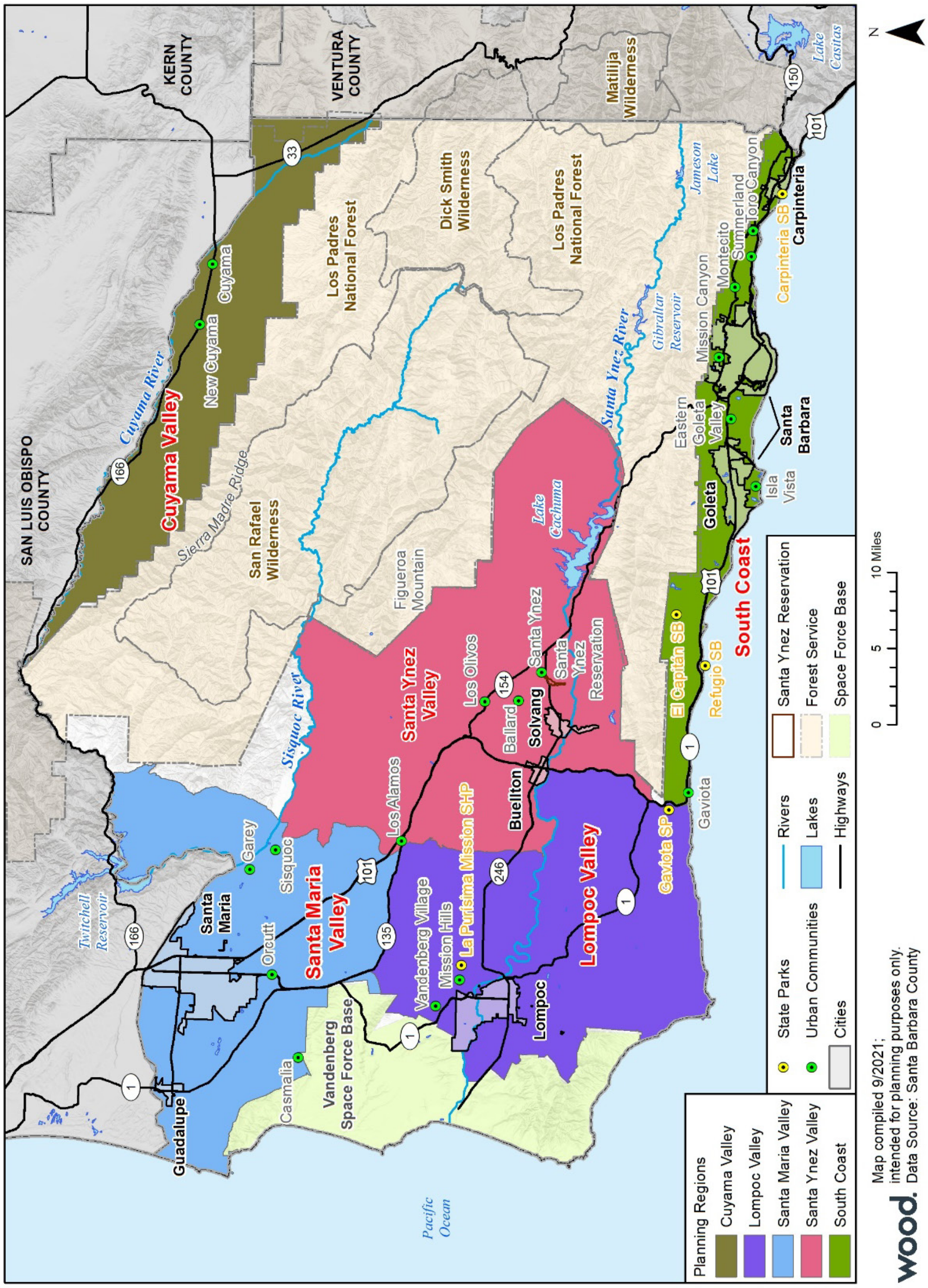
4.1 SANTA BARBARA COUNTY COMMUNITY PROFILE

Santa Barbara County Overview	
Total Area	3,789 square miles
Land Area	*2,735 square miles (72%)*
Ocean Area	*1,061 square miles (28%)*
Population (2019)	450,084
Median Household Income 2015-19	$74,624 (2019 dollars)

The County of Santa Barbara was established on February 18, 1850, and is one of 58 counties in the State of California. The County is located approximately 300 miles south of San Francisco and 100 miles north of Los Angeles and is bordered by Ventura County to the east and south, a corner of Kern County to the east, San Luis Obispo County to the north, and the Pacific Ocean to the west and south (Figure 4-1). Santa Barbara County covers approximately 2,735 square miles of land area along the central coast of California, extending approximately 45 miles north from the south-facing coastal segment and approximately 65 miles inland from the west-facing coastline (U.S. Census Bureau 2021). One-third of the land area is located in the Los Padres National Forest. Santa Barbara County has 110 miles of coastline. The County encompasses four of the eight Channel Islands and their marine environments: San Miguel Island, Santa Rosa Island, Santa Cruz Island, and Anacapa Island.

Santa Barbara County is comprised of eight incorporated cities and 19 census-designated places, including Vandenberg Space Force Base (SFB), as well as the Los Padres National Forest and the sovereign nation of the Santa Ynez Band of Chumash Indians. In 2019, Santa Barbara County's total population was 450,084 with a median household income of $74,624 (in 2019 dollars) (U.S. Census Bureau 2021). Santa Barbara County is currently the 19th most populous county in the state.

Figure 4-1. Santa Barbara County Regional Location Map



Santa Barbara County includes diverse geographies, infrastructure, and economies. With the Santa Ynez Mountains and Los Padres National Forest generally in the north and the Pacific Ocean and the Channel Islands to the south, the county encompasses a range of environments and ecosystems. The county has a diverse landscape with inherent relationships to natural and human hazards, including a $1.8 billion agricultural industry, strong tourism industry, and urban, suburban, and rural communities or assets located in areas that are vulnerable to known hazards, such as high fire hazard areas (e.g., San Rafael Wilderness area) and low-lying shoreline areas (e.g., Santa Barbara Harbor, Carpinteria City Beach, Goleta Beach County Park, Santa Barbara Airport) (County of Santa Barbara 2020a). The following subsections provide an overview of the Cities, Communities, and Special Districts, Population and Demographics, Economy, Climate, Geography and Physical Features, Infrastructure, and Land Use of the county.

4.1.1 Cities, Communities, and Special Districts

Census-designated places can be small geographically but have varying population sizes. For example, Isla Vista comprises just two square miles with 20,000 residents. Photo: KCBX

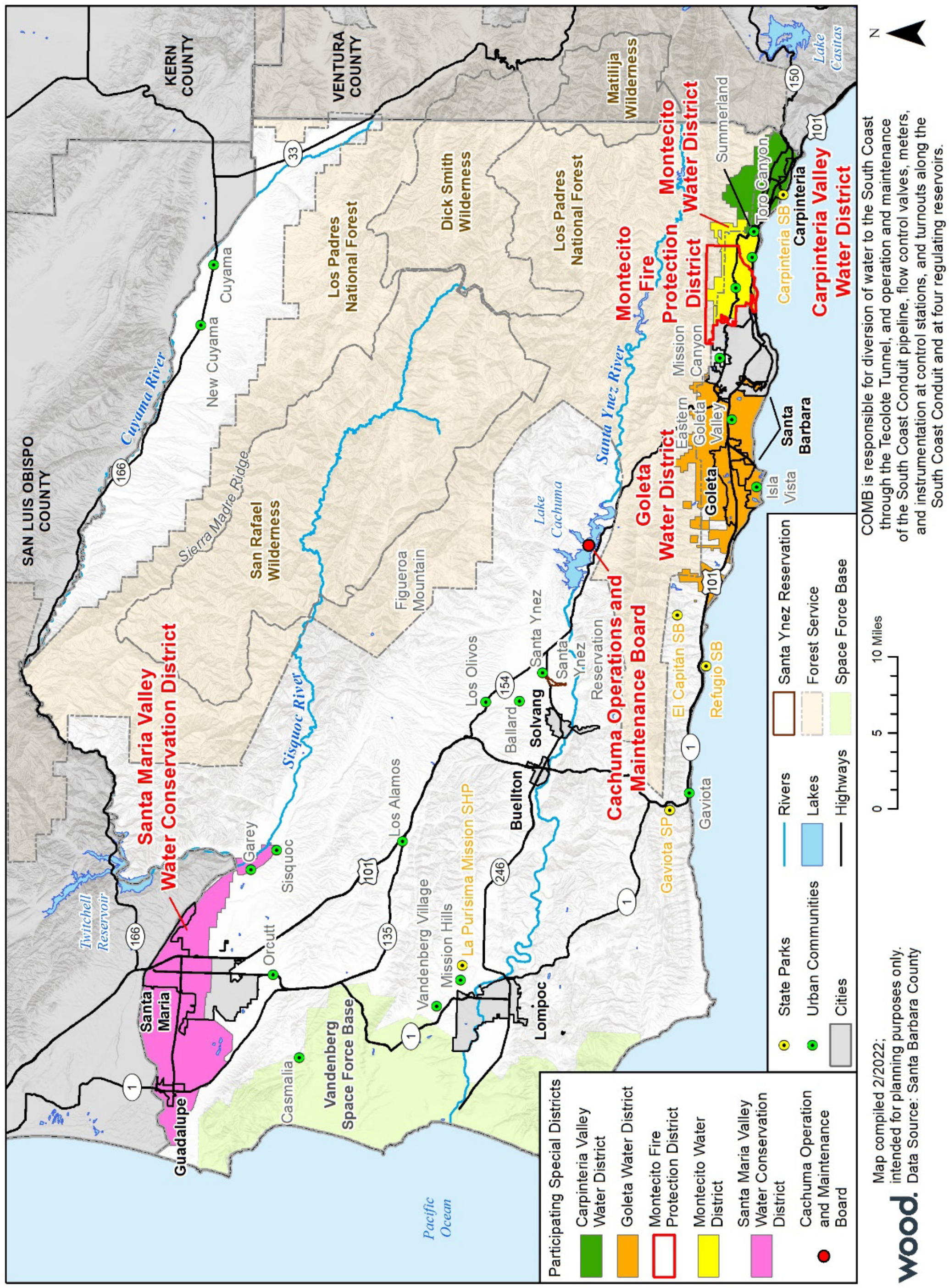
The eight incorporated cities in the county are surrounded by rural and semi-rural areas and census-designated places. As described in Chapter 3.0, *Planning Process*, participating jurisdictions involved in the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update process include the eight incorporated cities, as well as the Cachuma Operations and Maintenance Board (COMB), Montecito Fire Protection District, Montecito Water District, Carpinteria Valley Water District, Goleta Water District (GWD), and the Santa Maria Valley Water Conservation District (see Figure 4-2; also denoted with an asterisk (*) in Table 4-1). Incorporated cities in Santa Barbara County include:

- Buellton
- Carpinteria
- Goleta
- Guadalupe
- Lompoc
- Santa Barbara
- Santa Maria
- Solvang

Census-designated places in Santa Barbara County (i.e., unincorporated communities recognized in the 2015-2019 U.S. Census) include:

- Ballard
- Casmalia
- Cuyama
- Eastern Goleta Valley
- Garey
- Isla Vista
- Los Alamos
- Los Olivos
- Mission Canyon
- Mission Hills
- Montecito
- New Cuyama
- Orcutt
- Santa Ynez
- Sisquoc
- Summerland
- Toro Canyon
- Vandenberg SFB
- Vandenberg Village

Figure 4-2. Participating Agencies



The county also includes special districts that serve a specific area or purpose and may have particular capabilities in terms of hazard mitigation (Santa Barbara LAFCO 2021). Table 4-1 identifies key special districts that may have roles in hazard mitigation and response.

Table 4-1. Key Special Districts in Santa Barbara County

Resource	Districts
Airport	Santa Maria Public Airport District
Air Quality	Santa Barbara County Air Pollution Control District
Community Services	Casmalia Community Services District Cuyama Community Services District Isla Vista Community Services District Los Alamos Community Services District Los Olivos Community Services District Mission Hills Community Services District Santa Rita Hills Community Services District Santa Ynez Community Services District Vandenberg Village Community Services District
Fire Protection	Carpinteria/Summerland Fire Protection District Montecito Fire Protection District* Santa Barbara County Fire Protection District
Flood	Santa Barbara County Flood Control and Water Conservation District
Health Care	Lompoc Hospital District**
Lighting	Guadalupe Lighting District Mission Canyon Lighting District North County Lighting District
Municipal Improvements	Embarcadero Municipal Improvement District
Resource Conservation	Cachuma Resource Conservation District
Recreation and Park Districts	Cuyama Valley Recreation and Park District Isla Vista Recreation and Park District
Sanitation	Laguna County Sanitation District Carpinteria Sanitary District Goleta Sanitary District Goleta West Sanitary District Montecito Sanitary District Summerland Sanitary District
Transit	Santa Barbara Metropolitan Transit District
Vector Control	Mosquito and Vector Control District of Santa Barbara County
Water	Countywide Districts and Agencies: Santa Barbara County Flood Control and Water Conservation District Santa Barbara County Water Agency County Water Districts: Carpinteria Valley Water District* Goleta Water District* Montecito Water District* Water Conservation Districts: Santa Maria Valley Water Conservation District* Santa Ynez River Water Conservation District Santa Ynez River Water Conservation District, Improvement District No. 1

* indicates a participating agency in the 2022 MJHMP update.

** Lompoc Hospital District serves health care needs in addition to several non-district providers such as Cottage Health, Dignity Health, and Sansum Clinic

4.1.2 Population and Demographics

For hazard mitigation planning purposes, Santa Barbara County can be separated into five planning areas: the Santa Maria Valley, Cuyama Valley, Lompoc Valley, Santa Ynez Valley, and South Coast (refer to Figure 4-1). Delineations of these planning areas are based on population centers where residents tend to gather because they share amenities such as recreational features, government buildings, roadway networks, and other services such as school districts.

Santa Barbara County is geographically diverse with 450,084 residents as of 2019 living in cities and unincorporated communities that range from suburban communities such as Orcutt and Eastern Goleta Valley to small rural towns such as Sisquoc, Los Olivos, Santa Ynez, and Los Alamos. Most County residents live in urban areas with approximately 309,226 (68.7 percent) of County residents living in the eight incorporated cities and 140,858 (31.3 percent) residing in unincorporated communities and rural areas. The largest proportion of people live in the Santa Maria Valley, along the eastern and central reach of the South Coast from Goleta to Carpinteria, and, to a lesser extent, the Lompoc Valley and Santa Ynez Valley. Within these regions, most residents live in the cities of Santa Maria, Santa Barbara, Goleta, and Lompoc, which support 276,494 residents or 61 percent of the county's population. The largest unincorporated communities are Orcutt, Eastern Goleta Valley, and Isla Vista, supporting 88,309 residents or 20 percent of the county's population (U.S. Census Bureau 2021).

Projected Growth

Santa Barbara County's population is projected to increase by 13.2 percent through 2050, a total increase of approximately 45,875 residents (U.S. Census Bureau 2021; Santa Barbara County Association of Governments [SBCAG] 2018). Most of this growth (48.5 percent) is projected to occur in the Santa Maria Valley with an increase of 22,263 residents or approximately 15 percent. Although the total population is smaller, the Lompoc Valley is projected to grow by 16.3 percent, the highest growth rate in the county. While the South Coast is projected to experience the lowest growth rate by percent, the population is projected to increase by 14,130 residents. While all communities in Santa Barbara County are projected to grow, the City of Guadalupe is projected to have the highest population increase of 27.9 percent between 2019 and 2050, followed by the City of Buellton and Vandenberg SFB with a 19.9 percent total increase (Table 4-2).

Table 4-2. Projected Population Growth Across Communities in Santa Barbara County

Planning Area	Cities and Communities	Current Population (2019)	Projected Population (2050)	Percent Increase
Santa Maria Valley	City of Santa Maria	107,859	125,288	16.2%
	City of Guadalupe	7,719	9,873	27.9%
	Casmalia	173	188	8.7%
	Garey	67	73	9.0%
	Orcutt	30,819	33,462	8.6%
	Sisquoc	201	218	8.5%
	Area Total	**146,838**	**169,102**	**15.2%**

Table 4-2. Projected Population Growth Across Communities in Santa Barbara County (Continued)

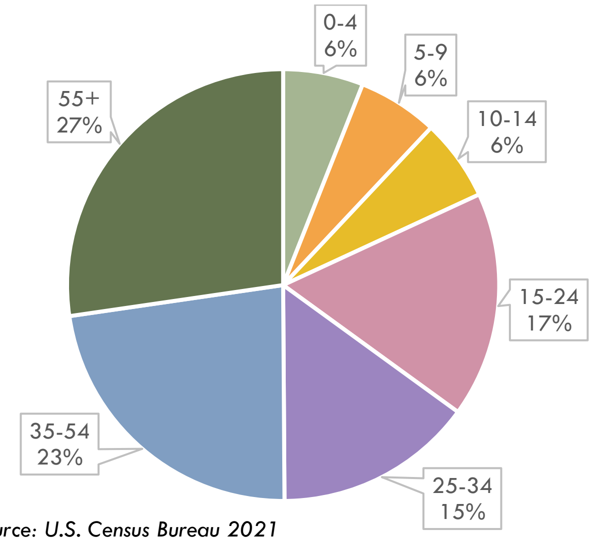
Planning Area	Cities and Communities	Current Population (2019)	Projected Population (2050)	Percent Increase
Cuyama Valley	Cuyama	59	64	8.5%
	New Cuyama	537	581	8.2%
	Area Total	**596**	**645**	**8.2%**
Lompoc Valley	City of Lompoc	44,188	52,200	18.1%
	Vandenberg Village	6,988	7,469	6.9%
	Mission Hills	3,630	3,880	6.9%
	Vandenberg SFB	5,441	6,525	19.9%
	Area Total	**60,247**	**70,074**	**16.3%**
Santa Ynez Valley	City of Buellton	5,441	6,525	19.9%
	City of Solvang	5,761	6,298	9.3%
	Ballard	507	542	6.9%
	Los Alamos	1,422	1,520	6.9%
	Los Olivos	1,190	1,272	6.9%
	Santa Ynez	4,836	5,169	6.9%
	Area Total	**19,157**	**21,326**	**11.3%**
South Coast	City of Goleta	32,413	34,884	7.6%
	City of Santa Barbara	92,034	98,655	7.2%
	City of Carpinteria	13,811	14,602	5.7%
	Gaviota	824	874	6.1%
	Isla Vista	24,696	26,188	6.0%
	Eastern Goleta Valley	30,071	31,888	6.0%
	Mission Canyon	2,344	2,486	6.1%
	Montecito	9,235	9,793	6.0%
	Summerland	1,504	1,595	6.1%
	Toro Canyon	1,598	1,695	6.1%
	Area Total	**208,530**	**222,660**	**6.8%**

(U.S. Census Bureau 2021; SBCAG 2021)

Age

The median age in Santa Barbara County is 35.1. The largest age group in the county is seniors over 55 years old with 27.3 percent, and children under 15 years old make up 18 percent of residents. Seniors over 55 are projected to increase in number by 13 percent through 2050, and the number of children and young adults is projected to decrease by four percent. Age ranges differ substantially between planning areas. The youngest, with a median age of 37.2, is Santa Maria Valley, and the oldest, with a media age of 48.4, is the Santa Ynez Valley. Communities like Isla Vista, the City of Buellton, and the City of Guadalupe have the youngest populations in the county, while the City of Solvang, Montecito, and Vandenberg Village have some of the county's oldest populations based on median age.

Chart 4-1. Age Distribution in Santa Barbara County



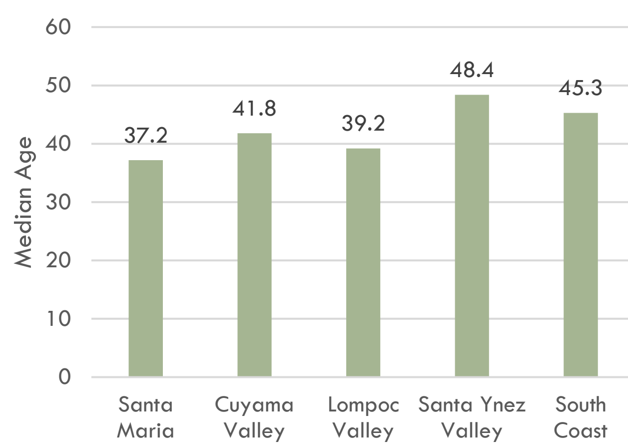
Source: U.S. Census Bureau 2021

In general, cities tend to have lower median ages than surrounding unincorporated communities. The cities of Guadalupe, Lompoc, and Santa Maria have populations that are generally younger than the county's median and their surrounding unincorporated communities. In south county, the cities of Carpinteria, Goleta, and Santa Barbara have populations that are older than the county average. This trend is expected to continue as the median age of the county is projected to rise incrementally. A notable exception is Isla Vista on the South Coast, which has the lowest median age in the county due in large part to its proximity to the University of California, Santa Barbara (UC Santa Barbara) campus and serving as the primary source of off-campus housing for UC Santa Barbara students (SBCAG 2018; U.S. Census Bureau 2021).

Race

Santa Barbara County's population identifies as 45.1 percent Hispanic, 44.9 percent White, 5.2 percent Asian, 1.8 percent Black, 2.5 percent Mixed Race, and 0.5 percent Other. Most residents in the cities of Guadalupe, Santa Maria, and Lompoc identify as Hispanic while most residents in the cities of Buellton, Solvang, Goleta, Santa Barbara, and Carpinteria identify as White. By 2050, ethnicity distribution is expected to change countywide with an increase of 13 percent in Hispanic residents and three percent in Other residents, a decrease of 15 percent in White residents, and a one percent decrease in Black residents (SBCAG 2018).

Chart 4-2. Median Ages in Santa Barbara County Communities



Source: SBCAG 2018

Housing

As of 2019, there were 149,662 households in Santa Barbara County with an average household size of 2.88 people (Environmental Systems Research Institute [ESRI] 2019). Considering each planning area, the total average household size is relatively similar, ranging from 2.57 on the South Coast to 2.95 in the Santa Maria Valley, but there are substantial differences when reviewing household size on a community level. For example, the City of Guadalupe has the highest average household size of 3.93, followed by the City of Santa Maria at 3.73. The City of Solvang has the lowest average household size at 2.39. In 2024, the average household size for Santa Barbara County is projected to remain at 2.88 residents per household. Average household size and median age are also closely linked. For example, the City of Guadalupe, the City of Santa Maria, and Isla Vista have the youngest populations with the highest average household sizes, whereas communities such as the City of Solvang and Montecito have generally older populations with smaller household sizes.

The owner-occupied housing unit rate in Santa Barbara County from 2015 to 2019 was 52.1 percent. The median value of those owner-occupied units was $577,400. The median monthly rent in that same timeframe was $1,643 (U.S. Census Bureau 2021).

Income

The 2019 median household income in Santa Barbara County was $73,602, though the range throughout the county is significant, from $25,300 in Isla Vista to $166,746 in Montecito. Comparing the five planning areas, Santa Ynez Valley has the highest median household income at $108,005 and Cuyama Valley has the lowest at $54,840. Several communities have substantially lower median incomes than both Santa Barbara County and their respective planning area, including the cities of Guadalupe, Santa Maria, and Lompoc, as well as Isla Vista. Other communities have notably higher median incomes compared to the county, including Orcutt, Eastern Goleta Valley, the City of Goleta, Vandenberg Village, Mission Hills, Buellton, Santa Ynez, Ballard, and Los Olivos. While no data are available for longer-term trends (e.g., to 2050), median household income countywide is projected to increase by 18 percent to $86,878 by 2024 (U.S. Census Bureau 2021).

4.1.3 Environmental Justice and Social Vulnerability

Social vulnerability and environmental justice considerations are included in the update of this plan to identify areas across Santa Barbara County that might be more vulnerable to hazard impacts based on several factors. To assist with these updates, a social vulnerability index (SoVI) was developed by the Center for Disease Control's (CDC's) Agency for Toxic Substances and Disease Registry (ATSDR) and their Geospatial Research, Analysis & Services Program teams, as a way to portray communities' capacities to prepare for and respond to natural and man-made disasters. The SoVI does this by providing insight into particularly vulnerable populations to assist emergency response planners and public health officials in identifying communities more likely to require additional support before, during, and after a hazardous event. The CDC's SoVI creates county- and state-level maps to show relative vulnerability and provide socially and spatially relevant information on communities' populations; further, these maps compare the SoVI based on Census Tracts. The overall social vulnerability based on SoVI data is shown for Santa Barbara County by

Census Tracts in Figure 4-3, based on statewide ranking. This overall index combines four main themes of vulnerability: socioeconomic status; household composition and disability; minority status and language; and housing and transportation, which in turn are comprised of subcategories for a total of 15 variables accounting for various vulnerability factors (CDC/ATSDR 2021). Based on these data, the areas with the highest level of social vulnerability in the county are the cities of Santa Maria and Guadalupe (and surrounding communities) and the Cuyama Valley (see Figure 4-3).

In addition, the County identified 22 different “frontline” populations and communities in the unincorporated county as part of the Climate Change Vulnerability Assessment (CCVA) prepared in 2021. Frontline populations and communities are people who experience the impacts of climate change earlier and/or to a disproportionately severe degree than others in the unincorporated county and are the least able to access resources. The CCVA used U.S. Census data for 15 frontline community indicators in each census block group of the county such as age, income, educational attainment, housing type, and access to a vehicle. As a result, several additional unincorporated communities were identified as vulnerable to hazards exacerbated by climate change, including Isla Vista, Eastern Goleta Valley, El Sueno (a neighborhood in Eastern Goleta Valley), and western Carpinteria in the South Coast, southern Santa Ynez Valley, and areas northwest of Santa Maria (near the City of Guadalupe).

4.1.4 Economy

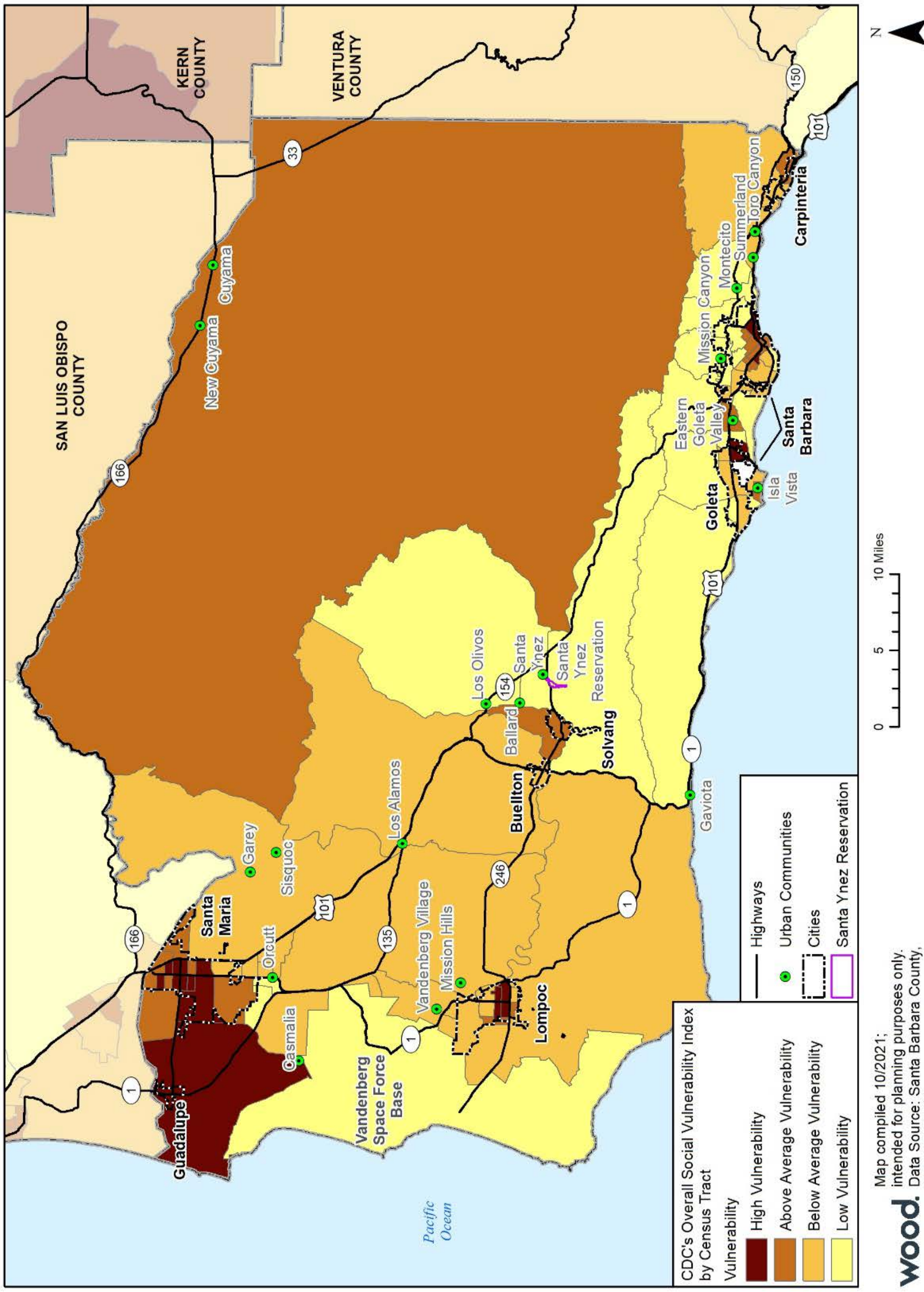
Santa Barbara County’s economy supports a wide range of industries, including agriculture, hospitality, construction, government, and professional services. Between 2010 and 2018 the fastest growing sectors for jobs within the county were wholesale trade, leisure and hospitality, and farming (UC Santa Barbara Economic Forecast Project 2018).

Economically, Santa Barbara County is generally divided into three regions: the agriculture and military-based north county, the technology, education, and tourist-based south county, and the Santa Ynez Valley, which is based on agriculture, primarily wineries and vineyards. Each region has unique social and environmental features that influence the economics of the area, such as demographics, proximity to irrigable farmland or Los Angles tourist markets, full-service airports, and location of technology/industry centers.

The north county is part of the central California coastal region and is defined by the Santa Maria and Lompoc Valleys with multiple larger unincorporated communities, as well as Vandenberg SFB. The presence of the base in the area has generated a variety of business opportunities, causing the region to evolve away from a strictly agriculture-based economy into one that is more diverse with hospitality, retail, and financial services. Alan Hancock College supports higher education in this region.

The Central County and Santa Ynez Valley regions are known primarily for their vineyards, horse ranches, bed-and-breakfasts, and Cachuma Lake. Visitors come to the Los Padres National Forest and Lake Cachuma for a variety of outdoor activities, including camping, boating, fishing, hiking, and rock climbing. The City of Solvang, with its Danish-inspired design, also attracts tourists to the region throughout the year.

Figure 4-3. Overall Social Vulnerability in Santa Barbara County based on the SoVI, by Census Tracts

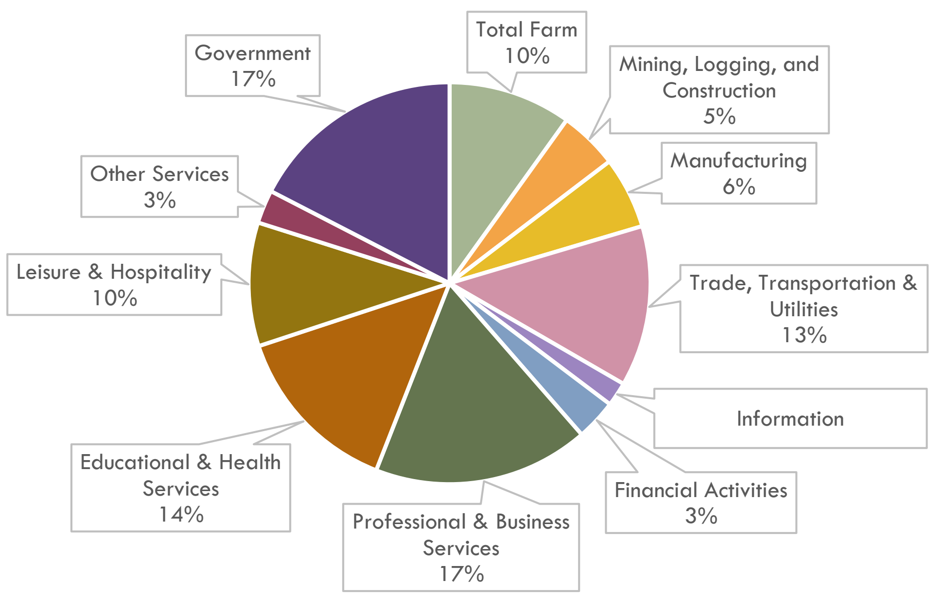


The south county's economy is based largely on, tourism, viticulture and wine, high technology and innovation industry jobs, healthcare, building and design, energy and environment, education, and business support services (see *Employment*). Several educational institutions are located in the south county, including Santa Barbara City College, Westmont College, and UC Santa Barbara. In addition to education and tourism, a variety of technological and agricultural businesses have headquarters in Goleta and Carpinteria. The City of Santa Barbara is the retail center of the region.

Employment

The top three industries in Santa Barbara County in terms of employment are Government (approximately 35,000 employees), Professional and Business Services (approximately 34,900 employees), and Trade, Transportation & Utilities (approximately 26,000 employees) (see Table 4-3). Santa Barbara County's unemployment rate in the civilian labor force as of March 2021, according to the State of California Employment Development Department (EDD), was 6.6 percent (California EDD 2021).

Chart 4-3. Employment by Industry, March 2021



Source: California EDD 2021.

Table 4-3. Employment by Industry, March 2021

Industry Type	Number of Persons Employed
Total, All Industries	200,900
Total Farm	19,900
Total Nonfarm	181,000
Mining, Logging, and Construction	9,500
Manufacturing	11,600
Infrastructure (e.g., Transportation, Utilities)	26,000
Information	3,900

Table 4-3. Employment by Industry, March 2021 (Continued)

Industry Type	Number of Persons Employed
Financial Activities	6,600
Professional & Business Services (e.g., Legal, Marketing, Real Estate)	34,900
Educational & Health Services	28,100
Leisure & Hospitality	20,000
Other Services	5,400
Government	35,000

Note: Data not adjusted for seasonality; data may not add due to rounding; labor force data are revised month to month.
Source: California EDD 2021.

Agriculture

Agriculture is a major industry throughout Santa Barbara County and provides significant employment opportunities. A large percentage of the county's undeveloped area is devoted to agriculture. Despite pressures from urbanization and imports, agriculture continues to thrive. The county's agricultural production primarily occurs on approximately 705,378 acres of agricultural lands, including 67,201 acres of prime farmland, 12,998 acres of farmland of statewide importance, 36,574 acres of unique farmland, and 9,720 acres of local importance under the Farming Mapping and Monitoring Program (FMMP)[1] (FMMP 2018).

Strawberries fields concentrated in north county (shown above in Santa Maria) produced the highest value crop in the County in 2020 with a value of nearly $730 million.

Table 4-4. Top Ten Crops in Santa Barbara County (2020)

Crop	Value
Strawberries	$727,444,000
Cauliflower	$109,282,000
Broccoli	$104,654,000
Nursery Products	$98,567,000
Wine Grapes	$93,836,000
Avocado	$80,161,000
Leaf Lettuce	$78,084,000
Head Lettuce	$74,298,000
Celery	$61,688,000
Blackberries	$46,560,000

The county's vegetable production includes artichokes, lima beans, broccoli, cabbage, carrots, cauliflower, corn, lettuce, peppers, potatoes, pumpkins, spinach, and tomatoes. Most of these truck crops are grown principally in the Santa Maria Valley, but favorable conditions in the Lompoc Plain, the Santa Ynez Valley, and the South Coast have encouraged vegetable production there as well. Field crops include barley, beans, alfalfa, oats, silage corn, sugar beets, and wheat. Avocados, lemons, oranges, strawberries, walnuts, and wine grapes are the fruit and nut crops grown in the

[1] The FMMP assesses the location, quality, and quantity of agricultural lands and monitors the conversion of these lands to nonagricultural uses. The FMMP classifies important farmland based on agricultural soil quality and current land use into four categories of important farmlands: prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance. Important farmlands contain soils best suited for producing food and forage, particularly for producing high-yield crops.

county. In 2020 top five crops by value were strawberries, cauliflower, broccoli, nursery products, and wine grapes (County of Santa Barbara 2020a). See Table 4-4 for details on crop value for the top ten crops in the county in 2020, the most recent year for which crop reports are currently available.

In addition to crop cultivation, livestock grazes on an estimated 568,303 acres of rangelands and 2,702 acres of pasture. As of 2020, the county supports 27,312 head of cattle with a total value of $24,825,000. Other livestock, including dairy, poultry, and aquaculture in the county, has a value of $8,087,000. Dairy cattle are raised primarily in the Cuyama Valley (County of Santa Barbara 2020a).

4.1.5 Climate

Santa Barbara County has a mild Mediterranean climate with over 300 days of sunshine per year. The local climate is typically warm and dry in summer and cool and wet in winter, with most of the county's rivers, creeks, and streams remaining dry during the summer months. The proximity of the county to the Pacific Ocean tends to moderate Santa Barbara's climate and temperatures near the coast, while adjacent steep mountain ranges paralleling the coast cause air masses to flow over high topography and condensate, causing generally increased precipitation at higher elevations. This occurs when storms approaching the county from the Pacific Ocean are forced upward against the mountains, resulting in increased precipitation release with increased topographic elevation. This effect, in conjunction with steep, short watersheds, occasionally results in flash flooding along Santa Barbara County's south coast.

Precipitation within Santa Barbara County varies greatly from season to season and with each location. Average annual precipitation ranges from a minimum of about eight inches in the Cuyama Valley to over 36 inches at the crest of the Santa Ynez Mountains. Snow is seasonal at the county's highest elevations, which are more than 6,600 feet above sea level. Climate studies have determined that drought periods occur regularly and may last a decade or longer. A recent severe drought lasted from 2012-to 2017, during which water storage in the county's major reservoirs was nearly depleted. Currently, Santa Barbara County has been in a state-declared drought since July 8, 2021when Governor Gavin Newsom proclaimed a drought emergency, which included 50 of the 58 counties in California. On July 13, 2021, the County Board of Supervisors passed a resolution proclaiming a Local Emergency caused by Drought Conditions. The County resolution cites Newsom's drought declaration, as well as below-average rainfall, received last winter, reduced storage in reservoirs, and reduced State Water Project supply. However, it is important to note these declarations are focused on broad-scale climatic conditions rather than local water supplies, and that due to the variability of water supplies across the county, not all communities are experiencing water shortages as of now.

Temperatures in the winter range from an average of 33-degree lows at night to 55-degree highs during the day and in the summertime the daytime highs range in the 70s and 80s with lows ranging in the 50s and 60s. The Cuyama Valley has consistently warm days and cold nights, with gentle breezes keeping temperatures mild in the afternoon, and down-valley breezes cooling things off at night. In the mountains, the climate is still considered to be Mediterranean, with mild rainy winters and warm dry summers. The county experiences sundowner winds, which are hot, gusty winds from the Santa Ynez Mountains, that can raise the temperature in the region by 20 degrees Fahrenheit (Santa Barbara County 2021).

4.1.6 Geography and Physical Features

The Santa Ynez Mountains in south county trend in an east-west direction and separate the coastline from the inter-mountain valleys.

Santa Barbara County has a mountainous interior, primarily made up of three mountain ranges; the Santa Ynez Mountains, the San Rafael Mountains, and the Sierra Madre Mountains. Most of the mountainous region is within the Los Padres National Forest. The forest contains the San Rafael and Dick Smith Wilderness Areas. The county is situated among a series of transverse mountain ranges, with intervening valleys such as the Santa Ynez, Los Alamos, and Cuyama valleys. These mountains naturally divide the county into distinct communities, as well as hazard planning areas. Rural valleys typically have limited road linkages which can hinder emergency response between areas, while the roads themselves are subject to hazards (e.g., wildfires, landslides) which can lead to road closures. Most of the county's developed areas are located along coastal valleys and plains and in the inter-mountain valleys. The valleys, especially those along the coast, are where most of the county's population resides. The cities of Santa Maria, Guadalupe, Lompoc, and the inland cities of Solvang and Buellton are located in coastal valleys north of the Santa Ynez Mountains, while the cities of Santa Barbara, Goleta, and Carpinteria are all along the South Coast, in the coastal plain south of the Santa Ynez Mountains. The Cuyama Valley in the north part of the county is separated from the more populated areas of the county by the Sierra Madre and San Rafael Mountains and has very limited road connectivity to the rest of the county (via State Route [SR] 166).

Offshore from the county lie San Miguel Island, Santa Barbara Island, Santa Cruz Island, and Santa Rosa Island, which comprise islands of the Channel Islands National Park. The Channel Islands National Park is owned and operated by the National Park Service, except for Santa Cruz Island, which is partially privately owned by The Nature Conservancy (approximately 76 percent of the island). None of the Channel Islands National Park is included within County responsibility areas for hazard disaster planning purposes. The islands are all in the Federal Direct Protection Area (DPA) for wildland fire only. As of 2022, the annexation of the Channel Islands into the County Fire District is in the final stages. Until annexation is approved by the Local Agency Formation Commission (LAFCO), the County will still respond as needed in the absence of a formal agreement. (Santa Barbara County Fire Department 2021b).

Santa Barbara County is divided into five major watersheds: Santa Maria, Cuyama, San Antonio, Santa Ynez River, and South Coast. The Santa Maria Watershed includes the Cuyama and Sisquoc watersheds. Table 4-5 lists the approximate drainage areas for each watershed and Table 4-6 describes key surface waters in the county.

Table 4-5. Watersheds in Santa Barbara County

Watershed	Drainage Area
Santa Maria	1,845 square miles
Cuyama	1,140 square miles
San Antonio	165 square miles
Santa Ynez River	900 square miles
South Coast	416 square miles

Due to the Mediterranean climate of Santa Barbara County and the variability of rainfall, stream flow throughout the county is highly variable and directly impacted by rainfall with little snowmelt or base flow from headwaters. Most streams in the county are dry during the summer months, particularly in their lower reaches. Many streams in the county have flows that can rise and fall rapidly in response to precipitation. Watercourses can experience a high amount of sedimentation during wet years, particularly following wildfire events, and high amounts of vegetative growth during dry and moderate years.

Table 4-6. Surface Waters in Santa Barbara County

Watershed Region	Major Surface Waters
South Coast Region	Surface waters in the South Coast Region are comprised of several smaller creeks. Major drainages include Rincon, Carpinteria, Franklin, Santa Monica, and Toro Canyon Creeks in Carpinteria; Cold Springs, Hot Springs, San Ysidro, and Romero Creeks in Montecito; Sycamore, Mission, San Roque, and Arroyo Burro Creeks in Santa Barbara; Cieneguitas, Arroyo Burro, and San Roque Creeks in Foothill; and Atascadero, Maria Ygnacio, San Jose, Tecolotito, and San Pedro Creeks in Goleta. Jalama Creek, Canada De La Gaviota, Canada Del Refugio, Canada Del Capitan, Dos Pueblos Canyon Creek, Tecolote Creek, and Glen Annie Canyon also drain this watershed. Many of these surface waters drain into the Pacific Ocean.
Cuyama River	The Cuyama River drains the Cuyama Valley Watershed to the Twitchell Reservoir. Salisbury Creek is also included in this watershed.
Upper Santa Ynez	The Upper Santa Ynez Watershed is primarily drained by the Santa Ynez River. The Santa Ynez River drains the north slope of the Santa Ynez Mountains, the south slope of the San Rafael Mountains, and much of the southern half of Santa Barbara County. Smaller drainages include Alder Creek and Rancho Nuevo Creek.
Middle Santa Ynez	The Santa Ynez River is the major drainage of the Middle Santa Ynez Watershed and is interrupted by Lake Cachuma. Additional drainages such as the extensive Santa Cruz Creek watershed and the smaller Cachuma Creek also drain into Lake Cachuma.
Lower Santa Ynez	While the Santa Ynez River is a major drainage in this watershed, other drainages include Alamo Pintado Creek, Santa Rosa Creek, San Miguelito Creek, and Salsipuedes Creek. Additionally, Zaca Creek and Zanja de Cota Creek both drain into the Santa Ynez River.
San Antonio Creek	The watershed is drained westerly by the San Antonio Creek and discharges into the San Antonio Lagoon at the Pacific Ocean.
Sisquoc River	The Sisquoc River drains the north side of the San Rafael Mountains and much of the Sierra Madre Mountains east of Santa Maria upstream of its confluence with the Cuyama River, which then flows into the Santa Maria River.
Shuman Creek	This watershed is drained westerly by Shuman Canyon Creek and Casmalia Canyon Creek.

Table 4-6. Surface Waters in Santa Barbara County (Continued)

Watershed Region	Major Surface Waters
Santa Maria River	The Santa Maria River Hydrologic Area includes all areas tributary to the Santa Maria River. The Santa Maria River is formed by the confluence of the Cuyama and Sisquoc rivers approximately seven miles southwest of Santa Maria.
Orcutt Creek	Orcutt Creek Watershed is drained by Orcutt Creek, Guadalupe Lake, Santa Maria River, and Greene Valley River.
Santa Clara River	Sespe Creek, a tributary of the Santa Clara River, originates within the boundaries of Santa Barbara County.
Ventura River	Matilija Creek originates in the Los Padres National Forest, within the boundaries of Santa Barbara County, before draining into the Ventura River.

The abundance of surface water varies from region to region, depending on precipitation, water use, and the size of the watershed and associated drainage (Table 4-6). For example, some areas, such as the agricultural area of Tepusquet, receive very little surface water, while the City of Buellton typically receives ample amounts of surface water from the Santa Ynez River. In general, the drainages in the southern part of the county are characterized by high-intensity events, with runoff events that are carried for a relatively short distance from the top of the Santa Ynez Mountains to the Pacific Ocean. The major drainages in the northern part of the county such as the Sisquoc and Santa Ynez Rivers often originate in the upper mountain areas but broaden out into level coastal plains. The drainages in the northern part of the county are generally characterized by longer duration and less intense storms than the southern coastal areas. Most streams in the county only flow during winter months in their lower reaches, while often maintaining perennial flows in upper mountain watersheds.

There are four major reservoirs located in the county: Lake Cachuma, Gibraltar Reservoir, Jameson Lake, and Twitchell Reservoir. Lake Cachuma, Gibraltar Reservoir, and Jameson Lake are located along the Santa Ynez River, in the north county. Lake Cachuma is the largest reservoir along the Santa Ynez River, with a drainage area of 421 square miles upstream of the Bradbury Dam. Gibraltar Reservoir has a drainage area of 214 square miles upstream of Gibraltar Dam, and Jameson Lake has a drainage area of 14 square miles upstream of Juncal Dam. There are also dozens of private reservoirs typically used for agricultural purposes.

In north county, the Twitchell Reservoir is located along the Cuyama River. The Cuyama River Basin has a drainage area of approximately 1,140 square miles and it is the confluence of the Cuyama and Sisquoc rivers that forms the Santa Maria River. The Twitchell Reservoir has a drainage area of 1,135 square miles above Twitchell Dam.

4.1.7 Infrastructure

Transportation

The transportation infrastructure of Santa Barbara County supports its industries and residents. The transportation network within the county consists of approximately 2,054 miles of maintained public roadways, 338 miles of Class I, II, and III bikeways, 13 public transit service systems, dozens of private transportation services, one major rail line with three railroad operators, and one harbor facility. (SBCAG 2021). These facilities provide for the transport of people and goods throughout the region. The County's Public Works Department maintains over 1,668 lane miles of major roads and local streets in the unincorporated portions of the county, including more than 112 bridges. There are five public airports in the county: Lompoc Airport, Santa Barbara Municipal Airport, Santa Maria Public Airport, Santa Ynez Airport, and New Cuyama Airport; however, as of September 8, 2019, New Cuyama Airport is closed indefinitely.

The county is also served by federal and state roadways. U.S. Highway 101 is the backbone of the county's road system, as well as several state routes, as described below:

- **Highway 101** serves as the primary transportation link between urban areas located throughout the county and connects the county with Ventura County to the south and San Luis Obispo County to the north. It forms the foundation of the local transportation network, provides the primary freight artery through much of the central coast region, and is critical for the movement of people and goods statewide. Most trips along this route are related to business, government, recreation, tourism, and daily living, including the journey to work. Highway 101 also provides national defense-related transport, including the movement of troops, equipment, and hazardous materials (e.g., associated with Vandenberg SFB). In addition, Highway 101 carries the highest volumes of commercial trucks in the county, particularly between the Ventura-Santa Barbara County line and downtown Santa Barbara (SBCAG 2013), and the highest volume of traffic of any roadway within the county, ranging from 17,400 average annual daily trips (AADT[2]) in Buellton to 141,000 AADT in Santa Barbara (California Department of Transportation [Caltrans] 2021).
- **SR 1** is a major coastal route through the county, extending for approximately 80 miles from its intersection with Highway 101 just north of Gaviota, through the City of Lompoc, and over Harris Grade into the Santa Maria Valley, eventually continuing into San Luis Obispo County. Commuter traffic has become the major component of congestion along SR 1 south of the City of Lompoc due to a regional jobs-housing imbalance with more than 15,000 Lompoc residents commuting to employment on the South Coast daily. In addition to linking the Lompoc Valley with the Santa Maria Valley and the South Coast, SR 1 serves as the main street through the historic centers of the cities of Lompoc and Guadalupe. Annually, SR 1 carries an average of between 3,200 AADT in Orcutt to 28,100 AADT in Lompoc (Caltrans 2019).
- **SR 154** is an east-west route that serves regional and interregional travel, spanning a distance of approximately 33 miles through Los Padres National Forest and the Santa Ynez Valley between its interchanges with Highway 101 on the South Coast and north of Buellton, and conveys between 9,500 AADT in Santa Ynez Valley to 21,000 AADT in Santa Barbara (Caltrans 2019). For SR 154's northern junction with Highway 101, the route runs through the Santa Ynez Valley, past the community of Los Olivos, and through rural agricultural land to its junction with SR 246, which links this route to the community of Santa Ynez and City of Solvang, as well as Highway 101 to the west. The route then traverses the ranchlands and lower foothills of the Santa Ynez Mountains to San Marcos Pass, then travels down the coastal side of the

[2] Caltrans uses two measurements for AADT: Ahead or Back. Ahead AADT means the traffic count was taken North or East of the associated intersection, while back AADT means that count was taken South or West of the associated intersection (Caltrans 2021).

mountains to Highway 101. The terrain levels out as the route enters the City of Santa Barbara and becomes an expressway. The corridor provides an alternative access route through central Santa Barbara County and has become a major commuter route for residents of the north county with employment on the South Coast, as well as serving as alternate access when segments of Highway 101 are closed due to harsh weather, incidents, or other emergencies. Most recently, the Alisal Fire closed Highway 101 on the Gaviota Coast, which created a reliance on SR 154 as the primary road connecting north and south county.

- **SR 246** extends approximately 24 miles from the City of Lompoc to the Santa Ynez Valley. It carries between 4,000 AADT in Buellton and 24,700 AADT in Solvang (Caltrans 2019). SR 246 connects Highway 101 with SR 154. SR 246 is the primary east-west route connecting the Lompoc Valley with the Santa Ynez Valley and serves as a key roadway for the county's agricultural areas, including wineries. This connection is also critical to connecting north and south county. For example, during the Alisal Fire in 2021, which closed Highway 101 along the Gaviota Coast, drivers detoured from Highway 101 in the north county and used SR 246 to reach SR 154, which circumvented the fire to connect to the South Coast (Caltrans 2019).
- **SR 166** is an east-west route that connects the City of Guadalupe to the City of Santa Maria to Cuyama and out east to Kern County. It totals 96 miles in length and is a key route for the community of Cuyama to access north county. Annually, SR 166 carries between 1,500 AADT in Tepusquet to 25,100 AADT in Santa Maria (Caltrans 2019).
- **SR 217** serves as a spur route that forms a branch between Highway 101, the Santa Barbara Airport, and UC Santa Barbara. It totals under three miles and carries between 8,000 AADT at the Highway 101 junction to 12,000 AADT at the UC Santa Barbara entrance (Caltrans 2019).
- **SR 192** runs from State Route 154 near Santa Barbara to State Route 150 near the Santa Barbara – Ventura county line. It is a two-lane road, also known as Foothill Road, that is a primary alternate route when Highway 101 is closed on the South Coast. Annually, SR 192 carries between 1,300 AADT at Toro Canyon Creek to 13,400 AADT at Cieneguitas Avenue (Caltrans 2019).
- **SR 135** runs through Los Alamos and Santa Maria. It serves as a western bypass of Highway 101 in northern Santa Barbara County. SR 135 carries between 1,900 AADT at Old State Highway to 34,000 AADT at Betteravia Road (Caltrans 2019).

In addition to the highway system, passenger rail runs along the western border of the county, connecting the City of San Luis Obispo to the City of Guadalupe, running west of the Lompoc Valley, with three southern stops in the cities of Goleta, Santa Barbara, and Carpinteria. In 2018, an early morning train service began serving commuters from Ventura County and the Carpinteria who work in Santa Barbara and Goleta.

Several long-distance buses connect north and south county. The Clean Air Express connects Lompoc, Santa Maria, and the Santa Ynez Valley to Goleta and Santa Barbara. All routes leave a few times early in the morning and return in the late afternoon or early evening. Additionally, the Coastal Express connects Ventura County to the south county, including routes from Camarillo, Oxnard, and Ventura to Santa Barbara, Goleta, and UC Santa Barbara.

The county contains several regional bike paths that commuters use. For example, the Obern Trail connects Gaviota, Isla Vista, Goleta, and Santa Barbara in an approximately 30-mile loop. The California Coastal Trail connects Pismo Beach in San Luis Obispo County to the Guadalupe Dunes and connects Gaviota to Carpinteria. The Santa Maria River Levee Trail is a 6.7-mile trail in the northern portion of Santa Maria.

Renewable Resources

The state strongly supports the production and use of renewable energy sources, including solar photovoltaic (PV), wind, hydrologic, and biomass. In 2019, total electricity generation for California was 277,704 gigawatt-hours (GWh), down 2.7 percent, or 7,784 GWh, from 2018. California's non-carbon dioxide emitting electric generation categories (nuclear, large hydroelectric, and renewables) accounted for 57 percent of its generation, compared to 55 percent in 2018. As a result, in-state generation increased by 3 percent (5,633 GWh) to 200,475 GWh (CEC 2021c). This total includes a little more than 5,200 MW of self-generation capacity, almost 5,100 MW of which is self-generation solar PV. The state's renewable energy portfolio includes wind (6,000 MW), solar PV (13,000 MW), geothermal (2,700 MW), small hydrologic (1,800 MW), solar thermal (1,300 MW) and biomass (1,300 MW) (CEC 2021b).

The 2015 County Energy and Climate Action Plan (CAP) includes action items that would increase renewable energy within the county, including providing low-interest loans for alternative energy technology, encouraging the use of anaerobic digesters in agriculture, wastewater treatment, and solid waste management, attracting businesses that develop or market alternative energy technologies, and developing a solar photovoltaic ready construction ordinance (County of Santa Barbara 2015). The increase in private solar infrastructure use throughout the county has offset a limited amount of energy use associated with new development in the county.

Industrial Oil and Gas Production

Santa Barbara County has been producing oil and gas since the late 1800s. Oil production occurs both onshore and offshore in the county. Ongoing oil production, processing, and associated transport (such as through the use of pipelines, vehicles, and limited train transport) present the potential for hazards due to spills, the potential for groundwater contamination, air pollutant emissions, etc.

It was in 1896 that oil producers constructed piers to access the underwater portion of the Summerland Oil Field, marking the beginning of offshore oil production, with intensive oil development along the shorelines of the Goleta and Gaviota coasts following. As discussed further in Chapter 5.0, *Hazards Assessment*, many of these older historic wells were improperly abandoned, presenting both environmental hazards in the surf zone, offshore, and onshore development. There are more than a dozen operational oil platforms located along the coast of Santa Barbara County, although several are moving toward decommissioning, and others stopped operating after a rupture caused the 2015 Refugio Oil Spill.

Onshore oil processing continues at facilities such as Las Flores Canyon on the Gaviota Coast, although oil is not currently sent out of Las Flores Canyon pending review of the proposed Plains Replacement Pipeline Project to replace the existing 123.4-mile pipeline system known as Lines 901 and 903 and modify related equipment.[3] Other facilities such as the Chevron processing facilities pier in Carpinteria and production near Santa Maria are initiating decommissioning. Major onshore oil production continues throughout the county, particularly in areas such as Cat Canyon, with more than 4,000 producing onshore wells in the county.

Electricity and Natural Gas

Santa Barbara County receives electricity services from two energy service providers: Pacific Gas & Electric Company (PG&E) in the north county regions (Santa Maria, Cuyama, Lompoc, and Santa Ynez) and Southern California Edison (SCE) in the South Coast Region. In 2019, the County joined Central Coast Community (CCCE) a community choice energy agency established by public agencies to source clean and renewable electricity. PG&E and SCE continue to play their traditional role of delivering power and maintaining electric infrastructure as well as billing. CCCE has committed to sourcing 100 percent clean and renewable energy by 2030 (CCCE 2021).

CCCE is a Community Choice Energy agency established by local communities to source clean and renewable electricity for Monterey, San Benito, and Santa Cruz counties and parts of San Luis Obispo and Santa Barbara counties while retaining your utility provider's traditional role of delivering power and maintaining electric infrastructure as well as billing. In its first two years of operations, CCCE has contracted for 453.3 MW of long-term eligible renewable resources and 192.7 MW of battery storage (CCCE 2021).

Natural gas services within the county are provided entirely by the Southern California Gas Company (SoCalGas). Electricity services are provided by both the PG&E and SCE. The northern county is at the end of the PG&E grid and the southern county is at the end of the SCE grid. The transmission grid is designed to carry electricity over large distances, connecting large utility-scale power plants to load centers such as cities (County of Santa Barbara 2019). Within the PG&E service territory, electrical power is generated by renewable (30 percent), natural gas (25 percent), and nuclear (23 percent) sources. Within the SCE service territory, electrical power is generated by natural gas (26 percent) and renewable sources (25 percent), with the majority of its supply sources associated with non-traceable electrical transactions[4] (41 percent) (California Energy Commission [CEC] 2016b). Within the county, total electricity consumption in 2020 was 2,763 gigawatt-hours (GWh), a reduction of 31 GWh from electricity consumption in 2019. Total natural gas consumption in 2020 was 124 million therms, a reduction of 31 million therms from natural gas consumption in 2019 (California Energy Commission 2021).

Petroleum and Transportation Fuel

Approximately 25.5 million automobiles, 5.5 million trucks, and 851,216 motorcycles were registered in California in 2020 (CA DMV 2021), resulting in 11.2 billion gallons of gasoline sold (CEC 2021a). In 2019, the state estimated a total of 351 billion vehicle miles traveled (VMT) throughout the state (Caltrans 2020). Within Santa Barbara County, an estimated 5.1 million vehicle miles were traveled daily in 2019 (Caltrans 2020).

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[3] See http://www.countyofsb.org/plndev/projects/energy/Plains.sbc

[4] "Non-traceable electrical transactions" means electricity from transactions that are not traceable to a specific generation source.

Water Supply

Groundwater is the primary source of potable water for many county residents. However, river water and rainwater are collected into reservoirs and treated, serving the majority of the south county population. Santa Barbara County has experienced excessive drought conditions over several of the last five years, nearly depleting its water resources. Desalinization and wastewater treatment provides additional supplemental water opportunities in the county.

Groundwater

Groundwater supplies approximately 77 percent of Santa Barbara County's domestic, commercial, industrial, and agricultural water. Groundwater in the county is pumped from 15 major groundwater basins, which are hydrogeologic units capable of furnishing a substantial supply of water, containing one large aquifer or several connected and/or interrelated aquifers (see Table 4-7). The Goleta Groundwater Basin is adjudicated and is therefore exempt from the requirement to form a Groundwater Sustainability Agency (GSA). Groundwater in eight other basins is managed by GSAs, including the Santa Ynez River Valley Groundwater Basin, the Cuyama Valley Groundwater Basin, the San Antonio Creek Valley Groundwater Basin, the Montecito Groundwater Basin, the Carpinteria Groundwater Basin, the Santa Barbara Groundwater Basin, the Foothill Groundwater Basin, the Goleta Groundwater Basin, and the Santa Maria Groundwater Basin.

Groundwater monitoring results have shown water level fluctuations that correlate with varying weather patterns of the area's semi-arid climate, with water levels generally increasing in years of higher precipitation and decreasing in drier years. As described further below, the groundwater basins in the county are generally in overdraft condition, which occurs when extraction greatly exceeds the influxes of water (mainly recharge) and produces an unsustainable condition characterized by sustained declining water levels. Only a few are in equilibrium or surplus. Causes of overdraft in these basins are likely due to agricultural, municipal, and industrial uses.

Table 4-7. Status of Groundwater Basins in the County

Groundwater Basin(s)	Available Water in Storage[1]	Annual Draw[1]	Status	Basin Priority[2]
Carpinteria	16,000	3,750	--	High
Montecito	16,100	500	--	Medium
Santa Barbara	10,000	500	--	Very Low
Foothill	5,000	1,000	--	Very Low
Goleta	70,000	4,000	--	Very Low
Santa Ynez River Valley	1,314,000	42,000		Medium
San Antonio Creek Valley	800,000	15,000	Overdraft	Medium
Santa Maria Valley	1,100,000	130,000	Overdraft	Very Low
Cuyama Valley	1,500,000	65,000	Overdraft	High (critically overdrafted)

[1] All amounts listed are in acre-feet. Source: California DWR 2017.

[2] As a part of the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, the California DWR created the CASGEM Groundwater Basin Prioritization statewide ranking system to prioritize California groundwater basins to help identify, evaluate, and determine the need for additional groundwater level monitoring. Source Santa Barbara County Public Works 2020; California DWR 2017.

Reservoirs and Desalinization

There are four major reservoirs located in Santa Barbara County. Cachuma reservoir is owned and operated by the U.S. Bureau of Reclamation (USBR), Twitchell reservoir is owned by the USBR and operated by the Santa Maria Valley Water Conservation District, Gibraltar Reservoir is owned and operated by the City of Santa Barbara, and Jameson Reservoir is owned and operated by the Montecito Water District. Water is delivered to the South Coast via three tunnels through the Santa Ynez Mountains (County Department of Water Resources (DWR) 2021).

Gibraltar Dam and reservoir are owned and operated by the City of Santa Barbara and are located on the Santa Ynez River in Santa Barbara County, about nine miles north of the City and upstream from Lake Cachuma.

Prolonged droughts in the past have required the installation of temporary pumping facilities in Cachuma Lake used to deliver water from deeper portions of the lake if needed. This option may also be utilized for water security during prolonged drought periods in the future.

An additional source of potable water available to the City of Santa Barbara is desalinated water from the ocean. Desalination is the process of removing salt from seawater. For communities in semiarid climates, desalinated ocean water provides a water source that is not dependent on rainfall. This gives the community the ability to provide fresh water as a backup for depleted surface water supplies, thereby easing the hardship of drought. As technology advances and other water sources become less available, desalination will become more cost-effective, and more communities may turn to this as a viable source of water. The Charles E. Meyer Desalination Plant, built in 1991, produces three million gallons of drinking water per day, equivalent to 3,125 acre-feet of water annually or approximately 30 percent of the City's demand (City of Santa Barbara 2020).

Wastewater Discharge and Treatment

Per the California Water Code and the State Water Resources Control Board (SWRCB), the Central Coast Regional Water Quality Control Board (RWQCB) regulates discharge permits for municipalities and special districts that operate wastewater treatment plants (WWTPs). County or incorporated city service districts manage all of the individually operated Onsite Wastewater Treatment Systems (OWTS). To manage wastewater services, the County delegates the management of wastewater systems to 17 wastewater service providers/districts, which serve at least some portion of unincorporated County lands within each district or treat wastewater collected by neighboring districts. Fourteen WWTPs collect and treat wastewater in the county.

While public entities operate most of the WWTPs, several are special districts not affiliated with city or County operations (Santa Barbara County Water Agency 2021). There are several Community Service Districts (CSDs) that manage WWTFs, including the Cuyama CSD, Laguna

County Sanitation District, Los Alamos CSD, Mission Hills CSD, Montecito CSD, and Summerland Sanitary District. Of the WWTPs that serve the unincorporated areas of the county, each is operating well within its permitted capacity, and the system currently operates at an average of 57.5 percent of the permitted treatment capacity of all facilities.

In unincorporated rural lands that are not served by municipalities or special districts, wastewater is typically treated through private sewage disposal systems (e.g., septic leach fields, dry wells). Based on a County survey in 2000, there are an estimated 8,749 properties in unincorporated areas served by septic systems (Santa Barbara County Environmental Health Services 2003). These systems are designed and managed under a variety of regulatory requirements. In June 2012, the SWRCB adopted the *Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems*. The Policy became effective in May 2013 and for the first time, established a statewide, risk-based tiered approach for the regulation and management of OWTS. In compliance with these regulations, the County developed the 2014 Local Agency Management Program (LAMP), which sets standards and regulatory requirements for wastewater management.

4.1.8 Land Use

Santa Barbara County is known for its natural scenic resources. The coastal terraces between ocean and mountains, the scenic inland valleys with large expanses of cultivated farmlands and gently rolling hillsides, and the rugged Los Padres National Forest are all key elements that define the county's resources. The unincorporated county is largely rural, with distinct compact urban communities separated by public open space and private grazing lands. The foothill elevations typically reach about 800 feet above sea level. The mountain ranges crest between four and five miles inland (north and east) from the coast and reach elevations between 3,200 and 3,800 feet above sea level, then taper down in elevation to the northwestern valleys, and rise again to the northeast within the Los Padres National Forest.

Land use in the unincorporated county is governed by the County Comprehensive Plan—particularly the Land Use Element. Land Use Element maps define boundary lines that characterize the intensity of development in the unincorporated county (County of Santa Barbara Comprehensive Plan 2016), and include the following five boundary areas:

- **Coastal Zone** – The coastal zone spans 110 miles of coastline and includes approximately 184 square miles. The offshore islands of Santa Cruz and Santa Rosa are entirely within the coastal jurisdiction. For most of the coastline, this area only extends 1,000 yards, but it extends further inland in several areas due to the presence of important habitat, recreational, and agricultural resources. These areas include the lands surrounding the Guadalupe Dunes, Point Conception, and most of the Carpinteria Valley.
- **Urban Area** – An area within which the development of residential, commercial, industrial, and recreation uses and their related buildings and structures, including schools, parks, and utilities, are permitted. Agriculture is permitted and encouraged in this area when it is surrounded by urban uses, but when adjacent to a Rural Area, agriculture shall stay in the Rural Area.

- **Inner-Rural Area** – An area where development is limited to rural uses such as agriculture and its accessory uses, mineral extraction and its accessory uses, recreation (public or private), ranchette development, and uses of a public or quasi-public nature. The minimum permitted lot size is five acres. Agricultural and open space preserves and related uses are encouraged.
- **Rural Area** – An area where development is limited to agriculture and related uses, mineral extraction and related uses, utility-scale solar photovoltaic facilities (if located in the Rural Area of Cuyama Valley Rural Region), recreation (public or private), low density residential and related uses, and uses of a public or quasi-public nature. The minimum lot size permitted in this area is 40 acres.
- **Existing Developed Rural Neighborhood (EDRN)** – A neighborhood area that has developed historically with lots smaller than those found in the surrounding Rural or Inner-Rural lands. The purpose of the neighborhood boundary is to keep pockets of rural residential development from expanding onto adjacent agricultural lands. Within the EDRN boundary, infilling parcels at densities specified on the land use plan maps is permitted.

The County Comprehensive Plan Land Use Element guides the physical development of the unincorporated county, establishes a pattern of land utilization, and sets out standards for both the density of population and the intensity of development for each of the land use classifications. The Land Use Element describes land use classifications, diagrams the distribution of land uses throughout the unincorporated County and addresses the policies established for each community plan area. Figure 4-4 illustrates the County Comprehensive Plan land use designations.

Since the previous update of the MJHMP in 2017, new residential development has occurred consistent with the adopted Comprehensive Plan, including adopted community and area plans, and existing regulations and development standards (see also, Section 4.2.3, *County Regulatory Mitigation Capabilities*). Residential land uses and development are generally limited to existing communities serviced by the County, including utilities, services, and emergency response capabilities. For example, the Rice Ranch Development Plan, including 725 units and a community park in the Orcutt area, continued construction of a project originally approved in 2003 consistent with the Orcutt Community Plan. Since new urban development generally lies within existing hazard mitigation capabilities and contributes to regional planned growth in existing urban service areas, vulnerability for new residents has not substantially changed since 2017. The County has also processed permits to rebuild structures damaged by the January 9, 2019 Montecito debris flows. The County Planning and Development Department provides streamlined permitting for the rebuilding effort as much as possible within the current regulatory framework, including current zoning and building standards and the policies of the Montecito Community Plan. Rebuilding to current standards will help improve community resiliency to future hazards, including flood and debris flow hazards. Development in rural areas of the county has not substantially changed vulnerability as it has generally comprised agricultural development (e.g., wineries), rural residential development (e.g., ranches) and energy development (e.g., photovoltaics, oil and gas) consistent with existing land use and regulations.

Land Use – Unincorporated County

Santa Barbara County contains five main geographical sub-regions for land use: 1) the South Coast, 2) Santa Maria Valley, 3) Lompoc Valley, 4) Santa Ynez Valley, and 5) Cuyama Valley. The unincorporated communities within these planning regions vary widely from rural agricultural communities to a densely populated college town. All new major development will need to meet all current building codes and standards and be consistent with the goals, policies, and measures in the County Comprehensive Plan. This includes a review of Safety Element policies on wildfire, flooding, and geologic and seismic hazards and incorporates lessons learned from the MJHMP update process. The Safety Element is also undergoing an update to include the results of the CCVA that will produce recommended adaptation strategies (see Section 4.2.3, *County Regulatory Mitigation Capabilities - Comprehensive Plan* below). Descriptions of each of the five sub-regions follow.

South Coast

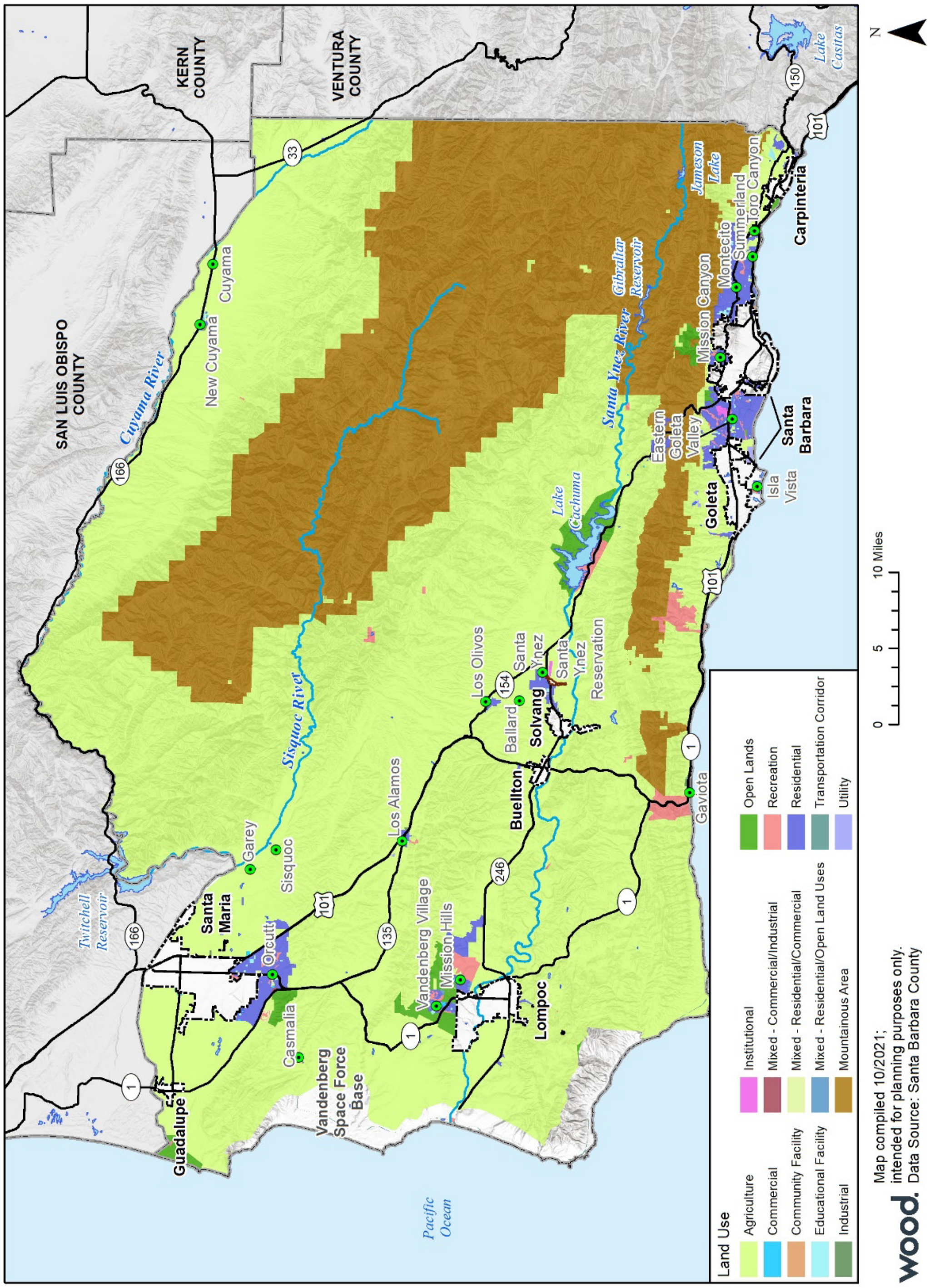
The South Coast is known for its sprawling coastline, seen here on a warm spring day. Source: Daniel Dreifuss/Independent

The South Coast constitutes the southern-most portion of Santa Barbara County, containing the incorporated cities of Santa Barbara, Goleta, and Carpinteria, and the unincorporated communities of Gaviota, Isla Vista, Eastern Goleta Valley, Mission Canyon, Toro Canyon, Montecito, and Summerland. The South Coast is the largest designated urbanized area in the county, covering approximately 130 square miles traversed by Highway 101. This coastal area is characterized by numerous canyons between the foothills of the Santa Ynez Mountains and the Pacific Ocean. In addition, the South Coast Region supports the greatest amount of State Parks, as well as the UC Santa Barbara campus and portions of the Los Padres National Forest. The South Coast region also supports the largest cannabis cultivators when compared to the other four regions, with most of the existing cannabis activities concentrated in the Carpinteria agricultural areas and urban foothills.

Summerland

Summerland is located in southern Santa Barbara County between the cities of Santa Barbara and Carpinteria and is bordered by Ortega Ridge Road on the west, Montecito to the north, Padaro Lane on the east, and the Pacific Ocean on the south. Summerland is bisected by two major transportation corridors: Highway 101 and Union Pacific Railroad (UPRR), used by passenger and freight trains. These major transportation corridors separate most of the community from the Pacific Ocean.

Figure 4-4. County Land Use Map



Land use and development in Summerland are determined by the County's Summerland Community Plan. Summerland is separated into two subareas: the urban area (where land uses are primarily residential), mixed-use, commercial, and the rural area (where land use is dominated by large lower density residential developments and agriculture). Summerland's existing approximate acreages for each land use include 249 acres of agriculture, 13 acres of commercial, 185 acres of residential, 235 acres of residential ranchette, and 38 acres of recreational. The area encompasses approximately 706 existing residential units for 1,504 residents (U.S. Census Bureau 2021). Summerland currently has a small commercial strip centered on Lillie Avenue adjacent to Highway 101 and has approximately 111,004 square feet of commercial development.

CSFPD Fire Station #1 serves the southern portion of the fire district including the City of Carpinteria and is located at 911 Walnut Avenue.

The Carpinteria-Summerland Fire Protection District (CSFPD) provides fire prevention and suppression services for Local Responsibility Areas, including the City of Carpinteria and the unincorporated communities of Summerland and Toro Canyon. CSFPD manages the Community Wildfire Protection Plan (CWPP), which provides a risk assessment and wildfire prevention measures for the service area. The CSFPD has mutual aid agreements for wildfire response with the Ventura County and Santa Barbara County Fire Departments, as well as the Santa Barbara County Office of Emergency Management.

Montecito

Montecito lies between the Pacific Ocean and the foothills of the Santa Ynez mountain range, with the City of Santa Barbara to the west and Summerland to the east. The community is a low- to medium-density residential community comprising 13 square miles and 9,235 people (U.S. Census Bureau 2021). Land use is determined by the County's Montecito Community Plan. The community contains approximately 3,010 residential units. The central urban sub-area, which lies between the Los Padres National Forest and Highway 101, is characterized by about 2,200 low-density residential parcels. The central urban sub-area also contains Montecito's commercial center and a public park. Montecito's coastal sub-area, which lies to the south of Highway 101, encompasses approximately 290 acres, all of which exist in the Coastal Zone. The coastal sub-area is primarily developed with medium to high-density residential. The mountain sub-area extends to the north of the Los Padres National Forest boundary and occupies the northern portion of the Montecito Planning Area. The mountain sub-area encompasses 9,984 acres and is dominated by mountainous open space with few residential units.

The Montecito Fire Protection District is located adjacent to the eastern border of the City of Santa Barbara. The southern border is three miles at sea into the Pacific Ocean. The northern border is shared with the U.S.D.A. Forest Service. The eastern border abuts the CSFPD. The District currently staffs two stations within Montecito. Station One, the Headquarters station houses a First Out engine company as well as a Paramedic Rescue. Also available from Station One is a Duty Battalion Chief.

Currently, seven personnel are available 24 hours, 7 days a week out of Station one. Station Two houses three or four personnel 24 hours a day (Montecito Fire Protection District 2021).

Toro Canyon

Toro Canyon is located between Summerland and the City of Carpinteria, approximately two miles northwest of the City. Major access roads into Toro Canyon include Highway 101, Via Real, and SR 192 (East Valley Road/Foothill Road). Land use in Toro Canyon is determined by the Toro Canyon Community Plan, which designates mixed rural and semi-rural, agricultural, and low-density residential uses of approximately 5,950 acres and accommodating 1,598 residents (U.S. Census Bureau 2021). Toro Canyon's existing land uses include large expanses of agriculture, a few concentrated and many scattered residential developments, two small commercial areas, recreation, and undeveloped open space. Toro Canyon includes approximately 1,000 parcels and the following approximate square footage for each land use: 850 residential units; 61,665 square feet of commercial and industrial space; 5,236,132 square feet of greenhouses and related development; 88,545 square feet of institutional/educational development; and 130,399 square feet of other non-residential development.

Santa Claus Lane and Via Real at the eastern Padaro Lane/Highway 101 interchange are the only commercial areas in Toro Canyon. Residential development is scattered throughout Toro Canyon, generally with larger parcels to the north and smaller parcels to the south. Several neighborhoods with parcel sizes between 7,000 square feet to one acre exist in southern Toro Canyon, including beachfront properties along Padaro Lane and Rural Neighborhoods (RNs) surrounded by agricultural and rural land. Upper Toro Canyon (generally north of East Valley Road and Paredon Ridge) residential development is characterized by parcel sizes of five acres or greater and is generally associated with either agricultural uses or large estates.

Mission Canyon

Mission Canyon is located in the foothills of the Santa Ynez Mountains, north of and adjacent to the City of Santa Barbara. Foothill Road/SR 192 lines the southern border of the community. Land use in this area is determined by the County's Mission Canyon Community Plan. Mission Canyon's 1,114 acres contain 1,138 parcels and support residential development, agriculture, and open space. There is no commercial or industrial development. Residential development occurs throughout the area, generally with larger parcels to the north and smaller parcels to the south. Residential parcels range from under 7,000 square feet to over 40 acres. The South Foothill sub-area falls to the south of Foothill Road and comprises approximately143 acres with 258 parcels that average 0.5 acres in size. The Mission Canyon Heights sub-area contains approximately 550 parcels within its 160 acres of steeply sloped terrain and averages about 0.5 acres per parcel. The Upper Mission Canyon sub-area comprises approximately 817 acres of terrain occupied by low-density residential and open space. Several popular hiking trailheads are located in this sub-area. Mission Canyon is home to 2,344 residents (U.S. Census Bureau 2021).

Eastern Goleta Valley

Eastern Goleta Valley is located between the City of Santa Barbara and the City of Goleta. The community is laterally bisected by Highway 101 and Hollister Avenue. The unincorporated coastal plain and foothills reaching from Camino Cielo Road on the north to the Pacific Ocean on the south cover approximately 23,300 acres. Land use is determined by the County's Eastern Goleta Valley Community Plan. Of this area, about 15,300 acres lie within the designated Rural Area, and about 7,900 acres lie within the designated Urban Area where the majority of the approximately 30,071 residents of Eastern Goleta Valley live (U.S. Census Bureau 2021). Eastern Goleta Valley is largely suburban residential in character, providing a range of residential types, including single-family, condominium, apartment, and mobile home types in the Urban Area, with ranchette neighborhoods in the peripheral areas of Hope Ranch and the foothills. There are approximately 10,222 residential units in the area. There is a total of approximately 3,187,463 square feet of commercial development in Eastern Goleta Valley, most of it concentrated along the Hollister Avenue – State Street corridor. The mid to higher elevations of Eastern Goleta Valley are designated as mountainous areas and are characterized by rugged terrain, habitat areas, headwaters of local watershed sub-basins, and clusters of rural residential neighborhoods. Much of the mountainous area lies within the boundaries of the Los Padres National Forest. The foothills of Eastern Goleta Valley support rural agriculture, typified by orchards, large parcel crop productions, and grazing land.

Isla Vista

Isla Vista is located nine miles west of the City of Santa Barbara adjacent to UC Santa Barbara and the City of Goleta. It is located on a coastal bluff overlooking the Pacific Ocean. Land use in Isla Vista is determined by the County's Goleta Community Plan (1993). Isla Vista is accessed by Storke Road and Mesa Road from Highway 101. The current population of Isla Vista is approximately 24,696 residing within approximately 2 square miles (U.S. Census Bureau 2021). Isla Vista is home to many students living in dense housing and dormitories. Much of Isla Vista is a densely populated residential community, with one of the highest concentrations of people in the state (62.5 people per acre). Isla Vista's downtown area is located on the eastern edge of the community adjacent to the UC Santa Barbara Main Campus and contains approximately 134,000 square feet of commercial development along loop-shaped Embarcadero del Mar linking to Embarcadero del Norte.

Gaviota Coast

The Gaviota Coast is a 158-square-mile (101,199 acres) unincorporated area of coastal plains and foothills west of the City of Goleta that contains 968 parcels with an average size of 110 acres. The area is bounded by Vandenberg SFB to the northwest, the Pacific Ocean on the south and west, the crest of the Santa Ynez Mountains on the north, and the City of Goleta to the east. Highway 101 runs along the coast, while Highway 1 provides access to the Lompoc Valley. Land use is determined by the County's Gaviota Coast Area Plan. Agriculture is the predominant land use designation with approximately 77,820 acres, followed by approximately 26,051 acres of Mountainous Area, approximately 5,562 acres of recreation/open space, and other miscellaneous designations for the balance of about 2,266 acres. Much of the agricultural land includes the Los Padres National Forest in the inland portions of the Gaviota Coast. Cattle grazing is the primary agricultural use, in addition to orchards and other agricultural operations. The Los Padres National Forest covers 15,634 acres on the Gaviota Coast. Three major State parks and one County park exist within the Gaviota Coast: Gaviota State Park, El Capitan State Beach, Refugio State Beach, and Jalama Beach County Park. Industrial land uses in the Gaviota Coast are limited to approximately 100 acres of oil facilities contained within three industrial developments: Plains Exploration and Production Company (PXP) Point Arguello, ExxonMobil's Las Flores Canyon Processing Facility, and the Tajiguas Landfill. Residential development in the area is broadly dispersed, with single-family homes located on large agricultural zoned parcels. An exception is a small pocket of rural residential development at Arroyo Quemada and the developed smaller agricultural parcels at El Capitan Ranch and the upper reaches of Refugio Road near West Camino Cielo. Approximately 234 existing single-family dwellings exist on the Gaviota Coast. The Gaviota Coast is home to approximately 824 residents (U.S. Census Bureau 2021).

Santa Maria Valley

The City of Santa Maria, which has the largest population in the County, is surrounded by rural agricultural areas. Source: George Rose/Getty Images

The Santa Maria Valley is in the northwestern portion of Santa Barbara County, including areas inland from the county's northern coastline and south of the County of San Luis Obispo. This region includes the Santa Maria urban area, which is the largest retail trade center in the north county. The valley is situated in the northwest corner of the county and is bounded by the Santa Maria River to the north, the Casmalia Hills to the west, the San Rafael Mountains to the east, and the Solomon Hills to the south. The area is accessed by Highway 101 from the north and south, SR 166 from the east and west, SR 1 from the northwest and southwest, and SR 135 from the south. The Santa Maria Valley encompasses the City of Santa Maria, the City of Guadalupe, and several unincorporated communities, including Orcutt, Garey, Sisquoc, and Casmalia, as well as rural residents. These communities provide local employment and services and are surrounded by highly productive agricultural land and rural resources, which contribute to local economies for Santa Maria Valley residents. For example, 26.3 percent of the City of Santa Maria residents are employed in the agricultural sector, and 35.9 percent work in the service sector (U.S. Census Bureau 2021).

Orcutt

Orcutt is located immediately south of the City of Santa Maria and encompasses 14,650 acres with 10,300 parcels and approximately 11,000 residential units. Land use is determined by the County's Orcutt Community Plan. The community is accessed by Highway 101 and SR 135. Orcutt's central urban core is located in the northern part of the township and comprises 3,600 acres and 8,250 residential units. All of Orcutt's major commercial development is located in this area. There are 609,000 square feet of commercial, industrial, or institutional development. South and West Orcutt are primarily low to medium density residential, with approximately 2,400 residential units in the 10,000-acre area. Orcutt is home to 30,819 residents (U.S. Census Bureau 2021). Agriculture dominates the land use outside the urban core and residential areas, with approximately 7,000 acres of land designated for agriculture in Orcutt, of which 6,000 are in production.

Sisquoc

Sisquoc is located 7.8 miles southeast of the City of Santa Maria and encompasses roughly 92 acres, including a small residential area on the intersection of Foxen Canyon Road and Palmer Road surrounded by agricultural lands. Sisquoc is home to 201 residents (U.S. Census Bureau 2021).

Garey

Garey is located approximately 1.8 miles northwest of Sisquoc and 6.1 miles southeast of the City of Santa Maria encompassing approximately 55.6 acres primarily accessed by Foxen Canyon Road. Similar to Sisquoc, the community consists of a small residential area surrounded by agricultural lands. Garey is the smallest community in the Santa Maria Valley, with just 67 residents (U.S. Census Bureau 2021).

Casmalia

Casmalia is located approximately 6.3 miles southwest of the City of Santa Maria encompassing approximately 116 acres. The community is accessed from the north by Black Road and from the south by West Lompoc Casmalia Road. Casmalia is made up of a small residential area lining Point Sal Road surrounded by agricultural use and rural lands, completely isolated from other communities. The community had 173 residents in 2019 (U.S. Census Bureau 2021).

Lompoc Valley

Vandenberg Space Force Base is a major source of employment in the Lompoc Valley. Source: ULA

The Lompoc Valley is located in the mid-western portion of Santa Barbara County, adjacent to Vandenberg SFB, and is separated from the rest of the county by the Purisima, Santa Rita, Santa Rosa, and White hills. The Santa Ynez River also traverses the Lompoc Valley in a westerly direction and eventually drains into the Pacific Ocean. The area is accessed by SR 1 from the north and south and SR 246 from the east and west. The Lompoc Valley is centrally located in Santa Barbara County and encompasses the City of Lompoc and Vandenberg Village and Mission Hills, two mid-sized unincorporated communities. The unincorporated communities lie immediately north of the City of Lompoc to form the population center of the Lompoc Valley with rural residents in the vicinity. Vandenberg SFB lies to the west of this population center and separates these communities from the rural northern coastline and beaches. Unlike surrounding areas in the Santa Maria Valley and Santa Ynez Valley, Lompoc Valley residents are not substantially employed in the agriculture sector. Many Space Force employees live in the area and on the base. Lompoc Valley residents are primarily employed in the service, retail, manufacturing, and public administration sectors, particularly related to operations of the nearby SFB. For example, 48.3 percent of the City of Lompoc residents are employed in the services sector, and 12.2 percent work in the retail trade sector.

Vandenberg Village

Vandenberg Village is located at the westerly end of the Santa Ynez River Basin and is bordered by Vandenberg SFB to the west and the City of Lompoc to the south. Vandenberg Village encompasses 3,338 acres and has a population of approximately 6,988 (U.S. Census Bureau 2021). The low- to medium-density residential core is surrounded primarily by agriculture and open space. Vandenberg Village is primarily accessed by SR 1.

Mission Hills

Mission Hills is located approximately one mile north of the City of Lompoc and one mile southeast of Vandenberg Village, encompassing approximately 1,025 acres. Both Mission Hills and Vandenberg Village are primarily accessed by SR 1, and similarly to Vandenberg Village, Mission Hills is mostly residential surrounded by agricultural land and open space. Mission Hills is home to 3,630 residents.

Santa Ynez Valley

The Santa Ynez Valley is located in central Santa Barbara County, adjacent to the Cachuma Lake Recreation Area. The area extends north from the Santa Ynez River to the Woodstock Ranch and Oak Trails subdivisions, and east from the western outskirts of the City of Buellton to the Rancho Estates neighborhood. The Santa Ynez Valley is located at the base of several converging mountain ranges, including the San Rafael and Santa Ynez mountains, and the Purisima and Santa Rita hills. The Santa Ynez River is located to the south of this valley. The area is approximately 72 square miles (46,933 acres) and includes the unincorporated communities of Santa Ynez, Ballard, Los Olivos, and Los Alamos. The area is accessible by Highway 101 from the southwest and northwest, SR 246 from the west, and SR 154 from the southeast.

The Santa Ynez Valley is a popular tourist attraction for its renown winery scene. Source: Epiphany Wine Company

The Santa Ynez Valley area contains 3,901 parcels with an area of approximately 45,380 acres. Agriculture is the predominant land use designation with 43,441 acres, followed by residential at 1,580 acres, commercial at 110 acres, and industrial at 51 acres. The Santa Ynez Valley Community Plan determines land use in the region and separates the area into three distinct land use types: rural, inner-rural, and urban townships. About half of the area (22,915 acres) is designated as rural, with parcels larger than 40 acres and large-scale agricultural users. Inner-rural land, which surrounds the townships and is home to agriculture, recreational, and ranchette-style residential parcels of 5 to 40 acres, accounts for 20,434 acres of the area. The remaining 2,031 acres are designated as urban land use or townships. Approximately 56 percent of the area's 9,850 residents reside in the three townships, which offer low- to medium-density residential development.

Santa Ynez

Santa Ynez is located east of the City of Solvang and west of the junction of Highways 154 and 246. Approximately 4,836 residents inhabit the township's 1,565 acres (U.S. Census Bureau 2021). Land use is predominantly lower-density residential surrounding a downtown commercial center located in the southeastern part of the town. The 137-acre reservation of the Santa Ynez Band of Chumash Indians is located within the urban boundary of Santa Ynez.

Los Olivos

Los Olivos is located in the northern part of the Santa Ynez Valley region and consists of 287 acres with a population of approximately 1,190 people (U.S. Census Bureau 2021). There is a 22-acre commercial district at the northern end of the township. Low to medium density residential surrounds the commercial core and accounts for over 85 percent of the total land area of the township.

Ballard

Located north of Santa Ynez and south of Los Olivos, Ballard has 507 residents and encompasses 94 acres and 118 parcels (U.S. Census Bureau 2021). Approximately 75 percent of the township is designated for residential use, with approximately four acres of commercial property. A mix of smaller agricultural parcels (5 to 40 acres) surrounds Ballard.

Los Alamos

Los Alamos is a residential community located in a narrow valley within the San Antonio Creek watershed between the Purisima Hills and the Solomon Hills approximately 15 miles southeast of the City of Santa Maria at the junction of Highway 101 and SR 135. The Los Alamos Community Plan determines land use in the township of Los Alamos. The community is approximately one square mile, or 460 acres, in area, with a population of about 1,422. The urban area is primarily composed of 10,000 square-foot residential lots. Agricultural land surrounding the community consists of large parcels (100 acres or greater), most of which are currently under active Williamson Act contracts.

Cuyama Valley

The Cuyama Valley constitutes the northeast and eastern-most portion of Santa Barbara County and is primarily comprised of the federally owned lands of the Los Padres National Forest. It is accessible by SR 166 from the north or SR 33 from the south. The Cuyama Valley is a large agricultural area bounded by the Caliente Mountain Range to the north and the Sierra Madre Mountains to the south. The San Andreas Fault is located to the east of the Cuyama Valley and travels in a northwest direction. The valley is bisected by the Cuyama River and includes the communities of Cuyama and New Cuyama. The area has a population of approximately 596, mostly concentrated in the community of New Cuyama (U.S. Census Bureau 2021). These communities are predominantly agricultural in use, with commercial, educational, industrial, recreational, and residential uses limited to the Cuyama and New Cuyama communities. Land use in the Cuyama Valley consists primarily of irrigated agriculture, dry farming, grazing pastures, and rural residential development. Irrigated agriculture is a dominant land use in the Cuyama Valley, comprising approximately 23,500 acres.

4.2 COUNTY OF SANTA BARBARA MITIGATION CAPABILITIES

4.2.1 Overview

The County, led by the County's Office of Emergency Management (OEM), has identified hazards posing a threat through the MJHMP Update planning process. Chapter 5.0, *Hazard Assessment*, describes the extent of those hazards and the associated existing risks to the county. This Capability Assessment reviews what loss prevention mechanisms are already in place to mitigate potential risks posed by various hazards. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters, as well as the technical mitigation and fiscal mitigation capabilities, and more accurately focuses the goals, objectives, and proposed actions of this plan. As such, this section presents the County's mitigation capabilities, including programs and policies currently in place to reduce hazard impacts or that could be used to implement hazard mitigation activities. Information about capabilities specific to the other participating jurisdictions can be found in the jurisdictional annexes.

The Mitigation Advisory Committee (MAC) and individual jurisdictions' Local Planning Teams (LPTs) identified current capabilities and mechanisms available for implementing hazard mitigation activities. This update process allowed the County and its participating jurisdictions to review their previous capabilities and identify ways in which these capabilities have improved or expanded since the adoption of the previous plan. Additionally, in summarizing their current capabilities and identifying gaps, Plan participants also considered their ability to expand or improve upon existing policies and programs to develop new mitigation strategies.

This section includes a summary of County departments and their responsibilities associated with hazard mitigation planning. During the 2021 annual update, this section was reviewed by County staff and the consultant team to update information where applicable.

4.2.2 County Administrative and Technical Capabilities

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities. Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using GIS to analyze and assess community hazard vulnerability.

Table 4-8 identifies jurisdictional resources available to implement the mitigation actions identified in Chapter 7.0, *Mitigation Plan*. Specific resources reviewed include those involving technical personnel such as planners/engineers with knowledge of land development and land management practices, engineers trained in construction practices related to buildings and infrastructure, planners/engineers with an understanding of natural or manmade hazards, floodplain managers, surveyors, personnel with geographic information systems (GIS) skills, and scientists familiar with hazards in the community.

The Local Plan Update Guides were used to capture information on administrative and technical capability through the identification of available staff and personnel resources. Table 4-8 provides a summary of the Local Plan Update Guide results for the region regarding relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill, a plus sign (+) indicates the service is contracted out, an asterisk (*) indicates a County staff member provides the specified knowledge or skill for the jurisdiction, and a blank box indicates no resources are available.

Table 4-8. Multi-Jurisdictional Summary of Staff and Administrative Capabilities

	County of Santa Barbara	City of Buellton	City of Carpinteria	City of Goleta	City of Guadalupe	City of Lompoc	City of Santa Barbara	City of Santa Maria	City of Solvang	Montecito Water District	Carpinteria Valley Water District	Montecito Fire Protection District	Cachuma Operation and Maintenance Board	Santa Maria Valley Water Conservation District	Goleta Water District
Planner/Engineer with knowledge of land development/land management practices	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	✓	✓	✓	✓	✓		✓			✓			✓	+	✓
Planner/Engineer/Scientist with an understanding of natural hazards	✓	✓	+	✓	✓	+	✓	✓	+	+	+	+	+	+	✓
Personnel skilled in GIS	✓	+	+	+	✓	+	+	+	+	+	+	+	✓	+	✓

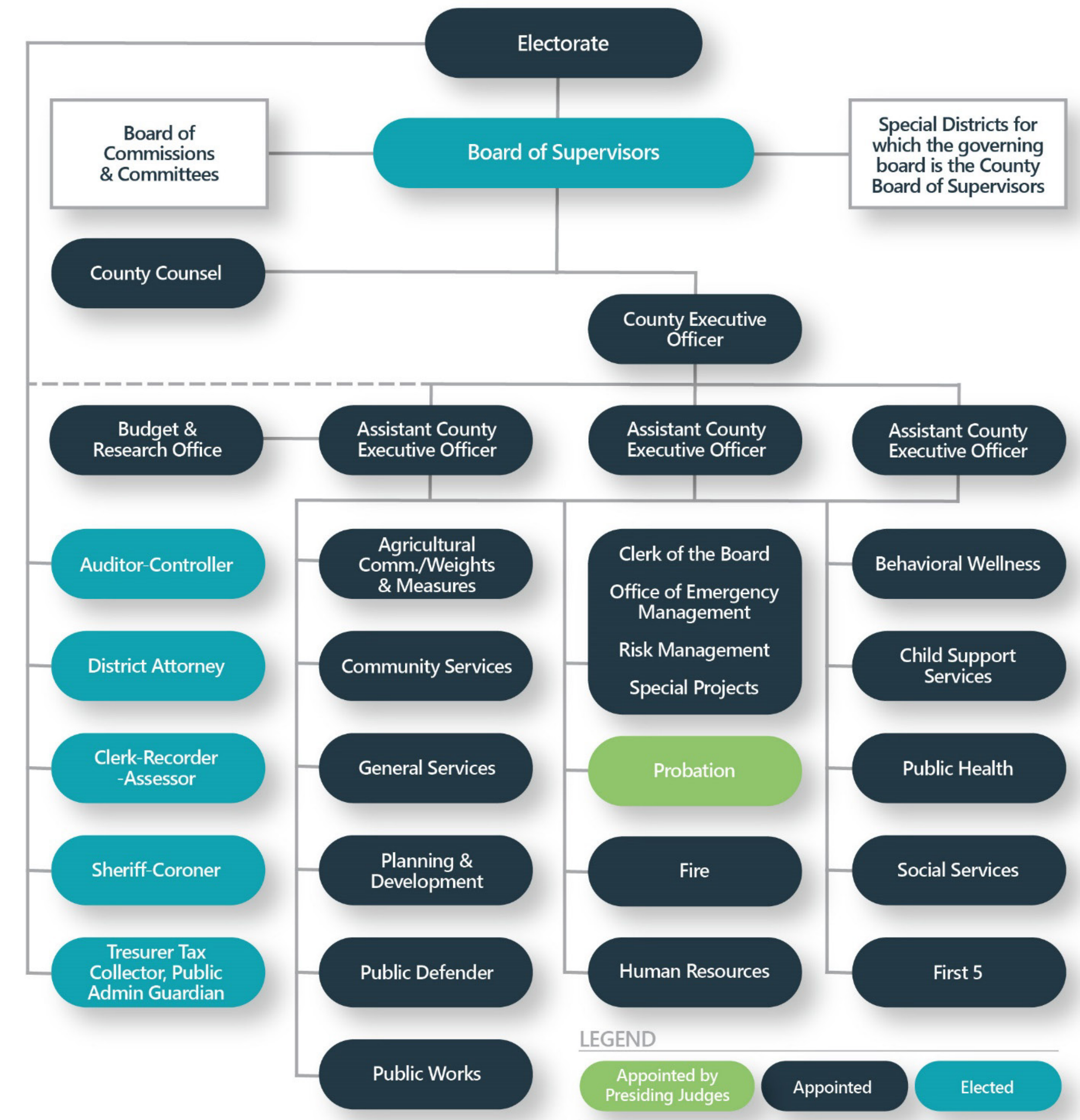
Table 4-8. Multi-Jurisdictional Summary of Staff and Administrative Capabilities (Continued)

	County of Santa Barbara	City of Buellton	City of Carpinteria	City of Goleta	City of Guadalupe	City of Lompoc	City of Santa Barbara	City of Santa Maria	City of Solvang	Montecito Water District	Carpinteria Valley Water District	Montecito Fire Protection District	Cachuma Operation and Maintenance Board	Santa Maria Valley Water Conservation District	Goleta Water District
Full-time Building Official	✓		✓												
Floodplain Manager	✓			✓			✓								
Emergency Manager	✓		✓	✓			✓	✓							
Grant Writer	+												✓		
Public Information Officer	✓	✓	✓			✓	✓			✓		✓			
Warning Systems	✓				✓								+		
GIS data: flood zones/hazard areas	✓	*	*	*	*	*	✓	*	✓	*	*	✓	*		
GIS data: critical facilities	✓									✓			✓		✓
GIS data: current and/or future land use	✓														
GIS data: building footprints										✓					✓
GIS data: links to Assessor's data	✓	*	*	*	*	*	*	*	*	*	*	*	*		*
Other personnel	✓									✓				✓	

A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.
A plus sign (+) indicates the service is contracted out.
An asterisk (*) indicates a County staff member provides the specified knowledge or skill for the jurisdiction.

The following is a summary of County departments and their responsibilities related to hazard mitigation planning and implementation. This section also identifies existing planning documents and regulations related to mitigation efforts within the community, as well as the County's abilities to expand on and improve existing policies and programs where applicable. Many of the programs and plans of these departments, with applicability and links to loss reduction efforts, are detailed in Section 4.2.3, *County Regulatory Mitigation Capabilities*. Figure 4-5 shows the organization of the County and County departments that will have a significant role in implementing the Plan.

Figure 4-5. County Organization



Source: County of Santa Barbara, *Inspiring Resilience and Recovery*, Recommended Budget FY 2021-22

Santa Barbara County Office of Emergency Management

The County Office of Emergency Management (OEM), a division of the Santa Barbara County Executive Office, is responsible for emergency planning and coordination for the Santa Barbara Operational Area, which includes County departments, incorporated cities, local government agencies, unincorporated areas, special districts, universities, nonprofit and volunteer organizations, and private sector business and industry groups (see Section 4.1.1, *Cities, Communities and Special Districts*). OEM is leading the MJHMP update and serves as a lead MAC member, coordinating County departments and providing hazard-related data.

OEM's Mission

The Santa Barbara County OEM's mission is to enhance safety and preparedness through strong leadership, collaboration, communication, and meaningful partnerships designed to protect lives and property by effectively preparing for, preventing and mitigating, responding to, and recovering from disasters, threats, and emergencies.

The County OEM is responsible for the following activities:

- Develop and maintain applicable emergency plans for the County and Operational Area, including the Emergency Operations Plan (EOP).
- Maintain the County Emergency Operations Center (EOC) in a state of operational readiness to activate for the County if an incident is occurring solely on unincorporated land.
- Maintain the Operational Area EOC in a state of operational readiness to activate if multiple jurisdictions are impacted or significant Operational Area coordination is occurring.
- Maintain a trained cadre of EOC team members for EOC activations.
- Provide ongoing leadership and coordinate disaster plans, training, and exercises with Operational Area partner agencies throughout the county.
- Assist County departments with emergency plans to address how they will perform during disasters.
- Provide ongoing training for County department emergency coordinators.
- Participate in public information campaigns for all hazards through public venues and various media presentations.
- Assist the County Sheriff's Office Dispatch Center with emergency public mass notification publication.
- Maintain 24/7/365 Duty Officer coverage.

The County provides community programs to educate volunteers about disaster response, such as the Community Emergency Response Team (CERT) program.

The County OEM, within its duties noted above, will use this MJHMP in conjunction with the County EOP to implement strategies, projects, and policies which lead to a more resilient and safer County (see Section 4.2.3, *County Regulatory Mitigation Capabilities - Standardized Emergency Management System Emergency Management Plan*).

As the Operational Area Coordinator, County OEM routinely works with several non-governmental, private, non-profit, and volunteer organizations in addition to local, state, and federal government organizations. These partner agencies include:

- American Red Cross
- CalOES
- FEMA
- NWS
- Utility Providers
- Local Schools, Colleges, and Universities
- Foodbank of Santa Barbara County
- Independent Living Resource Center (ILRC)
- Vandenberg SFB
- U.S. Coast Guard
- Direct Relief International
- United Way
- VOAD
- Santa Ynez Band of Chumash Indians
- 2-1-1
- Equine Evac

County OEM also routinely coordinates with several local agencies and organizations not explicitly listed here.

Tri-County Coordination

The County OEM also coordinates with adjoining offices of emergency services in Ventura and San Luis Obispo Counties. This relationship is particularly important during regional emergencies such as wildfires, earthquakes, and energy outages. For example, in December 2017, the Thomas Fire ignited in Ventura County and then spread regionally to Santa Barbara County, requiring interagency coordination and tracking to ensure unified response and fire suppression services at the local and state levels.

County OEM routinely coordinates with the Independent Living Resource Center (ILRC), a private non-profit organization providing disability advocacy and independence increasing or maintaining services to Ventura, Santa Barbara, and San Luis Obispo Counties. We provide this support to individuals with all disabilities, all ages, and all income levels. The mission of IRLC is to promote independent living and full access for individuals with disabilities through advocacy, education, and action in our communities. In particular, the IRLC assists with emergencies and disaster preparedness, as well as Public Safety Power Shutoffs (PSPSs), and supports clients with emergency kits and personal protective equipment (PPE).

State Coordination

County OEM is responsible for direct coordination with the California Office of Emergency Services (CalOES). Staff from County OEM and CalOES maintain regular communication and work collaboratively on local implementation of applicable plans and standards such as the State Hazard Mitigation Plan. During emergencies, County OEM partners with CalOES to coordinate state response capabilities and local needs.

<u>Santa Barbara County Fire Department</u>

The Santa Barbara County Fire Department serves and safeguards the community from the impacts of fires, medical emergencies, environmental emergencies, and natural disasters through leadership, planning, education, prevention, code enforcement, and all-hazard emergency response. The Fire Department plays a key role in the MAC for the MJHMP to ensure current data and mitigation strategies are planned and implemented for wildfire hazard reduction.

Fire Department's Mission

The Santa Barbara County Fire Department will be a model public safety agency, widely recognized for our effectiveness, regional strength, and community attentiveness.

The Fire Department is responsible for the following activities:

- Fire Suppression
- Defensible Space Program (see Section 4.2.3, *County Regulatory Mitigation Capabilities - Defensible Space Program*)
  - Enforcing Public Resource Code 4291 defensible space
- Enforcing Development Standards
- Updating and implementing the Santa Barbara County Fire Unit Strategic Fire Plan (meeting the California Strategic Fire Plan and National Fire Plan Standards)
  - The County of Santa Barbara is one of six "contract counties" (i.e., Santa Barbara, Ventura, Los Angeles, Orange, Kern, and Marin), which has executed a contract with the State of California to provide wildland fire protection in the state responsibility areas (SRA). The County has the responsibility as a contract county to implement the 2010 State Strategic Fire Plan for California in the county. As such the County Fire Department functionally operates as a Unit of the California Department of Forestry and Fire Protection (CAL FIRE) and is responsible for all Strategic Fire Plan activities within the county.
- Assisting Planning and Development (and other Departments) with Development Standards for High Fire Hazard Areas
- Conducting Community Outreach and Public Education Programs
- Aiding and overseeing Community Wildfire Protection Plans (CWPP) throughout Santa Barbara County (such as the San Marcos Pass/Eastern Goleta Valley CWPP, referenced in Section 4.2.3)
- Conducting prescribed burns and vegetation management projects

- Monitoring "fire weather" and maintaining and utilizing "Red Flag Alert" signs as part of the "Red Flag Warning Plan" to alert citizens of dangerous fire weather conditions
- Burn Permit Program (agriculture and hazard reduction burning to reduce hazardous accumulations of fuels)
- Support the Community Emergency Response Teams (CERT) program

Many of these policies and development standards are designed to reduce the risk of wildfire damage. They provide a foundation for implementing the identified wildfire mitigation strategies within this MJHMP. Through participation in the MAC, the County Fire Department will use this foundation to help implement the identified wildfire mitigation strategies as resources are available.

The Santa Barbara County Fire Department responds to wildfire emergencies across the County, particularly in the County's mountainous regions.

In addition to the 16 stations within the County Fire Department, there are other fire departments and fire protection agencies within Santa Barbara County (County Fire Department 2021b):

- Carpinteria-Summerland Fire Department – 2 stations
- Guadalupe Fire Department – 1 station
- Lompoc Fire Department – 2 stations
- U.S. Forest Service – Los Padres National Forest – 6 stations
- Montecito Fire Protection District – 2 stations
- Santa Maria City Fire Department – 6 stations
- Santa Barbara City Fire Department – 8 stations
- Vandenberg Fire Department – 8 stations

Santa Barbara County Sheriff's Office

The Sheriff's Office is responsible for law enforcement in the unincorporated areas of the county, the county jail system, superior court security, and coroner functions. The Sheriff's Office is also contracted to provide police services to the cities of Buellton, Carpinteria, Goleta, and Solvang. The Sheriff's office is a key MAC member, representing the County's capabilities in response to natural and human-caused disasters countywide. The Sheriff's Office has approximately 600 employees and 150 volunteers at more than 25 work sites located throughout Santa

Sheriff's Office's Mission

The Sheriff's Office is responsible for enforcing the laws, upholding the Constitutions, and providing custody and court services while enhancing the quality of life through effective partnerships, protecting persons and property, and serving as role models to our community.

Barbara County. Although the number varies, County currently includes approximately 260 law enforcement deputies and 200 custody deputies.

The County Sheriff's Headquarters is located in Santa Barbara near Goleta and eight sub-stations are located in Buellton, Carpinteria, Goleta, Isla Vista, Lompoc, New Cuyama, Santa Maria, and Solvang, as well as an office on the Santa Ynez Band of Chumash Indian's Reservation.

The Sheriff's Office Law Enforcement Operations Branch has several specialty units and divisions that aid in the County's ability to provide front-line law enforcement services and respond to all different types of emergency scenarios. The specialty units include the Santa Barbara County Sheriff/Fire Air Support Unit, K-9 Unit, Bomb Squad, Special Enforcement Team, Hostage Negotiation Team, Dive Team, Narcotics/ Gang Enforcement teams, Homeland Security Unit, Forensics Unit, Rural Crime Unit, and Cold Case Unit, among others.

The County Sheriff/Fire Air Support Unit conducts law enforcement, search and rescue as well as fire missions throughout the year and is a critical life-saving resource for Santa Barbara County.

The County's dispatch center maintains the Sheriff's Office, County Fire Department, ambulance, and other emergency communications for unincorporated areas of the county, plus the cities of Buellton, Carpinteria, Goleta, Guadalupe, and Solvang. Consolidating these services under "one roof" provides for seamless coordination among the dispatch consoles and personnel, whether it is a routine incident requiring a simple fire and medical response or a large-scale incident, such as a major wildfire or winter storm causing floods, or a mass shooting or riot. Dispatchers additionally provide Emergency Medical Dispatch and can give life-saving instructions to distressed callers until paramedics arrive.

Santa Barbara County Planning and Development Department

The Planning & Development (P&D) Department provides quality planning, permitting, and inspection services through a thoughtful, collaborative, and professional process under the policy direction of the Board of Supervisors and the Planning Commission. The Planning and Development Department plays an instrumental role in the MAC ensuring this MJHMP is consistent with other long-term and comprehensive planning efforts throughout the unincorporated county. The Planning and Development Department identifies development policies already in place that help reduce future damage to structures from natural hazards and would play a crucial role in creating new development policies as necessary to implement the identified mitigation strategies. It is responsible for the creation, update, and implementation of the County Comprehensive Plan, including the Seismic Safety and Safety Element.

P&D's Mission

The mission of the Planning Department is to promote reasonable, productive safe, and sustainable use of the land to foster economic, social, cultural, and environmental prosperity across Santa Barbara County.

The divisions of the Planning and Development Department that have a role in mitigation include:

- Development Review
- Long-Range Planning
- Building and Safety
- Energy and Minerals

Long-Range Planning

The mission of the Long-Range Planning Division is to research, analyze, develop, and communicate land use policies that meet Federal and State mandates in a manner that fosters economic, social, cultural, and environmental prosperity across the unincorporated county. The work of this division includes Comprehensive Plan Amendments, Community Plan Amendments, updating and maintaining land use ordinances (e.g., the Land Use Development Code, Coastal Zoning Ordinance, and Montecito Land Use Development Code), and additional special projects directed by the Board of Supervisors. Long Range Planning also reacts to changing physical or regulatory conditions in the county to update local land use planning and policy documents, including amendments in response to changing state law or emerging science and data such as new hazard information.

Development Review

This division reviews development project applications for land use entitlements. Various decision-makers, including the Zoning Administrator, the Planning Commission, or the Board of Supervisors, approve or deny these projects based on policies in the County Comprehensive Plan, State law, and local ordinances. A review of zoning restrictions, including hazard regulations (e.g., flood plain restrictions), is conducted for each proposed project in the unincorporated County by the Development Review staff. Development Review also conducts environmental review under the California Environmental Quality Act (CEQA) and ensures compliance with mitigation measures and permit conditions of approval.

Building and Safety

The Building and Safety Division provides property and permitting information to the public. The Division processes, reviews, and approves ministerial zoning permits, enforces the County's ordinances and zoning code, performs plan reviews, and inspects construction projects for compliance with building codes. It is also responsible for reviewing plans and inspecting grading for code compliance. Additionally, the Division conducts housing inspections, issues film permits, and provides safety reviews on oil operations for the Energy Division.

Energy

The Energy Division develops policy recommendations, administers mitigation programs, processes permit applications, and assures permit compliance for oil and gas and other energy development and transportation projects within the unincorporated county. The Energy Division oversees offshore projects and their related onshore facilities. It is also responsible for enforcing the Petroleum Ordinance for onshore oil and gas operations.

Santa Barbara County Department of Public Works

The County of Santa Barbara, Public Works Department is comprised of five divisions and each division performs functions that are directly related to hazard mitigation. Some of the most commonly referenced resources from the Department include road closures, coordination with local utility providers, rainfall statistics, and storm projections. Public Works Department is a key MAC member representing mitigation planning for flood hazards, debris management, and transportation

Public Works' Mission

The mission of the Public Works Department is to provide, operate, and maintain public works infrastructure, facilities, and services to make everyday life as safe and convenient as possible.

Water Resources Division and Flood Control & Water Conservation District

The Water Resources Division is comprised of office and technical staff and the Santa Barbara County Flood Control and Water Conservation District (Flood Control District) includes field maintenance shops in Santa Barbara, Lompoc, and Santa Maria to maintain hundreds of miles of creeks, channels, and rivers, including 26 miles of levees in the Santa Maria Valley. Office staff includes engineering, environmental, hydrology, and administrative services.

Construction of flood control and drainage system facilities has been taking place throughout the county since the Flood Control District was formed in 1955. The Flood Control District maintains an extensive amount of storm drains, channels, dams, debris basins, and sediment basins. The Flood Control District, within the Water Resources Division, also implements programs and projects designed to protect public and private property against flood risks and hazards. The most significant programs are the National Flood Insurance Program (NFIP) and the County's Floodplain Management Program. Capital improvement and ongoing maintenance projects are designed to reduce flood risks and enhance the environment by providing protection for property and minimizing flood hazards.

Water Conservation and Management

The Santa Barbara County Water Agency was established by the state legislature in 1945 to control and conserve storm, flood, and other surface waters for beneficial use and to enter into contracts for water supply. Today, the County Water Agency is primarily involved in projects for the storage, diversion, transportation, delivery, and sale of water. It prepares investigations and reports on the County's water requirements, the water needs of projected development, and the efficient use of water. It provides technical assistance to other County departments, water districts, and the public concerning water availability and water well locations and design. The Water Agency also administers the Cachuma Project and the Twitchell Dam Project contracts with the USBR.

Urban Drainage

The Flood Control District has constructed numerous underground storm drain-pipe systems in urbanized areas that serve a regional benefit. These systems carry the water safely to a major channel or the Pacific Ocean. Maintaining the underground storm drain-pipe system in operation and repairing or replacing worn or damaged facilities is a major ongoing obligation.

Major Channels

Over 200 miles of major channels carry peak flood runoff from the hills and upland areas safely through the developed communities in the valley and coastal plain. They also provide an outlet for the extensive urban drainage system extending throughout urbanized areas. Wherever possible, the Flood Control District encourages the preservation of natural creek channels as open space green belts. These generally require more maintenance than modified channels. Maintenance and repair of the channels is a major ongoing obligation.

The Flood Control District maintains over 200 miles of major channels to ensure conveyance of peak flows to prevent damaging flooding in communities throughout the county.

Flood Control Devices

The Flood Control District's dams and retarding basins are used for flood control, debris control, and water conservation. These dams require continual maintenance to assure the structural stability of the dams and the operational readiness of their mechanical equipment.

The Public Works Department and its divisions are responsible for the construction/physical aspects of implementing structural mitigation projects. Mitigation measures minimize the damage to the infrastructure in the event of a natural or man-made disaster. Some examples of where mitigation measures could be implemented are retrofitting bridge structures, placing cable mesh netting on slopes that are prone to rock falls, constructing retaining walls on slopes that are prone to slides, lengthening and raising bridges to reduce the flooding impacts, and installing scour mitigation at bridges that have been identified as scour critical by Caltrans.

Automated Local Evaluation in Real-Time Flood Warning System

County Public Works Water Resources Division (Hydrology Section) maintains and operates a comprehensive Automated Local Evaluation in Real-Time (ALERT) storm monitoring system consisting of rain gauges, weather sensors, stream flow gauges, and reservoir level and gate opening gauges.

The automated storm monitoring system consists of County-wide real-time transmitting gauge installations, including 72 ALERT rain gauges, 16 ALERT stream-flow gauges, 10 ALERT Weather stations, and six ALERT Reservoir gauge sites.

Once a predefined significant change in any of the parameters has occurred a transmission is sent from the sensor to the base station located at the District Office. The data is used in conjunction with computer models to determine the location and timing of potential flooding. District staff coordinates with the National Weather Service (NWS) and other emergency services to advise the public and reduce the damages to life and property from flooding. In addition, the ALERT network has been instrumental in guiding reservoir operations to maximize both flood control and water supply benefits.

The flood warning system also can issue automated cell phone and email messages if established thresholds (rain/stream/reservoir) have been exceeded. This valuable warning system enables District personnel to be immediately informed of potential flood risk information that may result in more timely and detailed field observations, coordinated agency action plans, and remediation action.

Transportation Division

The Transportation Division supports this mission by inspecting, maintaining, repairing, replacing, and improving all infrastructure within the County's Road Right-of-Way. This includes roadways, bridges, culverts, and drainage structures. The Transportation Division is responsible for the maintenance of approximately 900 center lane miles of roads, or approximately 1,800 lane miles, approximately 110 bridge structures, 4200 drainage structures (including culverts and drop inlets), 65 traffic signals (including flashing beacons), thousands of signs, and striping on the majority of the county's 900 roads.

The Transportation Division ensures that these facilities are maintained through preventative maintenance programs, capital improvement projects to replace structurally deficient structures, and the construction of vital links in the County's roadway infrastructure. In addition, the Transportation Division continually inspects all infrastructures and identifies hazards likely to impact County-owned facilities.

During a hazardous or disaster event, the Transportation Division maintenance staff immediately transforms into an emergency response organization that includes the design, traffic, and construction sections. A local base of operations (called a Department Operations Center [DOC] located in north and south county) is established to coordinate personnel and resources to immediately respond to hazardous conditions as they are identified by Public Works staff, local agencies, and the public. The DOC becomes a base of operations and collection center for information, inspection/ damage reports, EOC support, and response strategies as they are developed.

The County's Transportation Division responds to hazardous or disaster events that affect County roads, including flooding and washouts during storms. Photo: Noozhawk.com

In addition, monitoring with the Flood Control District (discussed further in *Water Resources Division* above) is coordinated with the Transportation Division for public information, as well as dispatch to the California Highway Patrol and Sheriff and dispatch to their construction and maintenance staff for road warnings and closures as needed. Staff is deployed to mitigate potential Public Health and Safety hazards on the roadway system and inspect critical structures, as well as oversee any contracted clean-up or construction crews. Transportation staff is well-rehearsed in disaster response training, having experienced declared disasters in 1993 (FEMA-979) 1995 (1044-1045), 1998

(FEMA-1203), 2001 (State Proclamation 2001-01), 2005 (FEMA-1577), 2007 (Zaca), 2008 (Gap), 2009 (Tea-Jesusita), 2010 (FEMA-1952), 2011 (State Proclamation), 2017 (FEMA-3396, FEMA-5224, FEMA-4308, FEMA-4305), 2018 (FEMA-5252, FEMA-4353), 2019 (FEMA-5303, FEMA-4431) and 2020 (FEMA-4482, FEMA-3428). During past declared disasters and other lesser events, staff performed exceptionally in quickly and thoroughly reacting to the changing conditions and requirements of emergency response. The Public Works Department and the Transportation Division in concert with the Flood Control District have a pre-planned routine for an emergency response to assure FEMA reimbursement by using the correct documenting and reporting techniques with pre-assigned teams responsible for inspecting critical facilities and performing as flexible response units. All the disaster locations are identified and numbered and called into the DOC and the EOC (if activated).

Developing proper mitigation strategies and designs for these hazards is part of the mission of this division. All four of the Transportation Division's sections work together to accomplish the mission statement. The four sections are Engineering, Traffic, Construction/ Permits, and Road Maintenance. Their roles are described in further detail below:

Engineering Section - Provides engineering needs related to new construction and rehabilitation of roads in the unincorporated area of the county. The Engineering Section is also responsible for the construction of bridges, culverts, bike lanes, and sidewalks. Engineering staff develops design engineering for all major and routine road maintenance projects and capital improvement projects within the road right of way, oversees the preparation of construction grant applications for Federal and State funding, manages any needed bidding for major road maintenance and construction projects, coordinates permit and environmental review, and plays a major role in administering and overseeing construction work performed by private contractors, including bridge management system and storm repair and restoration.

In response to a disaster, the Engineering Section:

- Performs immediate inspections of critical facilities to determine response strategies. This includes inspections of bridge structures, rock fall protection measures, drainage facilities, and roadways.
- Working together with the Construction and Maintenance Sections, properly trained staff survey the entirety of the County road system expeditiously and thoroughly, and rapidly respond to ensure public safety and protection of property.
- Develops and implements mitigation strategies to avoid further damage to critical facilities, or to reduce/avoid damage during future hazard events.
- Develops permanent designs to mitigate hazards, through construction/rehabilitation/retrofit strategies.
- Develops short and long-term inspection programs to monitor the degradation of transportation facilities due to natural hazards, and to develop mitigation strategies to avoid severe slides or other dangerous situations before disasters occur.

- Periodically works with County Fire, OEM, and other emergency response agencies to keep key roadways and facilities critical for fire suppression and/or resident evacuation open and accessible to emergency vehicles and resident traffic.

Traffic Section - Provides transportation planning and traffic engineering for the county's unincorporated areas; prepares and reviews transportation improvement plans (TIPs), community plans, traffic impact studies, general plans and specific plans for proposed development projects; and performs the operation and design functions, including traffic signal repair and maintenance, striping and signage of roads, design and construction of bikeways and pedestrian facilities, traffic and turning movement counts, design of minor safety and operational improvements, computerized traffic modeling, and evaluation of requests for stop signs, parking restrictions, speed limit changes, and traffic signals.

In response to a disaster, the Traffic Section:

- Performs inspections of critical traffic control facilities to determine response strategies to ensure the safety of the traveling public. This includes inspections of traffic control signals, signs, and potential electrical hazards.
- During major natural or man-made disasters, the Traffic Section would assist emergency services agencies to determine viable alternate routes and detours to avoid hazardous disaster areas, emergency repair sites, and staging areas.
- Works to quickly restore transportation access/infrastructure to avoid economic disruption and ensure public safety.

Construction/Permits Section - Inspects the construction for all projects that are constructed within the road right of way, including road rehabilitation, preventative road maintenance, and capital improvement projects. In addition, this group verifies all County road rights-of-way before the start of any road encroachment operations or activity by individuals, corporations, utilities, cites, and other governmental agencies; issues permits for construction activity within, under, or over the County right-of-way; and performs final review and inspections to ensure that construction activity meets Federal, State and County standards.

In response to a disaster, the Construction Section:

- Performs inspections of infrastructure and facilities to determine response strategies. This includes inspections of bridge structures, rock fall protection measures, drainage facilities, and roadways. Working together with the Engineering and Maintenance Sections allows for properly trained staff to survey the entirety of the county expeditiously and thoroughly.
- Develops and implements mitigation strategies to avoid further damage to critical facilities, or to reduce/avoid damage during future hazard events.
- Perform inspections of emergency repairs, direct construction crews during emergency construction and cleanup operations.

Road Maintenance Section - Provides major and routine maintenance of the County's road system and management of 13 different County road maintenance programs, including surface treatment, roadway and bike path surface maintenance, street tree maintenance and sidewalk surface grinding, roadway slope repair, weed and brush removal, traffic control maintenance/safety assessment, and culvert maintenance; cooperates with other public agencies and with private parties to promote the safe use of the county's roadways, and oversees private contractors that may be involved in major road maintenance projects.

In response to a disaster, the Maintenance Section:

- Maintenance crews perform emergency repairs to critical facilities, and clear roadways of debris and water, to restore access to the public and County staff.
- Oversee contractors performing emergency repairs and clean-up operations.

On an annual basis, the Maintenance Section:

- Performs annual culvert inspection program, including maintaining the Culvert Inventory Project, which has worked to determine the condition of all culverts within the maintenance system and prioritize which culverts need repairs or replacement.
- Performs annual roadway inspection program to monitor slipping, cracking, etc. to formulate maintenance projects to prevent slides, and washouts of roadways and accompanying infrastructure.
- Periodically works with County Fire and other emergency response agencies to keep key roadways and facilities critical for fire suppression open and accessible to emergency vehicles and resident traffic.
- Implements fire abatement program along roadways, involving vegetation control to avoid fires and to provide a wider break in the event of a wildfire.

Resource Recovery and Waste Management Division

The Resource Recovery and Waste Management Division is responsible for the cost-effective management of solid waste and utilities in the unincorporated county. The Resource Recovery and Waste Management Division's comprehensive program for the management of solid waste includes the collection, recycling, and disposal of solid waste, and the abatement of illegal dumping of waste. The County maintains one active landfill (Tajiguas).

There are four sections within the Resource Recovery and Waste Management Division, each responsible for performing a unique series of functions:

- Collection and Materials Management Section manages the County's resource recovery and waste diversion programs (community programs), reviews, and manages long-range solid waste management plans, and oversees the County's solid waste collection franchises for regularly generated solid waste.
- Operations Section manages waste processing and disposal operations at the County's transfer stations and active landfills.
- Engineering Section prepares all engineering and geologic plans and documents for the County's solid waste facilities and monitors all active and closed landfills currently or previously owned by the County to ensure ongoing compliance with the many Federal and State regulations governing the environmental safety of each facility.

- Utilities Section manages and operates the Laguna Wastewater Treatment Facility serving the unincorporated area of Orcutt in north county, and provides engineering and administrative support (i.e., billing) to the County's underground utility program and the County-administered wastewater, water, and street lighting districts located throughout the unincorporated areas of the county.

In coordination with the Transportation and Water Resource Divisions of Public Works, the principal natural hazard mitigation related function of this division is debris management planning in a pre-disaster environment and debris disposal post-disaster, of debris generated from Public Works infrastructure. For example, following the January 2018 debris flows associated with the Thomas Fire, immense amounts of sediment and debris excavated from channels and roadways in Montecito were disposed of in landfills including Tajiguas Landfill.

County Surveyor's Office

The mission of the County Surveyor's Office is to provide quality surveying services through the creation, maintenance, and protection of land-based records for public and private resources. The County Surveyor is designated in responsible charge of Land Surveying services provided by the Public Works Department. The Division has been allocated nineteen full-time positions and has five general areas of responsibility. They are 1) Checking and recording subdivision maps and documents, 2) Providing survey-related data to the general public, 3) Providing record map and document research and professional land surveying advice to the Public Works Department, 4) Conducting field surveys for County projects, 5) Administration of various State and local programs, and 6) Providing real property services for the Public Works Department.

Administration

The administration division has the Office of the Disaster Recovery Manager (DRM). This position is responsible for coordinating the Public Works response in a post-disaster environment to ensure that Federal and State disaster relief programs are handled efficiently and to the maximum benefit of the residents of Santa Barbara County. Additionally, Public Works has an ongoing Mutual Aid Plan that has been adopted by the Board of Supervisors which is managed by the DRM in which all the cities in the operational area may request disaster assistance in the form of labor, equipment, and/or materials for their Public Works Department. This has been accomplished by the Cities joining the County Mutual Aid Plan by City Council Adoption which is linked to the Statewide Public Works Mutual Aid Plan which assures reimbursement eligibility from the California Governor's Office of Emergency Services (Cal OES) and Federal Emergency Management Agency (FEMA).

The Public Works DRM, in addition to the responsibility of managing all disasters for the Public Works Department under the Federal and State Public Assistance Program, also manages, alongside chosen representatives from Public Works, the Public Works 5-Year *Capital Improvement Program* (refer to Section 4.2.3, *County Regulatory Mitigation Capabilities - Capital Improvement Plan*). For Public Works, this is a $584,968,000 funded and non-funded list of capital projects (<$100,000) report that is in creation (design) to completion (construction) from all the divisions in Public Works on behalf of the Director. As these are all new or upgraded projects, the opportunity to include hazard mitigation safety measures for each project is reviewed and discussed. In some cases, a Capital Improvement Plan (CIP) project may identify MJHMP funding from FEMA as the main source of revenue for that project, such as seismic upgrades for facilities, or steal pile retaining walls to replace the outdated wooden, more solid pile walls, tire revetment retaining wall and or drainage increases at major locations that elevates flooding and/or water retention.

Santa Barbara County Community Services Department

> **CSD's Mission**
>
> To provide community, cultural, recreational, and environmental resources that sustain and enhance quality of life for all who live, work, and play in Santa Barbara County.

The Community Services Department oversees recreational and cultural resources, including parks, cultural arts events and recreation, libraries, sustainability, affordable housing, and other services that improve the quality of life for County residents. The Community Services Department is a key MAC member, informing the MJHMP update concerning countywide community resources (e.g., parks and recreation), housing, and sustainability. The divisions of the Community Services Department that have a role in mitigation include:

Parks Division

The Parks Division maintains 360 acres of developed land and 1183 acres of open space, over 100 miles of trails and coastal access easements, and the grounds surrounding the County Courthouse building. Park rangers or hosts reside in every major park to provide public assistance and supervise the grounds, enjoyed by over seven million people annually. As pertains to natural hazard mitigation, the Park Department's role includes facility and infrastructure development, construction, and protection, hazard prevention, and public safety on Park lands.

Santa Barbara County Housing & Community Development Division

The mission of the Housing & Community Development Division (HCD), working in cooperation with County citizens, cities, governmental entities, commercial interests, and other valuable county stakeholders, is to:

- Coordinate the development and implementation of regional strategic housing and community development processes that respect local needs, priorities, and our natural environment, which lead to the development of healthy and viable neighborhoods and improved quality of life for all in our region.
- Lead this community-building effort by developing partnerships to create a full spectrum of housing; building creative strategies for economic vitality; promoting advocacy & educational activities on healthy growth and well-designed development initiatives.

These two mission areas for the HCD are closely linked to mitigation in that the department wants to ensure the development it promotes is safely constructed and well-sited in relation to the risk of identified natural hazards.

Sustainability Division

The Sustainability Division collaborates regionally to facilitate and implement equitable climate policies, programs, and projects that empower communities and improve quality of life. The

Sustainability Division leads the coordination of the County's CAP. The Division is currently working on developing the 2030 CAP which seeks to reduce greenhouse gas emissions by 50 percent below 2007 levels by 2030. The 2030 CAP will also include resilience and mitigation measures. Sustainability has also received funding to develop an Energy Assurance Plan that would assist the County with planning for and responding to natural and man-made events and emergencies that often result in a decrease or total outage of energy that is needed to sustain critical functions and essential services.

Santa Barbara County Public Health Department

The County of Santa Barbara Public Health Department oversees health programs, environmental health, animal services, disease prevention, emergency medical services, and health promotion. The Public Health Department serves as an LPT member to inform the development of the MJHMP update. The Public Health Department was intrinsically involved in the development of the MJHMP, including providing information regarding conditions of the COVID-19 pandemic in the County, health care response capabilities and capacities, and the County's response to address the pandemic. During the preparation of future updates of the MJHMP, the Public Health Department, as well as other healthcare organizations at the discretion of OEM, shall be invited to participate in the County's hazard mitigation planning on the MAC in addition to the LPT.

Public Health's Mission

The mission of the Public Health Department is to improve the health of our communities by preventing disease, promoting wellness and health equity, while ensuring access to needed health care, and maintaining a safe and healthy environment.

Primary Care and Family Health

The Primary Care & Family Health Division provides primary (including obstetrical services) and specialty care at eight Federally Qualified Health Centers in Santa Barbara, Carpinteria, Santa Maria, and Lompoc. More than 120,000 patient visits are provided each year to low-income, uninsured, and underinsured families, adults, and children. Pharmacy and clinical laboratories are also provided within the Health Care Centers.

There are approximately 350 employees, including physicians, nurse practitioners, and physician assistants, who supplement a teaching program (Internal Medicine and Surgical) to provide comprehensive multi-specialty services across the county. The Primary Care & Family Health Division is also responsible for administering the California Medical Services programs and the Medically Indigent Adult Program.

The Health Care Centers are Carpinteria, Franklin, Lompoc, Santa Barbara, and Santa Maria, as well as three servicing homeless shelters.

Community Health

The Community Health wing oversees nutrition services, epidemiology, maternal child and adolescent health, disease control and prevention, sexual assault response, public health laboratories, environmental health, emergency medical services, animal health services, and health education. Since 2020, the Public Health Department has maintained a COVID-19 Public

Information Portal with information about the virus, testing, vaccines, and resources, as well as daily data including confirmed cases and deaths.

The Community Health wing is also using grant funds from PG&E and the California Resilience Challenge to engage communities to develop conceptual designs for at least three pilot climate resilience centers or "Resilience Hubs" (i.e., two in north county, one in south county) that serve residents who are most vulnerable or at high risk during disasters. These centers utilize existing and trusted locations, such as schools, community centers, churches, and government buildings. Designed in partnership with residents, they offer support before, during, and after climate-related disruptions with services like:

- Providing clean air during smoke events
- Acting as cooling locations during extreme heat
- Distributing food
- Serving as a hub for emergency services
- Facilitating disaster preparedness training and neighborhood organizing
- Hosting off-grid charging during power outages or shutdowns

Administration, Support, Finance

The Administration, Support, and Finance teams work on providing services including information technology, human resources, safety, contracts, tobacco settlements, accounting, patient information, and facilities. These staffers work to ensure the Public Health Department can meet its strategic goals as well as its day-to-day operations.

Santa Barbara County General Services Department

The General Services Department provides a wide range of services, including administrative and financial support, such as risk management, purchasing, and a back-to-work program, support services such as facilities management, capital projects, and vehicle operations, and information technology services such as computer services, communications, imaging and copy services, and government TV access.

General Services Dept's Mission

The mission of the General Services Department is to provide a full range of services, guidance, and expertise that enables County government to deliver public services effectively.

General Services delivers an array of support services to County departments and prides itself on excellent customer service. Services provided by General Services include:

- Capital Improvements provides full-service planning, design, and construction of new County occupied facilities, including remodels and related projects for County departments. The Office of the County Architect provides services related to space planning and utilization in addition to the management of historical projects.
- Facility Management (including Energy Management) promotes a safe and healthy environment for County employees and visitors. It provides a full range of maintenance services and coordinates contracts for custodial and landscaping services for County-owned structures.

Facilities also include county-wide Energy Management efforts to improve the efficiency of the County's facilities and reduce our utilities.

- Finance and Administration support the department's mission by delivering successful Budgeting and Finances, Human Resources, county-wide utility processing, and Information Technology support.
- Information and Communications Technology (ICT) enables County departments to provide effective services to citizens through innovative technology solutions. The Division delivers reliable information technology, telephone, and public safety radio network systems. Services include Windows infrastructure and email services, web hosting, and network security systems. These services are used by Santa Barbara County employees and partners. In coordination with the County's Chief Information Security Officer (CISO), ICT is the central response division for responding to cybersecurity incidents.
    - Public Safety Radio Communications is a branch of the ICT division that provides portable and mobile microwave radio communications across the county's diverse terrain supporting Fire, Sheriff, Probation, EMS, and General Government communications in conjunction with our partner agencies.
- Purchasing, Mail Service & Surplus Property provides procurement services for County departments and encourages partnerships with local vendors on services and consumable commodities. This team also provides inter-office and US mail delivery, and movement of equipment, furniture, and disposition of surplus property.
- Real Estate Services Real Property provides professional real estate services to meet the needs of the County by preparing and negotiating real property transactions including leases, sales, and acquisitions.
- Vehicle Operations meets the transportation needs of the County by procuring, maintaining, and disposing of all light, medium- and heavy-duty vehicles and equipment, administration of the motor pool, and the fuel station operations.

The Department of General Services plays a key role in hazard mitigation, Countywide emergency preparedness, and support of an emergency response or threat. Each functional area represented above is an active member of the County Logistics Team, playing a key role in support of an incident, staffing the County/Operational Area EOC's Logistics Section, as well as continuing to deliver a continuity of mission-critical County Services during an event.

Santa Barbara County Agricultural Commissioner and Weights & Measures Program

> **Agricultural Commissioner's Mission**
>
> To improve and protect agriculture, natural resources, and the quality of life in Santa Barbara County.
>
> **Weights & Measures' Mission**
>
> The mission of the Weights and Measures Program is standardizing weights and measures involved in commercial transactions to protect consumer interests.

The Agricultural Commissioner and Weights & Measures Program regulate pesticide use by enforcing State laws and regulations to ensure the proper, safe, and effective use in production/non-production agriculture and non-agricultural settings. The department also inspects incoming commercial and private shipments of plants entering the county by truck and air from foreign countries, other states, and around California for compliance with plant import requirements. The department inspects and certifies commodities being exported for freedom of insects, diseases, and other quarantine pests. It also inspects and certifies farmers markets and producers upon demonstration of compliance with direct marketing and quality standards. Inspect producers, handlers, processors, and retailers to enforce the Federal Organic Foods Production Act of 1990 and the California Organic Products Act of 2003.

The Weights & Measures Division protects the consumer from fraud and assures that what consumers pay relative to a product's weight, volume, count, duration, or advertised price is appropriate for what they receive.

During disasters, this office gathers and compiles crop loss data to determine eligibility for Disaster Declarations and associated aid. Since agricultural pests and diseases were identified as a hazard of concern, the Agricultural Commissioner's Office will continue to serve on the MAC to reduce the risk to agricultural production from future pests and diseases. Additionally, the County's "Ag Pass" program provides a uniform way to identify vetted commercial farm and ranch owner-operators and their employees to firefighting personnel, California Highway Patrol officers, Sheriff's deputies and other law enforcement officers, and other emergency personnel. Possession of an Ag Pass during a wildfire or a similar disaster (or, "all-hazard" emergency) potentially allows the agriculturalist limited emergency access to areas that may otherwise be restricted to the public, to 1) protect or care for agricultural assets (such as irrigating crops or feeding, watering, and transporting livestock) and/or 2) provide support information to emergency personnel (such as identifying access roads and water points).

Beach Erosion Authority for Clean Oceans and Nourishment (BEACON)

The Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) is a two-county, multi-city, California Joint Powers Agency established in 1986 to address coastal erosion, beach nourishment, and clean oceans within the Central California Coast from Point Conception to Point Mugu. The member agencies of BEACON include the counties of Santa Barbara and Ventura as well as the coastal cities of Santa Barbara, Goleta, Carpinteria, Ventura, Oxnard, and Port Hueneme. The BEACON Board is made up of two Supervisors from each county and one counsel person from each coastal city for a total of ten board members. BEACON is staffed by a combination of specialist consultants with participation from member agency staff. Funding for

BEACON comes through annual agency membership dues and grant funding from State and Federal Agencies. Specific coastal studies and project development activities are contracted out by BEACON to other agencies or consultants. A full organization chart for BEACON can be seen under BEACON Organization (BEACON 2021a).

BEACON is involved in an array of coastal studies and projects within its jurisdiction and works in close coordination with the parks, planning, and public works departments of BEACON's member agencies. In recent years, BEACON has worked to help its members address climate change planning, with a focus on both hazard mitigation and adaptation strategies (BEACON 2021a). Key BEACON projects and reports include the Coastal Regional Sediment Management Plan, Managing Beach Ecosystems, the Kelp Anchor Demonstration Project, Debris Basins Project, the Oil Piers Artificial Reef Project, and the South Central Coast Beach Enhancement Program. Recently, BEACON has focused on the impacts to beaches from debris flows after the massive 2017 Thomas Fire, including sediment removal and deposition/disposal, rocks and boulders at creek mouths, beach growth, and water quality impacts (Governor's Office of Planning and Research (OPR) 2021).

Starting in January 2021, the BEACON Science Advisory Committee has been meeting and reviewing how science research and data collection can be improved enhanced and expanded to increase alignment with and better inform decision-making, and to better address the related topics of regional sediment management, coastal resource and ecosystem management, kelp forest restoration, and regional climate change and sea level rise adaptation planning (BEACON 2021b). The Santa Barbara Littoral Cell drains several large coastal watersheds providing sediment and sand to the coast. This coastal region faces many threats and many challenges, including many management and governance demands, requiring BEACON to seek out the best available science and support any new initiatives, or activities that would assist with improved decision-making and improved outcomes. BEACON can serve as a facilitator, connecting regional to local coastal resilience, science, and decision-making (BEACON 2021b).

Santa Barbara County Air Pollution Control District (APCD)

In 1970, the California Legislature gave local governments primary responsibility for controlling air pollution from all sources except motor vehicles. In response, the Santa Barbara County Board of Supervisors formed the Santa Barbara County Air Pollution Control District (APCD). The APCD is a local government agency that works to protect the people and the environment of the county from the harmful effects of air pollution. The APCD was originally part of the county government. In 1994, the District became an independent agency because state legislation added city representatives to the governing Board. The District Board consists of each of the five County supervisors plus a city council member or mayor from each of the county's eight incorporated cities. APCD staff includes meteorologists, engineers, environmental scientists, planners, inspectors, and administrative personnel. The Board meets at locations in Santa Barbara and Santa Maria and is sometimes advised by the Community Advisory Council.

APCD is the countywide resource for air quality-related matters and remains engaged in all incidents involving and/or affecting local air quality. However, APCD is not a first-responder agency. The first-responder agency to handle air impacts is the U.S. Environmental Protection Agency (EPA) Regional Response group, which has 24/7 response capabilities, including aircraft- and ground surveillance with air monitoring and sampling, as well as radiation detection. APCD can also recommend additional subject-matter experts as needed depending on the emergency scenario. APCD has a rotating Duty Officer at APCD that can be reached at the following email address: dutyofficer@sbcapcd.org (APCD 2022)

Engineering Division staff of the APCD issues and enforces permits and works with businesses to help them comply with issued permits, inspects businesses, responds to complaints from the public, implements the federal Title V program for large sources of air pollution, and implements the state's air toxics "Hot Spots" program for sources of toxic air pollution. Compliance Division staff enforces permits and works with businesses to help them comply with permits, inspects businesses, responds to complaints from the public, implements the federal asbestos program, oversees the APCD's open burning program, and handles petitions for variances and breakdowns. Planning Division staff monitors the air in the county, prepares Clean Air Plans to show how the county will meet clean-air standards, develops rules, implements clean air technologies, reviews environmental documents for compliance with the California Environmental Quality Act (CEQA), and educates and assists businesses and the public about ways to reduce air pollution. During wildfires or other events that generate hazardous emissions, APCD monitors, reports, and advises the public on actions or precautions to take to avoid air quality hazards such as particulate matter. APCD works directly with public health to notify the public and respond to changing conditions and needs during wildfires (Air Pollution Control District (APCD) 2021).

4.2.3 County Regulatory Mitigation Capabilities

There are many plans, programs, codes, and policies that help govern the County of Santa Barbara. The purpose of this section is to present pertinent plans, programs, codes, and policies that support risk education and reduction and/or help to implement mitigation measures. It is important to note that during the Local Hazard Mitigation Plan update planning process, these plans, programs, codes, and policies are evaluated to determine their effectiveness in risk education and reduction efforts, and their usefulness to implement mitigation measures. Any shortfalls or areas where the plans, programs, codes, and policies could be improved or expanded were identified and captured under annual review, the annual planning process, and Chapter 7.0, *Mitigation Plan* of this plan. If no mitigation actions were identified, then it can be assumed that the planning team determined that no shortfalls or areas for improvement are needed. Additionally, information gleaned through the MJHMP update process will be used in the plans, programs, codes, and policies update process. Below is a summary of the more significant relevant plans, programs, codes, and policies adopted by the County.

Planning and regulatory capabilities are based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner, while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning. Regulatory capability also includes the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built, as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision-making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools or programs in place or under development for the County, along with their potential effect on loss reduction. This information will help identify opportunities to address gaps, weaknesses, or conflicts with other initiatives and integrate the implementation of this plan with existing planning mechanisms where appropriate.

Table 4-9 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the County. An "X" indicates that the given item is currently in place and being implemented, an "NA" indicates that the jurisdiction would not be expected to have an associated plan, and a blank box indicates the jurisdiction does not support the resource. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the MJHMP.

Table 4-9. Multi-jurisdictional Capability Summary of Relevant Plans, Ordinances, and Program

	County of Santa Barbara	City of Buellton	City of Carpinteria	City of Goleta	City of Guadalupe	City of Lompoc	City of Santa Barbara	City of Santa Maria	City of Solvang	Montecito Water District	Carpinteria Valley Water District	Montecito Fire Protection District	Cachuma Operation and Maintenance Board	Santa Maria Valley Water District	Goleta Water District
Comprehensive Plan/ General Plan	X	X	X	X	X	X	X	X	X	NA	NA	NA	NA	NA	NA
Land Use Plan/Element	X	X	X	X	X	X	X	X	X	NA	NA	NA	NA	NA	NA
Zoning Ordinance	X	X	X	X	X	X	X	X	X	NA	NA	NA	NA	NA	NA
Subdivision Ordinance	X	X	X	X	X		X	X	X	NA	NA	NA	NA	NA	NA
Floodplain Ordinance	X	X	X	X	X	X	X	X	X	NA	NA	NA	NA	NA	NA
Erosion, Sedimentation, and Pollution Control Ordinance/ Plan	X	X	X	X	X	X	X		X	X	X	X			
Other Special Purpose Ordinance (stormwater, growth management, wildfire)	X	X	X	X	X		X		X	X	X	X			
Building Code	X	X	X	X	X	X	X	X	X						

Table 4-9. Multi-jurisdictional Capability Summary of Relevant Plans, Ordinances, and Program (Continued)

	County of Santa Barbara	City of Buellton	City of Carpinteria	City of Goleta	City of Guadalupe	City of Lompoc	City of Santa Barbara	City of Santa Maria	City of Solvang	Montecito Water District	Carpinteria Valley Water District	Montecito Fire Protection District	Cachuma Operation and Maintenance Board	Santa Maria Valley Water District	Goleta Water District
Fire Department ISO Rating	5/ 5x				4										
Stormwater Management Program	X	X		X			X	X	X						
Site Plan Review Requirements	X	X	X	X	X	X	X	X	X	X			X		
Capital Improvements Plan	X	X	X	X	X	X	X	X	X				X		X
Economic Development Plan		X		X			X	X	X						
Local Emergency Operations Plan	X	X	X	X	X	X	X	X	X	X					
Flood Insurance Study or Other Engineering Study for Streams	X	X	X	X	X	X	X	X	X						
Elevation Certificates	X														
Emergency Management Plan	X	X	X	X	X	X	X	X	X						X
Regional Emergency Response Plan					X			X		X			X		
Community Wildfire Protection Plan	X[1]		X	X			X					X			
Local Wildfire Mitigation Plan						X									
Local Wildland Fire Plan				X			X								
Tsunami Response Plan	X						X								

[1]Community Wildfire Protection Plans are adopted by the County only for Mission Canyon and Eastern Goleta Valley

Other Special Plans or Resources:

- State: AB 2140 legislation allows California counties and cities to adopt their current, FEMA-approved local hazard mitigation plans (LHMPs) into the Safety Element of their General Plans. This adoption makes the county or city eligible to be considered for part or all of its local-share costs on eligible Public Assistance funding to be provided by the state through the California Disaster Assistance Act (CDAA).
- County: Coastal Ecosystem Vulnerability Assessment, CCVA, CCAP, Strategic Energy Plan, Energy Assurance Plan, SBCAG Transportation Network Vulnerabilities Assessment, Disaster Debris Management Plan, Hazardous Materials Area Plan
- Montecito Water District (MWD): Emergency Action Planning (EAP) for Juncal Dam, Draft Groundwater Sustainability Plan, Recycled Water Facilities Plan, USBR Water Management Plan, Urban Water Management Plan
- Montecito Fire Protection District (MFPD): Strategic Plan, Wildland Fire Initial Attack, Retrospective Study
- Santa Barbara: El Estero Wastewater Treatment Plant Facility Plan, Urban Water Management Plan, EOC Activation Plan
- Cachuma Operation and Maintenance Board (COMB): Infrastructure Improvement Plan, Lake Cachuma Water Quality and Sediment Management Study
- Carpinteria Valley Water District (CVWD): Water Management Plan, Agricultural Water Management Plan, Urban Water Management Plan, Groundwater, Recycled Water Facilities Plan
- Carpinteria: Emergency Operations Plan
- Goleta: Emergency Operations Plan, Strategic Energy Plan
- Goleta Water District (GWD): Water Supply Management Plan, Groundwater Management Plan, Urban Water Management Plan, Drought Preparedness and Water Shortage Contingency Plan, Infrastructure Improvement Plan 2020-2025
- Solvang: Water System Master Plan
- BEACON: 2021 Strategic Plan
- Regional: SBCAG/Ventura County Transportation Commission/Caltrans Transportation Emergency Preparedness Plan

Other Special-Purpose Ordinances:

- MFPD: Development Standards for Fire Access and Vegetation Management, Fire Code
- CVWD: Drought ordinance

As indicated in Table 4-9, the County has several plans and programs that guide development in hazard-prone areas. Starting with the County Comprehensive Plan, which is the most comprehensive of the County's plans when it comes to mitigation, some of these are described in more detail below.

County Plans

Comprehensive Plan

The County Comprehensive Plan is a "comprehensive, long-term general plan" that governs the future growth and development of the unincorporated county. The County Comprehensive Plan contains land use goals, policies, and implementation measures within each of its elements. Mandatory elements include land use, circulation, housing, conservation, noise, safety, environmental justice, and open space. The County Comprehensive Plan also includes a Hazardous Waste Element and a Hazardous Facilities/Materials Supplement as well as an element on environmental resource management. The County Comprehensive Plan addresses several components of hazards and mitigation. The County Comprehensive Plan identifies procedures for protecting watersheds such as installing debris basins and silt traps at development sites to remove sediment from runoff, planting temporary vegetation to thwart erosion, and facilitating stormwater conveyance. The Seismic Safety and Safety Element contains goals, policies, and implementation measures aimed at identifying, avoiding, and mitigating the County's geologic, seismic, flood, and wildfire hazards. In addition, this MJHMP and Safety Element share similar goals, and the MJHMP is incorporated into the Safety Element by reference.

Key goals of the Safety Element include:

- Protect the community to the extent feasible from risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche and dam failure; slope instability leading to mudslides and landslides; subsidence, liquefaction, and other seismic hazards.
- Protect the community from unreasonable risks associated with the effects of wildland and urban fires.
- Protect the community from unreasonable risks of flooding.

The Safety Element is currently undergoing an update to address climate change-related hazards such as sea level rise, human health hazards, and drought. This update will be informed by the CCVA and this MJHMP Update.

The Housing Element is also currently undergoing an update to address the 6th Cycle Regional Housing Needs Assessment (RHNA) for unincorporated areas of the county. This update will be informed by the CCVA and this MJHMP to ensure new housing is provided within the existing service and hazard mitigation capabilities of the County.

Standardized Emergency Management System Emergency Management Plan

The County OEM developed the EMP in June 2003, and updated it in 2013, to ensure life and property safety, security, and protection of, as well as assuring the overall well-being of, the population during a disaster. The EMP was developed for the Santa Barbara Operational Area as part of the California Standardized Emergency Management System (SEMS). The EMP addresses emergency responses associated with natural disasters, technological incidents, and national-security emergencies- including both peacetime and wartime nuclear defense operations. The EMP assigns tasks and specifies policies and standard operating procedures for the coordination of emergency staff, resources, and service elements. The Plan states that hazard mitigation is a year-round effort and encourages all communities to prepare hazard mitigation plans. The following activities were identified by the Plan as potential mitigation activities: improving structures and facilities at risk, identifying hazard-prone areas and developing standards for prohibited or restricted use, recovery, and relief from loss (i.e., insurance), and providing hazard warning and protecting the population. The EMP is currently undergoing routine revision and will have the title "Santa Barbara County and Operational Area Emergency Operations Plan (EOP)."

Community Wildfire Protection Plans (CWPP)

The San Marcos Pass/Eastern Goleta Valley Mountainous Area (SMPEGV) CWPP identifies communities at risk of wildfire and includes fire hazard reduction strategies for at-risk communities that are in balance with sustainable ecological management and fiscal resources and provides educational resources for residents to enhance fire preparedness. Fire hazard reduction strategies include identifying and prioritizing areas for hazardous fuel reduction treatments, recommending current best practices as to the types and methods of fuel treatments, and recommending measures to reduce structure ignitability.

As a result of the successful completion of the SMPEGV CWPP, the FireSafe Council received funding through CAL FIRE's Wildfire Prevention Grants Program to create the Gaviota Coast CWPP. This project is currently underway and strives to develop a planning and working document for the residents of the Gaviota Coast. The resulting document will have the same elements and goals of the SMPEGV CWPP, but for the Gaviota Coast communities.

The Mission Canyon CWPP identifies potential areas for hazardous fuel reduction treatments, increases the community's understanding of living in a fire-adapted ecosystem, and improves its ability to prepare for, respond to, and recover from wildland fires. The Mission Canyon CWPP recommends fuel reduction treatments to protect lives and reduce structural ignitability of property and recommends best practices to improve the fire resilience of the landscape while protecting other ecological, social, and economic values.

In 2022, the process to update the Mission Canyon CWPP will begin to include new fuel and fire modeling, reaffirm fuel reduction activities, assess potential areas for new projects, provide resident fire preparedness activities, and provide potential home hardening opportunities. The resulting Santa Barbara Foothill CWPP is funded through an HCD Grant managed by the Santa Barbara County Fire Department. This CWPP will expand beyond the Mission Canyon to include additional areas along the adjacent Santa Barbara Foothills.

The cities of Carpinteria, Guadalupe, and Santa Barbara, as well as the Montecito Fire Protection District, also have CWPPs.

Debris Basin Maintenance and Management Plan

The Santa Barbara County Debris Basin Maintenance and Management Plan is managed by the Flood Control District and was most recently updated in 2021. This plan describes the Flood Control District's 17 debris basins along the south coast of Santa Barbara County and details the extent and frequency of annual basin maintenance activities. Debris basins are structures designed to capture sediment, gravel, boulders, and vegetative debris that are washed through creeks during storms, but allow excess water to flow downstream, reducing flood and mudflow risk for downstream communities. The debris basins must be regularly desilted and cleared of debris to minimize blockage and retain the capacity to retain flood flows. The plan also explores the post-disaster management of debris and sediment to use sediment as a resource for local beach nourishment.

Debris Management Plan

The Santa Barbara County Debris Management Plan was developed as a multi-jurisdictional effort in 2020 to guide the County in the clearance, removal, and disposal of disaster debris. The plan was developed in operational partnership with the cities of Buellton, Carpinteria, Goleta, Santa Barbara, and Solvang to develop a coordinated approach to regional debris operations in the county. The plan provides organizational structure, guidance, and standardized procedures for the clearance, removal, reuse, recycling, and disposal of debris caused by a debris-generating event that affects one or more operational partners. Building from lessons learned in response to the 2017 Thomas Fire and 2018 Montecito debris flow disaster, the plan will be used to facilitate and coordinate the removal, collection, and disposal of debris following a disaster to mitigate the effects of any potential threat to the health, safety, and welfare of the impacted citizens; expedite recovery efforts in the impacted area, and address any threat of significant damage to improved public or private property. Key elements of this Plan include:

- Description of debris management planning authorities and links to other planning efforts.
- Debris planning scenarios to guide the County and its jurisdictional partners in their planning efforts.
- Assignment of debris management roles and responsibilities to key agencies and departments.
- A comprehensive operational approach that addresses all phases of debris operations (readiness, clearance, removal, disposal, and recovery).
- Guidance to incorporate debris management operations into County and City incident management structures including Emergency Operations Center (EOC) operations and concepts for the establishment of Debris Management Teams.
- Guidance and procedures to support implementation and documentation of debris management activities that will maximize eligibility for reimbursement during a declared disaster.
- Identification of options for debris disposal, requirements for disposal sites, and permitting processes for each option.
- Procedures for ongoing plan development and implementation.

The Debris Management Plan is part of the County's comprehensive suite of emergency plans that provide a framework through which the County prepares for, responds to, recovers from, and mitigates the impacts of disasters that could affect the community. The plan complements the Santa Barbara County Emergency Management Plan and this MJHMP. The debris management organization presented within the plan is consistent with the National Incident Management System (NIMS), including the use of the Incident Command System, and is compliant with the State of California and federal debris management planning requirements.

Capital Improvement Plan

The CIP is a compilation of projects intended to implement various plans including community plans, facilities plans, and the County Comprehensive Plan. Projects in the CIP quantify current and future capital needs. Accordingly, it includes projects for new and improved roads and bridges, County buildings and clinics, parks, and other facilities. Because the CIP includes estimates of all capital needs, it provides the basis for setting priorities, reviewing schedules, developing funding policy for proposed improvements, monitoring, and evaluating the progress of capital projects, and informing the public of projected capital improvements and unfunded needs.

Tsunami Plan

Santa Barbara County has a countywide Tsunami Plan that covers emergency response actions associated with tsunami events. Santa Barbara County OEM receives advisory messages and warnings through an emergency services microwave/computer communications network from Coast and Geodetic Survey Stations. If a seismic wave or tidal disturbance has been observed, the main system at the Honolulu Observatory will transmit warnings to satellite stations including the time of occurrence of the disturbance, the location, verification of tsunami generation, and expected arrival times at various points along the Pacific coast.

Sea Level Rise Plans

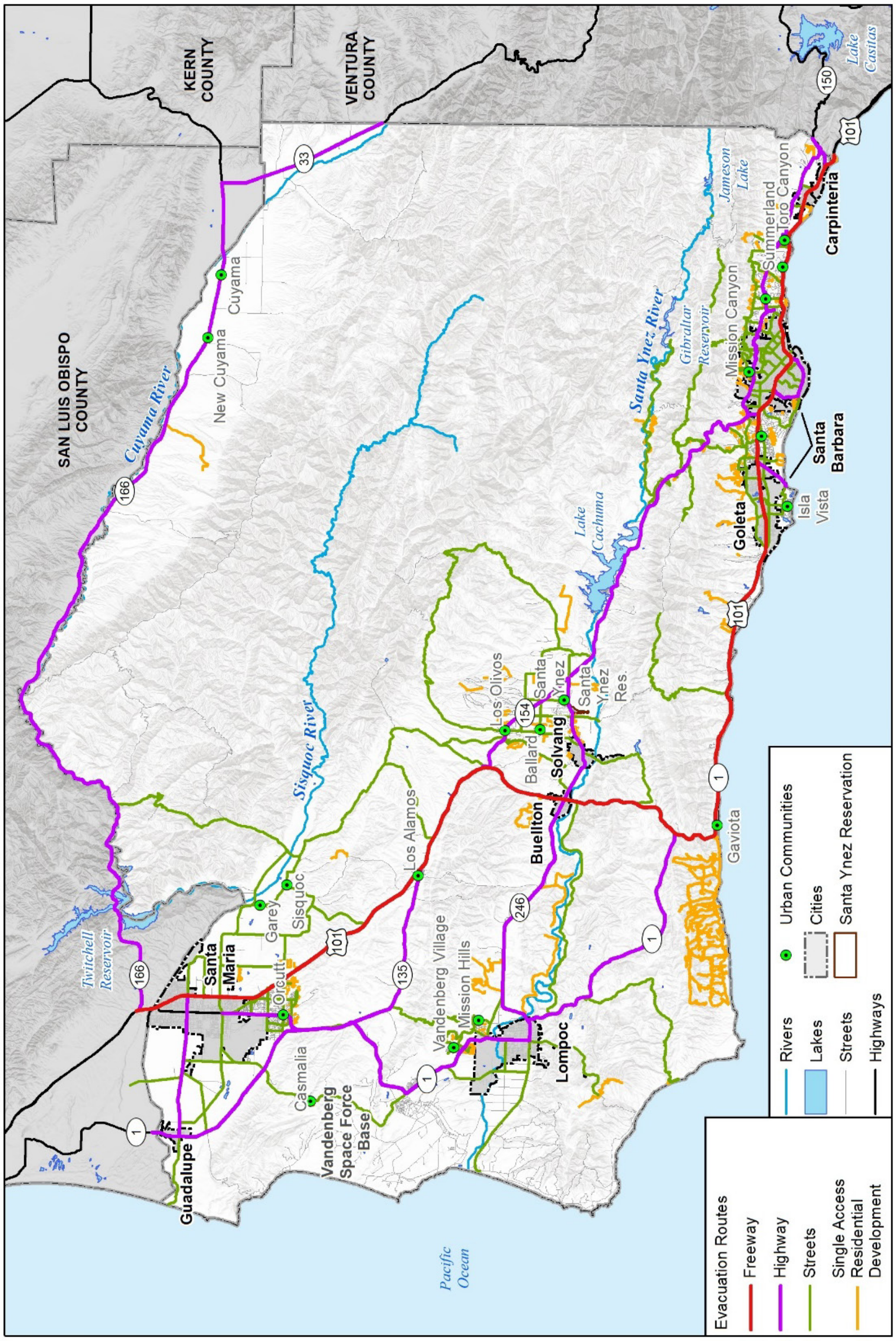
Within Santa Barbara County, several jurisdictions have developed plans to address sea level rise. The City of Santa Barbara adopted a Sea Level Rise Adaptation Plan in 2021. The City of Santa Barbara and the County also developed a Goleta Slough Sea Level Rise Vulnerability Assessment. In addition, the County completed a Coastal Resiliency Project in 2018 that evaluated the impacts of sea level rise and related coastal hazards along Santa Barbara County's entire shoreline. Most recently, the County prepared the CCVA to assess climate change-driven vulnerabilities in the county, including along shorelines subject to wave runup, coastal erosion, and storm damage (see below).

Climate Change Vulnerability Assessment

The County published its Final CCVA in November 2021 (Santa Barbara County 2021). The County prepared the CCVA as the first step to improving regional resiliency by analyzing how climate change may harm the community. The assessment looks at how severe the effects of climate change hazards are likely to be for the county's people and assets and identifies which groups of people and assets face the greatest potential for harm. The County will use these results to prepare an Adaptation Plan and update the Santa Barbara County Seismic Safety and Safety Element to increase resiliency throughout the unincorporated county. The Vulnerability Assessment helps Santa Barbara County comply with state laws, identifies the most vulnerable populations and assets in the county, and helps improve the eligibility of the County for grant funding to implement adaptation projects and develop resilience programs.

As a part of the planning process for the CCVA and Safety Element Update, the County has collated the major evacuation routes that provide access through the county (Figure 4-6).

Figure 4-6. Evacuations Routes



Climate Action Plan

In May 2015, the County adopted an Energy and Climate Action Plan (ECAP) to reduce GHG emissions to 15 percent below baseline levels (2007) by 2020, consistent with Assembly Bill (AB) 32. The County is now in the process of developing the 2030 CAP which seeks to reduce greenhouse gas emissions by 50 percent below 2007 levels by 2030. The 2030 CAP will also include resilience and mitigation measures.

Strategic Energy Plan

In 2018, the County undertook a countywide Strategic Energy Plan (SEP). The goal of the SEP is to develop strategies to tackle community-wide barriers to local renewable development, as well as to identify high-priority sites for distributed and utility-scale renewable energy development, thereby improving electricity reliability and resiliency for residents and businesses of Santa Barbara County. The cities of Goleta and Carpinteria chose to join this initiative to support these objectives while also addressing their own local goals. The objective of the SEP is to address these resiliency concerns and stimulate local renewable energy development in three ways:

- Identifying total resource potential for various types of renewable energy, including solar, wind, hydro, biomass/biogas, and geothermal power, as well as specific hotspots for potential future development
- Creating a list of priority sites for renewable energy development throughout the county
- Developing a set of strategies tackling barriers to renewable energy in diverse program areas ranging from drafting regulatory frameworks to creating new financing mechanisms

Energy Assurance Plan (pending)

The Energy Assurance Plan would assist the County with planning for and responding to natural and man-made events and emergencies that often result in a decrease or total outage of energy that is needed to sustain critical functions and essential services. Funding has been allocated for this plan but work has not yet started.

Groundwater Sustainability Plans

Groundwater is managed by several GSAs within Santa Barbara County. Basins that are subject to the Sustainable Groundwater Management Act (SGMA) include all medium and high priority basins, as defined by the State DWR, that have not previously been adjudicated. Under SGMA, agencies in each of these basins were required to form GSAs and have begun the process of drafting Groundwater Sustainability Plans (GSPs) (Table 4-10).

Table 4-10. Groundwater Sustainability Planning in Santa Barbara County

Groundwater Basin	Groundwater Sustainability Agency (GSA)	GSA Committee Members/Management	Groundwater Sustainability Plan (GSP)
Santa Ynez River	Western Management Area	Santa Ynez River Water Conservation District, County of Santa Barbara, City of Lompoc, Mission Hills Community Services District, Vandenberg Village Community Services District	2022
	Central Management Area	SYWCD, County of Santa Barbara, City of Buellton	2022
	Eastern Management Area	SYWCD, County of Santa Barbara, City of Solvang, SYWCD Improvement District No. 1	2022
Cuyama Valley	Cuyama Valley	Santa Barbara County Water Agency, the Counties of San Luis Obispo, Ventura, and Kern, the Cuyama Community Services District (CCSD), and the Cuyama Basin Water District (CBWD)	2020
San Antonio Creek Valley	San Antonio Basin	San Antonio Basin Water District, Los Alamos Community Services District	2022
Montecito	Montecito Groundwater Basin	Montecito Water District	Under Development
Carpinteria	N/A	Carpinteria Valley Water District, City of Carpinteria, Santa Barbara County Water Agency, County of Ventura	Under Development
Goleta	N/A	Goleta Water District	N/A
Santa Maria River Valley	N/A	Santa Maria Valley Water Conservation District, County of Santa Barbara, County of San Luis Obispo, Twitchell Management Authority	N/A
Foothill	N/A	N/A	N/A
Santa Barbara	N/A	N/A	N/A

Countywide Recreation Master Plan (Pending)

The Community Development Department, Parks Division is preparing a Countywide Recreation Master Plan. This project will provide a strategic planning program for parks, trails, and recreation facilities throughout Santa Barbara County. The Master Plan will assess existing facilities, address unmet recreation needs, identify a range of recreation improvements, and foster coordination and cooperation between the County, cities, agencies within the County, and non-profit and private recreation service providers. Key goals include increased interagency cooperation and potentially shared funding programs for needed parks and recreation facilities. The Master Plan will allow the County and participating agencies to better compete for project funding, including California Proposition 68 grant funding, and to streamline required environmental review.

Programs

Floodplain Management Program

The objective of the Floodplain Management Program is to minimize future flood hazards, created in developing areas subject to flooding, and to reduce the necessity of constructing expensive flood control facilities in the future. Benefits derived from this program include the prevention of losses in flood-prone areas and reduced need for public emergency response during storm activity. Activities associated with the Floodplain Management Program include reviewing new development permit applications for elevation above the 100-year flood level, proper setback from watercourses, and adequate drainage plans. The County's Floodplain Management Ordinance exceeds the minimum requirements for participation in the NFIP.

This program also reviews development permit applications for structure elevation above the base flood elevation (BFE) (2 feet within the county). The intent is to certify that the lowest floor of any building in a special flood hazard area (SFHA) is elevated above the BFE before final approval for floodplain construction can be obtained. FEMA Elevation Certificates are required.

National Flood Insurance Program

The County and all eight cities participate in the NFIP; the six special districts participating in the MJHMP are not eligible for the NFIP (Table 4-11). Santa Barbara County joined the NFIP in 1979. County participation in the program is administered by the County Flood Control District.

Table 4-11. NFIP Participation Status by Agency

Community Number	Agency Name	Community Status	Latest Map Panel	Map Panel Eff. Date
060331	County of Santa Barbara	Participating	1404	2012-12-04
060332	City of Carpinteria	Participating	1418	2018-09-28
060333	City of Guadalupe	Participating	0000	
060334	City of Lompoc	Participating	0739	2012-12-04
060335	City of Santa Barbara	Participating	1379	2015-11-04
060336	City of Santa Maria	Participating	0195	2005-09-30
060756	City of Solvang	Participating	1057	2012-12-04
060757	City of Buellton	Participating	1052	2012-12-04
060771	City of Goleta	Participating	1342	2018-09-28
-	Cachuma Operations Maintenance Board	Not Eligible	-	-
-	Carpinteria Valley Water District	Not Eligible	-	-
-	Goleta Water District	Not Eligible	-	-
-	Montecito Fire Protection District	Not Eligible	-	-
-	Montecito Water District	Not Eligible	-	-
-	Santa Maria Valley Water Conservation District	Not Eligible	-	-

Source: FEMA Community Status Book 2022 - https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book#reports

As stated by FEMA, “The NFIP aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures. Overall, the program reduces the socio-economic impact of disasters by promoting the purchase and retention of general risk insurance, but also flood insurance, specifically.

As part of the NFIP are the FEMA Flood Insurance Rates Maps (FIRMs) which identify areas in the county that are vulnerable to flooding. The flood zones identified on the FIRMs are areas susceptible to 100-year and 500-year flood events. A 100-year and 500-year flood events are when a flood has a 1 percent or 0.2 percent annual chance of occurrence in any given year. Another measure of the probability of occurrence of a 100-year flood is there is at least a 26% chance of a 100-year flood during the life of a 30-year mortgage.

The information in the Flood Insurance Study and resultant FIRMs is based on historic, meteorological, hydrologic, hydraulic, and topographic data, as well as open-space conditions, flood control works, and development within the study area. Other information included on the maps includes Special Flood Hazard Areas (SFHA), Base Flood Elevations, and insurance risk zones. FIRMs are used to determine the BFE at specific sites or if a specific property is located in a floodplain or SFHA to administer floodplain management regulations, determine potential locations for new development, and make flood insurance determinations. The FIRMs were last updated in September of 2018 and made available in GIS format as Digital Flood Insurance Rate Maps. In addition, RiskMAP products are available for the entire County and were completed in 2021 (see Chapter 5.0, *Hazard Assessment)*.

The County also participates in the Community Rating System (CRS) (Class 6). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood damage to insurable property;
2. Strengthen and support the insurance aspects of the NFIP; and
3. Encourage a comprehensive approach to floodplain management.

Defensible Space Program

The 2017 Thomas Fire burned nearly 282,000 acres and caused $2.2 billion in damage. Photo: Independent.com

Establishing defensible space around structures is one of the most powerful tools for preventing fire losses and is therefore required by both County regulations and State law. The California Fire Code Chapter 49 as amended by the County of Santa Barbara through Chapter 15 of the County Code defines defensible space as:

"The area surrounding a structure or building where basic wildfire protection practices are implemented, providing the key point of defense from an approaching wildfire, or escaping structure fire. The area is characterized by the establishment and maintenance of fuel modification measures."

The Defensible Space Program includes 16,000 annual inspections and helped prevent further damage from the 2017 Thomas Fire and 2021 Alisal Fire, as well as several other smaller, but significant wildfires in the county. The Program mandates that all brush, flammable vegetation, or combustible growth be removed for a 100-foot perimeter around the structure (County Fire Department 2021a). Other requirements include:

- Single specimens of trees, ornamental shrubbery, or ground covers are permissible provided they do not form a means of rapidly transmitting fire from the native growth to any structure. Such specimens shall be spaced a minimum of 10-15 feet, both horizontally and vertically, from other specimens, structures, or surrounding native brush. All trees and shrubs shall be maintained free of deadwood and litter.
- Roof surfaces shall be maintained free of accumulations of leaves, needles, twigs, or other combustible materials. Chimneys shall be provided a 10-foot clearance from trees.
- Access roads shall be maintained with a minimum 10-foot clearance on each side of the traveled section. Trees and shrubs protruding over the access roadway shall be trimmed to a minimum height of 13 feet 6 inches to allow proper access to emergency equipment.
- Discing and rototilling are acceptable methods for removing small types of vegetation. The material shall be tilled or descend into the soil in a manner to eliminate possible fire spread.

Routine Maintenance Program

As part of the Flood Control District's Floodplain Management Program, it conducts routine creek maintenance. It has been doing so since 1992. The Routine Maintenance Program occurs annually and each year the District prepares an Annual Routine Maintenance Plan, conducting public workshops and CEQA reviews of planned maintenance projects. The Annual Routine Maintenance Plan includes a description of the need for maintenance work, the work to be performed, the presence of sensitive biological resources, impacts of the activities on biological resources, standard maintenance practices to reduce impacts, and restoration measures. The Routine Maintenance

Program focuses on urbanized areas or developed agricultural areas. The main objective of the program is to reduce flood hazards and damage to life, public property, and infrastructure by maintaining the conveyance capacity of key channels. All routine maintenance activities are conducted in a manner that minimizes environmental impacts. Maintenance activities are completed before the winter. The Routine Maintenance Program includes selective brushing, de-silting, channel shaping, bank stabilization, bank protection, herbicide spraying, and channel clearing activities in most creeks and streams throughout the county. These activities can be applied individually or in combination to address the specific requirements of the affected drainage. The Routine Maintenance Program also addresses the maintenance and repair of concrete-lined channels. The individual flood zones fund the Routine Maintenance Program and the extent and frequency of channel maintenance are dependent upon the availability of funds.

Operation and Maintenance Program

The Operation and Maintenance Program is one of the Flood Control District's highest priority programs and includes the normal operation of the Flood Control District's dams, channels, and other flood protection facilities, and the routine and emergency maintenance and repair of these facilities. The District maintains channels, debris basins, dams, and storm drain facilities to prevent flooding.

Dam Safety Program – State Compliance

The Flood Control District is responsible for being compliant with the State's Dam Safety Program. There is only one dam under Flood Control Jurisdiction: the Santa Monica Debris Dam. The objective of the program is to assure the continuing safety of dams in their flood control and water conservation functions. The California DWR Division of Safety of Dams (DSOD) maintains regulatory power over jurisdictional-sized dams and reviews and approves inundation maps for extremely high, high, and significant hazard dams and their critical appurtenant structures (as required by California Water Code §6161). There are 14 dams in the county, which indicates that failure or misoperation during a flood or debris flow event could cause widespread, sudden flooding hazards and likely cause loss of human life (DWR DSOD 2019; 23 CCR § 335.4). Seven dams in the County are governed by other jurisdictions (e.g., cities, U.S. Bureau of Reclamation, private), which are directly responsible for their functions and regulations.

The Santa Monica Debris Basin was constructed as part of the Carpinteria Valley Watershed Project in the 1970s following a series of major flooding events that occurred along Santa Monica Creek.

Debris Control Program

The Flood Control District operates and maintains numerous debris basins, which constitute the primary debris control system within the Flood Control District. Flood runoff from the hillsides, particularly from those hillsides recently denuded by fires, slides, or development, is heavily laden with rock, sand, silt, mud, and debris. The dams and debris basins restrain the rock, sand, silt, mud, and debris that would otherwise clog and damage channels, which could result in flooding of adjacent property and downstream floodplains.

The Thomas Fire burned away trees and vegetation, which caused slope destabilization. It was a direct factor in the 2018 Montecito debris flow of at least an estimated 680,000 cubic meters of sediment and debris, resulting in the loss of 23 lives and 408 structures. Photo: Noozhawk.com

The objectives of the Debris Control Program include the prevention of debris flow; the planning and construction of adequate debris control facilities; the routine, scheduled clearance, and disposal of debris from basins and dams; and the overall management of debris flow-through channels.

There are 17 debris basins on the South Coast and the operation and maintenance procedures for these are described in the Debris Maintenance Plan, which is considered an element of the overall Maintenance Program.

Basin maintenance is conducted to ensure the proper functioning of the basin. Basins are inspected after the occurrence of certain events such as substantial rainfall. Routine maintenance includes keeping the outlet works clear of vegetation, and maintenance of a 15-foot-wide pilot channel through the center of the basin. Additional maintenance of the basins involves the removal of sediment to maintain line and grade (or when there is a significant wildfire in the basin's watershed).

In the aftermath of the December 2017 Thomas Fire and intense rainfall that caused the devastating debris flow on Jan 9, 2018, the Montecito region experienced major damage, including debris basins and flood control facilities. The Thomas Fire burned away trees and vegetation, which caused slope destabilization. It was a direct factor in the 2018 Montecito debris flow of at least an estimated 680,000 cubic meters of sediment and debris, resulting in the loss of 23 lives and 408 structures (County of Santa Barbara Public Works Department 2020). The Cold Springs Debris Basin embankment was severely damaged by the debris flow with a large portion of the embankment eroded and the outlet pipe breaking. The dam embankment was repaired in 2018 as an emergency temporary repair until a modification can be completed. As part of the emergency watershed response, Cold Spring Debris Basin was desilted following the debris flow and several times through the winters of 2019 and 2020. The watershed continues to shed large amounts of sediment as the watershed recovers and revegetates. The Cold Springs Debris Basin is tentatively scheduled to be modified in 2023 (Santa Barbara County Flood Control and Water Conservation District 2021).

Following the Thomas Fire, the Flood Control District looked to continue large debris capture in certain basins that would be in line with the requirements of the National Marine Fisheries Service (NMFS) and also reduce the fine-grain sediment capture that increased costs and caused disposal issues. The Flood Control District, NMFS, and Army Corps of Engineers (ACOE) have worked closely to find solutions that will comply with the requirements of the Biological Opinion and will allow the County to continue to fulfill public safety and flood-protection objectives (Santa Barbara County

Flood Control and Water Conservation District 2021). Several other basins were also affected by the 2018 Montecito debris flow: Montecito basin, Romero basin, San Ysidro Basin, Toro Canyon three basins, Santa Monica Debris Dam, Arroyo Paredon. These basins were rehabilitated in 2018.

Storm Rehabilitation Program

The Storm Rehabilitation Program provides for post-storm rehabilitation of flood control facilities damaged in any storm disaster. The objective of the program is to prevent a future hazard to life and property by returning the flood control system to its intended function. Activities included in the Storm Rehabilitation Program include removing debris from access roads, reservoirs, and debris basins, and reconstruction and repair as necessary.

The objectives of the Flood Control District through the Storm Rehabilitation Program are to:

1. Assess the condition of facilities quickly and completely concerning public safety;
2. Allocate District resources on a priority basis to emergency work and permanent work;
3. Maximize efforts to receive Federal and State funding, when possible; and
4. Complete emergency work quickly to provide for the public safety and to prevent further damage and complete permanent work promptly to return damaged infrastructure to its intended function; and Contact and request assistance from other agencies, when necessary.

Current Santa Ynez River Programs

The following subsections describe current activities performed by the Flood Control District along the Santa Ynez River.

Santa Ynez Maintenance Program

As part of the Lower Santa Ynez River Maintenance Project, the Flood Control District has periodically cleared portions of the lower Santa Ynez River that is prone to flooding. The maintenance project defined in 2001 was a 4.5-mile reach extending from the Lompoc Wastewater Treatment Plant to the 13th Street Bridge on Vandenberg SFB; however, the project no longer includes Vandenberg Space Force property.

The objective of the Lower Santa Ynez River Maintenance Project is to maintain a 100-foot-wide swath along the project reach with non-obstructive vegetation to allow sufficient channel capacity for certain flood flows. Maintenance is performed on the Lower Santa Ynez River as needed. The Santa Ynez Maintenance Program is evaluated annually.

Santa Ynez River Flood Warning System

The Santa Ynez River Flood Flow Model (SYRFFM) was developed by the Flood Control District and predicts flood flows in the Santa Ynez River in Santa Barbara and Ventura Counties. The model encompasses approximately 1,253 square miles of drainage area from the Santa Ynez headwaters above Gibraltar Reservoir to Vandenberg Village, just upstream from the river's outlet to the Pacific Ocean.

The program input is both for forecast and actual precipitation, plus various parameters for estimating losses, runoff, and reservoir operation. The output is hourly flow in cubic feet-per-second (cfs) at 20 locations along the Santa Ynez River, and hourly operational data for Gibraltar and Cachuma Reservoirs.

Typical model results show the predicted water flow behavior of the Santa Ynez River, water level and inflow predictions for Cachuma dam operations, and downstream dam water release predictions within the river system.

Closely coordinated communications with USBR (and others) during Cachuma Dam modeling operations typically result in hourly SYRFF Models being generated by Flood Control District personnel and disseminated by email to individuals involved with Cachuma Reservoir and Santa Ynez River operations.

Policies

Emergency Storm Response

During flood events, the Flood Control District staff transforms into an emergency response organization. District staff work around the clock and are deployed to flood-fighting and support activities. Staff from the District office performs a variety of emergency tasks such as answering phone calls, storm monitoring, radio dispatching, field patrolling, and computer modeling for flood flow forecasting. Emergency operations also include pre-planned routines such as the monitoring of all flood facilities and equipment; the operation of dams and channel gates; and the provision of logistics support, field operations headquarters, and responses to emergencies.

Flood Zone Development

FEMA's Flood Zone Designations are used to determine areas of potential flood hazard as mapped by the National Floodplain Insurance Program. FEMA's flood maps, known as Flood Insurance Rate Maps (FIRMs), identify areas of flood hazard, which are labeled on the flood map as zones starting with the letters A and V for high-hazard areas, known as Special Flood Hazard Areas or SFHAs, and Zone X for moderate- or low-hazard flood-risk areas. In some cases, there are areas with a potentially moderate to high risk of flooding, but the probability has not been determined. These areas are labeled Zone D on the flood maps. Floodplain districts identified in the FIRMs include the following flood hazard zones and definitions:

- **Zone A** is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study (FIS) by approximate methods. Because detailed hydraulic analysis is not performed for such areas, no Base Flood Elevations or flood hazard factors are determined.
- **Zone AO** is the flood insurance rate zone that corresponds to areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
- **Zone A1-A30** is the flood insurance rate zone that corresponds to areas of 100-year flood; base flood elevations and flood hazard factors are determined.
- **Zone B** is the flood insurance rate zone that corresponds to areas between limits of the 100-year flood and 500-year flood, or certain areas subject to 100-year flooding with average

depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.

- **Zone C** is the flood insurance rate zone that corresponds to areas of minimal flooding.
- **Zone D** is an area with a potentially moderate to high risk of flooding, but the probability has not been determined. In Zone D, there are typically no mandatory flood insurance requirements. Also, there are no minimum building requirements by FEMA. However, Zone D indicates that there is a risk of flooding; the level of risk is just unknown.

The County Comprehensive Plan establishes flood hazard area policies that regulate development within the one percent annual flood chance area (100-year floodplain), and the County maintains an associated floodplain overlay zone area to direct development, as further described within Section 4.2.3, *County Regulatory Mitigation Capabilities - Floodplain Management.*

Defensible Space and Development Standards

In 2005, the State Board of Forestry adopted provisions now identified in Public Resource Code 4291 that require all structures on State Responsibility Area (SRA) lands to maintain 100 feet of defensible space clearance from all structures. Defensible space is established through the Defensible Space Program administered by the County Fire Department (refer to Section 4.2.2.2.2, *Defensible Space Program*). Within the County of Santa Barbara, 100 feet of defensible space is also enforced on unincorporated Local Responsibility Area (LRA) in the Santa Barbara County Department (refer to Section 4.2.2, *County Administrative and Technical Capabilities - Santa Barbara County Fire Department*). The 100-foot defensible space clearance is a minimum, and in some instances, this distance may need to be increased due to the location of a structure on a slope or because of the vegetative fuel loading surrounding a structure. Beyond Defensible Space, the Fire Department has developed seven standards for residential and commercial development. These standards are identified in Table 4-11.

Passed into law in 2020, Assembly Bill 3074 requires a zone for defensible space. This law requires the Board of Forestry and Fire Protection to develop the regulation for a new ember-resistant zone (Zone 0) within 0 to 5 feet of the home by January 1, 2023. Guidance and definition of Zone 0 below:

- **Zone 0**: In the first five feet surrounding any structure and attached deck, avoid anything combustible- this includes woody plants, mulch, woodpiles, combustible trellises, and stored items. Zone Zero is an excellent location for walkways, or hardscaping with pavers, rock mulch, or pea gravel. Zone 0 should be coupled with a six-inch noncombustible zone between the ground and the start of the building's exterior siding.

Table 4-11. Santa Barbara County Fire Development Standards 1-7

Development Standard	Description
Development Standard #1 Private Roadway and Driveway Standards	Establishes minimum standards for driveways and private roads. These standards outline minimum road widths and vegetation clearance designed to provide fire vehicles access to residences and associated structures.
Development Standard #2 Fire Hydrant Spacing and Water Flow Rates	Establishes fire hydrant spacing, discharge outlet configuration, and flow rate requirements. Flow rate standards are used when calculating peak load water supply requirements for one-and-two family dwelling units.
Development Standard #3 Stored Water Fire Protection Systems Serving One and Two-Family Dwellings	Establishes standards for stored water fire protection systems serving one and two-family dwellings.
Development Standard #4 Automatic Fire Sprinkler System Standards	Establishes standards for automatic fire sprinkler systems.
Development Standard #5 Automatic Alarm System Standards	Establishes standards for automatic alarm systems.
Development Standard #6 Vegetation Management Plan	Establishes standards for vegetation management plans.
Development Standard #7 Access Gates	Establishes standards for gates on private roads and private driveway access points.

Isla Vista Bluff Policy

In 2004, the Planning and Development Department issued a policy as it relates to properties that abut the edge of the Isla Vista bluff. That policy required property owners to retain the services of a licensed professional to evaluate the safety of their structures once staff has determined that the bluff is within 15 feet of the structure's foundation. The policy used a 5-foot-wide single event failure as the safety threshold for these structures. During the winter of 2017, a single event failure exceeded the 5-foot-wide single event failure threshold and prompted the County to conduct additional studies to evaluate the continued adequacy of this threshold. Based on the information available to the Building Official from several geotechnical and geological studies performed to date on affected Isla Vista properties, the Isla Vista Bluff Policy was revised in 2020 (available at: https://www.countyofsb.org/uploadedFiles/plndev/Content/Permitting/Isla%20Vista%20Bluff%20Policy.pdf):

- For any properties within 20 feet of the Isla Vista bluff, the County will send a Notification Letter to the property owner requesting a geotechnical study specific to the site in question;
- For any properties within 15 feet of the Isla Vista bluff, the County will issue a Notice of Violation to the property owner requiring a geotechnical study specific to the site in question; and
- For any properties within 10 feet of the Isla Vista bluff, the County will issue a Notice to Vacate those specific portions of the structure that are within the 10-foot threshold. The property owner will be required to hire a geotechnical engineer to prepare a site-specific study to establish the maximum collapse width during a single event for that site.

Codes

Emergency Management Code

The County's Emergency Management code (Chapter 12) establishes per state laws and regulations, the authorities and systems that provide for the preparation and execution of plans for the protection of persons, property, and the environment within the county in the event of an emergency. Chapter 12 provides the direction for the emergency organization and the coordination of emergency and recovery functions with all other public agencies, corporations, organizations, and affected private persons. The County Executive Officer is designated the "director of emergency services" for the Operational Area and is responsible for recommending the Board of Supervisors and/or State Governor declare a local emergency.

County Building Codes

Under the County's Planning and Development Department, the Building & Safety Division's primary function is to provide reasonable controls and regulations that protect the citizenry and establish effective safeguards for the life, health, and property equally throughout the unincorporated areas of Santa Barbara County (refer to Section 4.2.2, *County Administrative and Technical Capabilities - Planning and Development Department*). This is achieved through the application of uniform codes and standards that involve the design, materials, construction, use, and occupancy of all buildings constructed within our jurisdiction. Building & Safety staff strive to implement these standards fairly and consistently while encouraging an open communication process with the public they serve. Chapter 10 of the County Codes, adopted in 2019, outlines the County Building Codes. The Primary Residential Building Code includes seismic mitigation modified from the California Residential Code, including longitudinal reinforcing bars in concrete footings, and requiring solid blocking in the roof sheathing.

Zoning Ordinances

The Santa Barbara County Land Use and Development Code carries out the policies of the County Comprehensive Plan and Local Coastal Program by classifying and regulating the uses of land and structures within the unincorporated county, consistent with the County Comprehensive Plan. The Development Code is adopted to provide standards and guidelines for the continuing orderly growth and development of the unincorporated county that will assist in protecting the character and stability (social and economic) of agricultural, residential, commercial, and industrial uses, as well as the character and identity of communities within the county. The County Land Use Development Code applies to all areas of the unincorporated county outside the Coastal Zone and outside the Montecito Community Plan Area. Article II Coastal Zoning Ordinance is part of the County's certified Local Coastal Program and provides zoning regulations for all areas of the unincorporated county within the Coastal Zone. The Montecito Land Use Development Code provides land use regulations for the portion of the Montecito Community Plan Area that is outside the Coastal Zone.

County Fire Code

The County's Fire Code contains regulations governing conditions hazardous to life and property from fire, hazardous materials, or explosion. The code contains provisions for construction and development, combustible waste material, fuel clearance, fire protection systems, inspections, maintenance, violations, and the general authority and responsibilities of County Fire officials. The code is based on the California Fire Code and International Fire Code.

Fire Hazard Severity Zones

A Fire Hazard Severity Zone (FHSZ) is a mapped area that designates zones (based on factors such as fuel, slope, and fire weather) with varying degrees of fire hazard (i.e., moderate, high, and very high). FHSZ maps evaluate wildfire hazards, which are physical conditions that create a likelihood that an area will burn over a 30- to 50-year period. They do not consider modifications such as fuel reduction efforts.

While FHSZs do not predict when or where a wildfire will occur, they do identify areas where wildfire hazards could be more severe and therefore are of greater concern. FHSZs are meant to help limit wildfire damage to structures through planning, prevention, and mitigation activities/requirements that reduce risk. The FHSZs serve several purposes: they are used to designate areas where California's wildland-urban interface building codes apply to new buildings. They can be a factor in real estate disclosure. Local governments also consider fire hazard severity in the safety elements of their general plans. Hazard severity zone maps are available through CAL FIRE Fire and Resource Assessment Program (FRAP) website, Santa Barbara County Fire, and County Planning and Development Department.

Floodplain Management

Chapter 15A Floodplain Management of the County's Code of Ordinances provides the regulations that govern development within mapped floodplains (refer to Section 4.2.3, *County Regulatory Mitigation Capabilities - Floodplain Management Program*). Its purpose is to promote public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas. This ordinance accomplishes its purpose by restricting or prohibiting uses that are dangerous to public health and safety due to water erosion hazards or flood height velocities, requires development construction containing protections against flood damage, controls the alteration of natural floodplains and stream channels to accommodate floodwaters, controls filling, dredging, and other development that may result in flood damage, and regulating the construction of flood barriers that may increase flood hazards in other areas.

Cannabis Land Use Ordinance

Chapter 50 of the Santa Barbara County Code titled "Licensing of Cannabis Operations" is the Cannabis Land Use Ordinance. The Planning and Development Department regulates cannabis activities within the county under this ordinance. The ordinance provides County-specific regulations addressing cannabis licensing activities in the unincorporated portions of the county while providing standards to address neighborhood compatibility concerns, adequacy of services and utilities, hazardous materials management and handling (i.e., pesticide use), and protection of natural resources. The ordinance involves new regulations governing commercial cannabis activities including cultivation and processing, product manufacturing, distribution, testing, and retail in the unincorporated areas of the county.

4.2.4 County Fiscal Mitigation Capabilities

The ability of a local government to implement mitigation actions is often dependent on the amount of money available. This may take the form of outside grant funding awards or locally based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program such as community outreach and information campaigns. In other cases, direct expenses are linked to an actual project such as the acquisition of flood-prone houses or improvements to channels or debris basins, which can require a substantial commitment from Federal, State, and local funding sources.

This section presents a review of the County's fiscal capabilities that may apply to providing financial resources to implement identified mitigation action items. Please see below Table 4-12 for a summary of the County's Financial Mitigation Capabilities.

Table 4-12. County of Santa Barbara Fiscal Mitigation Capabilities Summary

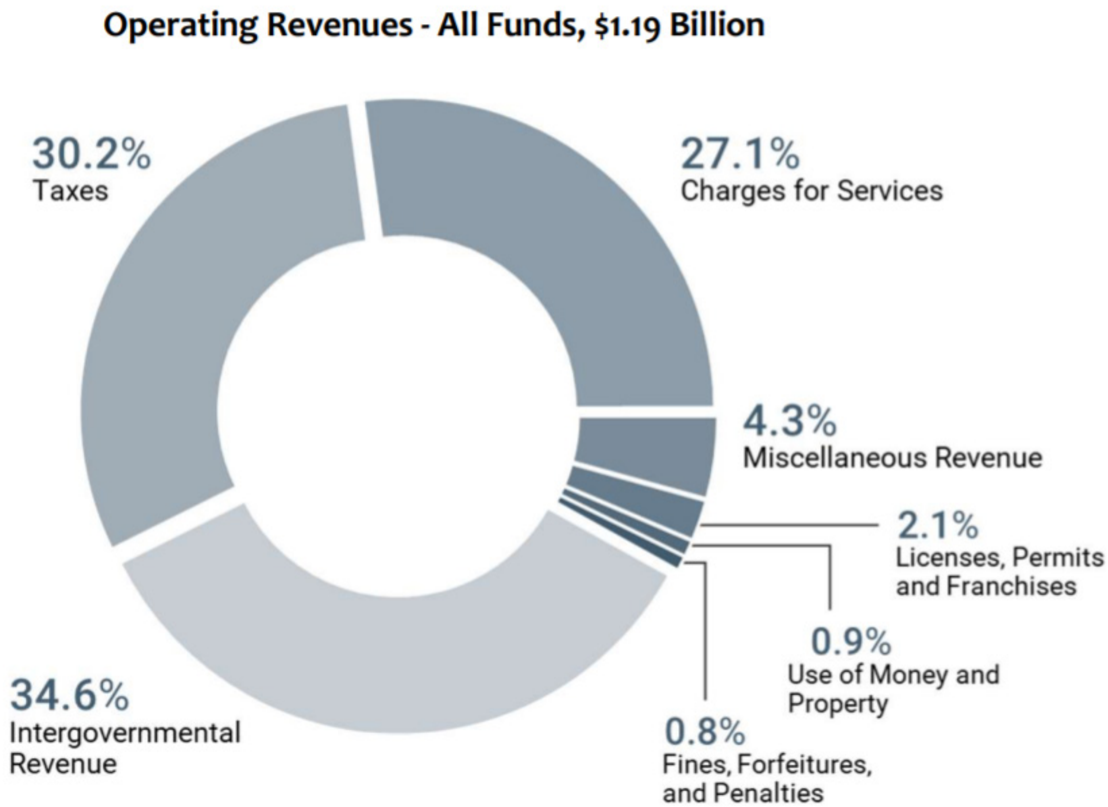
Financial Resources	Accessible/ Eligible to Use	Used for Mitigation in the Past?	Comments
Community Development Block Grants (CDBG)	Yes	-	Historically had CDBG, but lacking recordation on its usage.
Federal Grant Programs (Hazard Mitigation, Pre-Disaster Mitigation, Flood Mitigation Assistance, Emergency Management Performance)	Yes	Yes	Funded preparation of a CCVA for the County's Safety Element Update and is currently funding this MJHMP Update
Capital improvements project funding	Yes	Yes	FY 2020-21 capital improvements related to hazard mitigation include upgrading the County's public safety radio system and expanding the Emergency Operations Center
Authority to levy taxes for specific purposes	Yes	No	-
Fees for water, sewer, gas, or electric services, new development	Yes	No	Fees are charged for permits for new development
Incur debt through general obligation bonds	Yes	No	-
Incur debt through special tax bonds	Yes	No	-
Incur debt through private activities	Yes	No	-
Cannabis tax revenue	Yes	No	In the County's 2020-21 Budget, unallocated cannabis tax revenue totals approximately $875,000, and it is recommended that these remaining funds be considered to support the cannabis program to ensure success and the continuity of the revenue stream, for one-time critical expenditures, or to be set aside to backfill revenue to preserve service levels should that become necessary.

The County budget for Fiscal Years (FY) 2020-21 was dramatically affected by the costs of the COVID-19 pandemic and public health response with a total FY 2020-21 impact of $27,347,000 and a direct cost estimate of $5.6 million. Even so, The budget for FY 2020-21 is balanced with total operating revenues of $1.19 billion and total operating expenditures of $1.19 billion. Operating expenditures include both ongoing and one-time costs, and ongoing costs are largely supported by ongoing revenues. The FY 202021 recommended budget includes full-time equivalent (FTE) staffing of 4,304 and no service level reductions were required of any County department to balance revenues and expenditures (County of Santa Barbara 2020b).

Several capital improvements are funded under FY 2020-21, including the following hazard-related improvements:

- **Public Safety Radio Replacement**: The need for the replacement of the public safety radio system has been included in the fiscal issues report with a potential price tag of around $45 million. The County of Santa Barbara has a diverse radio communications environment, with several different land mobile radio systems deployed to meet specific operational needs of County departments. These systems, which together make up the County's Public Safety Radio Network, have varying technologies and capabilities. The County needs to replace the Public Safety Radio Network as it is at the end of its useful life. The replacement network must meet public-safety standards for performance and reliability and provide robust radio communications for the next 10 to 20 years. The County will consider consolidating systems where it can provide efficiencies and reduce operating costs. COPs are likely the most cost-effective funding option for this project, but the project will also require a significant upfront cash investment to fund certain components of this project that don't lend themselves to long-term financing, such as assets with shorter useful lives. The recommended budget includes the set aside of one-time sources to build up the necessary cash balance.
- **Emergency Operations Center Expansion**: This project was approved by the Santa Barbara County Board of Supervisors in November of 2021. The project will expand the existing EOC structure to provide space for a call center, a redesigned area for the Joint Information Center, as well as new space for the Regional Fire Communications Center. Training of call takers is slated to begin in mid-2022 with a launch of the center in 2024. Cost estimates are currently being refined but will likely exceed $10 million.

Figure 4-7. Operating Revenue by Category, FY 2020-21



(County of Santa Barbara 2020b)

In addition to the County's annual budget, the County and its jurisdictions regularly seek grant opportunities for hazard mitigation projects. Since 1994, County jurisdictions have led projects totaling $30,068,709 in grant funding (including $7,736,792.32 in local match dollars) from the FEMA Hazard Mitigation Program and Pre-Disaster Mitigation Program (Table 4-13). Of the 32 grants awarded, 15 have been received, three each by the City of Carpinteria and the City of Santa Barbara, two by the Montecito Water District and the California Department of Conservation, and one each for the cities of Goleta, Guadalupe, and Lompoc, as well as the City of Santa Barbara Fire Department, Land Trust for Santa Barbara, Santa Barbara School Districts, and Santa Ynez Band of Chumash Mission Indians.

Table 4-13. FEMA Hazard Mitigation Grants Awarded in Santa Barbara County

Sub applicant	Project Title	Total Project Amount	Local Portion	Status	Program Year	Project Type
County of Santa Barbara	7% Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan Update	$300,000	$75,000	Approved	2019	91.5: Local Multi-Jurisdictional Hazard Mitigation Plan - UPDATE
City of Carpinteria	7% Local Hazard Mitigation Plan Update	$112,583	$28,145.75	Approved	2018	91.3: Local Multi-Jurisdictional Hazard Mitigation Plan - UPDATE
City of Carpinteria	Carpinteria Creek Parcel Acquisition	$302,978	$75,744.50	Approved	2018	200.2: Acquisition of Private Real Property (Structures and Land) - Coastal
City of Carpinteria	Via Real Stormwater Project	$120,100	$30,025	Approved	2018	403.4: Stormwater Management - Detention/Retention Basins
City of Santa Barbara	192 Storm Drain	$106,605	$26,651.23	Closed	2018	403.1: Stormwater Management - Culverts; 403.8: Floodwater and Mudflow diversions - post-wildfire
City of Santa Barbara	Santa Barbara Desalination Plant Intake Pump Platforms Stabilization Project	$209,250	$52,312.50	Approved	2018	205.9: Retrofitting Public Structures - Tsunami; 501.1: Other Major Structural Projects; 601.1: Generators
County of Santa Barbara	7% County of Santa Barbara Vulnerability Assessment & Safety Element	$447,390	$299,136.59	Approved	2018	95.2: Planning Related Activities
County of Santa Barbara	Randall Road Debris Basin Project	$18,005,391	$4,501,347.75	Approved	2018	200.6: Acquisition of Private Real Property (Structures and Land) - Landslide
Land Trust for Santa Barbara	San Ysidro Creek Preserve Debris Removal and Replanting	$231,000	$57,750	Approved	2018	300.6: Vegetation Management - Erosion; 304.2: Post Wildfire Reforestation
Montecito Water District	5% Automatic Transfer Switch	$8,213	$2,053.25	Closed	2018	91.1: Local Multi-Jurisdictional Hazard Mitigation Plan
Montecito Water District	5% Bella Vista Automatic Transfer Switch	$21,163	$5,290.75	Approved	2018	602.1: Other Equipment Purchase and Installation

Table 4-13. FEMA Hazard Mitigation Grants Awarded in Santa Barbara County (Continued)

Sub applicant	Project Title	Total Project Amount	Local Portion	Status	Program Year	Project Type
City of Goleta	Seismic Retrofit of the Goleta Valley Community Center	$671,294	$167,823.50	Approved	2017	205.6: Structural Retrofitting/ Rehabilitating Public Structures - Seismic
City of Santa Barbara	Laguna Pump Station Project	$1,011,850	$252,962.50	Approved	2017	403.4: Stormwater Management - Detention/Retention Basins
County of Santa Barbara	Jalama Road Culvert Replacement Project	$371,592	$92,898	Approved	2017	403.1: Stormwater Management - Culverts
County of Santa Barbara	Debris Hazard Risk Analysis and Mapping	$109,390	$27,348	Closed	2017	100.1: Public Awareness and Education (Brochures, Workshops, Videos, etc.); 104.1: Developing, Implementing, and Enforcing Codes, Standards, Ordinances, and Regulations; 402.2: Roads and Bridges - post-wildfire erosion and flood protection
Santa Barbara County Office of Emergency Management	Santa Barbara County Multi-Hazard Mitigation Plan	$200,000	$50,000	Closed	2014	91.1: Local Multi-Jurisdictional Hazard Mitigation Plan
City of Lompoc	Santa Ynez Riverbank Stabilization	$1,241,830	$310,457	Closed	2011	302.1: Landslide Stabilization - Structural; 403.2: Stormwater Management - Diversions
County of Santa Barbara	Santa Barbara Plan Update	$222,899	$55,725	Closed	2009	91.1: Local Multi-Jurisdictional Hazard Mitigation Plan
County of Santa Barbara	Seismic Retrofit Santa Maria Court Facility	$860,000	$215,000	Closed	2008	205.6: Structural Retrofitting/ Rehabilitating Public Structures - Seismic
Department of Conservation	2006 Improving CISN Central Calif Earthquake Monitoring	$93,331	$23,331	Closed	2005	105.1: Applied Research and Development in the Building Sciences

Table 4-13. FEMA Hazard Mitigation Grants Awarded in Santa Barbara County (Continued)

Sub applicant	Project Title	Total Project Amount	Local Portion	Status	Program Year	Project Type
Santa Barbara School Districts	Santa Barbara School Districts Multi-Jurisdictional Hazard Mitigation Plan	$73,700	$12,275	Closed	2005	91.1: Local Multi-Jurisdictional Hazard Mitigation Plan
Santa Ynez Band of Chumash Mission Indians	Santa Ynez Tribal Multi-Jurisdictional Hazard Mitigation Plan	$80,876	$20,219	Obligated	2005	93.1: Tribal (Local) Multi-Jurisdictional Hazard Mitigation Plan
City of Guadalupe	Drinking Water Supply & Distribution System Improvement	$1,332,000	$333,000	Closed	2004	401.1: Water and Sanitary Sewer System Protective Measures
County of Santa Barbara	Santa Maria Court Facility SB 1732	$129,261	$32,314	Closed	2004	205.6: Structural Retrofitting/Rehabilitating Public Structures - Seismic
County of Santa Barbara	Courthouse Seismic Retrofit (SB 1732)	$796,290	$199,072	Closed	2004	205.6: Structural Retrofitting/Rehabilitating Public Structures - Seismic
County of Santa Barbara	Santa Maria Juvenile Court Building Seismic Retrofit SB 1732	$15,000	$3,750	Closed	2004	205.6: Structural Retrofitting/ Rehabilitating Public Structures - Seismic
Department of Conservation	Improving CISN Central CA EQ Monitoring: CGS Element	$138,666	$73,146	Closed	2004	105.1: Applied Research and Development in the Building Sciences
County of Santa Barbara	Veloz Drive RCB Culvert Replacement	$115,200	$28,800	Closed	1998	403.1: Stormwater Management - Culverts
Santa Barbara County Department of Public Works	Conejo Slide Area Acquisition	$1,060,153	$265,038	Closed	1998	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine
County of Santa Barbara	East Santa Maria Drainage Improvements	$1,549,475	$387,369	Closed	1995	403.4: Stormwater Management - Detention/Retention Basins
County of Santa Barbara	Via Regina Interceptor Channel	$28,590	$7,147	Closed	1995	500.2: Flood Control - Berm, Levee, or Dike
City of Santa Barbara Fire Department	Honda Valley Fuel Hazard Mitigation	$102,639	$25,660	Closed	1994	300.2: Vegetation Management - Wildfire

Source: FEMA Opendata 2019: https://www.fema.gov/openfema-data-page/hazard-mitigation-assistance-projects-v2

4.2.5 County Education and Outreach Capabilities

This type of local capability refers to education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Examples include natural disaster or safety-related school programs; participation in community programs such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns such as an Earthquake Awareness Month (February each year), National Preparedness Month (September), or the Great California ShakeOut (a statewide earthquake drill that happens annually on the third Thursday of October). The County and cities can capitalize on their existing educational capacities, even non-hazard related such as school partnerships, and build new capabilities to educate the larger community on hazard risk and mitigation options.

This section describes several existing outreach programs that are used to promote community awareness and readiness for natural disasters and hazards in the county.

ReadySBC Website and ReadySBC Alerts

County jurisdictions have established various communication pathways to inform the public of emergencies and recommended protective actions, such as evacuations and sheltering in place. These pathways are frequently used concurrently to amplify emergency information throughout the community and reach vulnerable individuals who may need additional information and resources to take action, including people with disabilities, access and functional needs, and commuters and visitors.

Emergency notifications are primarily disseminated using Everbridge, a web-based mass notification platform that supports alerting through phone calls, text messages, email, TTY/TTD (for the deaf and hearing-impaired), Wireless Emergency Alerts (WEAs), and Emergency Alert System (EAS) messages. Notifications may also be delivered directly to residents via door knocks and/or evacuation sirens on law enforcement vehicles. Incident information can also be posted on the County's emergency preparedness website: www.ReadySBC.org, shared on social media platforms (e.g., Twitter, Facebook), through print, radio, and TV media, and accessed through 2-1-1 and Call Center hotlines.

Ready Santa Barbara County (SBC) is the primary source for information and notifications regarding hazard preparation, current emergencies, and recovery. Residents sign up for the ReadySBC Alerts program to receive emergency alerts through the ReadySBC.org website. ReadySBC.org is the all-hazard preparedness and incident information resource where the public can receive countywide and/or local updates about preparing for hazards, recovery programs, and official information on current emergencies. The website also has information on wildfires, storms, emergency shelters, and public safety power shutoffs, as well as interactive maps. Residents who subscribe to ReadySBC Alerts can receive notifications via multiple methods, including text and email. The Office of Emergency Management works closely with partner agencies on updated content for the site (refer to Section 4.2.2, *County Administrative and Technical Capabilities - Santa Barbara County Office of Emergency Management*).

StormReady & TsunamiReady

The County is certified with the StormReady and TsunamiReady programs of the National Weather Service. These programs help arm communities with the communication and safety skills needed to save lives and property - before, during, and after the event. They also help community leaders and emergency managers strengthen local safety programs. StormReady and TsunamiReady recognition represents NWS' highest level of commitment to safety and preparedness. StormReady/TsunamiReady communities, counties, Indian tribes/nations, universities and colleges, military bases, government sites, commercial enterprises, and other groups are better prepared to save lives from severe weather and tsunamis through advanced planning, education, and awareness. The StormReady and TsunamiReady programs can help ensure communities are prepared when a weather or tsunami disaster strikes. Within Santa Barbara County, the cities of Santa Barbara and Goleta and UC Santa Barbara participate in the StormReady program, and the City of Santa Barbara participates in the TsunamiReady program.

These programs use a grassroots approach to help communities handle all types of severe weather and/or tsunami hazards by asking communities to proactively improve their weather and tsunami-related emergency operations. Local NWS meteorologists work one-on-one with emergency managers to provide clear-cut guidelines on how to strengthen these operations. To be officially StormReady a community must:

- Establish a 24-hour warning point and EOC
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Promotores Network

The Promotores Network is a grassroots network of individuals who are actively involved in promoting healthy communities and an understanding of the County's planning projects with a climate change lens through education, policy changes, and linking Santa Barbara County resources to health services. The mission of the Santa Barbara County Promotores Network is to empower families and individuals with respect, dignity, and compassion by enhancing the quality of all aspects of their lives through education and the promotion of healthy behaviors. The Promotores Network originated at the Santa Barbara Neighborhood Clinics in 2002 and now includes over 200 members countywide. The Promotores Network members understand and respect the traditional beliefs of the Latino community and can help agencies integrate these cultural beliefs into their programs and services. They do this by engaging the underserved and marginalized Spanish-speaking recent immigrant community around strategies to enhance systems to improve community awareness about health and social service issues that affect them. They speak Spanish and English, and some even speak Mixteco and Nahuatl and participate in health fairs, community forums, and peer-to-peer education and provide information on a variety of issues of interest or benefit to our community, including emergency preparedness and communicable diseases.

4.3 OPPORTUNITIES FOR MITIGATION CAPABILITY IMPROVEMENTS

The County continuously strives to mitigate the adverse effects of potential hazards through its existing capabilities while also evaluating the opportunities for improvements. As part of this update, the County aims to improve its resilience to hazards and maximize disaster readiness equitably in all communities. The County has identified several opportunities for improvements to its hazard mitigation capabilities. These opportunities are summarized below and reflected in the mitigation plan provided in Section 7.0, *Mitigation Plan*.

Mitigation Improvements by Capability Category

- **Administrative and Technical Capabilities**
  - Continue to improve the County's GIS database and mapping applications to improve accuracy and completeness and ensure public access.
  - Improve the accuracy of the County's critical facilities database to include accurate structural age, materials, size, value, and other key features.
  - Acquire aerial LiDAR imagery to improve the accuracy of GIS mapping.
- **Regulatory Capabilities**
  - Review County zoning code annually to ensure development is appropriately limited in hazard prone areas identified in the MJHMP.
  - Require coastal and blufftop development to avoid coastal hazards, including erosion and wave run up under current and projected climate change and sea level rise scenarios.
  - Improve countywide energy resilience, including low- or no-emission generators and developing an energy assurance plan to sustain critical functions and essential services during power outages.
  - Incorporate the MJHMP by reference with the County's Safety Element consistent with AB 2140.
- **Fiscal Capabilities**
  - Expand County fiscal capabilities by seeking and applying for grants such as Hazard Mitigation, Pre-Disaster Mitigation, Flood Mitigation Assistance, and Emergency Management Performance funds.
  - Expand County fiscal capabilities through local budget planning, including the County's annual budget process.
  - Consider funding hazard mitigation through local initiatives and programs such as taxes, bond programs, and property assessments.
  - Update the County CIP to include hazard mitigation actions and consider CIP updates annually as part of MJHMP management (see also, Chapter 8.0, *Plan Maintenance*).
  - Fund improved staffing of Operations Division of the County Fire Department to support wildfire mitigation capabilities.

    - Fund acquisition and development of a new facility for the County Fire Department's Fire Crew Program.
    - Fund a sediment management program to clear debris basins and deposit beach-quality sediments on local beaches.
    - Fund relocation of utilities landward of Goleta Beach County Park that are threatened by coastal hazards.

- **Education and Outreach Capabilities**
    - Increase multi-lingual public awareness of emergency alert systems and hazard readiness, including direct outreach, digital outreach, and social media.
    - Partner with community groups to reach underrepresented and/or underserved communities to increase equitable access to emergency services and hazard mitigation capabilities.

5.0 HAZARDS ASSESSMENT

5.1 OVERVIEW

The purpose of this section is to review, update, and/or validate the hazards identified for the 2022 Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) update. The intent is to confirm and update the description, location and extent, and history of hazards facing the County of Santa Barbara (County) and participating agencies now and in the future. This assessment also considers the potential exacerbating effects of climate change. The importance of this review is to ensure that all hazards are being considered so decisions and mitigating actions are based on the most up-to-date information available.

Another purpose of this section is to screen the hazards to determine their relative probability and severity to inform the risk posed to various communities and resources. This assessment will provide an understanding of the significance by ranking hazards by their priority in the potentially affected communities.

To assist with this effort, both the Mitigation Advisory Committee (MAC) and the Local Planning Team (LPT) were consulted (refer to Section 3.2 and Section 3.3, respectively, for further information regarding the MAC and LPT involvement in the MJHMP planning process). In addition, the information was shared and refined based on public input through a robust community outreach process (refer to Section 3.4 for information regarding public outreach).

5.2 HAZARD ASSESSMENT

In 2021, the MAC reviewed and revised 1) the list of hazards by community or geographic area; 2) the information and material presented for each hazard; and 3) the prioritization of the hazards utilizing the information and material from the State of California Multi-Hazard Mitigation Plan, the County Emergency Management Plan, the Santa Barbara County Comprehensive Plan Seismic Safety and Safety Element, the 2021 Final Santa Barbara County Climate Change Vulnerability Assessment (Final CCVA), the Santa Barbara County 2017 MJHMP, supplemented by local knowledge, hazard mitigation plans from the counties of Ventura and San Luis Obispo, and public input. The following sections provide the results of this effort.

5.2.1 Hazard Identification

Santa Barbara County is susceptible to a wide range of natural and manmade hazards. This MJHMP Update identifies and screens these hazards. Screening hazards intends to help prioritize which hazards present the greatest risks in each community or geographic area.

In total, 30 hazards have been identified and investigated for this MJHMP update. For presentation purposes, this MJHMP organizes these 30 hazard types into four categories:

- Natural and Destructive Hazards
- Severe Weather and Storm Events
- Urban and Human-caused Hazards

- Infrastructure failures

In alphabetical order within each category, the hazards identified and investigated for the Santa Barbara County MJHMP Update include:

- **Natural and Destructive Hazards**
  - Coastal Hazards
  - Drought & Water Shortage
  - Earthquake
  - Flood
  - Geologic Hazards
  - Landslide
  - Mudflow & Debris Flow
  - Tsunami
  - Wildfire
- **Severe Weather and Storm Events**
  - Extreme Heat/Freeze
  - Hailstorm
  - Hurricane
  - Tornado
  - Windstorm
- **Urban and Human-Caused Hazards**
  - Agricultural Pests
  - Civil Disturbance
  - Cyber Threat
  - Invasive Species
  - Pandemic/Public Health Emergency
  - Terrorism
  - Well Stimulation & Hydraulic Fracturing
- **Infrastructure Failures**
  - Aircraft Crash
  - Dam Failure
  - Energy Shortage & Resiliency
  - Hazardous Materials Release
  - Levee Failure
  - Natural Gas Pipeline Rupture & Storage Facility Incident

- Oil Spill
- Radiological Accident
- Train Accident

5.2.2 Hazard Screening/Prioritization

Historical data, catastrophic potential, relevance to the jurisdiction, and the probability and potential magnitude of future occurrences were all used to identify and prioritize the list of hazards most relevant in Santa Barbara County. Participating agencies were asked to complete Plan Update Guide worksheets to start the process of screening and ranking hazards within the county. The Plan Update Guides required ranking of the hazards based on the frequency/probability of occurrence, geographic extent, potential magnitude/severity of the hazard, and overall significance, as defined below in Table 5-1. The results of the Plan Update Guides were tallied to determine the rankings.

As shown in Table 5-1, the screening and scoring of frequency/probability of occurrence, geographic extent, potential magnitude/severity of the hazard, and overall significance are assigned numerical points. Hazards with a greater impact, such as *Highly Likely* for Frequency/Probability of Occurrence and *Extensive* for Geographic Extent, are associated with a higher number of points, while rankings with a smaller impact are associated with a lower number of points (e.g., *Limited* for Geographic Extent). The hazard prioritization included in this MJHMP Update is primarily based on the numerical ranking completed with the Plan Update Guides.

In addition to consideration of the Plan Update Guide worksheets, the results of the public survey were included in the prioritization of hazards within the county to incorporate public input. Specifically, the 10 most severe hazards as ranked in the public survey received an extra point. The MAC was also asked to rank the hazards by hazard category, as listed in Section 5.1.1, *Hazard Identification* above, during a virtual MAC meeting. An additional one or two points were added to the hazard rankings based on input from the MAC, depending on the importance conveyed by the MAC in discussion and direct input (see also, Chapter 3.0, *Planning Process*). Therefore, the Santa Barbara County hazard prioritization in the MJHMP update is based on the Plan Update Guides, the public survey feedback, and the results of the MAC hazard ranking and direct input and collaboration.

Table 5-1. Hazard Screening and Scoring

Hazard Type	Frequency/ Probability of Occurrence	Geographic Extent	Potential Magnitude/ Severity	Overall Significance	MAC and Public Input	Total Points
Wildfire	4 Highly likely	2 Significant	3 Critical	3 High	+3	15
Drought & Water Shortage	3 Likely	3 Extensive	3 Critical	3 High	+3	15
Extreme Heat & Freeze	4 Highly likely	3 Extensive	2 Limited	2 Medium	+2	13
Flood	3 Likely	2 Significant	2 Limited	2 Medium	+2	11

Table 5-1. Hazard Screening and Scoring (Continued)

Hazard Type	Frequency/ Probability of Occurrence	Geographic Extent	Potential Magnitude/ Severity	Overall Significance	MAC and Public Input	Total Points
Mudflow & Debris Flow	4 Highly likely	1 Limited	3 Critical	2 Medium		10
Landslide	2 Occasional	1 Limited	2 Limited	1 Low		6
Geologic Hazards	2 Occasional	1 Limited	1 Negligible	1 Low		5
Coastal Hazards	3 Likely	1 Limited	1 Negligible	1 Low	+3	9
Earthquake	3 Likely	3 Extensive	3 Critical	3 High	+2	14
Hailstorm	1 Unlikely	1 Limited	2 Limited	1 Low		5
Windstorm	3 Likely	2 Significant	2 Limited	2 Medium	+1	10
Hurricane	1 Unlikely	1 Limited	2 Limited	1 Low		5
Tornado	1 Unlikely	1 Limited	2 Limited	1 Low		5
Tsunami	1 Unlikely	1 Limited	2 Limited	1 Low		
Energy Shortage & Resiliency	3 Likely	3 Extensive	2 Limited	2 Medium	+2	12
Hazardous Materials Release	2 Occasional	1 Limited	2 Limited	2 Medium	+2	9
Oil Spill	2 Occasional	1 Limited	1 Negligible	1 Low	+1	6
Natural Gas Pipeline Rupture & Storage Facility Incident	2 Occasional	1 Limited	2 Limited	1 Low	+1	7
Well Stimulation & Hydraulic Fracturing	1 Unlikely	1 Limited	1 Negligible	1 Low		4
Radiological Accident	1 Unlikely	1 Limited	2 Limited	1 Low		5
Dam Failure	1 Unlikely	1 Limited	3 Critical	2 Medium	+1	8
Levee Failure	1 Unlikely	1 Limited	1 Negligible	1 Low	+1	5
Pandemic/Public Health Emergency	3 Likely	2 Significant	3 Critical	3 High	+2	13
Aircraft Crash	2 Occasional	1 Limited	2 Limited	1 Low		6
Train Accident	2 Occasional	1 Limited	2 Limited	1 Low		6
Cyber Threat	3 Likely	1 Limited	2 Limited	2 Medium	+2	9
Agricultural Pest	2 Occasional	3 Extensive	1 Negligible	1 Low	+1	6
Invasive Species	2 Occasional	3 Extensive	1 Negligible	1 Low	+1	8
Terrorism	2 Occasional	1 Limited	2 Limited	1 Low		6
Civil Disturbance	3 Likely	1 Limited	2 Limited	1 Low	+1	7

Table 5-1. Hazard Screening and Scoring (Continued)

<table>
<tr><th>Hazard Type</th><th>Frequency/ Probability of Occurrence</th><th>Geographic Extent</th><th>Potential Magnitude/ Severity</th><th>Overall Significance</th><th>MAC and Public Input</th><th>Total Points</th></tr>
<tr><td colspan="2"><u>Frequency/Probability of Occurrence</u>:
4 - Highly Likely: Near 100% probability in next year
3 - Likely: Between 10 and 100% probability in next year or at least one chance in 10 years
2 - Occasional: Between 1 and 10% probability in next year or at least one chance in the next 100 years
1 - Unlikely: Less than 1% probability in the next 100 years.</td><td colspan="5"><u>Potential Magnitude/Severity</u>:
4 - Catastrophic: Multiple deaths, a complete shutdown of facilities for 30 days or more, more than 50% of property within the county is severely damaged
3 - Critical: Multiple severe injuries, a complete shutdown of facilities for at least 2 weeks, more than 25% of property within the county is severely damaged
2 - Limited: Some injuries, complete shutdown of critical facilities for more than one week, more than 10 percent of the property within the county is severely damaged
1 - Negligible: Minor injuries, minimal quality-of-life impact, a shutdown of critical facilities and services for 24 hours or less, less than 10 percent of the property within the county is severely damaged</td></tr>
<tr><td colspan="2"><u>Geographic Extent</u>:
3 - Extensive: 50-100% of the county
2 - Significant: 10-50% of the county
1 - Limited: Less than 10% of the county</td><td colspan="5"><u>Overall Significance</u>:
3 - High: Widespread potential impact
2 - Medium: Moderate potential impact
1 - Low: Minimal potential impact</td></tr>
</table>

The hazards that scored the most points were considered to have the highest priority and the hazards with the least points were considered to have the lowest priority. Table 5-2 lists the hazard types in order of highest priority to lowest priority, using the scoring methodology described above.

Table 5-2. Hazard Priority Ranking in Santa Barbara County

County Hazards Prioritization	Total Number of Points
Wildfire	15
Drought & Water Shortage	15
Earthquake	14
Pandemic/Public Health Emergency	13
Extreme Heat/Freeze	13
Energy Shortage & Resiliency	12
Flood	11
Mudflow & Debris Flow	10
Windstorm	10
Hazardous Materials Release	9
Cyber Threat	9
Coastal Hazards	9
Dam Failure	8
Invasive Species	8
Civil Disturbance	7

Table 5-2. Hazard Priority Ranking in Santa Barbara County (Continued)

County Hazards Prioritization	Total Number of Points
Natural Gas Pipeline Rupture & Storage Facility Incident	7
Agricultural Pests	6
Train Accident	6
Aircraft Crash	6
Landslide	6
Terrorism	6
Oil Spill	6
Geologic Hazards	5
Tsunami	5
Hailstorm	5
Tornado	5
Hurricane	5
Levee Failure	5
Radiological Accident	5
Well Stimulation & Hydraulic Fracturing	4

Given the overall prioritization of hazard types, as summarized in Table 5-2 above, the discussion of hazards in Chapter 5.0 is organized by hazard category (i.e., natural and destructive hazards, severe weather and storm events, urban and human-made hazards, and infrastructure failures) and in descending order with "*higher priority*" hazards listed at the top and the "*lower priority*" hazards at the bottom within each category, as follows.

- **Natural and Destructive Hazards**
  - Wildfire
  - Drought & Water Shortage
  - Earthquake
  - Flood
  - Mudflow & Debris Flow
  - Coastal Hazards
  - Landslide
  - Geologic Hazards
  - Tsunami
- **Severe Weather and Storm Events**
  - Extreme Heat/Freeze
  - Windstorm
  - Hailstorm

- Tornado
- Hurricane

- **Urban and Human-Caused Hazards**
  - Pandemic/Public Health Emergency
  - Cyber Threat
  - Invasive Species
  - Civil Disturbance
  - Agricultural Pests
  - Terrorism
  - Well Stimulation & Hydraulic Fracturing
- **Infrastructure Failures**
  - Energy Shortage & Resiliency
  - Hazardous Materials Release
  - Dam Failure
  - Natural Gas Pipeline Rupture & Storage Facility Incident
  - Train Accident
  - Aircraft Crash
  - Oil Spill
  - Levee Failure
  - Radiological Accident

5.2.3 Approach and Methodology

Section 5.3 contains **"Incident Profiles"** to describe a recent example of a hazardous incident within the county that required response.

This hazards assessment covers the entire geographical area of Santa Barbara County. Since this plan is multi-jurisdictional, the MAC was required to evaluate how the hazards and risks vary from jurisdiction to jurisdiction. While these differences are noted in this section, they are expanded upon in the annexes of the participating jurisdictions. If no additional data is provided in an annex, it should be assumed that the risk and potential impacts to the affected jurisdiction are similar to those described here for the entire Santa Barbara County planning area.

The following material provides an overview of the hazards. More information can be found in the State of California Multi-Hazard Mitigation Plan, the Santa Barbara County Comprehensive Plan Seismic Safety and Safety Element, the CCVA, and Community Wildfire Protection Plans (see Chapter 4.0, *Community Profile and Capability Assessment* for a description of applicable plans and regulations).

Sections 5.3 through 5.6 contain detailed hazard profiles for the identified hazards. This plan does not omit any natural hazards that are commonly recognized to affect Santa Barbara County. Each hazard profiled includes the following subsections:

- **Description of Hazard** – This section gives a description of the hazard and associated issues followed by details on the hazards specific to Santa Barbara County.
- **Location and Extent of Hazard in Santa Barbara County** – This section gives a spatial description of the potential location or areas of Santa Barbara County that the hazard is expected to impact. This section also describes the potential strength or magnitude of the hazard as it pertains to Santa Barbara County.
- **History of Hazard in Santa Barbara County** – This section contains information on historical incidents, including impacts where known. The Plan Update Guide worksheets provided by the MAC and LPT were used to capture the latest information from participating jurisdictions on past occurrences of hazards.
- **Probability of Occurrence** – The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, the frequency was calculated based on existing data. It was determined by dividing the number of events observed by the number of years on record and multiplying by 100. This gives the percent chance of an event happening in any given year (e.g., three droughts over 30 years equates to a 10 percent chance of a drought in any given year). The likelihood of future occurrences is categorized into one of the following classifications:
    - **Highly Likely** – Near 100 percent chance of occurrence in next year or happens every year.
    - **Likely** – Between 10 and 100 percent chance of occurrence in the next year or has a recurrence interval of 10 years or less.
    - **Occasional** – Between 1 and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
    - **Unlikely** – Less than 1 percent chance of occurrence in the next 100 years or has a recurrence interval of greater than every 100 years.
- **Climate Change Considerations** – This section describes the potential for climate change to affect the frequency, intensity, and location of the hazard in the future.

5.3 NATURAL AND DESTRUCTIVE HAZARDS

5.3.1 Wildfire

Description of Hazard

A **wildfire** is an unplanned fire that is fueled by natural areas or wildlands, such as the Los Padres National Forest, larger state parks, such as Gaviota State Park, or undeveloped ranchland, particularly in the Santa Ynez Mountains or San Rafael Mountains. Of critical concern is the wildland-urban interface (WUI), where wildfire can burn buildings and infrastructure. According to the National Fire Plan issued by the U.S. Departments of Agriculture and Interior, the WUI is defined as "*…the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels*." In WUI fires, the fire is fueled primarily by naturally occurring vegetation in the wildland and urban areas as well as the urban structural elements themselves. Wildfire directly threatens structures, vegetation, and life when ignition occurs in a WUI and also indirectly threatens human health from smoke and particulates, even when wildland fires are not a direct threat to a community.

In the county, this area of transition exists between open undeveloped public and private lands that support flammable vegetation and the county's cities and unincorporated urban communities and small towns that support potentially vulnerable homes and businesses. WUIs vary in character throughout Santa Barbara County. WUI areas in the county include developed single-family neighborhoods immediately adjacent to the foothills of the Santa Ynez Mountains in the communities of Santa Barbara and Goleta and the Solomon Hills in Orcutt. Additional examples of WUIs include larger estate homes within the wildland areas in Montecito, Toro Canyon, and Carpinteria or ranchettes and larger ranches along the Santa Ynez Valley's WUIs. A wildfire in the WUI could burn from wildlands into the urban area, which has happened during several prior fires in Santa Barbara County.

The majority of wildfires are caused by humans or lightning; however, once burning, wildfire behavior is based on three primary factors: fuel, topography, and weather. Fuel will affect the potential size and behavior of a wildfire depending on the amount present, its burning qualities (e.g., level of moisture), and its horizontal and vertical continuity. Topography affects the movement of air, and thus the fire, over the ground surface. The terrain can also change the speed at which the fire travels, and the ability of firefighters to reach and extinguish the fire.

The county's mountainous terrain and limited road access to these areas can sometimes prevent easy access by firefighting equipment. Weather as manifested in temperature, humidity, and wind (both short- and long-term) affects the probability, severity, and duration of wildfires. High winds, in particular, can cause a wildfire to rapidly advance through already dry vegetation posing a major challenge to fire fighting and may even at times limit the safe use of aircraft, which can greatly reduce firefighting capacity. Certain conditions are typically present for a wildfire hazard to occur: a large source of fuel must be present, the weather must be conducive (i.e., generally hot, dry, and windy), and fire suppression sources may be unavailable or insufficient to easily suppress and control the fire, although in some instances of high winds (e.g., sundowner winds) and dry fuels such suppression may not be able to provide full protection.

Table 5-3 provides a summary of fire loss in dollars in Santa Barbara County in 2020. State fire suppression expenditures are expected to increase from $691 million in the 2019-2020 fiscal year to an estimated $1.3 billion for the 2020-2021 fiscal year (CAL FIRE 2021). Michele Steinberg, director of the Wildfire Division at NFPA, notes that "money spent on suppression means less money for prevention efforts, which is key to addressing the problem of wildfire losses," (Roman et al. 2020). The popular weather forecasting service AccuWeather has predicted that costs for the 2020 wildfire season could total between $130 and $150 billion (Roman et al. 2020). Less understood are wildfire's indirect costs associated with environmental cleanup, lost business and tax revenue, and property and infrastructure repairs

Table 5-3. Fire Loss (in Dollars) Within the County of Santa Barbara in 2020

Property Type	Loss in Dollars to Fire
Property or Structure	$1,552,900
Vehicles and Vehicle Contents	$199,600
Miscellaneous Property	$110,867
Total Dollar Loss	$1,863,367

Source: Santa Barbara County Fire Department 2021.
Note: The year 2020 is the only year for which this information is available although it should be noted that 2020 was a relatively calm fire year, and these losses are insignificant compared to fire losses from the Tea, Jesusita, and Paint fires.

Location and Extent of Hazard in Santa Barbara County

Wildfires are a regular occurrence in the state and county. The Mediterranean-type climate, topography, and vegetation of Santa Barbara County make the county especially prone and conducive to wildfires. Since 2012, Santa Barbara County has experienced drought and dry periods with only limited wet years. In addition to the 2012 through 2017 statewide drought emergency, the county is currently identified in the National Integrated Drought Information System (NIDIS) by the National Oceanic and Atmospheric Administration (NOAA) as an area in D3 – Extreme Drought condition (see Section 5.3.2, *Drought & Water Shortage*; NOAA 2021a). This drought condition dries out vegetation and exacerbates wildfire risk in the county.

The California Department of Forestry and Fire Protection (CAL FIRE) Fire and Resource Assessment Program (FRAP) provides high-quality spatial data, maps, and online data viewers which provide critical information on the health and risk factors associated with forest and range lands within the State of California. These maps include but are not limited to Fire Hazard Severity Zones, Wildland-Urban Interface (WUI), Communities At Risk, Fire Threat, and Fire Perimeters. Fire Hazard Severity Zones are areas of significant fire hazards based on fuels (vegetation), terrain, weather, and other relevant factors. These zones define the application of various mitigation strategies to reduce the risk associated with wildland fires. The most current Fire Hazard Severity Zone maps were created in 2007. Figure 5-1 shows the Fire Hazard Severity Zones located in Santa Barbara County. CAL FIRE's FRAP also developed data that displays the relative risk from wildfire in areas of significant population density, known as the WUI. This data is created by intersecting residential housing unit density with proximate fire threat to give a relative measure of potential loss of structures and threats to public safety from wildfire. Figure 5-2 was generated using this data and shows the WUI areas in Santa Barbara County. This figure depicts areas where potential fuels treatments (e.g., controlled burns, vegetation thinning) should be prioritized to reduce wildland fire threats to population centers.

Figure 5-1. Santa Barbara County Fire Hazard Severity Zones

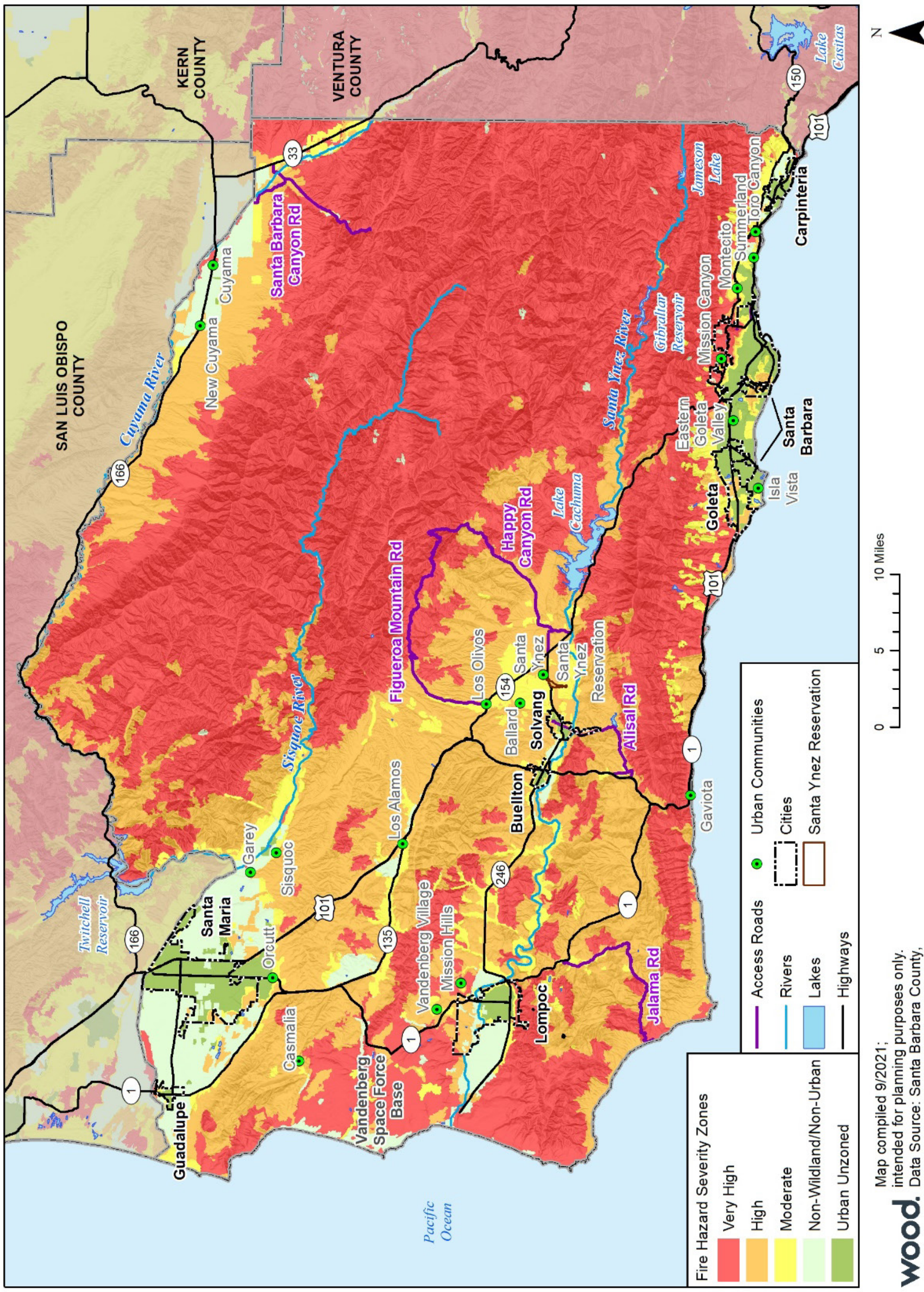
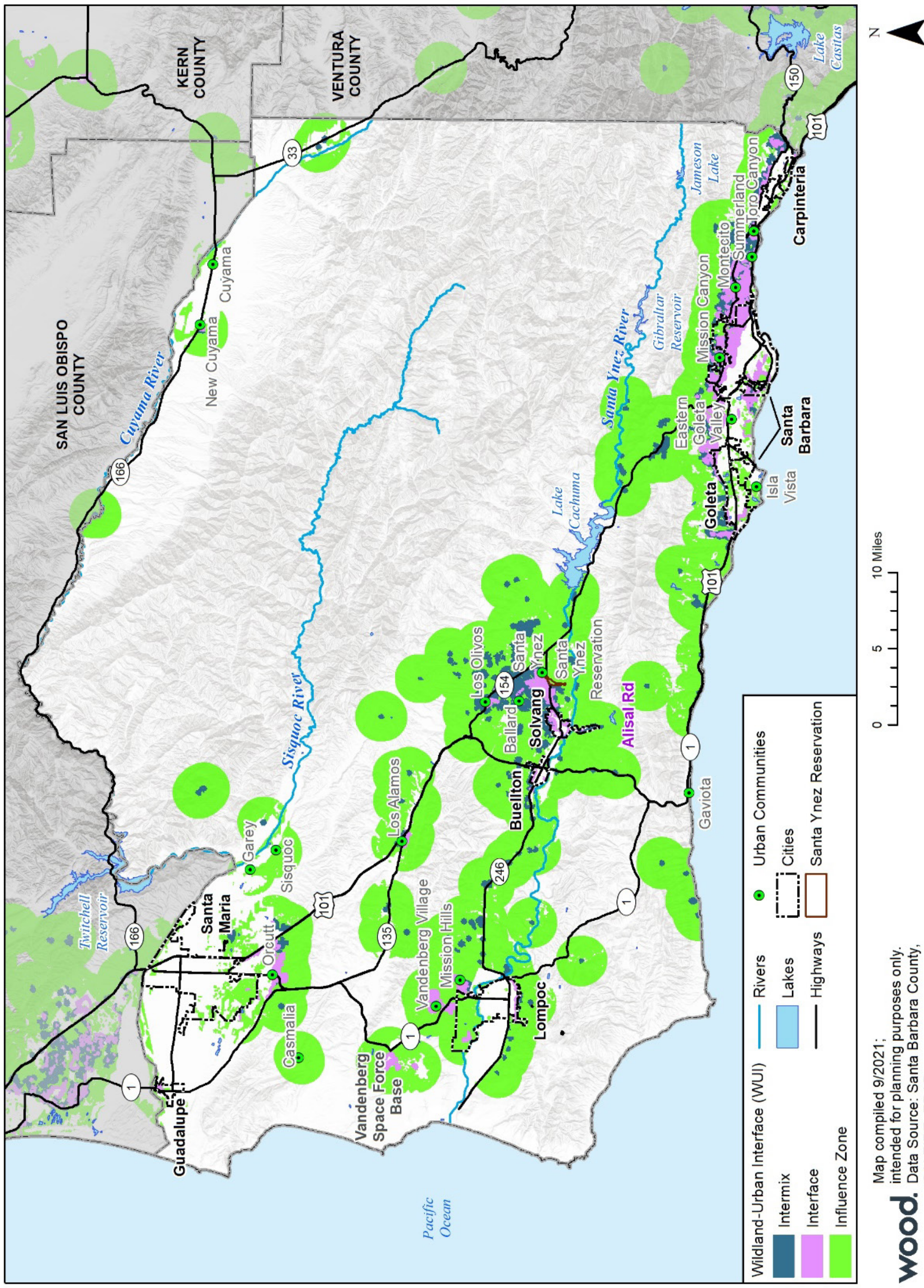


Figure 5-2. Wildland-Urban Interface (WUI)



WUI data shown in Figure 5-2 was developed on a statewide basis and does not consider the precise location of local neighborhoods within or adjacent to these hazard zones. To account for this, the Santa Barbara County Fire Department has synthesized the data at a more local level to convey communities at risk. Further, to help protect people and their property from potential catastrophic wildfire, the National Fire Plan recommends that funding be provided for projects designed to reduce the fire risks to communities. A fundamental step in achieving this goal was the identification of communities that are at high risk of damage from wildfire. These high-risk communities identified within the WUI were published in the Federal Register in 2001. At the request of Congress, the Federal Register notice only listed those communities neighboring federal lands. The list represents the collaborative work of the 50 states and five federal agencies using a standardized process, whereby states were asked to submit all communities within their borders that met the criteria of a structure at high risk from wildfire. Beginning August 17, 2001, no new updates were being made to the Federal Register with states assuming responsibility for continued updates to their lists.

The following list contains the federally identified communities which adjoin federal lands most at risk within Santa Barbara County; however, risks between and within these communities vary substantially, with the WUI of Goleta, Santa Barbara, and Carpinteria along the foothills of the Santa Ynez Mountains perhaps having the greatest risk due to often dense highly flammable chaparral vegetation, steep topography, and exposure to sundowner winds:

- Carpinteria
- Gaviota
- Mission Hills
- Tajiguas
- Casmalia
- Goleta
- Orcutt
- Vandenberg Space Force Base (SFB)
- Cuyama
- Lompoc
- Santa Barbara
- Vandenberg Village

With the county's extensive WUIs bordering multiple communities, the list of communities extends beyond just those adjacent to Federal lands. After the 2000 fire season CAL FIRE, working with the California Fire Alliance, developed a list of communities at risk from wildfire using 1990 Census and U.S. Geological Survey (USGS) Geographic Names Information System data to identify populated places and CAL FIRE's FRAP fuel hazard data. In addition to the already-mentioned communities, they designated the following as WUI Communities at Risk. As with the above list, risks between and within these communities vary substantially, with communities such as forested Montecito being bordered by dense highly flammable chaparral vegetation, steep topography, and exposure to sundowner winds:

- Buellton
- Isla Vista
- Montecito
- Sisquoc
- Ventucopa
- Garey
- Los Alamos
- Santa Maria
- Solvang
- Guadalupe
- Los Olivos
- Santa Ynez
- Summerland

Combining both lists, there are 25 communities on the Communities at Risk List in Santa Barbara County. The California State Forester (CAL FIRE Director) has assigned the role of managing the list to the California Fire Alliance. In addition to the 25 state and federally recognized communities, the Santa Barbara County Fire Department identifies an additional 16 neighborhoods or small communities (Santa Barbara County Fire Department 2021) at risk of wildfire:

- Cebada Canyon
- Woodstock
- Miguelito Canyon
- Painted Cave
- Jalama
- Gobernador
- Toro Canyon
- Jonata Ranch/Bobcat Springs
- Mission Canyon
- Rosario Park
- Tepusquet Canyon
- El Capitan
- Hope Ranch
- Trout Club
- Refugio Canyon
- Paradise

Many of the communities at risk listed above contain relatively old homes that reflect the building materials and/or codes in effect at the time of construction. As such, large numbers of homes are at increased risk of ignition due to structure vulnerabilities (e.g., wood shake roofs and siding, open eaves, unscreened crawlspace, and attic vents), which research has shown to be important in most home losses during wildfires. In addition to hazard reduction through fuel reduction, education of homeowners and mitigation of structure ignition vulnerabilities is therefore recognized as an important priority in these Communities at Risk. Programs that support retrofits to existing structures, combined with building codes that make future structures more fire-resistant, are needed in many fire-prone areas. Figure 5-3 provides an overview of the location of the Communities at Risk as well as the federal, state, and local wildfire responsibility areas.

History of Hazard in Santa Barbara County

Because Santa Barbara County is prone to wildfires, there is a long history of wildfires in the county. Table 5-4 lists the major wildfires (1,000 acres or greater) in Santa Barbara County from 1932-to 2021.

CAL FIRE's FRAP also compiles fire perimeters of wildfires and has established an ongoing fire perimeter data capture process. Figure 5-4 shows wildfire perimeters of significant wildfires (i.e., fires that burned more than 5,000 acres) within the last ~50 years (1970-2021) in Santa Barbara County. Some recent fires (e.g., Cave Fire) may not be shown on this figure if the total burned area was less than 5,000 acres. Fire perimeters provide a reasonable view of the spatial distribution of past large fires. These historic fires are organized by decade to show the evolution of fire behavior over the years. For example, over the last 10 years, Santa Barbara County has experienced nine major fires. Four of these fires (i.e., Thomas, Cave, Sherpa, and Whittier) directly threatened the heavily populated Santa Barbara front country. Three of these fires (i.e., Thomas, Sherpa, and Whittier) resulted in destroyed structures, with over 1,000 structures destroyed in the Thomas Fire, including many in Ventura County.

Figure 5-3. Santa Barbara County Fire Responsibility Areas and Communities at Risk

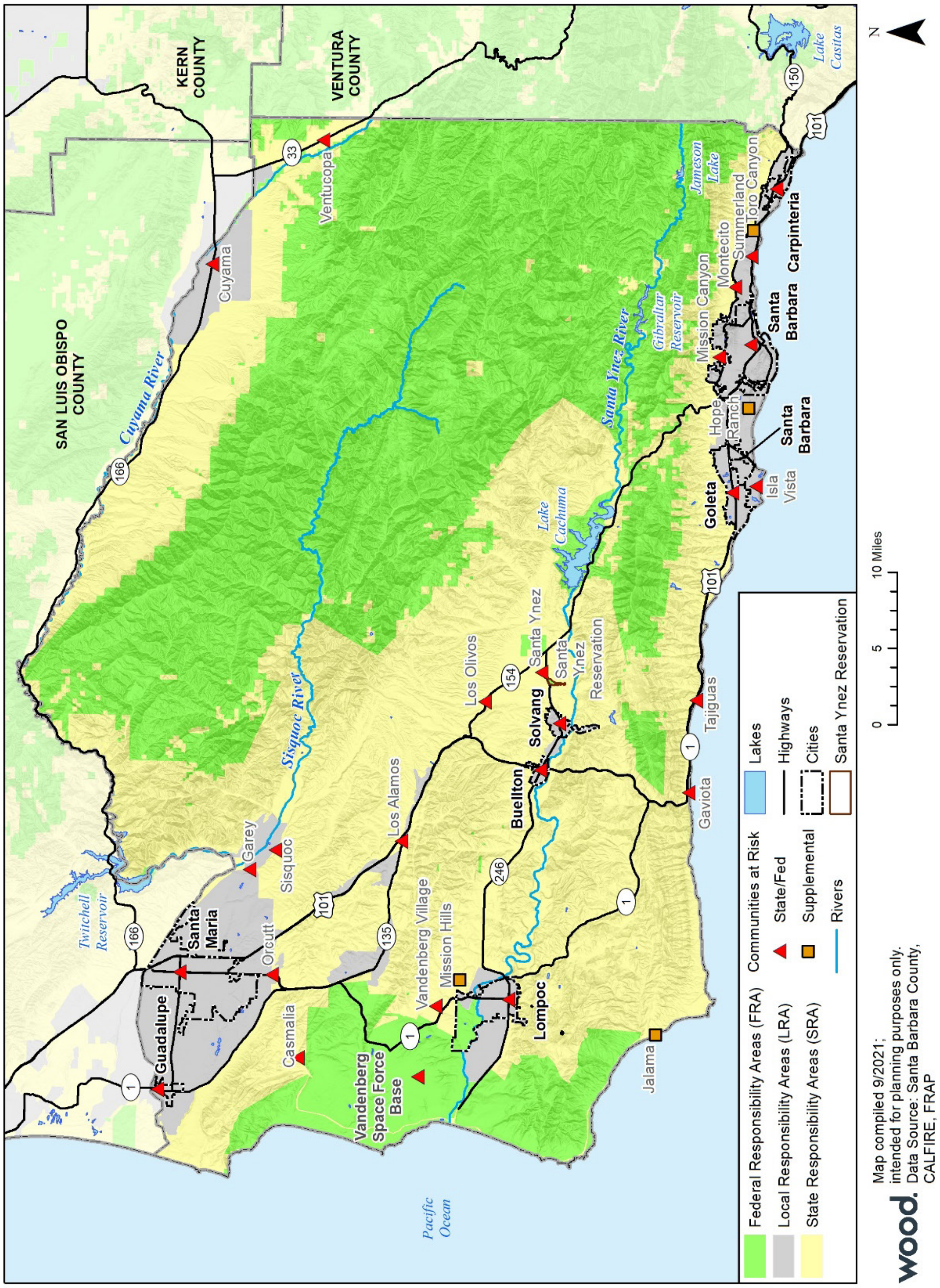
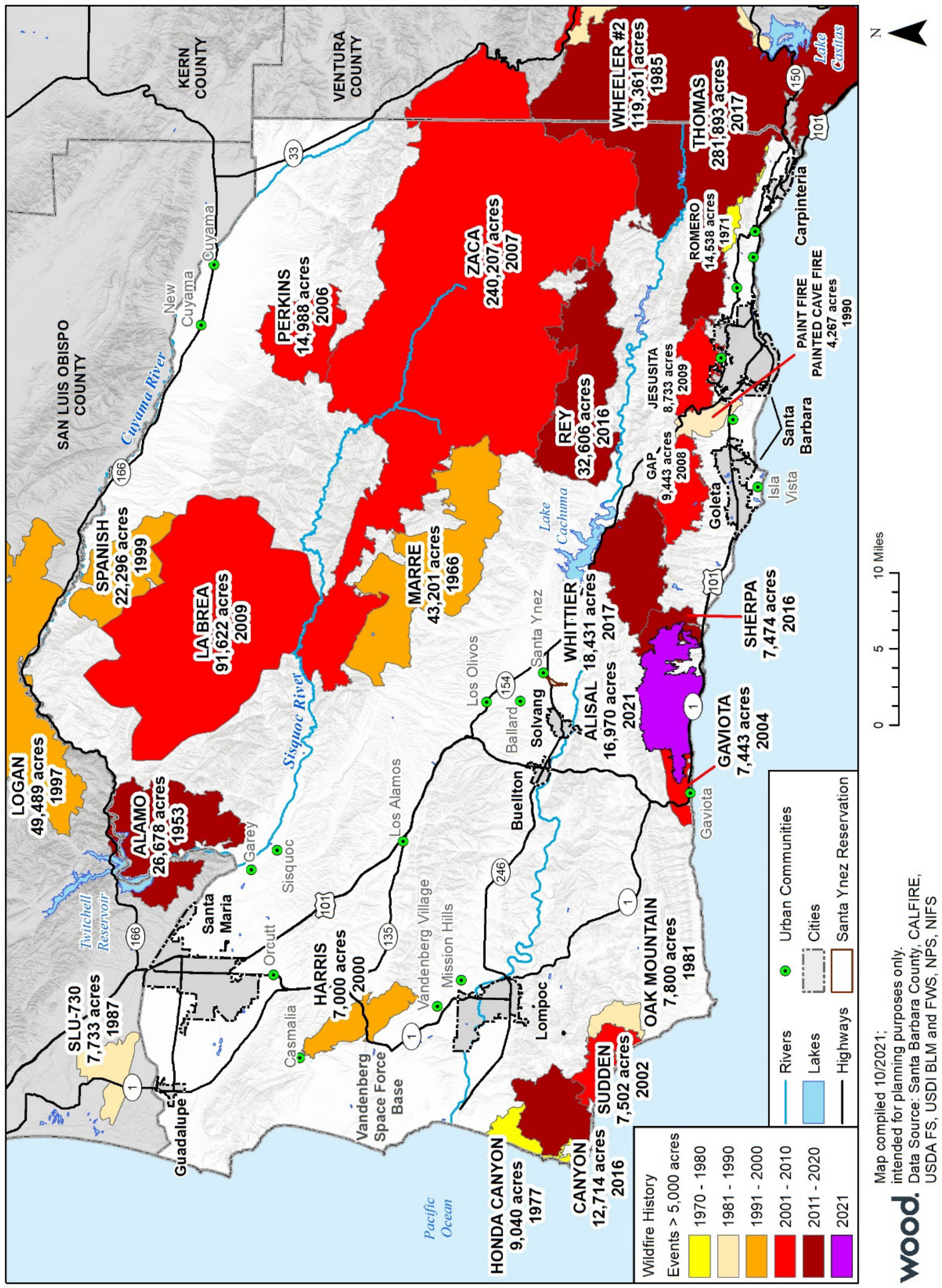


Figure 5-4. Santa Barbara County Fire History (1970-2021)



Recent fires have been burning faster and bigger due to drier vegetation related to recent drought conditions, potentially exacerbated by climate change (NOAA 2021a). These conditions allow for intense fires that can spread quickly and threaten urban areas (see *Climate Change Considerations* below for further discussion regarding the impact of climate change on wildfire within the county).

Table 5-4. Major Wildfires in Santa Barbara County

Year	Fire Name	Acres Burned		Year	Fire Name	Acres Burned
1932	North Shore	7,576		2002	Sudden	7,500
1971	Cielo	2,010		2004	Gaviota	7,197
1971	Romero	14,538		2004	Cachuma	1,115
1975	--	1,527		2006	Bald Fire	4,332
1977	Cachuma	2,250		2006	Perkins	14,923
1977	Hondo Canyon	8,526		2007	Zaca	240,807
1979	Wasioja	2,006		2008	Gap	9,443
1981	Rey	1,638		2008	Tea	1,940
1981	Oak Mountain	8,688		2009	Jesusita	8,733
1984	Minuteman	1,187		2009	La Brea	89,489
1985	Wheeler	122,687		2010	Bear Creek	1,252
1989	Cocheo	1,233		2013	White	1,984
1990	Paint	4,424		2016	Rey	32,606
1993	Marre	43,864		2016	Sherpa	7,474
1994	Aliso	3,244		2017	Alamo Fire	28,834
1996	Wasioja	2,812		2017	Whittier Fire	18,430
1996	Cuyama	1,400		2017	Thomas Fire	281,893
1997	Logan	49,490		2018	Front Fire	1,014
1997	Azaela	1,351		2019	Cave Fire	3,126
1997	Halloween	1,129		2020	Scorpion Fire	1,395
1998	Ogilvy	4,029		2021	Alisal Fire	16,970
2000	Harris	8,684				

Source: National Interagency Fire Center 2021.
Notes: Acreage represents total burned by fire; however, a number of these fires such as the Thomas Fire burned in other counties as well (e.g., Ventura County) so acreages burned in Santa Barbara County would be lower in some instances.

While more extensive discussion of previous wildfires in Santa Barbara County is available, the following information provides an overview and the location of the significant events (greater than 3,000 acres burned) since 2016:

- The **Alisal Fire** in 2021 burned 16,970 acres, shut down Highway 101, and forced dozens of people to evacuate. The fire destroyed 12 homes and damaged one other. OEM published the evacuations orders on behalf of the Sheriff's Office for about 300 residents in the Alisal Fire burn area (CBS Los Angeles 2021).
- The **Cave Fire** in 2019 burned over 3,000 acres near Painted Cave in the Los Padres National Forest for 21 days (National Interagency Fire Center 2021). Approximately 2,400 homes were placed under evacuation orders for areas north of Cathedral Oaks Road between Patterson

Avenue and Highway 154 and areas of Foothill Road between Highway 154 and North Ontare Road. A unified command consisting of multiple County agencies was assembled to assist with the fire (County Fire Department 2021). No homes were damaged (Santa Maria Times 2021).

- Before even larger fires in recent years, the **Thomas Fire** in 2017 was the largest California wildfire in modern California history, engulfing 281,893 acres, destroying or damaging more than 1,063 structures, primarily within Ventura County, and resulting in two fatalities. The Thomas Fire began on December 4, 2017 and was reported 100 percent contained on January 12, 2018 by the U.S. Forest Service. The fire was ignited north of Santa Paula in Ventura County and burned into Santa Barbara County through the Santa Ynez Mountains and parts of the upper Santa Ynez River watershed. It was one of the first wildfires to burn from inland Ventura County into the Santa Barbara front country of the Santa Ynez Mountains. The fire was active for 40 days and at one time involved more than 8,500 firefighters, 800 fire engines, and dozens of aircraft (National Interagency Fire Center 2021; Santa Maria Times 2021).

Incident Profile: The Thomas Fire

The 2017 Thomas Fire burned approximately 281,893 acres in Ventura and Santa Barbara counties, making it the largest California wildfire in modern history at the time. The fire was started by power lines coming in contact during high winds and remained active for 40 days. At one point, over 8,500 firefighters from all across the western U.S. were working the fire. The fire resulted in the destruction of 1,063 structures and the loss of one civilian and one firefighter.

Source: CALFIRE 2021; Ventura County Fire Department 2019. Photo: SB Bucket Brigade

- The **Alamo Fire** in 2017 started in San Luis Obispo County near Twitchell Reservoir off Highway 166. Due to hot weather, winds, and dry grass, the fire quickly grew and spread into Santa Barbara County, lasting a total of 15 days. The Alamo Fire burned nearly 29,000 acres in San Luis Obispo and Santa Barbara counties (National Interagency Fire Center 2021). The fire caused the evacuation of approximately 200 homes (CAL FIRE 2017). Thanks to a total of 1,664 firefighters, four fixed-wing planes, five helicopters, four bulldozer teams, 10 hand crews, and five water tankers, one home was destroyed and one additional building was damaged in the Alamo Fire. One of the factors that made fighting this fire so difficult was that the Whittier fire described below was going on at the same time, so resources were stretched thin. Fire crews from Los Angeles and Orange counties jumped in to help (Santa Maria Times 2021; The Tribune 2017).

- The **Whittier Fire** in 2017 burned over 18,000 acres above Camp Whittier on the north slope of the Santa Ynez near Lake Cachuma primarily within the Los Padres National Forest and private ranchlands. The fire was active for 167 days. In total, 16 homes and 30 outbuildings were destroyed. One home and six outbuildings were damaged. Thousands of campers in and around the Cachuma Lake Recreation area and nearby Paradise Road had to flee, leaving eerie ghost towns of pitched tents and picnic lunches on the tables as they fled (Santa Maria Times 2021).

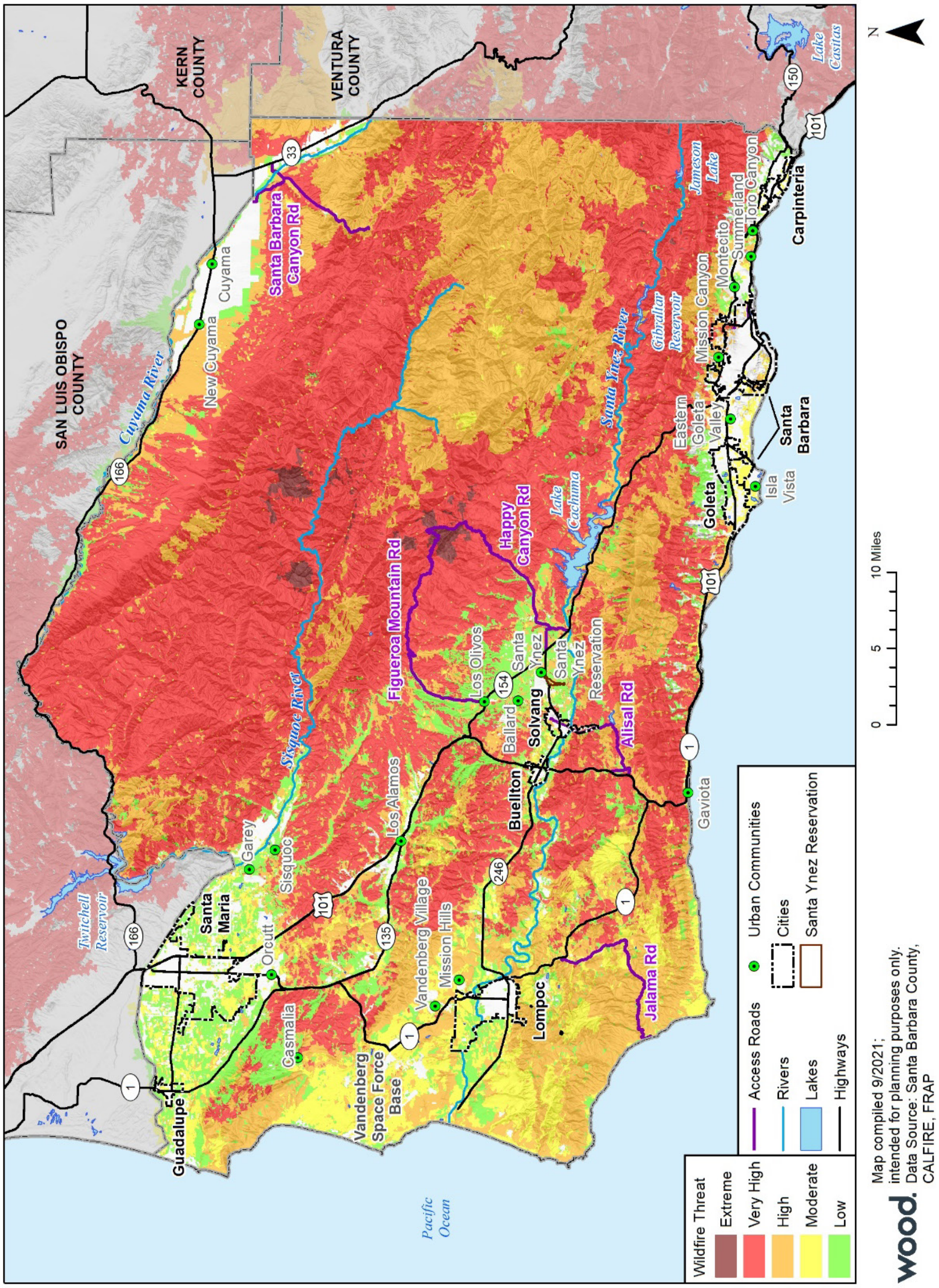
- The **Rey Fire** burned over 32,000 acres off of Highway 154 and Paradise Road, north of Santa Barbara for 29 days, requiring emergency evacuations (National Interagency Fire Center 2021). Over 10,000 of those acres were on Rancho San Fernando Rey itself and 19,752 were in the Los Padres National Forest. Over 300 people had to be evacuated from their campsites and residences. The fire was fought by 1,260 firefighters, 28 crews, 48 engines, 11 aircraft, two helicopters, and numerous bulldozers. No structures or homes were burned (Santa Maria Times 2021).
- The **Sherpa Fire** burned over 7,400 acres in Santa Barbara County, west of Goleta, for 27 days (National Interagency Fire Center 2021). The blaze prompted evacuation orders for El Capitan and Refugio State Beaches as well as for the ranches in El Capitan Canyon. The fire destroyed the water system for El Capitan State Beach, which remained closed for weeks. At the peak of the fire, 2,000 firefighters were on site to try to contain the fire (Santa Maria Times 2021).

Probability of Occurrence

Highly Likely - Vegetation and topography are significant elements in the identification of the fire threat zones, as well as areas subject to high winds such as sundowners (see Section 5.4.2, *Windstorm*). Santa Barbara supports extensive tracts of chaparral vegetation, a shrubland habitat of dense and scrubby brush that has evolved to persist in a fire-prone habitat. Chaparral plants will eventually age and die; however, they will not be replaced by new growth until a fire rejuvenates the area. Chamise, manzanita, and ceanothus are all examples of chaparral vegetation that are quite common in Santa Barbara County, particularly in the Santa Ynez Mountains, San Rafael Mountains, and even the Solomon Hills and Casmalia Hills.

Santa Barbara County was subject to 42 major wildfires over 88 years, resulting in a 48 percent chance of occurrence in any given year. In addition, Figure 5-5 shows the threat of fire to Santa Barbara County as mapped by CAL FIRE. Fire threat is a combination of two factors: 1) fire frequency or the likelihood of a given area burning, and 2) potential fire behavior. These two factors are combined to create four threat classes ranging from moderate to extreme.

Figure 5-5. Santa Barbara County Wildfire Threat



Climate Change Considerations

Based on research performed by the State of California Governor's Office of Planning and Research (OPR) and as noted by fire protection specialists, climate change is now playing a significant role in increasing the frequency and severity of wildfires (Office of Governor 2019). Growing amounts of greenhouse gases (GHGs) coupled with population growth and development are expected to continue impacting California forests, natural resources, and residential neighborhoods. Likewise, the effects of climate change have the potential to impact wildfire behavior, the frequency of ignitions, fire management, and fuel loads. Increasing temperatures may intensify wildfire threat and susceptibility to more frequent wildfires in the county. The County's CCVA estimates that the annual average acres burned is expected to increase to 23,040 acres per year (30 percent increase) by 2030, 25,782 acres per year (46 percent increase) by 2060, and 24,050 acres per year (36 percent increase) by 2100 due to higher annual average temperatures and the increased frequency and intensity of droughts.

Exactly how climate change will affect total precipitation is not clear, but models suggest that there is a tendency for wetter conditions in the northern part of the state and drier conditions in the south. Results are also likely to vary across the substantial precipitation gradient from south to north along the Central Coast, including the county. More northern higher precipitation areas may see decreased fire return intervals and higher severity, while areas to the south may ultimately see the opposite as warming increases climatic water deficit but also reduces vegetation growth rates and fuel loads. (California Natural Resources Agency 2018). The projected changed conditions from alternating wet years to more frequent, extended, and severe drought can create more fuel (vegetation) during wet years, followed by extending drying of such vegetation, increasing fuel loading and the flammability of such vegetation. Studies noted in California's Fourth Assessment report note climate change impacts on wind patterns may trigger a conversion of forested areas to other types of vegetation (California Natural Resources Agency 2018). There is some evidence that increasing fire frequencies can cause coastal sage shrubs and chaparral to shift to grasses, including exotic grasses, and these shifts in ecosystems can have feedback on fire regimes since grasslands tend to promote more frequent fires. Climate impacts, particularly precipitation, also alter post-fire behavior, including the recovery trajectories and the rate of vegetation recovery following a fire, although these effects vary with fire severity, pre-fire species, and landscape characteristics. Forests and woodlands are also sensitive to variable precipitation events, as the 2012-2017 drought contributed to widespread tree mortality as warmer temperatures stressed trees and made them more susceptible to pests and pathogens (California Natural Resources Agency 2018).

Current scientific models expect California will be affected by increased numbers of wildfires with added intensity due to longer warmer seasons, reduced the distribution of biodiversity, lack of moisture, changes in ecosystems, drought impacts (e.g., pest diseases, and continued spread of invasive species), and other impacts in coming years. Wildfire behavior appears to be becoming more severe with fires burning hotter, moving more quickly, and even creating their own weather which in turn can cause firestorms that are difficult to contain. While wildfires are a natural part of California's ecology, the fire season is getting longer every year—with most counties now experiencing extended fire seasons (e.g., 6 to 9 months) and several counties facing fire danger year-round. Warmer temperatures, variable snowpack, and earlier snowmelt caused by climate change make for longer and more intense dry seasons, leaving forests more susceptible to severe fire.

The extension of the wildfire season into the winter months, coinciding with seasonal high wind patterns, has contributed to severe fires in recent years. Fifteen of the 20 most destructive wildfires in the state's history have occurred since 2000; 10 of the most destructive fires have occurred since 2015 (Office of Governor 2019). Anticipated growth and development in the county can also be expected to amplify these effects. As seen with the 2017 - 2018 wildfires, more damage occurred in developed areas like Montecito in Santa Barbara County, the City of Ventura in Ventura County, Santa Rosa in Sonoma County, and Paradise in Butte County.

The Thomas Fire also exhibited such increased wildfire severity with a total burn area of 281,893 acres; destroying 1,063 structures and resulting in one civilian and one firefighter fatality (Ventura County Fire Department 2019). The Thomas Fire, which occurred in December, was fueled by dry brush, 10 years of drought, and strong sundowner winds. More than 8,500 firefighters were assigned to the fire. Over 2,000 were in the South Coast communities and had been for three days prepping houses, laying lines, scouting escape routes, and becoming familiar with the landscape (Community Environmental Council 2020). Furthermore, large wildfires that burn hotter remove all vegetation and can melt surface soils creating hydrophobic soils which do not allow rainfall to percolate, increasing the threat of other disasters such as flooding and mud or debris flows. For example, the Thomas Fire was followed by the 2018 Montecito debris flows which severely damaged the community of Montecito, killed more than 20 residents, damaged or destroyed 400 or more homes, and led to a 3-week closure of Highway 101 and the Union Pacific Railroad (UPRR), severing connections between Santa Barbara and the rest of Southern California. Similarly, the Whittier Fire near Lake Cachuma exhibited extreme behavior and was followed by a strong downpour across the burn scar of the Whittier Fire which triggered a debris flow in Duval Canyon, clogging and damaging a culvert beneath Highway 154, shutting down this key north-south arterial for a month. Both of these fires illustrate the cumulative effects of climate change increasing wildfire severity lined with increased rainfall intensities to cause severe infrastructure damage. Fires in northern California, such as the Camp Fire which burned more than 153,330 acres and destroyed 19,000 homes and other structures as well as much of the Town of Paradise, also exemplify this trend of extreme fire behavior (Office of Governor 2019).

Large wildfires also have several indirect effects beyond those of a smaller, local fire. These may include air quality and health issues, road closures, business closures, and other forms of losses.

5.3.2 Drought & Water Shortage

<u>Description of Hazard</u>

A **drought** occurs when climactic and weather conditions are drier than normal for a long period, making less water available for people, agricultural uses, and ecosystems. Drought and water shortages are a gradual phenomenon and generally are not signified by one or two dry years. California's and the county's extensive system of water supply infrastructure (e.g., reservoirs, groundwater basins, and interregional conveyance facilities) generally mitigates the effects of short-term dry periods for most water users. However, drought conditions are present when a region receives below-average precipitation over an extended multiple-year period (e.g., 3 to 4 or more years), resulting in prolonged shortages in water supply, whether atmospheric, surface, or ground water (California Department of Water Resources [DWR] 2021b).

Drought is a complex issue involving many factors—it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects. Research in the early 1980s uncovered more than 150 published definitions of drought. The definitions reflect differences in regions, needs, and disciplinary approaches. In *Understanding the Drought Phenomenon: The Role of Definitions* (1985), researchers Wilhite and Glantz categorized the definitions in terms of four basic approaches to measuring drought: *meteorological*, *hydrological*, *agricultural*, and *socioeconomic*. The first three approaches deal with ways to measure drought as a physical phenomenon. The last deals with drought in terms of supply and demand, tracking the effects of water shortfall as it ripples through socioeconomic systems (National Drought Mitigation Center 2021).

- **Meteorological drought** is defined usually based on the degree of dryness (in comparison to some "normal" or average amount) and the duration of the dry period. Definitions of meteorological drought must be considered region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region (National Drought Mitigation Center 2021).
- **Agricultural drought** occurs when there is inadequate soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought usually occurs after or during meteorological drought, but before the hydrological drought and can affect livestock and other dry-land agricultural operations (Texas State Historical Association 2018).
- **Hydrological drought** is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (i.e., streamflow, reservoir and lake levels, groundwater). Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. There is usually a delay between lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Therefore, hydrological measurements tend to lag other drought indicators (National Drought Mitigation Center 2021; Texas State Historical Association 2018).
- **Socioeconomic drought** occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product (Texas State Historical Association 2018).
- **Ecological drought** is a more recent concept defined as a prolonged and widespread deficit in naturally available water supplies – including changes in natural and managed hydrology – that create multiple stresses across ecosystems (National Drought Mitigation Center 2021).

The magnitude of a drought's impact is directly related to the severity and length. The severity of a drought depends on water availability and moisture deficiency, the period, and the size and location of the affected area. The longer the drought persists and the larger the area impacted, the more severe the potential impacts. Droughts can be a short-term event over several months or a long-term event that lasts for years or even decades. Hot and dry conditions that persist into spring, summer, and fall can aggravate drought conditions, making the effects of drought more pronounced as water demands increase during the growing season and summer months. Impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline (DWR 2021c).

Longer-term droughts can impact surface water reservoir storage levels in major reservoirs, such as Lake Cachuma, which provides about 85 percent of the water for over 200,000 residents and 12,000 acres of agriculture for the South Coast of Santa Barbara County (Goleta Water District 2021). Longer-term droughts can also impact water levels in major groundwater basins that are key to both urban and agricultural water supply. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. In some instances, when large amounts of water are pumped, the subsoil compacts, thus reducing in size and number of the open pore spaces in the soil that previously held water. This can result in a permanent reduction in the total storage capacity of the aquifer system (USGS 2021a). The soil compaction causes soil to not absorb water well, potentially making an area more susceptible to flooding. Declines in groundwater level and soil compaction can lead to subsidence of ground surface elevations as more groundwater is withdrawn, causing associated damage to infrastructures, such as roads, bridges, railroads, storm drains, sanitary sewers, canals, and levees (see Section 5.3.8, *Geologic Hazards*; USGS 2016).

The most significant impacts associated with drought in the county are those related to water-intensive activities such as wildfire protection, agriculture, municipal usage, commerce, tourism, recreation, and wildlife preservation. Droughts also have direct implications for public health and safety. Droughts can cause drinking water shortages and declines in water quality as sediments and other contaminants aggregate in depleted reservoirs, leading to increased reservoir maintenance needs. This is a greater concern for small water systems in rural areas and private residential wells.

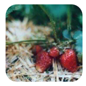
Droughts increase the chances of catastrophic wildfire risks. Drought is a major determinant of wildfire hazard, in that it creates a greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation, along with reduced water supply for firefighting purposes. As illustrated by the state's catastrophic 21st century wildfire seasons, devastating urban/wildland fire episodes occurred during or following a drought, when dead timber and brush and dry vegetation created conditions favorable for massive fire outbreaks (DWR 2021d).

Drought is also an economic hazard. Significant economic impacts to the state and local agriculture industry can occur as a result of short- and long-term drought conditions; these include agricultural land fallowing or retirement and associated job loss for farmers, farm workers, packers, and shippers of agricultural products (DWR 2021c; DWR 2021d). Although groundwater and water transfers may make up for some of the lost surface water supplies, cuts of significant magnitude result in the abandonment of permanent plantings such as orchards and vineyards, large-scale land fallowing, and socioeconomic impacts in rural communities dependent on agricultural employment (DWR 2021d).

As described in Section 4.1.4, *Economy*, Santa Barbara County has a $1.8 billion agricultural industry. In 2020, the top five crops by value were strawberries, cauliflower, broccoli, nursery products, wine grapes, and head lettuce in the county (County of Santa Barbara 2020). High-value crops have significant water needs to ensure economic success. In addition, with the passage of laws legalizing cannabis, agricultural land uses have been transitioning to cannabis, and/or new cannabis cultivation has occurred, which also has relatively high water demands. In Santa Barbara

County, most agricultural water supplies are obtained from private groundwater wells. Some farmers on the South Coast buy some or all of their water from a water purveyor. During drought, high-value crops may be less resilient given their higher water demands, which in turn may adversely affect the local and state agricultural economic sector.

Estimated Irrigation Water Demand by Crop Type



Strawberry
1.4 AFY/acre

Vineyard
1.1 AFY/acre

Rotational Crops (lettuce, broccoli, cauliflower, etc.)
2.3 AFY/acre

Orchard
2.6 AFY/acre

Nursery Products
2 AFY/acre

Cannabis
1 - 5 AFY/acre

Source: (County of Santa Barbara 2017)

In some cases, droughts can also cause significant increases in food prices to the consumer due to shortages. Examples of other economic impacts include costs to homeowners due to loss of residential landscaping, degradation of urban environments due to loss of landscaping, and higher electricity costs due to the loss of hydropower supplies (DWR 2021c). Water quality deterioration can occur during droughts due to lower levels of precipitation and limited water storage supply (DWR 2021c). Increased groundwater pumping in combination with sea-level rise can increase saltwater intrusion in groundwater aquifers (Environmental Protection Agency [EPA] 2021). Saltwater intrusion into the groundwater basin can also occur when groundwater levels fall below sea level proximate to the coast. For example, during the late 1980s and early 1990s, seawater intrusion was observed in the Santa Barbara groundwater basin, as indicated by increased chloride concentrations at several monitoring wells that ranged from 200 feet to 1,300 feet from the ocean and as close as 2,900 feet to the nearest pumping well (USGS 2018). Saltwater intrusion, through surface or ground water sources, may diminish the availability or quality of source waters for drinking water utilities (EPA 2021a). This decrease in water quality also results in subsequent degradation of fisheries and riparian habitats (DWR 2021c).

The drought issue in California is further compounded by water rights. Water is a commodity possessed under a variety of legal doctrines. During a drought, water allocations decrease, which results in reduced water availability. Voluntary water conservation measures are typically implemented during extended droughts. The subregion also faces water restrictions during droughts, which are exacerbated by extreme heat days that require additional water to irrigate agricultural lands (County of Santa Barbara Planning and Development Department 2021).

Location and Extent of Hazard in Santa Barbara County

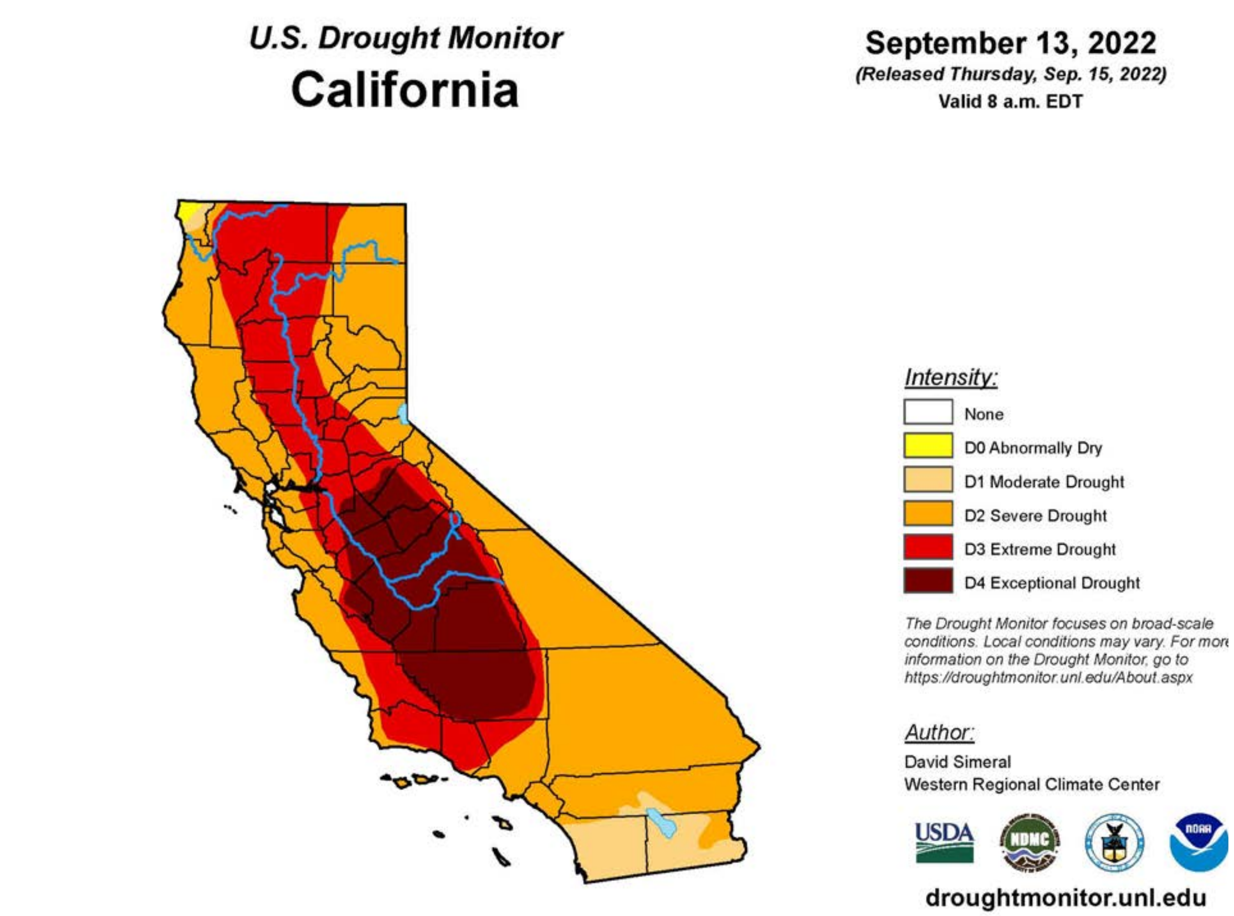
As of May 2021, Governor Gavin Newsom has declared a drought emergency in 41 California counties in northern and central California (CalMatters 2021). Currently, Santa Barbara County has been in a state-declared drought since July 8, 2021when Governor Gavin Newsom proclaimed a drought emergency, which included 50 of the 58 counties in California. On July 13, 2021, the County Board of Supervisors passed a resolution proclaiming a Local Emergency caused by Drought Conditions. The County resolution cites Newsom's drought declaration, as well as below-average rainfall, received last winter, reduced storage in reservoirs, and reduced State Water Project supply.

The U.S. Drought Monitor, which is a joint effort of the National Drought Mitigation Center, U.S. Department of Agriculture (USDA), and NOAA, is an accepted and widely used source for obtaining and summarizing drought information, as it integrates data from several other sources, including the Palmer Drought Index, Soil Moisture Models, U.S. Geological Survey Weekly Stream Flows, Standardized Precipitation Index, and the Satellite Vegetation Health Index. It includes drought intensity categories for measuring dry conditions across counties, states, and regions of the U.S. so that drought can be quantified. The USDM shows drought conditions using a five-category system, from Abnormally Dry (D0) conditions to Exceptional Drought (D4). D3 drought conditions include longer fire seasons, burn bans, extremely low reservoir levels, and later seasonal irrigations (NOAA NIDIS 2021). As summarized in Table 5-5 below, droughts can impact urban and agricultural water supplies and the natural environment throughout the county.

Table 5-5. U.S. Drought Monitor Drought Condition Levels

Drought Condition	% of CA
D0 - Abnormally Dry Soil is dry; irrigation delivery begins early Dryland crop germination is stunted Active fire season begins	100.0% of CA (D0–D4)
D1 - Moderate Drought Dryland pasture growth is stunted; producers give supplemental feed to cattle Landscaping and gardens need irrigation earlier; wildlife patterns begin to change Stock ponds and creeks are lower than usual	100.0% of CA (D1–D4)
D2 – Severe Drought Grazing land is inadequate Fire season is longer, with high burn intensity, dry fuels, and large fire spatial extent Trees are stressed; plants increase reproductive mechanisms; wildlife diseases increase	93.8% of CA (D2–D4)
D3 - Extreme Drought Livestock need expensive supplemental feed; cattle and horses are sold; little pasture remains; fruit trees bud early; producers begin irrigating in the winter Fire season lasts year-round; fires occur in typically wet parts of the state; burn bans are implemented Water is inadequate for agriculture, wildlife, and urban needs; reservoirs are extremely low; hydropower is restricted	87.2% of CA (D3–D4)
D4 - Exceptional Drought Fields are left fallow; orchards are removed; vegetable yields are low; the honey harvest is small Fire season is very costly; several fires and areas burned are extensive Fish rescue and relocation begins; pine beetle infestation occurs; forest mortality is high; wetlands dry up; survival of native plants and animals is low; fewer wildflowers bloom; wildlife death is widespread; algae blooms appear	45.7% of CA (D4)

Source: NOAA NIDIS 2021.



As identified by the U.S. Drought Monitor (USDM), low rainfall from 2020 to 2021 resulted in Classification D3 – Extreme Drought conditions in over 99 percent of the county. Drought conditions have improved slightly in 2022 with D3 conditions in approximately 70 percent of the county. Source: U.S. Drought Monitor, September 2022

The entire county can be subject to drought conditions and water shortages with associated increased conservation requirements during moderate to severe drought. Currently, an estimate 423,895 people reside in drought areas in Santa Barbara County, including 297,824 residents in Extreme Drought areas (D3), 125,765 residents in Severe Drought areas (D2), and 304 residents in Moderate Drought areas (D1) (U.S. Drought Monitor 2022). Drought severity can vary within the county and regions and communities can be affected differently depending on topography, rainfall amounts, and the resiliency of local water supplies, including storage capacity of underlying groundwater basins and diversity of water sources. Communities such as the City of Santa Barbara with a diverse water portfolio may be more resilient than other areas with more limited water supply options, although communities such as Santa Maria that overlie large but over-drafted groundwater basins may have the option of increased pumping during droughts. Natural habitats and agriculture tend to suffer equally by region during droughts, although cooler temperatures along the coast can somewhat buffer the worst impacts of drought.

Water supply in the county is strongly dependent on groundwater, and to a lesser extent surface water from reservoirs primarily along the Santa Ynez and Santa Maria Rivers, the State Water

Project, recycled water, and desalinized water for South Coast areas, including the City of Santa Barbara and Montecito (Santa Barbara County IRWM Cooperating Partners 2019; Santa Barbara County Planning and Development Department 2021). Water supplies also are enhanced by the conjunctive use of surface water and groundwater supplies.

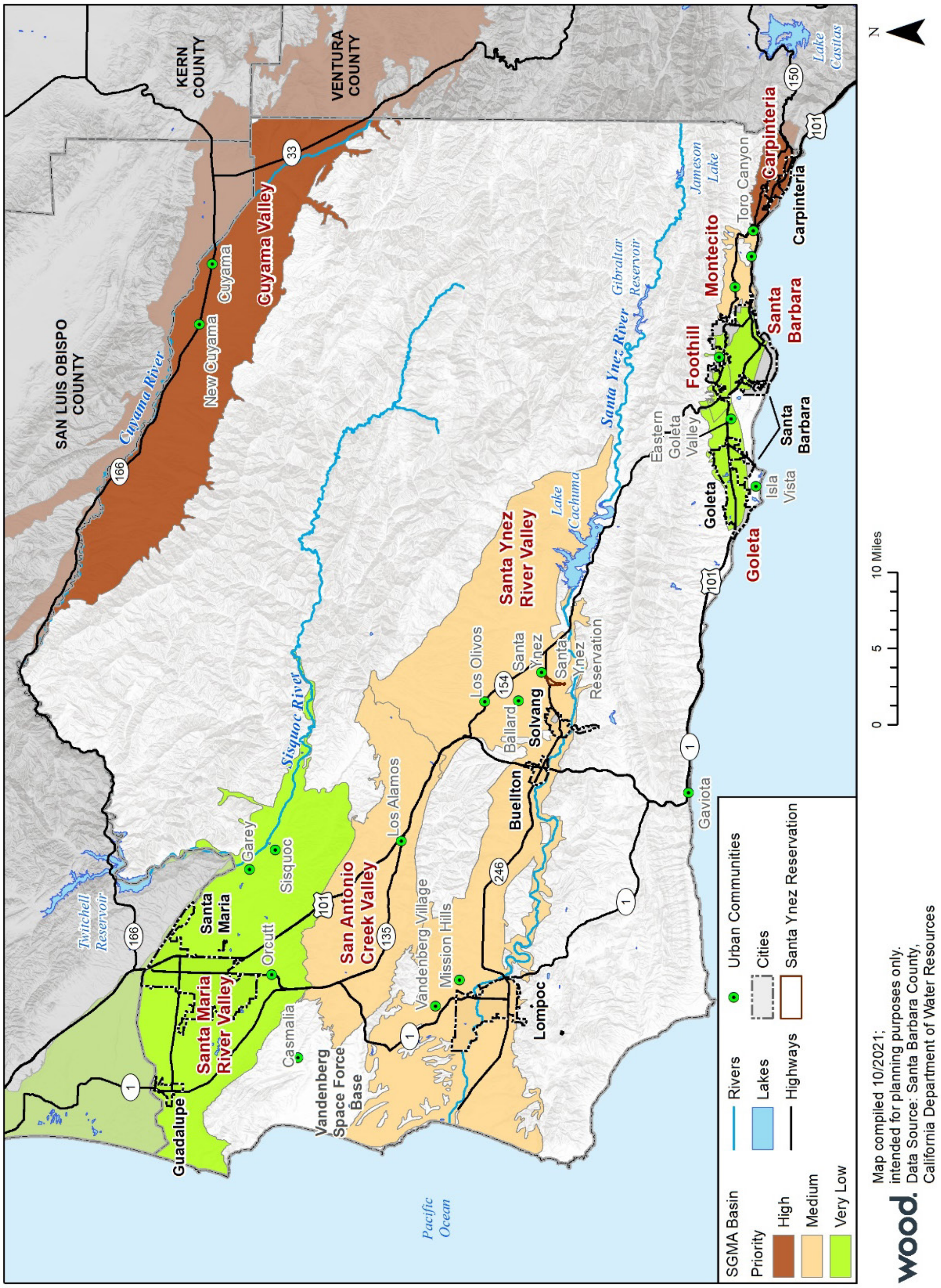
Groundwater

Historically, groundwater has accounted for 75 percent of the county's water use for domestic, commercial, industrial, and agricultural uses. In the south county, water purveyors use groundwater as a secondary source of potable water. However, the north county is largely supported by groundwater and/or shallow, riparian basin water, both of which are recharged by surface flows; precipitation; and, in the case of groundwater, percolation of treated wastewater. The areas of the county that are wholly dependent on groundwater include the Cuyama Valley, the communities of Los Alamos, Mission Hills, Vandenberg Village, and the City of Lompoc (Santa Barbara County IRWM Cooperating Partners 2019). However, several of the basins are in overdraft conditions, where groundwater users pump more water to the surface than is replenished into the basin, causing a drawdown in the water table (Santa Barbara County Planning and Development Department 2021).

In January 2014 the Governor declared an emergency proclamation due to multiple years of drought. The proclamation called on citizens to reduce water use by 20 percent; a subsequent executive order in April 2015 directed urban water agencies to reduce water use by 25 percent. In September 2014, the Governor signed a three-bill package (i.e., California Senate Bills 1168 and 1319, and Assembly Bill 1739), known as the Sustainable Groundwater Management Act of 2014 (SGMA). The SGMA provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within the groundwater subbasins defined by the DWR.

The DWR prioritized all groundwater basins in the state designating High and Medium priority basins. High or Medium priority basins subject to critical conditions of overdraft were required to submit a Groundwater Sustainability Plan (GSP) by January 31, 2020. The purpose of the GSP is to ensure a sustainable yield of groundwater without causing undesirable results. The deadline to submit a GSP for a high- or medium-priority basin not subject to critical conditions of overdraft is January 31, 2022. Failure to comply with that requirement could result in the state asserting its power to manage local groundwater resources. The state has identified the following five high and medium priority groundwater basins within Santa Barbara County (refer also to Table 4-7 and Figure 5-6):

Figure 5-6. Santa Barbara County SGMA Basin (2020)



- Carpinteria Groundwater Basin
- Montecito Groundwater Basin
- Santa Ynez River Valley Groundwater Basin
- San Antonio Creek Valley Groundwater Basin
- Cuyama Valley Groundwater Basin

In years with little rainfall, higher levels of groundwater pumping can exacerbate ongoing overdrafts in many of the county's groundwater basins, accelerating groundwater drawdown and potential water quality problems. Since groundwater level fluctuations are cyclical and sensitive to overdraft, groundwater withdrawal is closely monitored (Santa Barbara County IRWM Cooperating Partners 2019).

Surface Water

Surface water reservoirs are an important part of the regional water supply and presently account for approximately 15 percent of all water resources countywide. Surface water found in streams and reservoirs is often a vital component of water supplies for domestic use within the county. The development of reservoirs can reduce the threat of flooding and store stream runoff until it is needed, allowing society to use water from winter rains to meet our needs during the dry summer and fall months when streams cannot meet demand.

Locally, the Jameson, Gibraltar, and Cachuma Reservoirs on the Santa Ynez River help meet the needs of communities on the South Coast and help supplement groundwater supplies in the Santa Ynez River downstream. Jameson Lake is the primary surface water supply to the Montecito Water District. Gibraltar Lake is located on the upper Santa Ynez River. Gibraltar Lake provides about 30 percent of the City of Santa Barbara's water supply during a normal water year (City of Santa Barba Public Works Department 2021). Twitchell Reservoir on the Cuyama River straddles the Santa Barbara County and San Luis Obispo County lines and primarily serves for flood control and groundwater recharge purposes (USBR 2021). The reservoir replenishes groundwater important to agriculture in the Santa Maria Valley and supplies about 32,000 acre-feet of recharge to the Santa Maria Groundwater Basin annually (Santa Barbara County IRWM Cooperating Partners 2019).

Lake Cachuma, the county's largest reservoir, is located on the middle Santa Ynez River about 25 miles northwest of Santa Barbara. Lake Cachuma is the south county's main surface water supply and also releases water to recharge downstream groundwater basins such as the Lompoc Groundwater Basin. During the 2014-2019 drought, Lake Cachuma was down to approximately 6 percent of its overall water holding capacity and although it has recovered, it is now only at approximately 48.1 percent capacity (see Table 5-6). Moreover, over the past 11 years and through five large fires, the watershed areas surrounding Lake Cachuma have been denuded of extensive amounts of vegetation, which will result in abundant amounts of sediment and debris during stormflows, much of which will end up in Lake Cachuma. The resultant debris flows have introduced large amounts of organic material into surface waters, and possible impacts could include increased nutrient loading, dissolved organic carbon, major ions, firefighting compounds, turbidity, and general treatability challenges in the region's largest drinking water source (Santa Barbara County IRWM Cooperating Partners 2019). Related to water storage and hazard mitigation measures, Lake Cachuma Reservoir has at least two major facilities (the water treatment plant and sewage lift station #2) that have been determined by the U.S. Bureau of Reclamation (USBR) should be relocated to higher ground to allow for a higher surcharge. Funds are needed for implementation.

Table 5-6. Summary of Reservoirs in Santa Barbara County

Reservoir Name	Owner/Operator	Max. Storage	Current Storage	Current Capacity
Jameson Reservoir	Montecito Water District	4,848	2,839	58.6%
Gibraltar Reservoir	City of Santa Barbara	4,693	201	4.3%
Cachuma Reservoir	Owned and operated by the U.S. Bureau of Reclamation (USBR) and also managed by the Cachuma Operation and Maintenance Board (COMB)	193,305	93,064	48.1%
Twitchell Reservoir	Owned by the USBR and operated by the Santa Maria Valley Water Conservation District	194,971	-	-

Source: Santa Barbara County IRWM Cooperating Partners 2019; Santa Barbara County Flood Control and Water Conservation District (County Flood Control District) 2021.
Note: Current storage and capacity data were not available for Twitchell Reservoir.

Imported Water (State Water Project)

There are 14 State Water Project participants in Santa Barbara County, each with varying amounts of water to which each State Water Project participant has a contractual right. State Water Project water has helped reduce the use of groundwater in all major basins except the Cuyama Valley Groundwater Basin, which does not have a water purveyor that receives State Water Project water. State Water Project water also has improved water quality in areas that directly receive State Water Project water and has increased the overall water supply in Santa Barbara County (County of Santa Barbara 2017b). Since State Water is used primarily as a supplemental supply, the amount received by water purveyors in the county will vary each year. Historically, actual water deliveries from the state to the county have ranged from 30 percent to 90 percent of the contracted allocation since the Region began importing State Water Project water (Santa Barbara County IRWM Cooperating Partners 2019).

Recycled Water and Advanced Treatment

In addition to potable water supplies, several water purveyors in the county also use non-potable recycled wastewater to irrigate parks, schools, golf courses, and other large, landscaped areas. The City of Santa Barbara even uses recycled water for toilet flushing in its beach-front restrooms (Santa Barbara County IRWM Cooperating Partners 2019).

Currently, three agencies in the county treat all of their effluents to full tertiary levels. These agencies are the Laguna County Sanitation District, the City of Lompoc, and the Summerland Sanitary District. The Laguna County Sanitation District produces approximately 2,242 acre-feet per year (AFY), which is used for agricultural, landscaping, and industrial purposes, with recycling as its only discharge mechanism (Santa Barbara County, Public Works, Resource Recovery and Waste Management 2018). The Summerland Sanitary District treats approximately 168 AFY, which are discharged to the Pacific Ocean (Santa Barbara County, Public Works 2018).

Two other agencies treat some of their flow to tertiary levels for reuse as landscape irrigation: the City of Santa Barbara and the Goleta Sanitary District. However, tertiary effluent from the El Estero Wastewater Treatment Plant (WWTP) is currently unable to meet its permit requirements without blending with potable water. This is due to high turbidity and total dissolved solids (TDS) levels in the wastewater. The City of Santa Barbara is in the process of implementing upgrades to the El Estero WWTP. The City of Santa Barbara currently provides 800 AFY of recycled water to users and 300 AFY of process water at the El Estero WWTP, and additional demands of 300 AFY are anticipated in the long term. The Goleta recycled water system, operated jointly by the Goleta Sanitary District and the Goleta Water District, currently serves approximately 785 AFY of recycled water, and the Goleta WWTP can treat up to 1,500 AFY of tertiary effluent (Santa Barbara County, Public Works 2018).

The City of Lompoc's Recycled Water permit for dust control and compaction allows 62,000 gallons of recycled water sales per day; therefore, the total maximum amount of recycled water yearly sales allowed is 69 AFY of its tertiary treated effluent for reuse. The city currently discharges approximately 2.98 MGD to the Santa Ynez River, through San Miguelito Creek. The Los Alamos Community Service District (CSD) discharges all of its approximately 130 AFY of secondary effluent for pasture irrigation (Santa Barbara County, Public Works 2018).

Desalinized Water

An additional source of potable water available to the City of Santa Barbara is desalinated water from the ocean. Desalination is the process of removing salt from seawater. Desalination is used in many arid countries around the world to provide a reliable source of drinking water. Desalinated ocean water provides a water source that is not dependent on rainfall. This gives the community the ability to provide fresh water as a backup for depleted surface water supplies, thereby easing the hardship of drought. As technology advances and other water sources become less available, desalination will become more cost-effective, and more communities may turn to this as a viable source of water. However, as a primary water supply, desalinized water has several drawbacks. This water source would primarily benefit coastal communities and is not a viable option for inland areas of the county. Also, desalinized water requires high energy inputs and environmental resources, plus maintenance and staffing costs.

The City of Santa Barbara owns a desalination facility that is discussed in more detail in Chapter 2.0, *Community Profile and Capabilities Assessment*. In addition, the Venoco oil treatment facility on the Gaviota coast operates a desalination facility to meet plant needs of up to 500 gallons per minute (Santa Barbara County Planning and Development, Energy Division 2018).

Water Conservation

To use all available water supplies wisely and efficiently, the Santa Barbara County Water Agency, as well as several local water purveyors, operate water demand management programs. For example, WaterWise in Santa Barbara County (waterwisesb.org) is the water conservation website for the county, providing information about the county's network of water supplies and conservation programs. These programs, referred to as water conservation or water use efficiency, are directed at helping water users minimize unnecessary use of water during times of plentiful supply and help stretch limited water resources during water shortages (see also, Section 6.3.3, *Drought & Water Shortage*; Santa Barbara County IRWM Cooperating Partners 2019).

History of Hazard in Santa Barbara County

California is no stranger to drought; it is a recurring feature of our climate. Drought played a role in shaping California's early history, as the so-called Great Drought in 1863–1864 contributed to the demise of the cattle rancho system, especially in Southern California. Subsequently, a notable period of extended dry conditions was experienced during most of the 1920s and well into the 1930s, with the latter time including the Dustbowl drought that gripped much of the United States. Three 20th century droughts were of particular importance from a water supply standpoint—the droughts of 1929–1934, 1976–1977, and 1987–1992. More recent multiyear droughts occurred in 2007–2009 and 2012–2017 (DWR 2021d). California's most recent multi-year drought occurred from 2012-to 2017 as previously mentioned, but the driest single year of California's measured hydrologic record was 1977. The following multi-year droughts were identified as having significant impacts on the county:

- **1929 - 1934** – The 1929–1934 drought was notable not only for its duration but also for its occurrence within a longer period of very dry hydrology. This drought's hydrology was subsequently widely used in evaluating and designing the storage capacity and yield of large Northern California reservoirs (DWR 2021d).
- **1975 - 1977** — From November 1975 through November 1977, California experienced one of its most severe droughts. Although people in many areas of the state are accustomed to very little precipitation during the growing season (April to October), they expect it in the winter. In 1976 and 1977, the winters brought only one-half and one-third of normal precipitation, respectively. Most surface storage reservoirs were substantially drained in 1976, leading to widespread water shortages when 1977 turned out to be even drier. This resulted in $2.67 billion in crop damage. When statewide runoff in 1977 hit an all-time low, this drought served as a wake-up call for California water agencies that were unprepared for major cutbacks in their supplies. Forty-seven of the state's 58 counties declared local drought-related emergencies at that time, including Santa Barbara County.
- **1987 - 1992** —Twenty-three counties declared local drought emergencies during this period, including Santa Barbara County. Santa Barbara experienced the greatest water supply reductions among the larger urban areas. In addition to the adoption of measures such as a 14-month ban on all lawn watering, the city installed the City of Santa Barbara Charles Meyer Desalination Facility, constructed in 1991-1992, as a temporary emergency water supply, and an emergency pipeline was constructed to make State Water Project supplies available to southern Santa Barbara County. The DWR's state drought water bank and enactment of legislation clarifying water rights aspects of water transfers catalyzed the development of the institutional framework for transfers that exist today (DWR 2021d; Santa Barbara County Water Agency 2000).
- **2007 - 2009** – California proclaimed a statewide drought in 2009, and unprecedented restrictions were placed on water diversions to protect fish species, exacerbating drought impacts for water users. The greatest impacts of this multi-year drought were suffered on the

western side of the San Joaquin Valley, on agricultural communities where drought effects were coupled with the economic recession. Emergency response actions were necessary concerning social services.

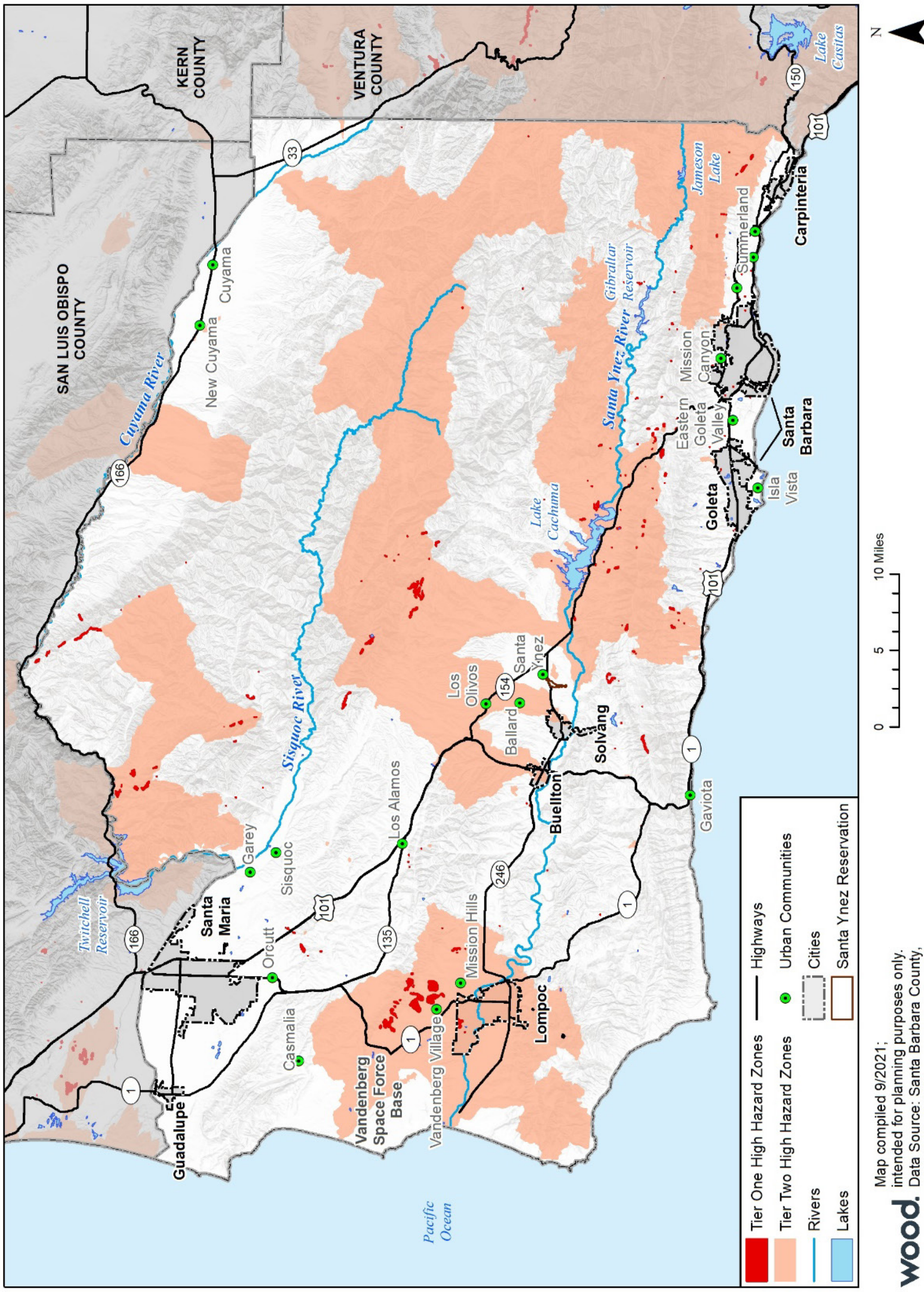
- **2012 - 2017** – In January 2014, Santa Barbara County joined the State of California in declaring a local drought emergency (County of Santa Barbara 2014). Calendar years 2014 and 2015 were the warmest and second-warmest years of record, respectively, for statewide average temperature. New records for catastrophic wildfires were set during and after the 2012–2017 drought, which was likely exacerbated by long-term drought conditions. This was the first time the state-imposed mandatory urban water use reduction requirements on water suppliers, and all of California's 58 counties declared local emergencies.

Incident Profile: Desalinization Plant

In 2015 during a major drought, the City of Santa Barbara reactivated its desalination plant to provide up to 3,125 acre-feet per year, or roughly 30% of the city's water supply (IDE Technologies 2018).

Additionally, California declared a statewide drought emergency on January 17, 2014. An iconic image of this drought was in 2017 when the temporary emergency pumping plant and pipeline were used at Lake Cachuma to move water for the Santa Barbara area across the lake's dry bottom to the distribution system intake that had been stranded by falling lake levels. Lake Cachuma, which supplies drinking water to more than 200,000 South Coast residents with drinking and agricultural water was at roughly 8 percent of its capacity, with water levels so low a special barge fitted with large pumps had to be employed to access the remaining water. On April 7, 2017, the Governor lifted the statewide drought emergency; however, given ongoing low water levels in local reservoirs, the County kept the local drought emergency in place until 2019. Effects of this drought included wetland and stream drying, impacts on grazing and agricultural land, and tree mortality across the county (see Figure 5-7). Additionally, the county's water storage capacity and water quality were impacted at Lake Cachuma, Gibraltar, and Jameson reservoirs from increased sedimentation from the Rey Fire in 2016 and the Thomas Fire and Whittier Fire in 2017 (Hodgson 2019).

Figure 5-7. Santa Barbara County Drought Related Tree Mortality (2019)



Since August 2020, the period between 2012 and 2016 was one of the documented driest consecutive water years in the county with 50.83 inches in cumulative rainfall (County of Santa Barbara 2021a). Effects of the drought have lowered water storage at Lake Cachuma and the Twitchell Reservoir, which are the county's two largest surface water reservoirs, with Lake Cachuma being at 48.4 percent of capacity in late 2021 (County Flood Control District 2021). Although the statewide drought of 2012–2016 was ended by a wet Water Year in 2017, localized drought conditions persisted in the Central Coast region and were not ended until a wet Water Year in 2019 (DWR 2021d).

Probability of Occurrence

Likely - Droughts are a regularly recurring feature of the California and Santa Barbara weather that can be affected by overall regional or worldwide climactic patterns. El Niño and La Niña events are natural climate patterns over the Pacific Ocean often with global effects, with influence over the weather of the U.S. southwest that on average occur every two to seven years. El Niño conditions occur when sea temperatures in the region are warmer than normal and are often associated with wet years on California's south and central coast. La Niña conditions occur when sea temperatures are cooler than normal and are typically associated with dry years. The state recently experienced the 5-year significant drought event of 2012-2017; other notable historical droughts included 2007-09, 1987-92, 1976-77, and off-and-on dry conditions spanning more than a decade in the 1920s and 1930s. In any given year, Santa Barbara County can be subject to drought conditions and water shortages. However, out of the last 10 years, the county has been under a locally declared drought emergency for five years and in 2021 meets Classification D3 – Extreme Drought conditions; therefore, it is likely drought and associated water shortages will continue and may increase due to climate change considerations, as described further below. Recent droughts are thought to be potentially related to a "mega-drought" in the southwest which has reduced snowpack in the Rocky Mountains, reduced flows in the Colorado River, and led to the lowest water levels ever recorded on Lake Powell (National Geographic 2015). While Santa Barbara does not directly receive water from the Colorado River, this mega-drought can influence Santa Barbara County's weather and regional water supplies.

Climate Change Considerations

Climate change has the potential to make drought increasingly common along the west coast, including in California and Santa Barbara County. DWR projects climate change will result in more variable weather patterns in California that may lead to more severe, frequent, and extended droughts, which will impact the California water supply (DWR 2021d). Extreme heat creates conditions more conducive to evaporation of moisture from the ground, thereby increasing the severity of drought as well as wildfires.

As described in the County's CCVA (Santa Barbara County Planning and Development Department 2021), "Two distinct metrics measure precipitation: 1) annual average precipitation and 2) seasonality. Countywide historical annual average precipitation was 17.6 inches per year. Projections show a fluctuation in precipitation by 2.8 inches per year by 2030, 1.2 inches per year by 2060, and 3.9 inches per year by 2100. Table 5-7 shows the expected annual average precipitation change countywide and in the three subregions.[1] Changes in average precipitation due to climate change are also expected to vary substantially in different regions of the county. For instance, the eastern areas of the county in the Los Padres National Forest are projected to see increased annual averages, and the areas in the Santa Maria Valley and the Cuyama Valley will likely see a decrease in annual average precipitation. Although there will likely be a slight increase in precipitation throughout the 21st century, the seasonality may change (i.e., timing during a given year). There will likely be more rain during periods of precipitation (e.g., storms with higher rainfall totals), fewer total days with precipitation, and an increase in year-to-year variability. This means that more rain may fall during fewer storms throughout the year."

Table 5-7. Historical and Projected Annual Average Precipitation (in/year)

Subregion	Historical	2030	2060	20100
Countywide	17.6	20.4	18.8	21.5
North County	16.7	19.2	17.6	19.7
Cuyama Valley	7.2	7.7	6.9	8.4
South Coast	21.8	25.5	23.9	27.9

Source: California Energy Commission 2018.
Note: Projections are an average of the four state-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.

Based on these projections, there will be a gradual increase in average annual precipitation in North County and South Coast, with larger increases in annual average precipitation in the Los Padres National Forest. Cuyama Valley will likely experience little variation in annual average precipitation compared to historical baseline conditions, even though the subregion may experience considerable variation in totals year to year (Santa Barbara County Planning and Development Department 2021).

Due to the changes in precipitation patterns discussed above, although episodic severe storm events may increase in severity, droughts will likely last longer and happen more frequently because of more variability in precipitation extremes. Average base flows in rivers and creeks in the county's coastal and inland areas are projected to decline significantly in the North County and South Coast subregions, in an early- and late-century (e.g., post-2050) extended drought scenario. This reduction in average base flows will affect two key local water supply sources (i.e., surface water reservoirs and groundwater), impacting urban and agricultural uses and natural resources (Santa Barbara County Planning and Development Department 2021).

Snowpack is the amount of snow that accumulates during the winter and is a natural reservoir that stores water during the winter. As it slowly melts in the spring and summer, it feeds streams and rivers that provide water to regions hundreds of miles away along the Central Coast and Southern California. A warming planet could lead to earlier melting of winter snowpacks, leaving lower stream flows and drier conditions in the Sierra Nevada during late spring and summer. The southwest region of the U.S. relies on snowmelt to supply 50 to 80 percent of the lake, reservoir,

[1] The CCVA defines three sub-regions in the county for the purposes of assessing climate change vulnerabilities based on topgraphic and climatic features. As described in Chapter 4.0, the MJHMP update defines five sub-regions for the purposes of assessing hazards based on service areas, geography, and transportation networks.

river, and creek inflows for water supply. Snowpack levels dropped by 25 percent during the 2011 to 2016 drought, and the average springtime snowpack is expected to drop 64 percent by 2100. In 2021, the snowpack in the Northern Sierra was 70 percent of the average, but the rain was less than 50 percent of the annual average, making it the third driest year on record. Loss of snowpack will increase as temperatures increase because of less precipitation during droughts, more precipitation falling as rain, and snow melting earlier in the spring (Santa Barbara County Planning and Development Department 2021). The Sierra Nevada snowpack is important in terms of providing water storage and ensuring adequate supply in the summer to the State Water Project when water is most needed. Changing precipitation distribution and intensity is projected to lead to increased run-off rather than be captured and stored exacerbating the potential for drought. The result of these processes is an increased potential for more frequent, longer-lasting, and more severe periods of drought. Even though some climate models predict that Northern California may be slightly wetter by the century's end, the loss of winter storage capacity in mountain snowpack and warmer temperatures will exacerbate drought conditions (DWR 2021d).

5.3.3 Earthquake & Liquefaction

Description of Hazard

An **earthquake** is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the earth's surface or along fault lines. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet, commonly called faults; however, some earthquakes occur in the middle of plates.

A **fault** is a fracture in the earth's crust along which movement has occurred either suddenly during earthquakes or slowly during a process called creep. Cumulative displacement could be tens or even hundreds of miles if movement occurs over geologic time. However, individual episodes are generally small, usually less than several feet, and are commonly separated by tens, hundreds, or thousands of years. Damage associated with fault-related ground rupture is normally confined to a fairly narrow band following the trend of the fault. Structures are often not able to withstand fault rupture and utilities crossing faults are at risk of damage. Fault displacement involves forces so great that it is generally not feasible (structurally or economically) to design and build structures to accommodate this rapid displacement. Fault displacement can also occur in the form of barely perceptible movement called "fault creep." Damage by fault creep is usually expressed by the rupture or bending of buildings, fences, railroads, streets, pipelines, curbs, and other linear features. Whether by rapid movement or slow creep, cumulative amounts of displacement along a fault can be quite significant. In the past 40 million years, the San Andreas fault in southern California has moved approximately 130 to 180 miles (Santa Barbara County Planning and Development Department 2015).

An earthquake is caused by a release of strain within or along the edge of the Earth's tectonic plates producing ground motion and shaking, surface fault rupture, and secondary hazards, such as ground failure. The severity of the motion increases with the amount of energy released decreases with distance from the causative fault or epicenter and is amplified by soft soils. After just a few seconds, earthquakes can cause massive damage and extensive casualties.

The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and destruction. The scale currently used in the U.S. is the Modified Mercalli Intensity Scale. It was developed in 1931 by Harry Wood and Frank Neumann, two American seismologists. This scale is composed of 12 increasing levels of intensity designated by Roman numerals that range from imperceptible shaking to catastrophic destruction. It does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects.

Most people are familiar with the Richter scale, a method of rating earthquakes based on strength using an indirect measure of released energy (Table 5-8). The Richter scale is logarithmic. Each one-point increase corresponds to a 10-fold increase in the amplitude of the seismic shock waves and a 32-fold increase in energy released. For example, an earthquake registering 7.0 on the Richter scale releases over 1,000 times more energy than an earthquake registering 5.0.

Table 5-8. Richter Scale

Richter Magnitudes	Earthquake Effects
Less than 2.0	Microearthquakes generally not felt
2.0-2.9	Generally not felt but recorded.
3.0-3.9	Often felt, but rarely causes damage.
4.0-4.9	Noticeable shaking of indoor items, and rattling noises. Significant damage is unlikely.
5.0 -5.9	Can cause major damage to poorly constructed buildings in small regions. At most slight damage to well-designed buildings.
6.0-6.9	Can be destructive in areas up to about 100 kilometers across residential areas.
7.0-7.9	Can cause serious damage to larger areas.
8 -8.9	Can cause serious damage in areas several hundred miles across.
9 or greater	Devastating in areas several thousand miles across.

Source: GNS Science 2021

Peak ground acceleration (PGA) is a measure of the strength of ground shaking. Larger peak ground accelerations result in greater damage to structures. PGA is used to depict the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (10, 5, or 2 percent) of being exceeded in a 50-year return period. Figure 5-8 shows the probability of areas of the county experiencing 2 percent shaking within the next 50 years. These values are often used for reference in construction design, and in assessing relative hazards when making economic and safety decisions.

Figure 5-8. Santa Barbara County Probability of Shaking 2% in 50 Years

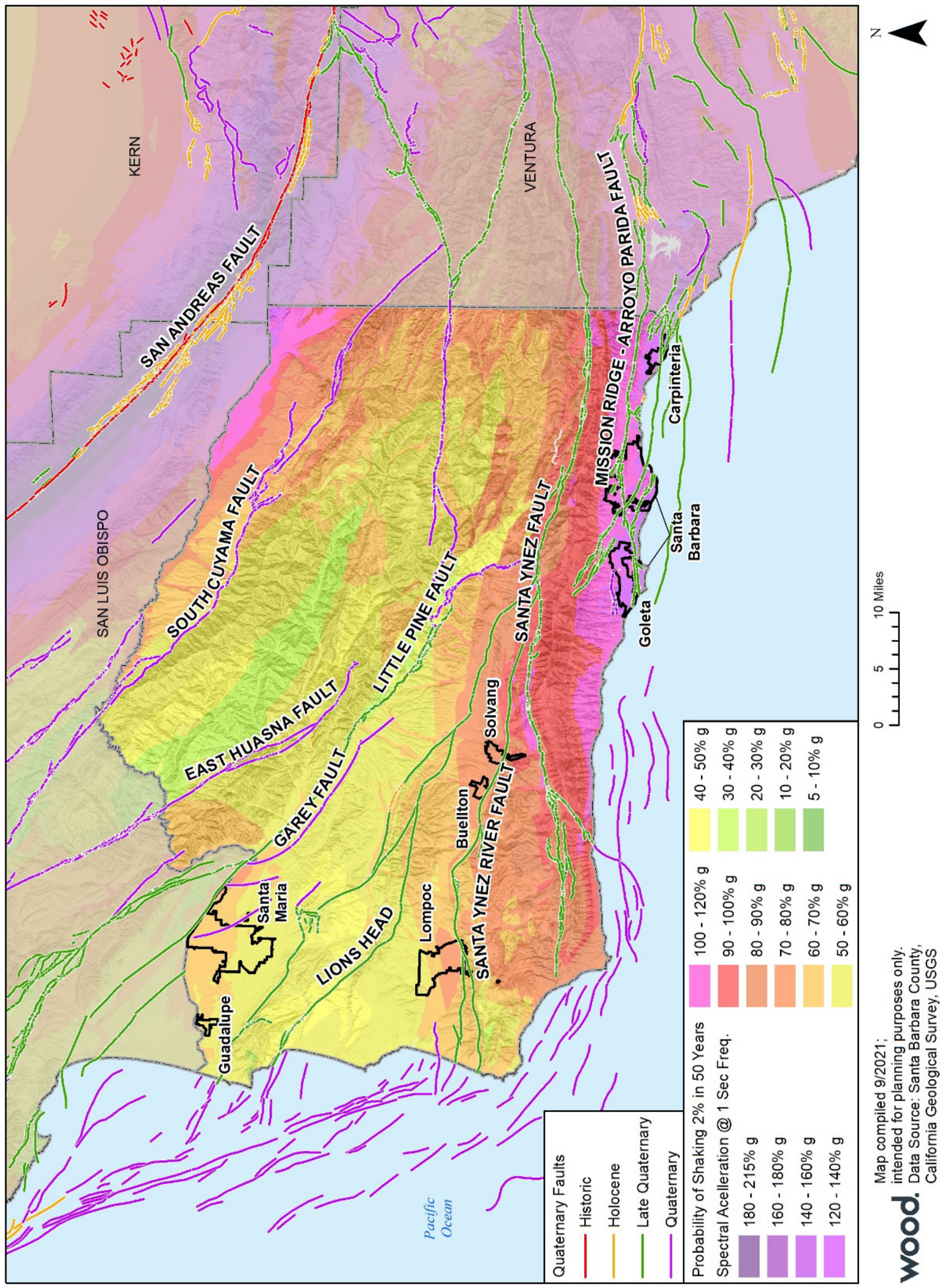
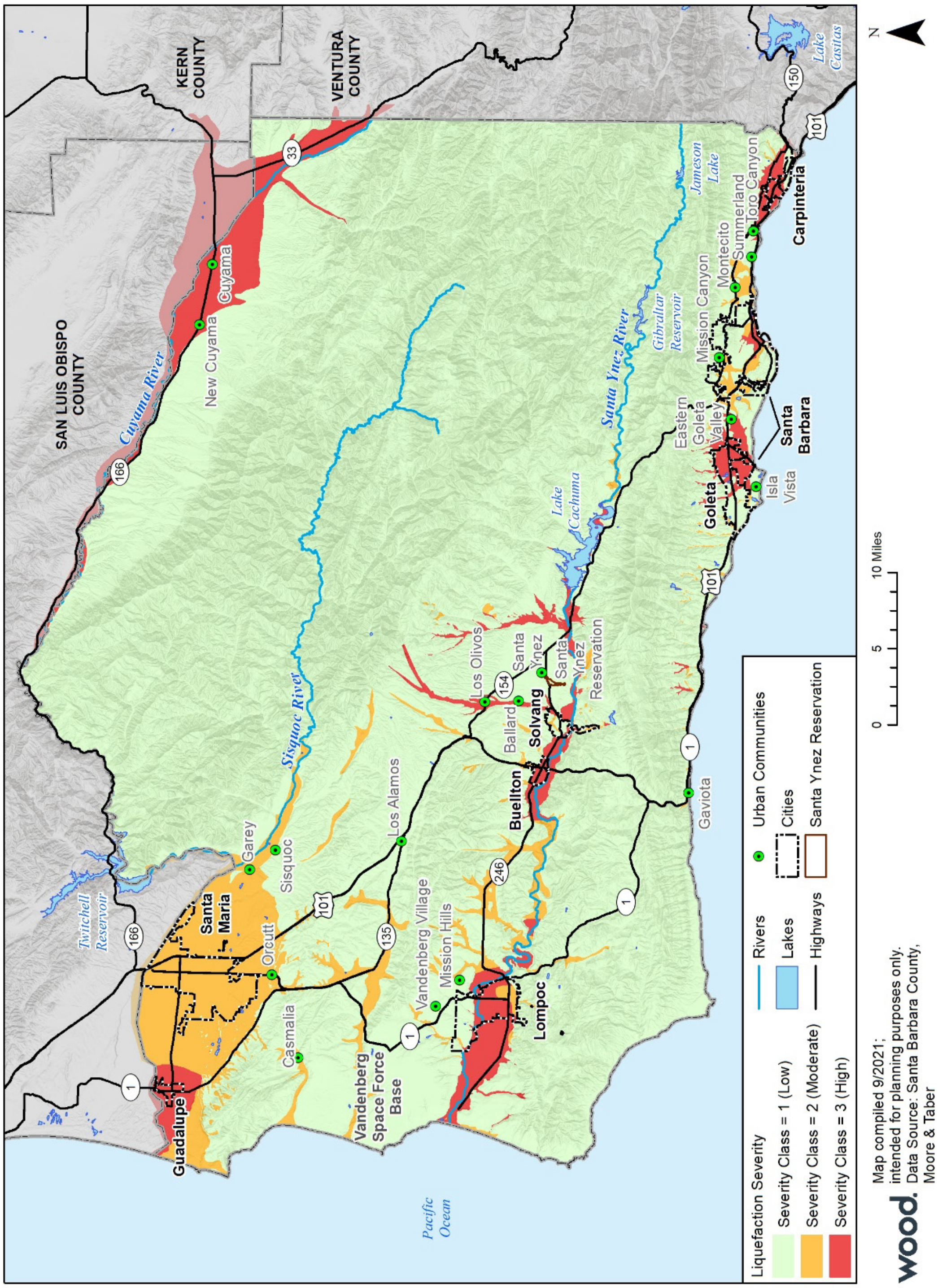


Figure 5-9. Santa Barbara County Liquefaction Severity



Liquefaction occurs when ground shaking causes the mechanical properties of some fine-grained, saturated soils to liquefy and act as a fluid. It is the result of a sudden loss of soil strength due to a rapid increase in soil pore water pressures caused by ground shaking. For liquefaction to occur, three general geotechnical characteristics should be present: 1) groundwater should be present within the potentially liquefiable zone, 2) the potentially liquefiable zone should be granular and meet a specific range in grain-size distribution, and 3) the potentially liquefiable zone should be of low relative density. If those criteria are present and strong ground motion occurs, then those soils could liquefy, depending upon the intensity and duration of the strong ground motion. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength occurs when the soil supporting structures liquefy, causing the structures to settle; resulting in damage and, in some cases, collapse. Collapsed structures can be directly dangerous to occupants and can also create indirect hazards such as structure fire or the release of hazardous materials such as asbestos.

Liquefaction that produces surface effects generally occurs in the upper 40 to 50 feet of the soil column, although the phenomenon can occur deeper than 100 feet. The duration of ground shaking is also an important factor in causing liquefaction to occur. The larger the earthquake magnitude, and the longer the duration of strong ground shaking, the greater the potential there is for liquefaction to occur.

Location and Extent of Hazard in Santa Barbara County

Santa Barbara County is located in a high seismic activity zone in the Transverse Range geologic province (County of Santa Barbara 2015). As such, all residents and structures in Santa Barbara County are susceptible to earthquake hazards, including direct damage to buildings and infrastructure from ground shaking and liquefaction and indirect hazards caused by utility outages and structural fires. See Section 6.2.1, *Earthquake (Ground shaking)* for estimates of populations vulnerable to different earthquake hazards.

The California Geological Survey, previously known as the California Division of Mines and Geology, has classified faults into the following four categories (City of Santa Barbara 2011):

- **Historically Active** - Faults on which earthquakes have occurred during the historic time (200 years) are classified as historically active. Often it is hard to pinpoint the exact fault responsible for an earthquake, as epicenters are not always well located, and fault patterns are often complex.
- **Active** - Faults that show evidence of displacement during the most recent epoch of geologic time, the Holocene (11,000 years ago), are classified as active. It is considered that any topographic expression of movement along the fault is evidence that the fault is active because, after 11,000 years, such evidence would probably be erased by erosion and deposition.
- **Potentially Active** - Faults that displace deposits of the Pleistocene age but show no evidence of movement in the Holocene period can be considered to be potentially active. While Pleistocene time is generally held to be the last 2-3 million years, the California Geological Survey now considers potentially active faults as having evidence of displacement in the last 1.6 million years.

- **Inactive** - Faults that displace rocks of early Pleistocene age or older (greater than 1.6 million years) and show no more evidence of recent movement are classified as inactive.

The movement of continental plates manifests primarily within the San Andreas Fault system. The San Andreas Fault is situated 7 miles northeast of Santa Barbara County. Active faults in the San Andreas Fault system that fall within Santa Barbara County include the Nacimiento, Ozena, Suey, and Little Pine faults. The Santa Barbara County Comprehensive Plan Seismic Safety and Safety Element provides descriptions of other active faults in the region, including the Big Pine, Lagoon, Lavigia, Mesa/Rincon, Mission Ridge Arroyo Pardida, Montecito, More Ranch, Pitas Point, Red Mountain, Santa Ynez, and Sycamore (Santa Barbara County Planning and Development Department 2015). All historically active (i.e., Historic), active (i.e., Holocene), and potentially active (i.e., Late Quaternary and Quaternary) faults are represented in Figure 5-8 as mapped by USGS and the California Geological Survey. Note, Figure 5-8 does not include inactive faults.

After earthquakes, some regions may be prone to **liquefaction**. On level ground, liquefaction results in water rising to the ground surface. On sloping ground, liquefaction will usually result in slope failure, such as the event at the Sheffield Dam in the aftermath of the 1925 Santa Barbara earthquake. Most of the low coastal plain and valley bottoms are underlain by alluvium and are at moderate risk for liquefaction potential as identified by the Santa Barbara County Comprehensive Plan Seismic Safety and Safety Element. Alluvial areas where the water depth was uncertain in the county were given a moderate-high to low rating, areas underlain with bedrock were given a low rating with no variation, and areas with geologically recent granular materials were rated low with a possible variation to moderate or high. This rating is largely based on the probable depth to groundwater with consideration given to probable soil characteristics (i.e., classification, grain size, density) and probable earthquake intensity and duration (Santa Barbara County Planning and Development Department 2015). Based on this information and work conducted as part of the Santa Barbara County Comprehensive Plan, a map was generated indicating liquefaction severity (see Figure 5-9).

Liquefaction is important to consider for planning purposes as it can lead to ground failure associated with moderate and large earthquakes and contribute to substantial building and infrastructure losses. Areas in the county that generally have high groundwater levels and poorly consolidated sandy soils have been delineated as having a high liquefaction potential during a major earthquake. These areas generally coincide with land that is filled-in wetland, including areas near the coast. Areas that have soils of mixed sand and clay, with historic high groundwater levels have been outlined as having a conditional liquefaction potential. Liquefaction could occur in these areas if groundwater levels were to return to their historic high levels. A minimal liquefaction potential has been assigned to areas with groundwater levels historically below 40 feet and having high soil densities (City of Santa Barbara 2011).

County unincorporated areas that are more susceptible to liquefaction are the low coastal areas with high groundwater in the Toro Canyon-Carpinteria areas south of Highway 101, the Goleta Slough-Santa Barbara Airport area, and alluvial valleys along the Santa Ynez River near Solvang, Buellton and Lompoc, and the Santa Maria River near Santa Maria and Guadalupe (Santa Barbara County Planning and Development Department 2015).

History of Hazard in Santa Barbara County

Santa Barbara County is located in a high seismic activity zone and as such has a long history of earthquakes. Although most seismic activity in California occurs within the San Andreas Fault system, most historic seismic events in the region have been centered offshore on an east-west trending fault between the county and the Channel Islands. Several smaller earthquakes have taken place in the past years, including two magnitude 2.0 earthquakes in March 2021 in the Santa Ynez Valley and a magnitude 2.3 earthquake in April 2021 near the City of Lompoc (Earthquake Track 2021). These approximate magnitude 2.0 earthquakes are fairly common in the county.

While a more extensive discussion of previous earthquakes in Santa Barbara County is available in the Seismic and Safety Element of the Santa Barbara County Comprehensive Plan, Table 5-9 provides an overview of significant events within the last 50 years. Figure 5-10 displays historical epicenters of earthquakes located in Santa Barbara County since 1700.

Table 5-9. Historic Earthquakes in Santa Barbara County (1970-2020)

Year	Location	Magnitude	Description
1978	Less than 1 mile southeast of Santa Barbara	5.1	The main shock was followed by 373 aftershocks extending 7.5 miles from the epicenter. 65 injured.
2003	7 miles northeast of San Simeon	6.5	2 fatalities, 40 injured, 46 buildings were damaged.
2017	7.5 miles west of Isla Vista	4.1	No reported injuries or damage.
2017	20 miles southwest of Lompoc	4.3	Public school buildings were evacuated as a precaution.
2018	8 miles west of Isla Vista	3.8	No reported injuries or damage. Mild disturbance in homes.
2020	3.7 miles southeast of Santa Ynez	3.9	Reportedly felt by people in Santa Maria and Santa Barbara.

Source: Santa Barbara County Planning and Development Department 2015.

There is no historic evidence of liquefaction in Santa Barbara County (Santa Barbara County Planning and Development Department 2015).

Probability of Occurrence

Likely - The USGS and their partners, as part of the latest Uniform California Earthquake Rupture Forecast Version 3 (USGS 2015), have estimated the chances of having large earthquakes throughout California over the next 30 years. Statewide, the rate of earthquakes around magnitude 6.7 (the size of the 1994 Northridge earthquake) has been estimated to be one per 6.3 years (more than 99 percent likelihood in the next 30 years); in southern California, the rate is one per 12 years (93 percent likelihood in the next 30 years). Southern California's rates are given in Table 5-10.

Figure 5-10. Historic Earthquake Epicenters

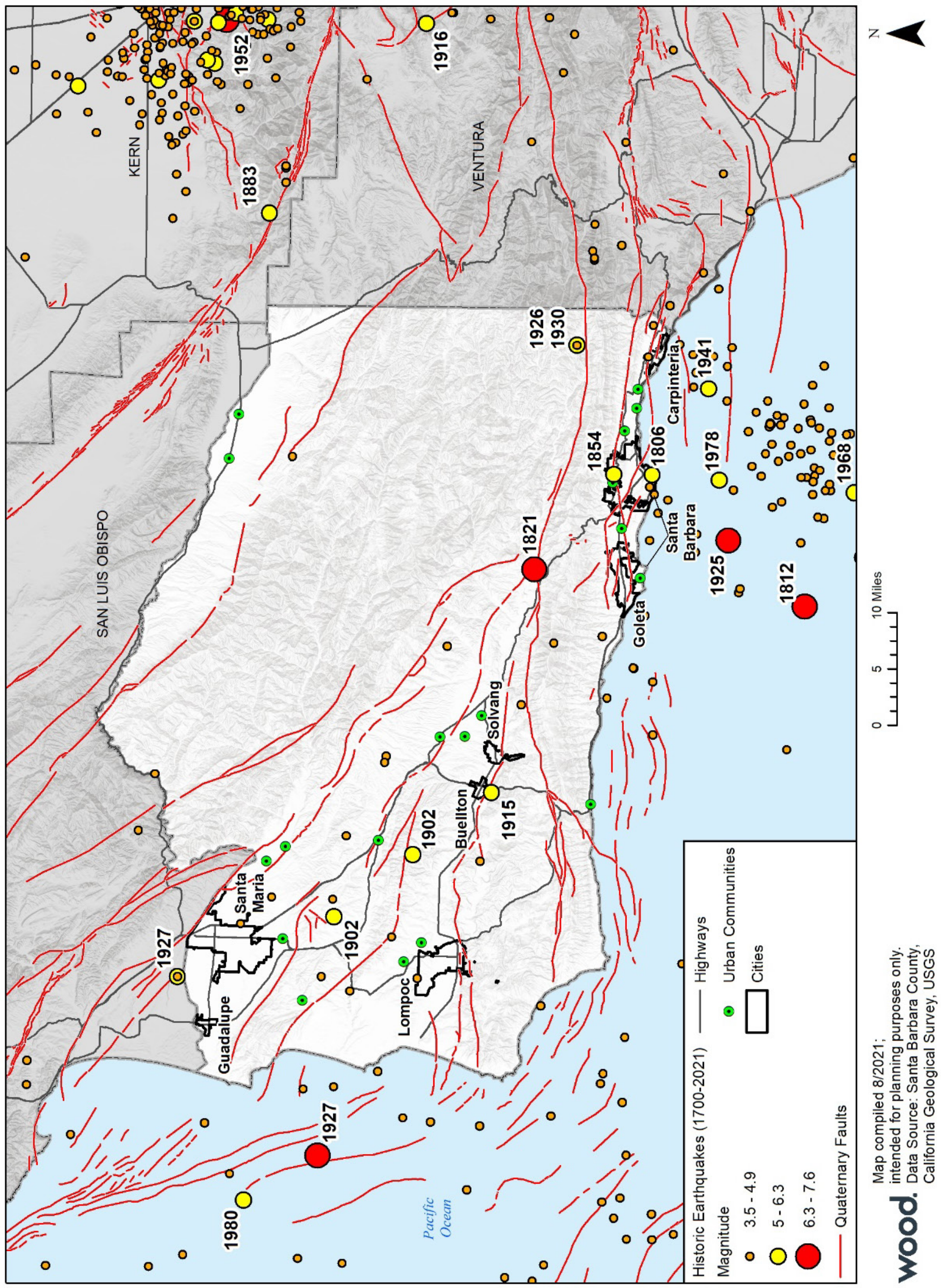


Table 5-10. Southern California Region Earthquake Likelihoods

Magnitude (greater than or equal to)	Average Repeat Time (years)	30-year likelihood of one or more events
5	0.24	100%
6	2.3	100%
6.7	12	93%
7	25	75%
7.5	87	36%
8	522	7%

Source: USGS 2015.

Climate Change Considerations

While climate change is not expected to directly affect earthquake frequency or intensity; it could exacerbate indirect or secondary impacts of earthquakes. For example, climate change could increase the frequency and intensity of extreme precipitation events, which in turn increases the probability of landslides and liquefaction events during an earthquake if the earthquake coincided with a wet cycle (California Natural Resources Agency 2018).

5.3.4 Flood

Description of Hazard

All flooding is a breakdown in surface water conveyance. **Flooding** happens when water surpasses the capacity of local water bodies to contain it, creeks and rivers to carry it, or soil to absorb it. When flood control infrastructure fails, water builds up and washes into normally dry areas, where it can cause significant harm to buildings, people, infrastructure, and ecosystems. Floods can be caused by heavy rainfall, long periods of moderate rainfall, or blocked-off drainage areas during rainfall. A break in a dam or levee, water pipe, or water tank can also cause flooding in rare instances (see also, Section 5.6.3, *Dam Failure* and Section 5.6.8, *Levee Failure*). Floods that develop very quickly are called flash floods; they are especially dangerous because they give little or no warning.

Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floodwaters can be deep enough to drown people and move fast enough to carry away people or heavy objects, such as cars. In some cases, floods have lifted buildings off their foundations (Santa Barbara County Planning and Development Department 2021). Certain health hazards are also common to flood events. Standing water and wet materials in structures can become breeding grounds for microorganisms such as bacteria, mold, and viruses. This can cause disease, trigger allergic reactions, and damage materials long after the flood. When floodwaters contain sewage or decaying animal carcasses, a rise in infectious disease risk becomes a concern. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warnings and evacuation are critically important to reduce life and safety impacts.

Key Flood Hazard Definitions

100-year flood: flood that has a **1% chance** in any given year of being equaled or exceeded.
500-year flood: flood that has a **0.2% chance** in any given year of being equaled or exceeded.
Floodplain: The area adjacent to a river or stream channel that can become **inundated** during a 100-year or 500-year flood event.

The area adjacent to a river or stream channel is the floodplain. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to the area that is inundated by a 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP). The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. A 500-year flood event would be slightly deeper and cover a greater area than a 100-year flood event (Federal Emergency Management Agency [FEMA] 2020). The potential for flooding can change and increase through various land use changes and changes to the land surface, which can result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity. Inland flooding is measured by the size of the areas flooded per year, and this will likely increase as more precipitation falls in fewer storms (Santa Barbara County Planning and Development Department 2021).

Santa Barbara County is susceptible to various types of flood events as described below.

- **Riverine flooding** - Riverine flooding, defined as the condition when a watercourse (e.g., river or channel) exceeds its "bank-full" capacity, generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water resistance of the surface due to urbanization. In the Santa Barbara County planning area, flooding is largely caused by heavy and continued rains, and heavy flow from tributary streams. The county's major rivers (e.g., Santa Ynez River) and foothill streams of the Santa Ynez Mountains and San Rafael Mountains can all present flood hazards. Intense storms can overwhelm the local waterways as well as the integrity of any flood control structures. The warning time associated with slow rise floods assists in life and property protection.

- **Localized flooding** - Localized flooding problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. This type of flood often occurs quickly and with little warning. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems.

- **Dam or levee failure flooding** - Flooding from a failure of one or more upstream dams or water control structures such as levees is also a concern to Santa Barbara County. A catastrophic flood control structural failure could easily overwhelm local response capabilities to save lives and require mass evacuations. Impacts on life safety will depend on the warning time and the resources available to notify and evacuate the public. Loss of life could result, and there could be associated health concerns as well as negative effects on local buildings and infrastructure. Dam failure and levee failure are addressed in more detail under Section 5.6.3, *Dam Failure,* and Section 5.6.8, *Levee Failure*, respectively.

- **Coastal flooding** - Coastal floods come from the Pacific Ocean where large waves are and can be affected by storm surges. Coastal floods can be very dangerous when high waters are combined with the destructive forces of waves. In low-lying coastal areas, storm surges and flooding can reach many miles from the shoreline, flowing up rivers and across flat land (FEMA 2021a). Coastal flooding hazards and the potential for climate change to exacerbate coastal flooding hazards are addressed in more detail under Section 5.3.6, *Coastal Hazards*.

Additionally, mudflow and debris flow which can be caused by localized flooding are discussed further in Section 5.3.5, *Mudflow & Debris Flow*.

<u>Location and Extent of Hazard in Santa Barbara County</u>

The climate and topography of Santa Barbara County make some communities and regions along creeks and rivers prone to flooding. There are two main river systems in the county – the 24.4-mile-long Santa Maria and the 92-mile-long Santa Ynez – which pose flood hazards with floodplains extending outside of established channels by as little as dozens of feet to as much as 0.5 miles or more along portions of the Santa Ynez River (Community Environmental Council et al. 2003). Floods usually occur during the rainy season, with the highest precipitation from December through March during heavy rainfall. Streamflow throughout the county is highly variable and directly impacted by rainfall with little snowmelt or base flow from headwaters. Watercourses can experience dramatic peak flows during high rainfall events. High amounts of sedimentation during wet years and high amounts of vegetative growth during dry and moderate years can affect stream or river channel capacity to carry floodwaters.

The drainages in the southern part of the county are characterized by high intensity, short duration runoff events, due to the relatively short distance from the top of the Santa Ynez Mountains to the Pacific Ocean. Runoff from high intensity, short-duration storm events can cause inundation of overbank areas, debris including sediment, rock, downed trees in the water that can plug culverts and bridges, erosion and sloughing of banks, and loss of channel capacity due to sedimentation. The communities of Carpinteria, Toro Canyon, Summerland, Montecito, Santa Barbara, and Goleta are all traversed by the floodplains of more than a dozen creeks that drain the Santa Ynez Mountains, with the degree of flood hazard varying substantially by community and creek. Some creeks such as Franklin and Santa Monica Creeks in Carpinteria, Mission Creek in Santa Barbara, and Las Vegas Creek in Goleta have been channelized reducing but not eliminating flood hazards. Other Creeks such as Carpinteria Creek in the City of Carpinteria or Maria Ygnacia Creek in the Goleta Valley remain in a more natural condition with the corresponding potential for flood hazards. Flood control debris basins have been constructed on many of these creeks to intercept sediment and debris, reducing the potential for plugging of downstream creek channels and associated flood hazards.

North county has floodplains that cross the Santa Maria Valley, Lompoc Valley, and Santa Ynez Valley sub-regions along rivers, including the Santa Maria River, San Antonio Creek, and Santa Ynez River, and create flood hazards for communities that border these waterways in the Santa Maria and Santa Ynez Valleys (Santa Barbara County Planning and Development Department 2021). The primary flood hazards in north county as associated with the county's two major rivers, the Santa Ynez River and Santa Maria River, as well as San Antonio Creek. Although dammed at three locations, the Santa Ynez River can generate high flood flows that can impact portions of Solvang, Buellton, and Lompoc, as well as public infrastructure and agricultural land. Flood hazards along the Santa Maria River are managed by Twitchell Dam and a riverside levee system that protects the City of Santa Maria, downstream agricultural land, and most of the City of Guadalupe. San Antonio Creek presents flood hazards to the town of Los Alamos and adjacent agricultural land. Creeks draining the San Rafael Mountains such as Alamo Pintado Creek present some flood hazards to Santa Ynez Valley communities. The drainages in the northern part of the county are generally characterized by longer duration and less intense storms than the southern coastal areas. Additionally, portions of the county are subject to flooding due to flash flooding, urban flooding, river channel overflow, and downstream flooding.

Another contributing factor to flooding is the county's location along the Pacific Ocean. With its 110 miles of coastline, low-lying portions of communities in the county are susceptible to wave attack, coastal flooding, and storm surge. In particular, low-lying areas of the City of Carpinteria, some areas of Montecito, much of the City of Santa Barbara's waterfront, and lower downtown and Goleta Beach County Park are subject to wave attack, coastal flooding, and storm surges. Most other areas on the South Coast are elevated on coastal bluffs above coastal flood hazards, while north county communities are generally located well inland outside of coastal flood hazards zones. Some facilities, such as Jalama Beach County Park, Ocean Beach County Park, and Surf Beach, along with segments of the UPRR in the Lompoc Valley are within coastal flood hazard zones.

History of Hazard in Santa Barbara County

Flooding has been a major problem for communities and regions along rivers, creeks, and the shoreline throughout Santa Barbara County's history. Santa Barbara County has several hydrologic basins that have different types of flooding problems, including overbank riverine flooding, flash floods, tidal flooding/tsunamis, and dam failure. The most common flooding in Santa Barbara is due to riverine flooding and flash flood events.

Between 1907 and 2018, Santa Barbara County experienced 20 significant inland flood events. Eight of these floods received Presidential Disaster Declarations (i.e., 1971, 1978, 1980, 1982-1983, 1992-1993, 1995, 1998, 2020). Additionally, a Presidential Disaster Declaration was issued in January 2018 for all of California in response to statewide wildfires, flooding, mudflows, and debris flows, including the Montecito debris flows following the Thomas Fire. These historical flood events and years as well as information concerning the nature of the flooding and the extent of the damages are described below.

- **1907** –The entire Lompoc Valley was also engulfed in floodwaters following four straight days of rain, causing significant damage to structures and crops (County Flood Control 1993).
- **1914** – Torrential rains occurred on the South Coast over two weeks beginning on January 15. Severe damages were caused by 16 inches of rainfall, with over four inches of rain in two hours

on the final day of the storm. A married couple drowned in Montecito Creek. However, Mission Creek and Hot Springs Creek experienced the most severe flooding. The Flood Control District estimated approximately $500,000 in losses (County Flood Control 1974).

- **1952** – In January 1952, Mission Creek flooded on two separate occasions. More than 50 homes were inundated, with large-scale evacuations across the county, and the lower State Street area was flooded with water one or two feet in depth (County Flood Control 1993; U.S. Department of Commerce 1994).
- **1964** – Following the Coyote Fire, relatively light rain fell on portions of the watershed burned by the fire, causing severe flooding in the areas surrounding Montecito, Hot Springs, and San Ysidro Creeks. Eyewitnesses reported 20-foot walls of water, mud, boulders, and trees moving down the channels at approximately 15 miles per hour. Bridges were swept away in seconds and flow inundated large areas damaging structures and depositing debris. Large boulders were carried along Montecito Creek by the flow and deposited upstream of the bridge near Hot Springs Road. Overflow from Hot Springs Creek ran along Olive Mill Road. A 20-inch-high pressure gas line near Mountain Drive was bent by the force of the flow in San Ysidro Creek, although it did not break. County Flood Control estimated damages to public and private property at more than $300,000 (County Flood Control 1974).
- **1969** – During a major flood in January 1969, highways were closed between Montecito and Carpinteria, Las Cruces and Lompoc, and in the Santa Maria area. Gushing water along Toro Creek tore up pine trees and deposited huge boulders up against homes. Torito Road bridge collapsed and a new creek channel was created by a water force upstream of the bridge, removing 10 to 15 feet of the embankment. A gas main at Toro Canyon and East Valley Road burst. Near its confluence with the Pacific Ocean, Oak Creek eroded its banks and undercut surrounding structures. The San Ysidro Creek channel was filled with debris, forcing floodwaters onto La Vuelta Road where many houses were flooded. Boulders carried by Romero Canyon Creek crashed through homes near Featherhill Road (County Flood Control 1974). Both Gibraltar and Juncal Dams overflowed, resulting in the raging flows on the Santa Ynez River that wiped out nearly everything in its path. Helicopters lifted more than 100 marooned residents from the upper Santa Ynez Valley. The cost of damages was approximately $4.5 million (County Flood Control 1974).
- **1971** – Following the Romero Fire in October 1971, which burned 14,538 acres, a heavy storm caused flooding along Romero, Garrapata, and Toro Canyon creeks (National Interagency Fire Center 2021; County Flood Control 1974). Flooding from overflow at Toro Canyon Creek shut down Highway 101 and the UPRR for several hours. This flood received a Presidential Disaster Declaration (County Flood Control 1974).
- **1978** – This flood, which caused the inundation of agricultural areas and mudslides across the county, cost millions of dollars in damages and received a Presidential Disaster Declaration (County Flood Control 1993). A total of 36.08 inches (359 percent of normal rainfall) was measured at the County Flood Control office during the 3 months between mid-December through mid-March. Several creek channels within the county were eroded and damaged, including Arroyo Pandon, San Ysidro Creek, Romero Creek, San Pedro Creek, Atascadero Creek, Tecolito Creek, Carneros Creek, Santa Monica Creek, and Mission Creek (USACE 1978).

- **1980 –** This flood, which also received a Presidential Disaster Declaration, consisted of severe flooding, mudslides, and high tides throughout the county.
- **1982-1983 –** Between 1982 and 1983, several parts of southern California received over 200 percent of normal rainfall. Two Presidential Disaster Declarations were received due to these floods.
- **1992-1993 –** The 1992-1993 rainy season was one of the wettest on record in Santa Barbara County. Areas of the county received 180 percent to 209 percent normal rainfall. One of the county's highest short-duration rainfall intensities was recorded in 1993; 1.25-inches fell in 15 minutes at the Buellton Fire Station. Following a 25-year storm event that occurred in late March, Santa Barbara was declared a federal disaster area with 12 creeks experiencing substantial flooding along with damage to several detention basins and residences. The flood also received a Presidential Disaster Declaration. Santa Barbara County received approximately $1.4 million in disaster recovery funds from FEMA (County Flood Control 1993).
- **1995 Floods –** Two major storm-related flooding events occurred in the winter of 1995 on January 10 and March 10. The floods of 1995 brought widespread flooding to Santa Barbara County, with the most severe flooding of creeks along the South Coast while the rest of the county was largely spared from serious damages. Flooding occurred on most major streams in the cities of Goleta, Santa Barbara, and Carpinteria as well as the community of Montecito. Both floods caused closures of road and rail transportation for several hours and received Presidential Disaster Declarations. Estimated public and private damages were around $100 million (County Flood Control 1995).
- **January 1995 –** The January 10th flood affected approximately 510 properties along the South Coast and caused roughly $50 million of damage. Flooding occurred on most major creek channels in Goleta, Santa Barbara, Montecito, and Carpinteria. All modes of transportation in and out of the South Coast, including the Santa Barbara Airport, Highway 101, UPRR, the harbor, and other major roads on the South Coast were cut off for several hours as a result of this flood. Highway 101 reopened to the north later that day; however, southbound roads, the airport, UPRR, and the harbor were not restored for several days (County Flood Control 1995).

  In Goleta, major flooding occurred on Carneros and San Pedro Creeks from Calle Real to the Goleta Slough. On Carneros Creek, the culvert under Los Carneros Road was completely plugged with trees and debris. In addition, the culvert under Highway 101 was partially plugged. Flows overtopped Calle Real and Highway 101. On San Pedro Creek, several homes were flooded when the culvert under Calle Real (and continuing under Highway 101) became almost completely plugged. Several homes on and around Carlo Drive and Valdez Drive at the intersection of Calle Real were flooded with up to 3 feet of water and mud. San Jose Creek jumped out of its banks at the Twin Screens Outdoor Theater at the end of Kellogg Avenue, causing flooding in portions of downtown Goleta. A major disaster was averted on Atascadero Creek due to the creek clearing project completed by Flood Control maintenance crews just ten days before the storm (County Flood Control 1995).

  The Santa Barbara Airport remained closed for three days due to extensive flooding, except for helicopter service, while maintenance crews cleaned mud and debris from the runways.

In Santa Barbara, Mission Creek gauges reported peak flows at 5,000 cubic feet per second (cfs), overtopping its banks at the De la Vina Street bridge near Alamar Avenue, causing flooding in the vicinity of Cottage Hospital. The creek also flooded at the De la Guerra Street bridge and flowed uncontrolled through the city to the ocean. Sycamore Creek flooded the five-way intersection at the top of North Salinas Street and several mobile home parks further downstream near Highway 101. Flooding in Montecito and Carpinteria was less severe due to debris basins and channel clearing. However, on Mountain Drive, Bella Vista Drive, and San Ysidro Riad, plugged culverts resulted in a diversion of the creek flows, causing roadway flooding and damage to residential structures. San Ysidro Creek and Oak Creek overtopped Highway 101. Montecito Creek also flooded and flowed down Olive Mill Road, causing flooding in the neighborhood around Danielson Road, Virginia Road, and Virginia Lane (County Flood Control 1995).

- **March 1995 –** The storm event on March 10 caused flooding of most major channels in Goleta, Santa Barbara, Montecito, and Carpinteria. More than 300 structures were reported flooded and/or damaged, with many of the same structures flooded in January flooded again. Approximately $30 million of public and private property were damaged during the storm. Flows over 5,000 cfs were recorded at San Jose Creek, causing flooding in Old Town Goleta. In Santa Barbara, the Mission Street underpass flooded; however, Mission Creek caused less damage compared with the damages from the January storm. Sycamore Creek, however, flooded and severely damaged many homes, bridges, and trailer parks in Santa Barbara. Flood waters also swept away cars and portions of buildings. One man lost his life as floodwaters swept him out of his home on Sycamore Canyon Road. Although the debris basins trapped thousands of cubic yards of debris, culvert plugging occurred again, causing flooding in Romero, San Ysidro, Oak, and Montecito Creeks (County Flood Control 1995).

  Once again, the airport, Highway 101, and UPRR in and out of the South Coast were cut off for several hours. This flood received a Presidential Disaster Declaration (County Flood Control 1995).

- **1998 –** The storm events of 1998 arrived on a strong El Niño and brought several record-breaking rainfalls with 50-year storm event intensities throughout February. The City of Santa Barbara recorded its wettest month in history, with 21.36 inches of rainfall. By the end of the month, many areas in the county had received 600 percent of normal February rainfall. Flood-related damages within Santa Barbara occurred during three major storm periods: February 1-4, February 6-9, and February 22-24. The cost to repair extensive flood damage to public and private property was estimated at $15 million. Just like in 1995, transportation throughout the county was disrupted through closures of roads, the Santa Barbara Airport, and train service. Flood damage was spread throughout the county and the county was declared a Federal Disaster Area on February 9. The floods received a Presidential Disaster Declaration (County Flood Control 1998).

Incident Profile: 1998 El Nino Storms

A series of El Nino storms in February 1998 cause widespread flooding and mudslides, as well as tornadoes, in the county and throughout California.

ISLA VISTA. Feb. 9, 1998. Flooding in Isla Vista.

Photo: County of Santa Barbara

February 2, 1998 – During the first storm on February 2, winds with gusts as high as 63 mph knocked over hundreds of trees and caused loss of power to thousands of homes across Goleta and Santa Barbara. A large eucalyptus tree crushed an Isla Vista apartment complex and forced the evacuation of its residents. Carpinteria declared a local state of emergency in response to the storm damage. The next day, 15-foot-high waves damaged pilings under Stearns Wharf and a broken sewer line near Arroyo Burro Beach, closing several nearby beaches due to high levels of bacteria buildup. Gaviota Creek overtopped and flooded the State Beach at the mouth of the creek. At the Gaviota Chevron plant, storm-related damage caused a release of hazardous materials (County Flood Control 1998). The Santa Ynez Valley was hit particularly hard by this first storm. Severe flooding occurred in Solvang when Alamo Pintado Creek overtopped its banks, flooding a least six businesses. Flooding on Adobe Creek in Solvang also flooded homes, garages, and automobiles. A culvert on Zanja de Cota Creek plugged, flooding homes and damaging Farady Road. Local officials declared a State of Emergency in Solvang and major landslides closed several North County roads, including Highways 101 and 154. In Santa Ynez Valley, schools were closed, and some homes were without power and water. A broken sewage main resulted in a spill that contaminated Zanja De Cota Creek. People living on Vandenberg SFB were evacuated and several homes on the Base were damaged (County Flood Control 1998).

Transportation throughout the county was disrupted due to flooding and mudflows: the Santa Barbara Airport was closed due to flooded runways, train service was halted due to mud slides over the tracks, and numerous South Coast roads were closed. Highway 101 was closed south of Ventura by a mudslide and reduced to one lane at Gaviota because of rockslides. Highway 154 was closed due to rockslides. Highway 1 between Lompoc and Gaviota was closed to erosion (County Flood Control 1998).

On February 3, the Cachuma Reservoir spilled, and farmland west of Lompoc was inundated. Overflow from the Santa Ynez River entering the Rodeo San Pasqual Channel caused severe damage midway between Central Avenue and the River (County Flood Control 1998).

- **February 6, 1998 –** With little time to recuperate, the South Coast was hit by a second major storm on February 6, causing severe damage in the Goleta area, including flooding at Las Vegas, Encina, and San Pedro creeks. University of California, Santa Barbara (UC Santa

Barbara) was closed due to inundated classrooms. Street flooding was widespread throughout Isla Vista and Old Town Goleta. Disruptions of transportation were widespread throughout the South Coast – a downed tree resulted in an accident that closed Highway 101. In Santa Barbara, residents were evacuated from Sycamore Canyon and lower State Street businesses were inundated. Along the coast, berms were hastily constructed to protect beachfront property (County Flood Control 1998).

In Santa Ynez Valley, the Highway 246 bridge over Santa Rosa Creek was closed due to erosion around its supports. The failure of an oil pipeline near Vandenberg Village resulted in a spill.

- **February 22-24, 1998 –** Intense rain again hit the County on February 23 and 24 after several days of moderate rainfall. This time, it was the creeks of Montecito and Carpinteria that were most heavily affected. Among those creeks that overtopped their banks were Montecito, Romero, San Ysidro, Oak, and Arroyo Paredon. Montecito homes were flooded, especially those adjacent to creeks on San Leandro Lane, Veloz Drive, Santa Rosa Lane, and Olive Mill Road.

  Transportation was again interrupted with the closure of Highway 101 near Ventura, Sycamore Canyon Road, and Gaviota Road. Long-distance telephone service was disrupted due to a broken cable and power went out in parts of Goleta. In addition, a ruptured water line in Goleta resulted in limited deliveries to some customers. Several major mud slides threatened and destroyed homes throughout the South Coast.

  Flooding of the Cuyama River resulted in erosion of its northern bank and a washout of State Route (SR) 166. In dark and hazy conditions, four vehicles plummeted into the river leaving three people dead, including two police officers. Two other people survived and were rescued from the river. Although the February storms had higher annual rainfalls, flooding in 1998 was considered less severe than other historical events due to flood control improvements, such as Cachuma Reservoir, and channel and debris dam maintenance performed by the County (County Flood Control 1998).

- **2005 –** In January 2005, a powerful Pacific storm tapped into a subtropical moisture source to produce heavy rain, snow, flash flooding, high winds, and landslides in Central and Southern California. Rainfall totals ranged from 4 to 8 inches over coastal areas to between 10 and 20 inches in the mountains. With such copious rainfall, flash flooding was a serious problem across Santa Barbara, Ventura, and Los Angeles counties. In Santa Barbara County, flash flooding and mudslides closed Highway 101 at Bates Road in Carpinteria and Gibraltar Road at Mt. Calvary Road, stranding several vehicles, while mudslides inundated 3 homes in Lake Casitas. With such heavy rainfall, the Santa Ynez River exceeded its flood stage. Regionally, Ventura County and Los Angeles County experienced similar flooding with road closures, damage to structures, and loss of life. Located just outside of Santa Barbara County, Ventura County's La Conchita community experienced a devastating mudslide that killed 10 people, destroyed 15 homes, and damaged 12 other homes. Overall, damage estimates for the entire series of storms that started December 27th, 2004, and ended on January 11th, 2005, were easily over $200 million with the most damage incurred by agricultural interests in Santa Barbara County and Ventura County (NOAA 2005).

- **2010 –** A storm event between December 17-23, 2010, brought approximately 280 percent of the normal countywide rainfall, with a maximum of 17.18 inches of rain at Tecolote Canyon and 1.19 inches per hour at Manzanita Mountain on December 19. The storm extremes were primarily located in the north county, especially Santa Maria and Sisquoc (County Flood Control 2011). The storm caused flooding, mudflows, and debris flows, resulting in a Presidential Disaster Declaration. Total individual assistance from FEMA was approximately $1.9 million, and total public assistance was $75.4 million.

- **2011** – A severe winter storm occurred on March 19-21, 2011, that included flooding, debris flows, and mudflows throughout Santa Barbara County. The rainfall intensity maximum was 1.64 inches per hour at San Marcos Pass on March 20. The 2-day storm produced up to 11.5 inches of rainfall. The storm extremes were primarily located in the south county, especially affecting Gibraltar and Cachuma reservoirs. With all three primary Santa Ynez River-related county reservoirs full (as of March), the necessary water releases from Lake Cachuma added to the storm runoff to create relatively high discharge rates in the lower Santa Ynez River. This storm event resulted in moderate agricultural land flooding (approximately 200 acres) downstream of Cachuma. Several County Flood Control debris basins, including the Bradley Basin in Santa Maria, were filled and sustained some damage (County Flood Control 2011). According to County Insurance Claims, the storm cost approximately $1.7 million in damages. Isolated flooding also caused moderate damage to some County-maintained Flood Control District debris basins (County Flood Control 2011).

- **2015** – A brief localized storm west of Cuyama on October 5-6, 2015, resulted in flash flooding and road closure on Highway 166, leaving more than 100 cars briefly stranded on the highway. All drivers stayed with their vehicles, no rescues had to be performed, and no injuries were reported (Lompoc Record 2015).

- **2018** – Following the December 2017 Thomas Fire, heavy rains caused local creeks to swell and also unleashed destructive rivers of water, mud, and debris in Santa Barbara County, particularly Montecito, leaving 23 people dead, destroying over 100 homes, and damaging over 300 homes. The National Weather Service, Los Angeles reported that 0.54 inches of rain had fallen in 5 minutes at Montecito. Other figures include 0.73 inches in 10 minutes at KTYD Radio Towers, 0.86 inches in 15 minutes at Carpinteria, 1.11 inches in 30 minutes at Carpinteria, and 1.45 inches in 1 hour at Matilija Canyon (FloodList 2021) Rain from the storm

Incident Profile: 2015 Hwy 166 Flooding

Heavy rains in 2015 brought large flows of water as well as large debris flows - approximately 50 yards wide - along and across Hwy 166 near Cottonwood Canyon

Source: Noozhawk.com

fell on hillsides and mountains stripped of trees and vegetation by the Thomas Fire. (See also, Section 5.3.5, *Mudflow and Debris Flow*).

Probability of Occurrence

Likely –The 100-year flood is a flood that has a one percent chance in any given year of being equaled or exceeded. The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year.

Figure 5-11 shows the location of the 100-year (1-percent annual chance) and 500-year (0.2-percent annual chance) flood hazard zones in Santa Barbara County as mapped by FEMA's Flood Insurance Rate Maps (FIRM). Zone D areas, as depicted in Figure 5-11, identifies areas of the county with a potentially moderate to high risk of flooding, but the probability has not been determined.

Figure 5-12 shows the location of 100-year flood awareness zones, based on DWR's Best Available Maps (BAM). The BAM does not replace existing FEMA regulatory floodplains shown on FIRM. The BAM floodplains identify potential flood risks that may warrant further studies or analyses for land use decision-making. The floodplains shown delineate areas with potential exposure to flooding for 100-year storm flows. These flows and resulting flooded areas are based on the best available floodplain information and may not identify all areas subject to flooding (DWR 2021a).

Climate Change Consideration

As described in the County's CCVA, although climate change will increase the frequency and intensity of droughts (refer to Section 5.3.2, *Drought & Water Shortage*), scientists also project that it will increase the frequency and intensity of heavy rainstorms that cause inland flooding (Santa County Barbara Planning and Development Department 2021). Climate change is projected to amplify existing flood hazards through increased frequency and strength of El Niño events and rainfall intensity. Extreme weather events have become more frequent over the past 40 to 50 years and this trend is projected to continue. Up to half of California's precipitation comes from a relatively small number of intense winter storms, which are expected to become more intense with climate change. For example, what is currently a 200-year storm, or one that has a 1 in 200 chance of occurring in a given year, by 2100 would increase in frequency by 40 to 50 years (to a 1 in 150/160 chance in a given year). This means that the 100-year and 500-year floodplains may expand, and the current floodplains may become 40- to 50-year floodplains (Santa County Barbara Planning and Development Department 2021). The frequency and intensity of heavy rainstorms are projected to increase, causing fluvial flooding along the county's creeks and rivers, although overall annual precipitation levels are expected to increase only slightly. For discussion regarding the impacts of climate change on coastal flooding and sea level rise, see Section 5.3.6, *Coastal Hazards*.

Figure 5-11. Santa Barbara County FEMA 100-Year (1% Annual Chance) and 500-Year (0.2% Annual Chance) Flood Hazards plus Zone D areas

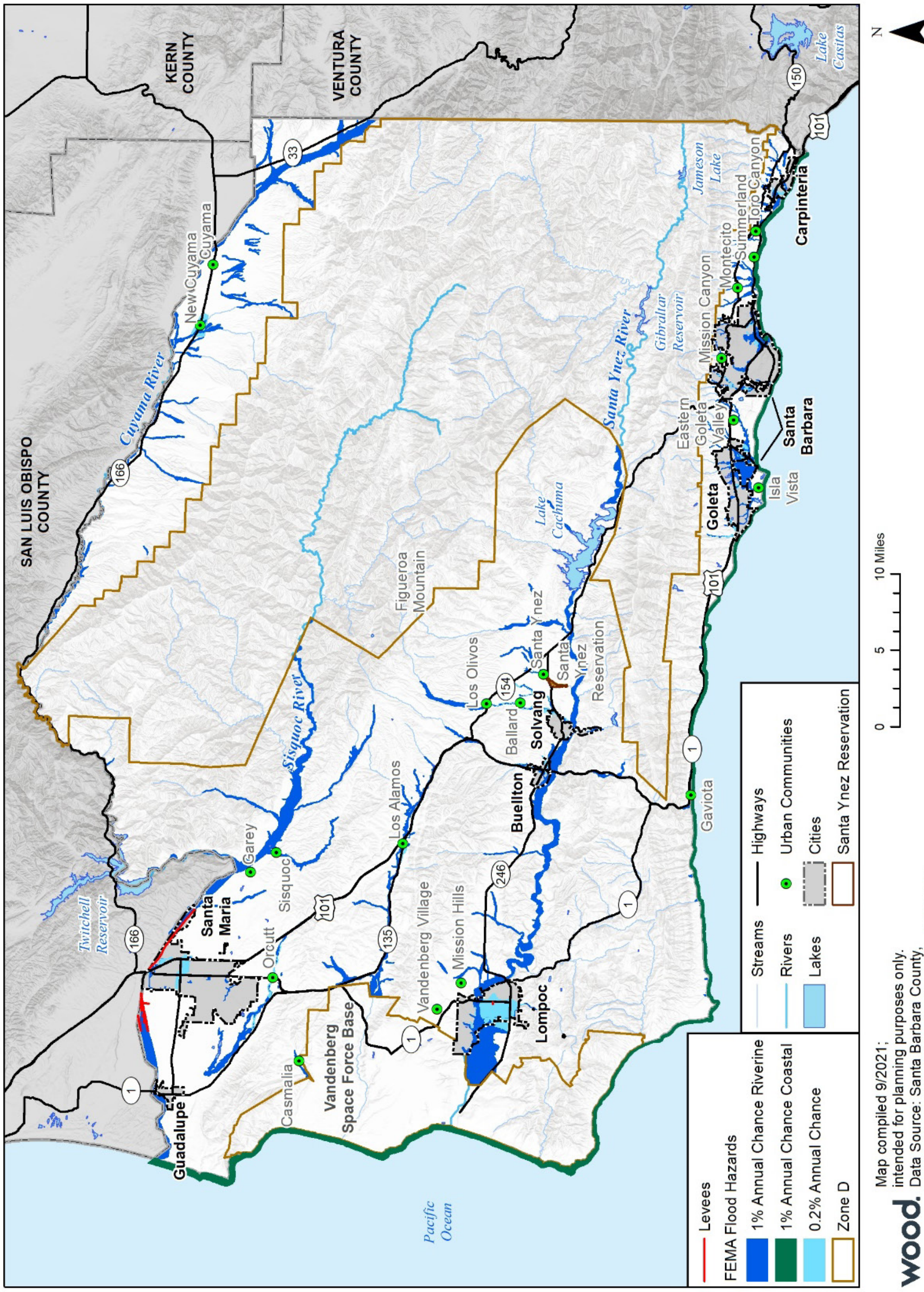
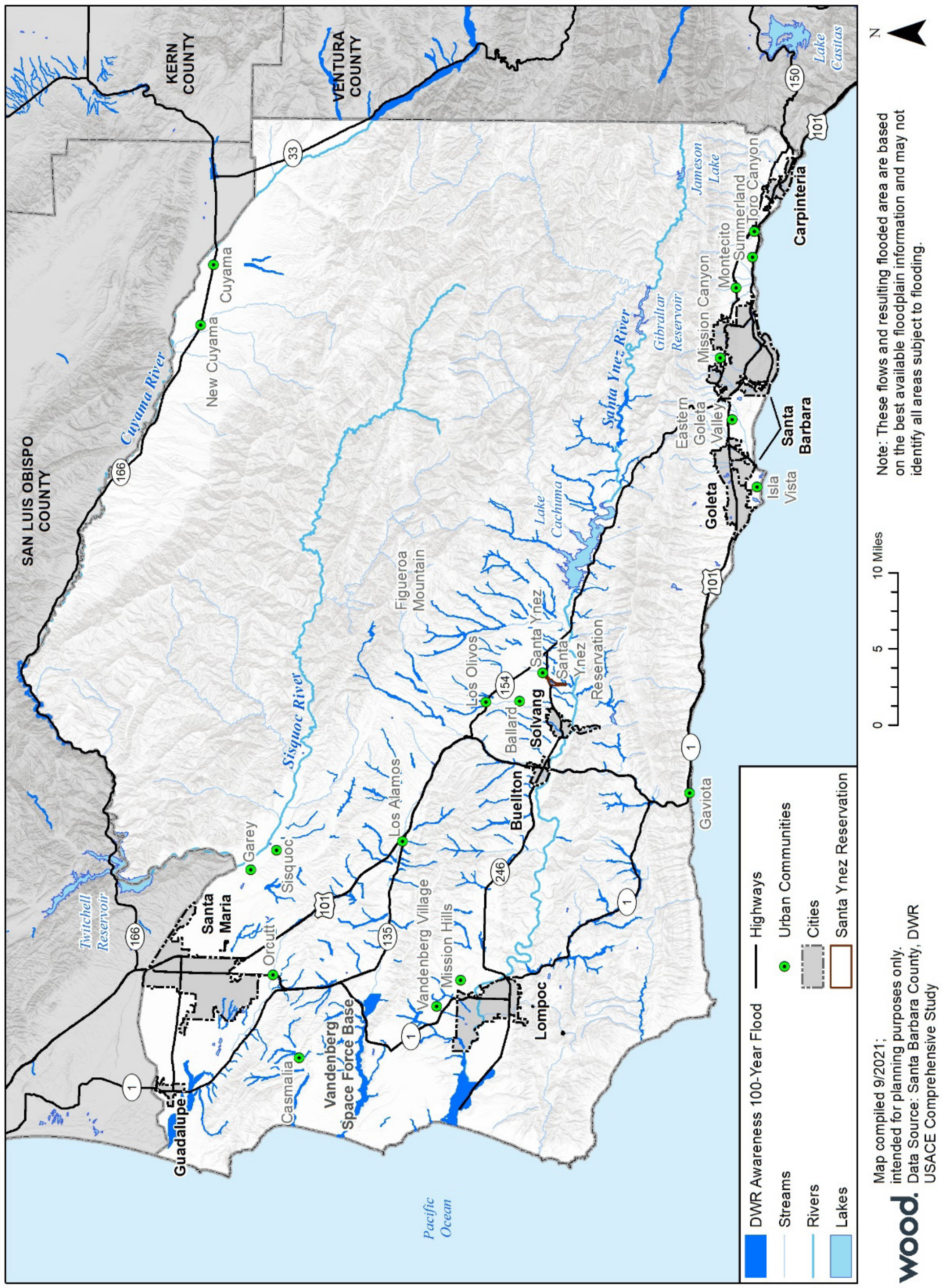


Figure 5-12. Santa Barbara County DWR Awareness 100-Year Flood BAM



5.3.5 Mudflow & Debris Flow

Description of Hazard

Mudflows are flows or rivers of liquid mud down a hillside on the surface of normally dry land. They occur when water saturates the ground, usually following long and heavy rainfalls or rapid snowmelt. Mud forms and flows down the slope if there is no ground cover such as brush or trees to hold the soil in place. To be considered a mudflow, more than half of the particles must be sand-sized or smaller that can flow very rapidly. A mud flow is the sandy, more water-saturated analog of a debris flow (Colorado Geological Survey 2021).

A **debris flow** is a soil flow where the majority of the materials are coarse-grained (fine sand to boulder size particles) and non-cohesive. Debris flow occurs when water begins to wash material from a slope or when water sheets off of a newly burned stretch of land. The threat of debris flow increases following wildfire, particularly in areas with steep slopes and drainages, where rain can mobilize post-fire debris and expose soils readily. A debris flow is far more powerful and dangerous than a mudslide or mudflow. It can move faster and farther, and it's strong enough to carry enormous boulders and entire trees, not to mention houses, cars, k-rails, and sandbags. Debris flows can move at rates ranging from meters per hour to meters per second and travel relatively long distances, making them a significant threat to life and property (California Geological Survey 2019a). The flow will pick up speed and debris as it descends the slope. As the system gradually picks up speed it takes on the characteristics of a basic river system, carrying everything in its path along with it. Chaparral land is especially susceptible to debris flows after a fire. Debris flows are most often triggered by intense rainfall following a period of less intense precipitation, or by rapid snowmelt. High pore water pressures cause the soil and weathered rock to rapidly lose strength and flow downslope (California Geological Survey 2019a).

Debris flows commonly begin as a slide of a shallow mass of soil and weathered rock. Their most distinctive landform is the scar left by the original shallow slide. The path of the debris flow may be marked by small drainages that have been stripped of vegetation. The debris flow may not leave any deposit if it flows directly into a larger creek and is immediately eroded. Many debris flow deposits are singular, but in some cases, successive debris flows may deposit material in the same area thereby forming a debris fan, which resembles a small, steep alluvial fan (California Geological Survey 2019a).

Individual debris flows typically are small in areal extent and their deposits are relatively thin. Evidence of past debris flow movements often is masked by vegetation growth which can cover the surface rapidly, sometimes within a few years, making them difficult to identify using aerial photography and field reconnaissance methods. Therefore, only the larger and more recent debris flows typically are identified and included on landslide inventory maps (California Geological Survey 2019a).

Location and Extent of Hazard in Santa Barbara County

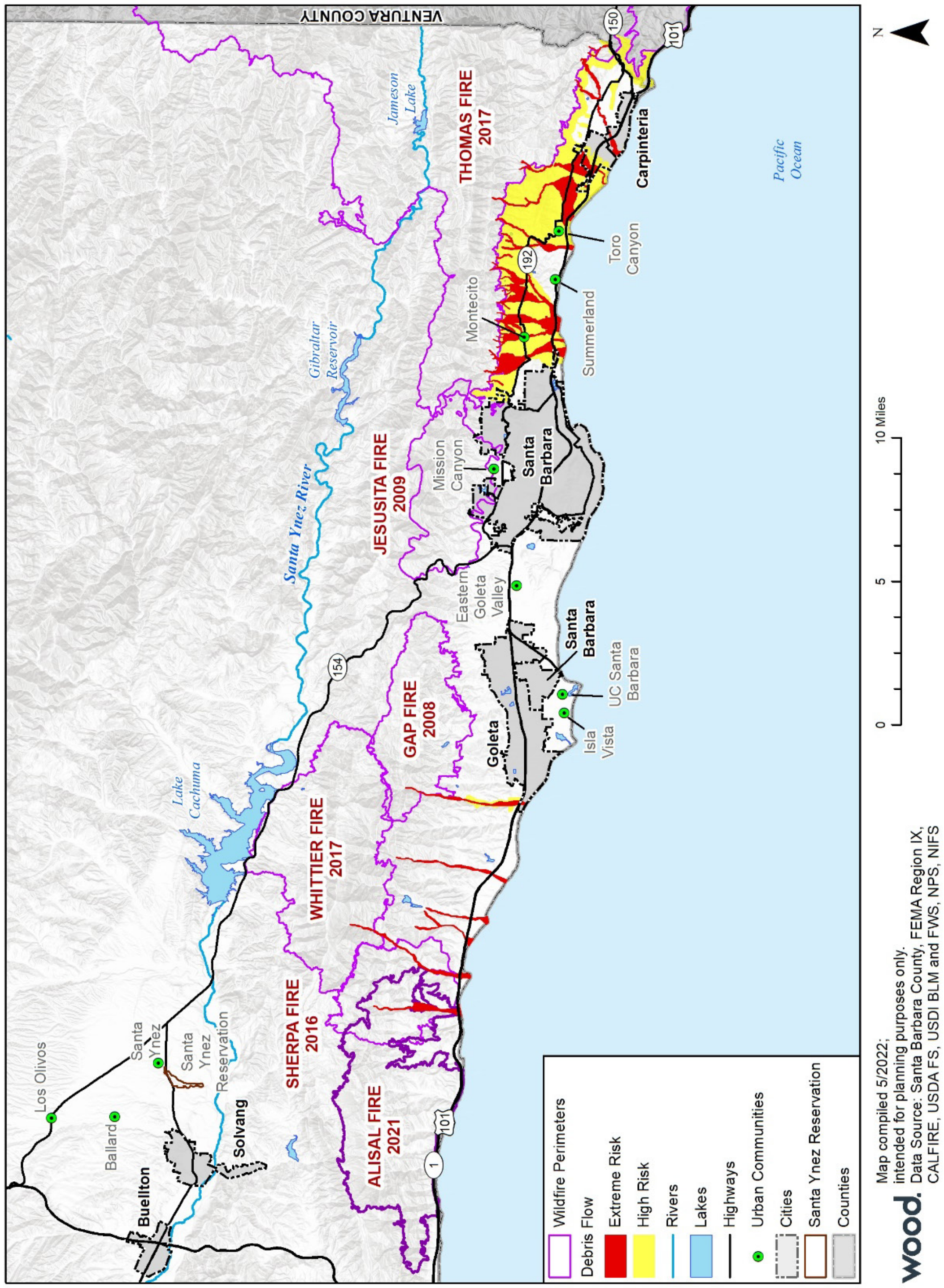
Mud and debris flow typically occur on steep slopes and drainages. Given topography in the county, areas susceptible to mudflow and debris flow hazards are present throughout the county at the base of hillsides and drainages and the extent varies widely. Lowland areas of the county are prone to impacts from mudflows and debris flows as sediment, water, and debris slide down slopes towards these lowland areas. Vegetated upland areas, such as the Santa Ynez Mountains, within the county are prone to wildfires, which strip the land of vegetation that holds soil in place, and therefore, are susceptible to increased runoff, mudflows, and debris flows. Steep areas of the county are also susceptible to mudflows and debris flows. Additionally, any area of the county that experiences substantial wildfire may experience debris flow if rain occurs before vegetation regrowth can begin. This occurrence was recently demonstrated by debris flows following the Thomas Fire and Alisal Fire. With the knowledge gained from these recent events, some debris flow hazard areas have been mapped. Figure 5-13 shows the mapped debris flow hazard areas along the South Coast based on a FEMA Recovery Map for this area. Recovery Maps were developed by FEMA so that communities and citizens make better informed decisions about rebuilding. This hazard area may shift after a debris flow or landslide or other hazards have affected an area, such as wildfire, flooding, or drought (Santa Barbara County Department of Planning and Development 2021). While Figure 5-13 depicts known extents and locations of this hazard, mudflows and debris flows may occur countywide where heavy rain occurs on steep, exposed slopes, particularly following wildfires.

History of Hazard in Santa Barbara County

As described in Section 5.3.4, *Flood*, several historic storm and flood events in the county, particularly storms following intense wildfires, resulted in mudflows and debris flows. The most significant mudflow and debris flow events are summarized below.

- **1964 –** Following the Coyote Fire, relatively light rain fell on portions of the watershed burned by the fire, causing severe flooding in the areas surrounding Montecito, Hot Springs, and San Ysidro Creeks. Eyewitnesses reported 20-foot walls of water, mud, boulders, and trees moving down the channels at approximately 15 miles per hour. Bridges were swept away in seconds and flow inundated large areas damaging structures and depositing debris. Large boulders were carried along Montecito Creek by the flow and deposited upstream of the bridge near Hot Springs Road. Overflow from Hot Springs Creek ran along Olive Mill Road. A 20-inch-high pressure gas line near Mountain Drive was bent by the force of the flow in San Ysidro Creek, although it did not break. County Flood Control estimated damages to public and private property at more than $300,000 (County Flood Control 1974).
- **1978 –** This flood, which caused the inundation of agricultural areas and mudslides across the county, cost millions of dollars in damages and received a Presidential Disaster Declaration (County Flood Control 1993).
- **1980 –** This flood, which also received a Presidential Disaster Declaration, consisted of severe flooding, mudslides, and high tides throughout the entire county.
- **1998 –** The storm events of 1998 disrupted transportation throughout the county due to flooding and mudflows: the Santa Barbara Airport was closed due to flooded runways, train service was halted due to mud slides over the tracks, and numerous South Coast roads were closed. Highway 101 was closed south of Ventura by a mudslide and reduced to one lane at Gaviota because of rockslides. Highway 154 was closed due to rockslides. Highway 1 between Lompoc and Gaviota was closed to erosion Several major mudslides threatened and destroyed homes throughout the South Coast (County Flood Control 1998).

Figure 5-13. Debris Flow Risk in Santa Barbara County



- **1995 –** On January 10 in Goleta, debris clogged culverts under Los Carneros Road and Highway 101 causing the Los Carneros and San Pedro creeks to overtop the highway and flow down Calle Real. On Carneros Creek, the culvert under Los Carneros Road was completely plugged with trees and debris. In addition, the culvert under Highway 101 was partially plugged. Flows overtopped Calle Real and Highway 101. On San Pedro Creek, several homes were flooded when the culvert under Calle Real (and continuing under Highway 101) became almost completely plugged. Homes on and around Carlo Drive and Valdez Drive at the intersection of Calle Real were flooded with up to three feet of mud and debris. This flood and mudflow affected approximately 510 properties along the South Coast and caused roughly $50 million of damage (County Flood Control 1995).
- **2005 –** Mudflows closed down Highway 101 at Bates Road in Carpinteria. In Ventura County, SR 150 was closed at the Dennison Grade due to flash flooding and mudslides. Preliminary damage estimates from this storm range between $8-10 million with agricultural interests in Santa Barbara and Ventura Counties accounting for most of the monetary damage (NOAA 2005).
- **2010 –** A storm event between December 17-23, 2010, caused flooding, mudflows, and debris flows, resulting in a Presidential Disaster Declaration. The storm extremes were primarily located in the north county, especially Santa Maria and Sisquoc (County Flood Control 2011). The total individual assistance from FEMA was approximately $1.9 million, and total public assistance was $75.4 million.
- **2011 –** A severe winter storm occurred on March 19-21, 2011, that included flooding, debris flows, and mudflows in Santa Barbara County. The storm extremes were primarily located in the south county, especially Gibraltar and Cachuma reservoirs. Several County Flood Control debris basins, including the Bradley Basin in Santa Maria, were filled and sustained some damage (County Flood Control 2011). According to County Insurance Claims, the storm cost approximately $1.7 million in damages.
- **2017 –** In January 2017, at least 20 campers were trapped by flooding and a mudflow at El Capitan Canyon and Resort Campground (Breslin 2017). Heavy rain the night before caused a mudflow that carried away five cabins and 15 vehicles. The previous summer's

Incident Profile: Montecito Debris Flows

Post-fire hillsides become prone to mudflow and debris flow with the loss of vegetation. Approximately one month after the Thomas Fire started, heavy rains on the Santa Ynez mountains caused a mudslide through town of Montecito. Twenty-three people were killed in the mudslide and 408 homes were damaged or destroyed. Source: CALFIRE 2021; Ventura County Fire Department 2019.

Source: CALFIRE 2021; Ventura County Fire Department 2019 Photo: independent.com

Sherpa fire left a burn scar that elevated the flooding risk.

- **2018 –** Following the 2017 Thomas Fire, which burned 281,893 acres in Ventura and Santa Barbara Counties, a reported 0.54 inches of rain fell within 5 minutes in the burn scars from the Thomas Fire in the foothills of Montecito on Tuesday, January 9, 2018. Four inches of rain fell in two days, causing massive debris flows and flooding that damaged or destroyed 408 homes, killed 23 residents, and led to the closure of Highway 101 and the UPRR for more than 3 weeks, cutting off the county from communities to the south. California Geological Survey scientists estimated the Montecito debris flow as having speeds of 10-15 mph, being up to 25-30 feet deep, and capable of carrying boulders as large as a tow truck. (California Geological Survey 2019b).
- **2019 –** On the morning of February 2, 2019, a strong downpour across the burn scar of the 2017 Whittier Fire triggered a debris flow in Duval Canyon (Giorgi 2019). The event clogged and damaged a culvert beneath Highway 154, shutting down the highway for a month between Highway 246 in Santa Ynez to Highway 192 in Santa Barbara for clearing, severing a key north-south arterial linking north county and south county.
- **2020 –** In December 2020, a mudflow briefly closed Highway 154 for a few hours near San Antonio Creek Road (Bolton 2020).

Probability of Occurrence

Highly Likely – Based on historical data and given the likelihood of wildfires and intense rainfall events, as well as steep slopes in the county, mudflow and debris flow hazards are likely to continue on an annual basis, with damaging mudflow and debris flow occurring less frequently. Mudflows and debris flows are usually a cascading effect of severe weather. The probability of more severe and damaging mudflows and debris flows increases during El Niño years or severe winter storms. The potential for debris flows dramatically increases following a wildfire when heavy rain mobilizes ash, soil, rocks, and vegetation on denuded slopes (see also, Section 5.3.1, *Wildfire* and Section 5.3.7, *Landslide*).

Climate Change Consideration

As described in Section 5.3.1, *Wildfire*, California experiences wildfires nearly every year with most of them taking place immediately before the winter rainy season. Climate change is now playing a significant role in increasing the frequency and severity of wildfires (Office of Governor 2019). The effects of climate change have the potential to impact wildfire behavior, the frequency of ignitions, fire management, and fuel loads. Increasing temperatures may intensify wildfire threat and susceptibility to more frequent wildfires in the county (USDA and USGS 2009).

Research dating back to the 1930s and 1940s shows an association between debris-flow occurrence and recent wildfires in mountain watersheds, commonly referred to as the “fire and flood cycle.” Much of the burned areas in Southern California are on steep, brush-covered slopes drained by equally steep, short channels which facilitate debris flow occurrence. As previously described, the increased potential of wildfire occurrence also escalates the risk of mudflows and debris flows in the period following a fire, when slopes lack vegetation to stabilize soils and burned soil surfaces create more rainfall runoff. Therefore, greater wildfire frequencies result in an increased likelihood of precipitation-induced debris-flow events in recently burned areas (USDA and USGS 2009).

Additionally, as described in Section 5.3.2, *Drought & Water Shortage*, projected climate change-associated variance in rainfall events may result in more high-intensity events, which may increase mudflow and debris flow frequency. Mudflow and debris flow can result from intense rainfall and runoff events. As climate change affects the length of the wildfire season, a higher frequency of large fires may occur into late fall, when conditions remain dry, and then be followed immediately by intense rains early in the winter, as occurred with the Thomas Fire in December 2017 and subsequent Montecito debris flows in January 2018. The County's CCVA estimates that the annual average acres burned is expected to increase to 23,040 acres per year (30 percent increase) by 2030, 25,782 acres per year (46 percent increase) by 2060, and 24,050 acres per year (36 percent increase) by 2100 due to higher annual average temperatures and the increased frequency and intensity of droughts. Mudflows and debris flows will likely increase as more precipitation falls during a storm event and hillsides more frequently have burned.

5.3.6 Coastal Hazards

Description of Hazard

Coastal hazards result from coastal processes, such as rising and falling water levels, breaking waves, and shifting sands that can alter the coastline, as well as those hazards projected to increase substantially with sea level rise including coastal erosion and coastal flooding. Within the county, development within coastal areas, particularly the South Coast, has been and will continue to be susceptible to various types of coastal hazards.

Sea level rise is defined as the rising of the level of the oceans. Globally, sea levels are rising as a result of two factors caused by human-induced climate change. The first factor is the thermal expansion of the oceans. As ocean temperatures warm, the water in the ocean expands and occupies more volume, resulting in a rise in sea levels. The second factor contributing to global sea level rise is the additional volume of water added to the oceans from the melting of mountain glaciers and ice sheets on land. It is predicted that if all of the ice on earth were to melt, ocean levels would rise by approximately 225-265 feet above present-day levels (USGS 2022). The rate at which sea levels will rise is largely dependent on the feedback loop between the melting of the ice, which changes the land cover from a reflective ice surface, and the open ocean water, which absorbs more of the sun's energy and increases the rate of ice melt. The County's CCVA estimates the sea level to increase locally by 8.4 inches by 2030, 30 inches by 2060, and 79.2 inches by 2100.

Coastal erosion refers to beach, dune, and bluff erosion that results from winter storms, tidal action, wave action, and over time rising sea levels. Erosion cuts into dunes and bluffs, threatening development along the coast, and can wash away beach sand supplies, resulting in narrower beach conditions and the landward encroachment of ocean mean high-water mark. In the county, coastal erosion is heavily influenced by storm surges when water levels are higher than normal and wave attacks are particularly strong.

Coastal flooding can result from waves and runup, high tides including" king tides", storm surges, and the confluence of heavy rainfall and storms. It can include tidal flooding from extremely high tides causing seawater to spill inland to low-lying areas, and storm surges and wave attacks where runup from storm waves overtops beaches, rock revetments, or seawalls and washes inland, sometimes in concert with heavy rain events. Such flooding can inundate homes, businesses, and public facilities in low-lying areas while storm surges and wave attacks can damage or destroy structures or facilities. Wave attacks can flood low-lying areas, erode the shoreline or cause bluff retreat with damage to structures (FEMA 2021a).

All coastal hazards in the county can be exacerbated by El Niño events. While an El Niño event can occur every 2 – 5 years, a strong El Niño event typically occurs every 6 - 10 years. El Niño events vary in severity, but can substantially increase storm frequency and severity, with much, but not all, of past coastal damage and current coastal hazards related to these events. Coastal storms produce large ocean waves that sweep across low-lying coastlines making landfall. Storm surges can inundate coastal areas, destroy dunes, and cause flooding. If a storm surge occurs at the same time as high tide, the water height will be even greater. Historically, the county has also been vulnerable to storm surge inundation associated with El Niño events and a related increase in storm severity both onshore and offshore.

There are many strategies for adaptation to sea level rise and protection from coastal hazards, ranging from dune and shoreline management (i.e., beach nourishment, living shorelines), managed retreat (i.e., relocating shoreline facilities inland), and structures (i.e., groins, revetments, coastal armoring, artificial reefs/offshore rock mass). The long-term effects of such coastal protection structures are subject to debate, as well as their secondary impacts on natural coastal processes and sand supply. This creates a complex regulatory and physical environment that the County must consider when selecting these strategies.

Location and Extent of Hazard in Santa Barbara County

Existing coastal hazards along the county's 110-mile-long shoreline tend to be concentrated along the South Coast due to extensive existing shoreline development, whereas in the north county, cities and urban development tend to be located away from the coast and related hazards. The South Coast has a long history of exposure to coastal hazards from bluff retreat to coastal erosion and flooding. Low lying areas such as those within the Beach Neighborhood of Carpinteria, areas within Montecito, the Santa Barbara waterfront, and Goleta Beach County Park have all experienced coastal flooding due to storms surges and wave attacks, although the currently wide beaches fronting the City of Santa Barbara's waterfront tend to reduce such hazards.

Bluff erosion is another serious local hazard with annual bluff erosion rates generally varying from 6 inches to one foot per year, depending upon location. Houses in Hope Ranch and on the Mesa in Santa Barbara have been destroyed by a bluff failure. Additionally, blufftop apartments in Isla Vista are threatened by ongoing erosion. This issue is being addressed by the County's revised Isla Vista Bluff Policy, which requires managed retreat where seaward portions of the apartments are either removed or placed on structures such as cantilevered grade beams to prolong the life of the units safely.[2]

Wave attack and coastal erosion at Goleta Beach County Park have been a long-running policy dispute regarding how to manage this vulnerable public facility. In response to these coastal hazards, private property owners and local governments have erected rock revetments and

[2] Isla Vista Bluff Policy is provided by the County Planning & Development Department:

https://www.countyofsb.org/uploadedFiles/plndev/Content/Permitting/Isla%20Vista%20Bluff%20Policy.pdf seawalls to attempt to protect public and private improvements from coastal hazard damage. The UPRR has also installed both concrete seawalls and rock revetments to protect the railroad tracks along the South Coast from Carpinteria to Gaviota. Coastal state parks, including Gaviota State Park, Refugio State Beach, and El Capitan State Beach, are also located on shoreline areas that are subject to existing coastal hazards and those in the future exacerbated by sea level rise.

In the north county, the cities of Lompoc, Guadalupe, and Santa Maria are all located 2 to 8 miles from the shoreline and are not currently affected by coastal hazards. However, some north county facilities such as those at Vandenberg SFB, Jalama Beach County Park, Surf Beach, Ocean Beach Park, Rancho Guadalupe Dunes Preserve County Park, and segments of the UPRR are exposed to coastal hazards. These facilities could be exposed to tidal flooding and wave attack, particularly during higher tides and El Niño events.

Incident Profile: Isla Vista Bluff Erosion

In January 2017, a balcony of a bluff top apartment in Isla Vista collapsed into the ocean below; a second partial patio collapse occurred at a nearby residence again in 2019, prompting the County of Santa Barbara to re-examine bluff retreat setback requirements

Photo: thebottomline.as.ucsb.edu

Coastal hazards modeling efforts show that the coastal dunes and bluffs of both the north county from Paradise Beach to Jalama Beach County Park, and the South Coast from Jalama Beach County Park to Carpinteria, are vulnerable to coastal erosion caused by exposure to waves, weathering, and runoff (County of Santa Barbara 2017). In particular, areas of the county vulnerable to beach and dune erosion include the Guadalupe Dunes, Paradise Beach, Minuteman Beach at Vandenberg SFB, Ocean Beach, Surf Beach, Jalama Beach County Park, Refugio Beach State Park, El Capitan Beach State Park, Isla Vista, Goleta Beach County Park, Leadbetter Beach, East Beach, Montecito, Padaro Lane, Santa Claus Lane, Carpinteria City Beach, and Carpinteria State Beach. Areas of the county vulnerable to cliff/bluff erosion include Point Sal, much of the Vandenberg SFB coastline, Gaviota, Isla Vista, Hope Ranch, the Mesa, and the Carpinteria Bluffs. In such areas, erosive processes slowly eat away at the beach and foundations of the bluffs, reducing beach widths, eroding dunes, and creating a risk for bluff collapse. Bluff collapses threaten bluff-top property and create a safety risk to people visiting the lower beaches. Low lying waterfront and beach areas of the county are currently vulnerable to coastal flooding, including wave inundation or heavy rainfall, and are mapped by FEMA Flood Insurance Maps.

The USGS Coastal Storm Modeling System Version 3.1 (CoSMoS 3.1) data provides detailed projections of tidal inundation and coastal flood hazards. Projections show the modeled flood extents under both existing conditions, and 10 possible future sea level rise scenarios ranging from 25 cm to

500 cm. CoSMoS 3.1 is based on global climate models developed by the Intergovernmental Panel on Climate Change and considers region-specific factors such as oceanographic conditions, backshore types (beach, bluff, or estuarine), long-term changes in the shoreline, river and stream drainages, wind patterns, and seasonal changes. The model identifies areas along the coast where significant flooding may occur under both a non-storm scenario (Figure 5-14 and Figure 5-15) and storm scenarios (Figure 5-16 and Figure 5-17). The storm scenario of analysis uses the same sea level rise elevations but models the area extent of inundation associated with a 100-year (1-percent annual chance) coastal flood event including waves. The addition of the flooding worsens the extent of the overall inundation and represents how coastal and estuarine flooding will be exacerbated by sea level rise in the future.

History of Hazard in Santa Barbara County

Typically, coastal hazards increase during periods of major storms that can coincide with high tides, causing coastal flooding, coastal bluff erosion, and landslides such as those that were experienced during the 1983, 1998, and 2015/2016 El Niño storms. Segments of the South Coast, in particular, have been subject to significant damage from coastal hazards. Homes along Sandyland Cove and Padaro Lane in the City of Carpinteria, portions of the Montecito shoreline, the City of Santa Barbara, and Goleta Beach County Park suffered substantial damage during the 1983 and 2015/2016 El Nino events in particular. Subsequent storms in 2017 destroyed recently installed geotextile revetment structures and severe erosion at the Park. Offshore damage has also occurred. El Nino seasons in the 1980s and 1990s decimated the Goleta Bay kelp forest offshore of Goleta Beach County Park. These kelp forests have never recovered. Kelp forests are important natural features that provide marine habitat and coastal resiliency, including carbon sequestration and sand retention within local littoral cells. Re-establishment of the kelp forest (which is currently in phased trial/progress with the County) can play a part in reducing the impacts of climate change and increasing the resiliency of the coast.

As a result of these events, the County has already begun planning for the adaptive management of the park, and even the potential long-term managed retreat of the park and other critical facilities, while many other agencies are preparing similar studies or undertaking extensive planning efforts to adapt to existing and projected coastal hazard conditions. Subsequent El Niño seasons led to major beach erosion and further damage in some locations. Segments of the UPRR along the Gaviota Coast have been undermined, causing short-term closure of this key coastal rail route and the UPRR armoring their coastal infrastructure. Figures 5-14 through 5-17 depict projected sea level rise scenarios and tidal inundation, including projections that account for flood events.

Incident Profile: Goleta Beach Coastal Erosion

In 2017, Goleta Beach County Park experienced severe erosion along unprotected shoreline due to major storms, exposing major utilities to potential damage; this erosion was compounded by previous beach erosion during a 2014 storm and the historically erosive 2015-2016 El Nino. In response, the County installed an 800-foot-long emergency rock revetment. Goleta Beach also received sediments from the Montecito debris flow, which nourished the beach.

Figure 5-14. Santa Barbara County Sea Level Rise Projections (200cm) Tidal Inundations: No Flood Event

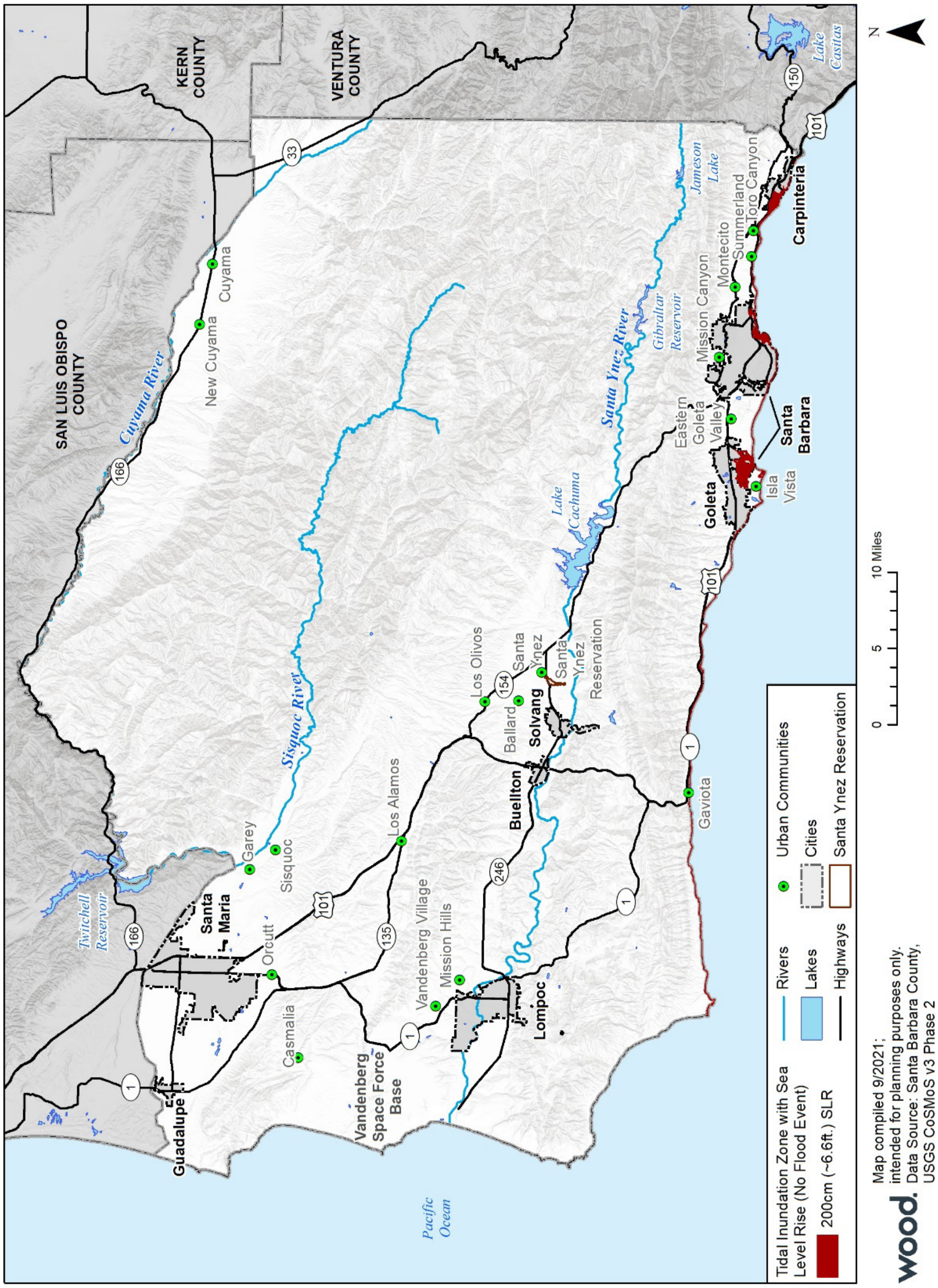


Figure 5-15. Santa Barbara County Sea Level Rise Projections (200cm) Tidal Inundations: No Flood Event Zoom

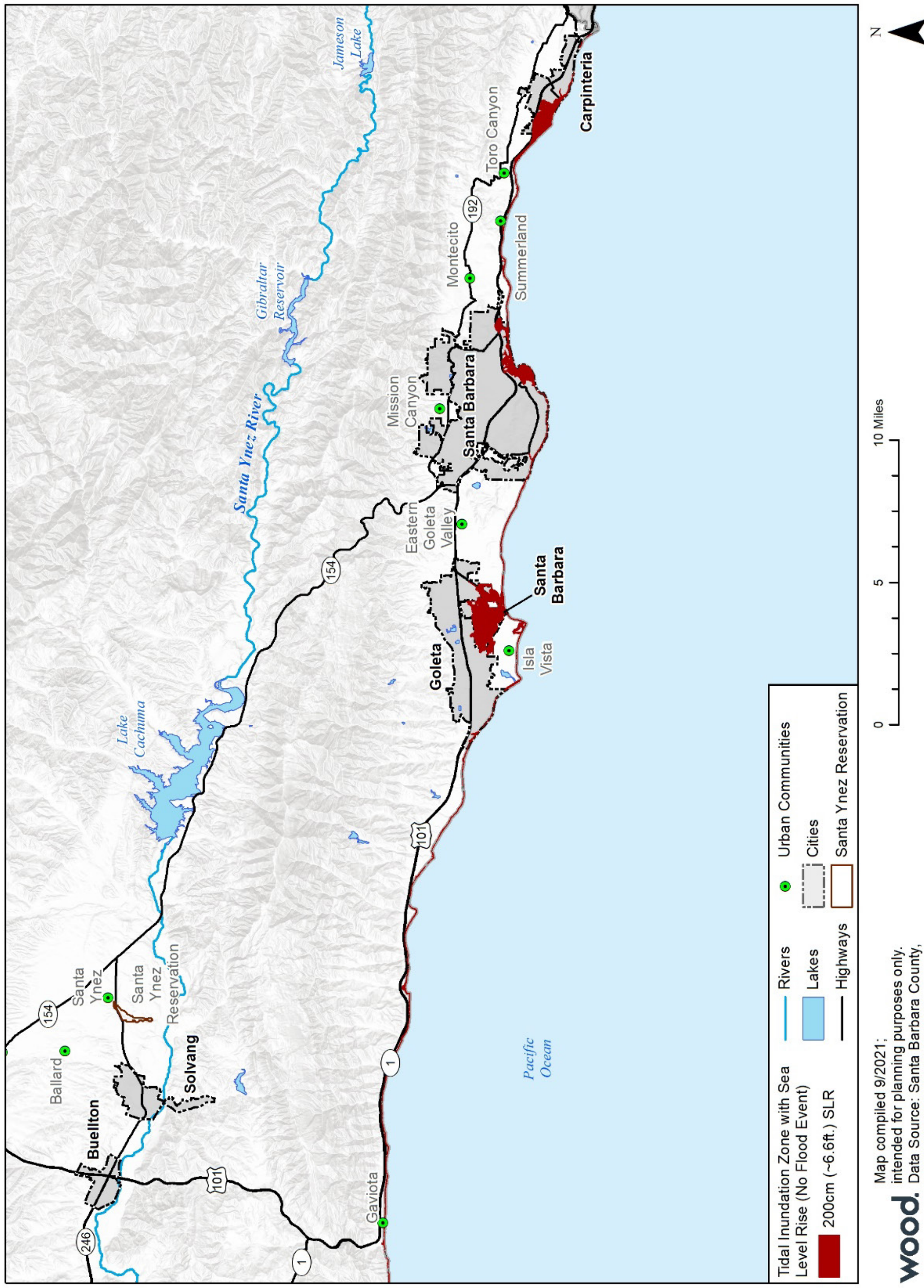


Figure 5-16. Santa Barbara County Sea Level Rise Projections (2030, 2060, 200cm) Tidal Inundations 100-Year Flood Event

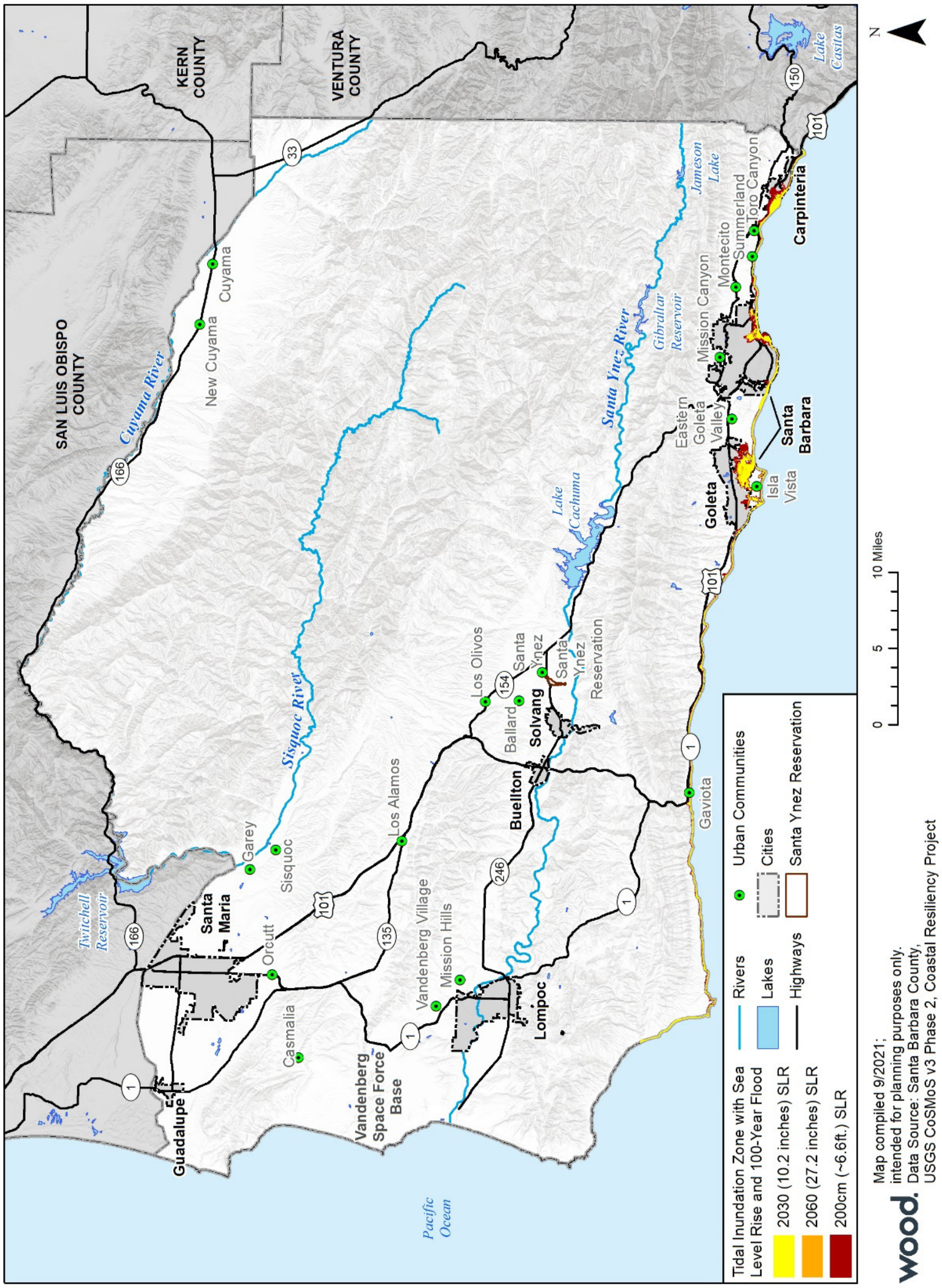
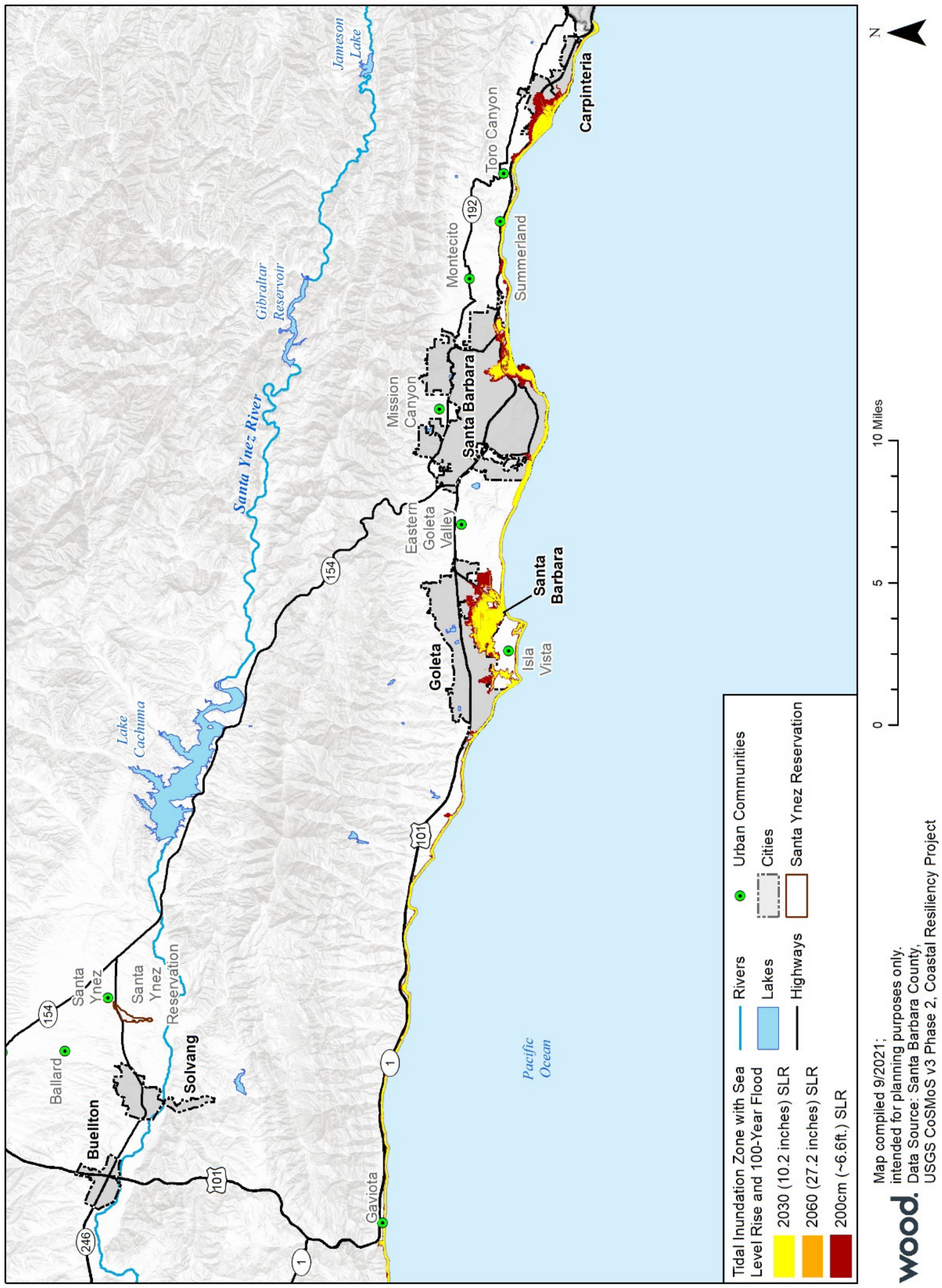


Figure 5-17. Santa Barbara County Sea Level Rise Projections (2030, 2060, 200cm) Tidal Inundations: 100-Year Flood Event Zoom



Historic coastal flooding has occurred along the county's South Coast, particularly in Carpinteria Valley, sections of Montecito, and the Goleta Beach County Park area since the mid-1800s (see also, Section 5.3.4, *Flood*) Coastal flooding has historically damaged residences, crops, recreation facilities, and transportation infrastructure and is highly costly (each costing millions of dollars) (County of Santa Barbara 2017).

Historical coastal erosion is a recurring and ongoing hazard in south county and is particularly severe along Padaro Lane, Channel Drive, Del Playa Drive, More Mesa, Goleta, and Hope Ranch. Coastal erosion hazards have resulted in the adoption of required city and County blufftop setbacks for development in coastal communities generally require a minimum of 75 years of structural life. Many residences along Del Playa Drive in Isla Vista are threatened by coastal erosions and setbacks have eroded to the point many homes sit on the cliff edge. Apartments in Isla Vista have also been damaged during such events, largely as a result of increased coastal bluff erosion occurring during major storm events coinciding with high tides. This damage led to the installation of extensive rock revetments in affected areas.

Probability of Occurrence

Likely - Coastal flooding from tidal inundation and wave attack and associated erosion of coastal bluffs and beaches occurs during many winters but is most pronounced during past major El Niño events, which have return intervals of 2 to 10 years depending on severity. Although many private coastal properties and public facilities have been protected by rock revetments or seawalls, coastal flooding, and beach and bluff erosion continue in areas such as the City of Carpinteria, Toro Canyon, Montecito, the City of Santa Barbara, Isla Vista, and the City of Goleta. More limited damage can occur in the north county to the largely undeveloped nature of the shoreline at Vandenberg SFB, Point Sal, and Paradise Beach. Additionally, flooding and erosion can threaten the UPRR, Vandenberg SFB, and County parks. While the existing probability of occurrence is typically confined to El Niño seasons or major storm events, as discussed below, climate change is projected to increase the frequency and severity of coastal hazards.

Climate Change Considerations

As of 2021, the most current sea level rise projections for California are from the Ocean Protection Council (OPC) 2018 *State of California Sea Level Rise Guidance* (OPC 2018). Therefore, for this analysis, estimates from current OPC and County sources, as well as the best available science, will be provided. OPC's 2018 *State of California Sea Level Rise Guidance* projections and the County's CCVA predict sea level in Santa Barbara County will rise 8.4 inches by 2030, 30 inches by 2060, and 79.2 inches by 2100 (Santa County Barbara Planning and Development Department 2021). Due to the rapidly changing nature of sea level rise planning guidance, it is not uncommon for local planning jurisdictions to update local modeling to follow the new guidance. The County is in the process of updating the countywide sea level rise study which is anticipated to be completed by 2022.

OPC's 2018 guidance asserts the direction of sea level change is clear along coastal California and the coast is already experiencing early impacts including more extensive coastal flooding during storms, periodic tidal flooding, and increased coastal erosion (OPC 2018). Projections of future sea level rise, especially under high emissions scenarios, have increased substantially over the last few years due to a new and improved understanding of mass ice loss from continental ice sheets. Additionally, the rate of ice loss from Greenland and the Antarctic is increasing and is anticipated to become the primary contributor to global sea level rise in the near term. Finally, new scientific evidence has found if GHG emission continues at the current rate, key glaciological processes could cross thresholds for rapidly accelerated loss resulting in irreversible ice loss and associated extreme sea level rise, including on the California coast.

The County's 2017 Coastal Resiliency Project included the preparation of a *Sea Level Rise and Coastal Hazards Vulnerability Assessment*, which used the best available science for sea level rise projections at the time of publishing the National Research Council's *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* released in 2012 (County of Santa Barbara 2017; National Research Council [NRC] 2012). The County of Santa Barbara Coastal Resiliency Project projects sea level in the county will rise by 10.2 inches in 2030, 27.2 inches by 2060, and 60.2 inches in 2100. The County's 2017 *Sea Level Rise and Coastal Hazards Vulnerability Assessment* used existing 2015 coastal hazards modeling from Jalama Beach to Rincon Point by Environmental Science Associates as well as additional coastal hazard modeling on the south coast by Revell Coastal, LLC with the same sea level rise scenarios and planning horizons. The County modeled coastal hazards for coastal armoring and no coastal armoring. Particularly susceptible areas of the county to sea level rise related impacts include Isla Vista, Goleta Beach County Park, and the Santa Barbara Airport, coastal bluff homes in Summerland, Toro Canyon, and Padaro Lane, segments of the UPRR and Highway 101 from the City of Carpinteria to the Gaviota Coast, and the Beach Neighborhood and Downtown in Carpinteria (Figure 5-17; County of Santa Barbara 2017).

Additionally, more specific coastal hazard modeling was performed for the City of Carpinteria by Wood Environment & Infrastructure Solutions, Inc. and Revel Coastal, LLC as part of the city's 2019 *Sea Level Rise Vulnerability Assessment and Adaptation Project*, and for the City of Santa Barbara by Environmental Science Associates as part of the city's 2021 *Sea Level Rise Adaptation Plan*. These studies similarly concluded that the most susceptible areas of the City of Santa Barbara and City of Carpinteria include Downtown Santa Barbara, East Beach, Leadbetter Beach, Carpinteria Beach Neighborhood, and Carpinteria Salt Marsh (City of Carpinteria 2019; City of Santa Barbara 2021). Many similar studies have been completed to study the effects of sea level rise and coastal hazards/vulnerability on specific jurisdictions or facilities in the County with similar results.

Based on local studies, sea levels are projected to rise by as much as 6.6 feet by 2100, though more extreme scenarios project sea levels rising as much as 7.1 feet by 2100; however, these extreme scenarios are based on worst-case GHG emissions assumptions, are highly conservative, and considered to be very unlikely of occurring (see Table 5-11). While sea level rise projections will continue to change as scientific understanding increases and policy choices manifest, what is clear from the most current projections is that sea levels are bound to increase at a significant rate, further increasing both the probability and severity of coastal hazards throughout all of Santa Barbara County (OPC 2018).

Table 5-11. Projected State and Local Sea Level Rise Scenarios (inches)

Ocean Protection Council Rising Seas in California: An Update on Sea-Level Rise (2017)				
Year	*Sea Level Rise Scenario*			
	Median (50% Probability)	*Likely (67% probability)*	*Unlikely (5% Probability)*	*Very Unlikely (0.5% Probability)*
2030	1.2 – 6.0	0.0 – 7.2	4.8 – 8.4	6.0 – 10.8
2050	0.4 – 10.8	2.4 – 14.4	10.8 – 16.8	18.0 – 24.0
2100	8.4 – 31.2	1.2 – 43.2	27.6 – 55.2	57.6 – 85.2
County of Santa Barbara Sea Level Rise and Coastal Hazard Vulnerability Assessment (2017)				
Year	*Sea Level Rise Scenario*			
	Low Rate	*Medium Rate*	*High Rate*	--
2030	0.0 - 1.8	1.2 - 5.8	8.0 - 12.1	--
2060	0.0 - 6.3	7.2 - 11.8	22.5 - 30.8	--
2100	10.6 - 16.5	30.7 - 36.7	60.2 - 66.0	--
City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)				
Year	*Sea Level Rise Scenario*			
	Low Rate	*Medium Rate*	*High Rate*	--
2030	0.04	3.5	10.2	--
2060	2.8	11.8	27.2	--
2100	10.6	30.7	60.2	--
City of Santa Barbara Sea Level Rise Adaptation Plan (2021)				
Year	*Sea Level Rise Scenario*			
	Low Risk	*Medium-High Risk*	*Extreme Risk*	--
2030	4.8	8.4	--	--
2060	6.0 – 15.6	26.4 – 30.0	--	--
2080	--	--	63.6 – 79.2	--
2100	24.0 – 37.2	63.6 – 79.2	--	--
City of Carpinteria Sea Level Rise Vulnerability Assessment & Adaptation Plan (2019)				
Year	Sea Level Rise Scenario			
	Median (50% Probability)	*Likely (67% probability)*	*Unlikely (5% Probability)*	*Very Unlikely (0.5% Probability)*
2050	3.6 – 8.4	2.4 – 12.0	6.0 – 14.4	8.4 – 21.6
2080	8.4 – 16.8	4.8 – 25.2	16.8 – 32.4	26.4 – 51.6
2100	12.0 – 25.2	6.0 – 37.2	24.0 – 49.2	43.2 – 79.2

Source: Ocean Protection Council (OPC) 2017; County of Santa Barbara 2017; City of Goleta 2015; City of Santa Barbara 2021; City of Carpinteria 2019.

Sea level rise will cause more rapid erosion of beaches, dunes, and bluffs, increasing the threat to shoreline development and infrastructure, including blufftop homes in Santa Barbara, Hope Ranch, and Isla Vista. Climate change will exacerbate the impacts of coastal hazards and erosion in Santa Barbara County along its 110-mile-long coastline. The county's coastline contains a diversity of environmental influences and conditions, which creates differences in existing and projected rates of sea level rise-related impacts including coastal flooding and coastal erosion. While sea levels are projected to increase globally, sea level rise will not occur uniformly, and along the Pacific Ocean, sea levels will depend partially on tectonic movements and weather patterns. The county's portion of the San Andreas Fault's tectonic plate is folded causing areas of uplift and subsidence. Local subsidence can lead to a slightly higher sea level rise in the county than global estimates and uplift can reduce the rate of sea level rise. Additionally, the county is affected by El Niño storm surge events, particularly during some winter months. Sea level rise coupled with increased frequency, severity, and duration of high tide and storm events related to climate change will result in more frequent and severe extreme events along the coast. These events could expose the coast to severe flooding, damage to coastal structures and real estate, and salinity intrusion into delta areas and coastal aquifers (Cayan et al. 2006).

Further, the increased severity of coastal storms has the potential to increase coastal erosion events. More frequent storms will impact how frequently acute coastal erosion events occur, while more intense events will cause the erosion to extend further inland than before. Following a similar trend as projected rates of sea level rise, the rate of bluff-top erosion is also projected to increase by up to 140 percent on average with 6.6 feet of sea level rise and may increase from a current average rate of 6 inches to 1 foot per year to up to 3 feet per year along the South Coast. As an illustration of the increased hazard, the City of Santa Barbara's 2012 Plan Santa Barbara General Plan EIR projected that 80-90 blufftop homes along the Mesa could be damaged or destroyed by coastal erosion by 2100 (City of Santa Barbara 2012). In addition, coastal flooding and tidal inundation will also become a more frequent and severe hazard, as coastal flooding is directly correlated with the mean average sea level. In the City of Santa Barbara, increased rates of sea level rise, coastal erosion, and coastal flooding could result in the loss of up to 98 percent of the city's bluff-backed beaches and threaten many commercial and residential properties worth hundreds of millions or billions of dollars and other critical infrastructure (e.g., Highway 101, sewer lines, storm drains) (City of Santa Barbara 2021).

5.3.7 Landslide

Description of Hazard

Landslide movements are interpreted from the geomorphic expression of the landslide deposit and source area, and are categorized as falls, topples, spreads, slides, or flows. Falls are masses of soil or rock that dislodge from steep slopes and free-fall, bounce, or roll downslope. Topples move by the forward pivoting of a mass around an axis below the displaced mass. Lateral spreads, commonly induced by liquefaction of material in an earthquake, move by horizontal extension and shear or tensile fractures. Slides displace masses of material along one or more discrete planes. In rotational sliding, the slide plane is curved and the mass rotates backward around an axis parallel to the slope; in translational sliding the failure surface is more or less planar and the mass moves parallel to the ground surface. Flows mobilize as a deforming, viscous mass without a discrete failure plane. More than one form of movement may occur during a failure, in which case the movement is classified as complex if movements occur sequentially and composite if they do not. Of the 20 possible material/movement combinations, five are more common: earth flows, debris flows, debris slides, rockslides, and rockfalls (California Geological Survey 2019a). For landslides to occur, the correct geological conditions, which include unstable or weak soil or rock, and topographical conditions, such as steep slopes, are necessary. Heavy rain often triggers these hazards, as the water adds extra weight that the soil cannot bear. Over irrigating has the same effect. Earthquakes can also affect soil stability, causing enough weakening to favor gravitational forces. Debris flows are described in Section 5.3.5 *Mudflow & Debris Flow*. The rest are described in more detail below.

An **earth flow** is a specific type of soil flow landslide where the majority of the soil materials are fine-grained (silt and clay) and cohesive. The material strength is low through much of the slide mass, and movement occurs on many discontinuous shear surfaces throughout the landslide mass. This movement along numerous internal slide planes disrupts the landslide mass leading to the cumulative movement that resembles the flow of a viscous liquid characterized by a lumpy, or "hummocky" slope morphology. The lower parts of an earth flow usually bulge outward and are steeper than adjacent slopes. Earth flows commonly occur on moderately steep slopes. Slope gradients are commonly from 10% to as steep as 30 percent, although steeper slopes may be found in headscarp and toe areas. Earth flows typically are initiated by periods of prolonged rainfall and sometimes don't initiate until well after a storm or the rainy season has passed. They are characteristically slow moving, in the millimeters or centimeters per day range, and may continue to move for a period of days to weeks after initiating (California Geological Survey 2019a).

A **debris slide** is a landslide of coarse-grained soil, most common in unconsolidated sandy or gravelly units, but also common in residual soils that form from in-place weathering of relatively hard rock. Owing to the granular constituents, the overall strength of the debris slide mass generally is higher than that of earth flows, but there may be a very low strength zone at the base of the soil or within weathered bedrock. Debris slides typically move initially as shallow intact slabs of soil and vegetation but break up after a short distance into falls and flows. The movement of the slide mass as a shallow slab leads to a smooth, steep, commonly curved scar. The debris is deposited at the base as a loose hummocky mass, although the deposit may be rapidly removed by erosion.

Debris slides commonly occur on very steep slopes, as steep as 60 percent to 70 percent, usually in an area where the base of a slope is undercut by erosion. Debris slides create steep, un-vegetated scars which are likely to remain un-vegetated for years. Re-vegetated scars can be recognized by their steep slopes, and a shallow amphitheater morphology (California Geological Survey 2019a).

A single heavy rainstorm or series of storms may deliver enough rain to trigger debris slides. Individual debris slides may move at rates ranging from meters per day to meters per minute. Debris slide scars are extremely steep and therefore are very sensitive to renewed disturbance. Natural erosion at the base of debris slide scars may trigger additional slides. Cutting into the base of a debris slide scar may also trigger renewed slides. Even without additional disturbance, debris slide scars tend to ravel and erode, leading to small rock falls and debris slides from the same slope (California Geological Survey 2019a).

A **rockslide** is a landslide involving bedrock in which the rock that moves remains largely intact for at least a portion of the movement. Rockslides can range in size from small and thin to very large and thick and are subject to a wide range of triggering mechanisms. The sliding occurs at the base of the rock mass aligned with one to several relatively thin zones of weakness, which are variably referred to as "slide planes," "shear surfaces," "slip surfaces," "rupture surfaces," or "failure surfaces." The sliding surface may be curved or planar in shape. Rockslides with curved sliding surfaces are commonly called "slumps" or "rotational slides," while those with planar failure surfaces are commonly called "translational slides," "block slides," or "block glides." Rockslides that occur on intersecting planar surfaces are commonly called “wedge failures (California Geological Survey 2019a).

Rockslides commonly occur on relatively steep slopes. Slope gradients are commonly from 35 percent to as steep as 70 percent. The movement of an intact rock mass along a curved slide plane leads to a steep, arcuate headscarp at the upper boundary of the slide. Immediately below the headscarp is a block that is commonly rotated so that it is less steep than the surrounding hill slopes. Below the bench, the slide mass may be intact with a similar gradient to the surrounding slopes or may have additional scarps and benches. The lower parts of the slopes may bulge outward and be steeper than the surrounding slopes (California Geological Survey 2019a).

A **rockfall** is a landslide where a mass of rock detaches from a steep slope by sliding, spreading, or toppling and descends mainly through the air by falling, bouncing, or rolling. Intense rain, earthquakes, or freeze-thaw wedging may trigger this type of movement (California Geological Survey 2019a).

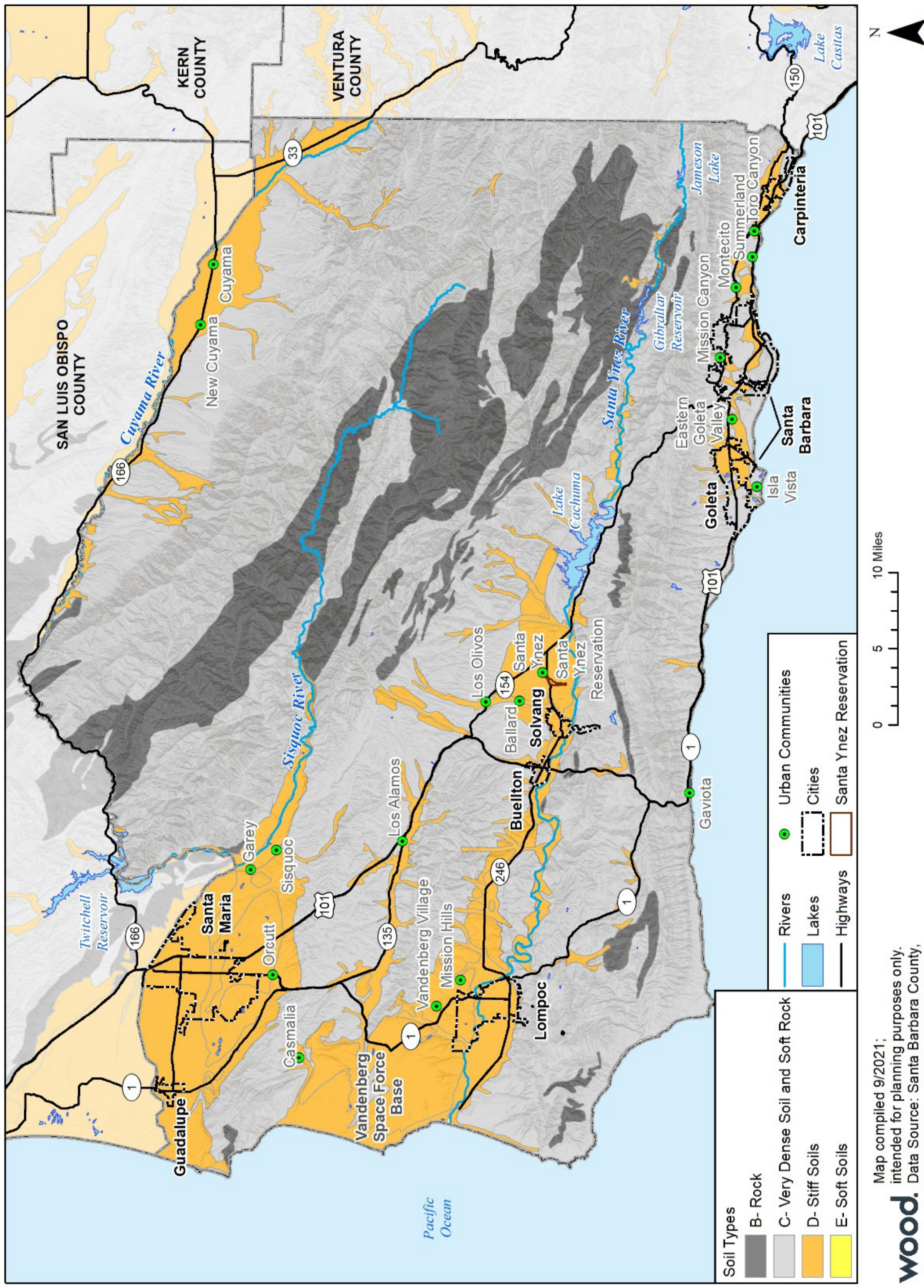
Rockfalls occur on steep slopes of hard, fractured rock. The scar left by a rockfall on the slope may be no more apparent than an area of rock that is less weathered than the surrounding rocks. Rockfall deposits are loose piles of rubble that may be easily removed by erosion. Because neither the scar nor the deposit is distinctive, and because the most frequently occurring rock falls are typically small, individual rockfalls are usually not shown on regional-scale (1:24,000 and smaller) landslide maps.

Though infrequent, moderate- to large-volume rock falls can be extremely dangerous and sometimes fatal. Large slabs of rock impacting a hard ledge after a long drop can rapidly break apart, leading to air entrainment and long runouts, induced air blasts, air-borne projectiles (flyrock), and severe dust clouds (California Geological Survey 2019a).

<u>Location and Extent of Hazard in Santa Barbara County</u>

Landslides and landslide-prone sedimentary formations are present throughout the coastal plain of western Santa Barbara County. Figure 5-18 shows the location of soil types throughout the county. Generally, areas with soft soils are more prone to movement. Landslides also occur in the granitic mountains of East Santa Barbara County, although they are less prevalent. Many of these landslides are thought to have occurred under much wetter climatic conditions than at present. Recent landslides are those with fresh or sharp geomorphic expressions suggestive of active (ongoing) movement or movement within the past several decades. Reactivations of existing landslides can be triggered by disturbances such as heavy rainfall, seismic shaking, and/or grading. Many recent landslides are thought to be reactivations of ancient landslides.

Figure 5-18. Santa Barbara County Soil Types



The Santa Barbara County Comprehensive Plan Seismic Safety and Safety Element lists the areas in Santa Barbara County where there are geologic formations that can lead to fairly severe landslides (County of Santa Barbara 2015). The areas are as follows:

- Foothills in the Summerland area
- Foothills of the South Coast – from Santa Barbara west to Gaviota Pass
- Hope Ranch area – west of Lavigia Hill to Goleta
- Sea cliffs along the coast from Santa Barbara to Gaviota, particularly those with out-of-slope dips
- Solvang area south of the Santa Ynez River in the vicinity of, and east of Alisal Ranch
- Areas east and northeast of Los Olivos near the Los Padres National Forest boundary
- Lompoc area south of Santa Ynez River
- Mountains south of Guadalupe and east of Point Sal

Several areas in the county are prone to more frequent rain-induced landslides, resulting in disruption to transportation and damage to roadways. The most common areas of recent historic landslides are listed in Table 5-12 below.

Table 5-12. Common Areas of Recent Historic Landslides in Santa Barbara County

Road	Year
South County	
Palomino Road	1995, 1998
Gibraltar Road	1995, 1998, 2001, 2003
Glen Annie Road	1995, 1998, 2001, 2004
Refugio Road	1995, 1998, 2001
Ortega Hill Road	1195, 1998
Stagecoach Road	2003, 2004, constant
Painted Cave	1995, 1998
Old San Marcos Road	1995, 1998, currently moving
Gobernador Canyon	1995, 1998, currently moving
East Mountain Drive	1995, 1998, 2001
All roads that are underlain by the Rincon Shale Formation	
Highway 154	2017, 2019, 2020
North County	
Miguelito Canyon	1995, 1998, ongoing threat
Sweeney Road	1995, 1998, ongoing threat
Jalama Road	1995, 1998, ongoing threat
Point Sal Road	1995, 1998, ongoing threat
Drum Canyon Road	1995, 1998, ongoing threat
Mail Road	1995, 1998, ongoing threat
Santa Rosa Road	1995, 1998, ongoing threat
Figueroa Mountain Road	1995, 1998, ongoing threat

History of Hazard in Santa Barbara County

As previously mentioned, Santa Barbara County is prone to landslides; however, many previous landslide occurrences within the county were smaller and are not well documented. As described in Section 5.3.4, *Flood*, several historic storm and flood events in the county have resulted in earth movement. Additionally, significant historic mudflows and debris flows are described in Section 5.3.5 above. Five of the more significant recent landslides are discussed below:

- **1980** – In 1980, the costliest landslide event in the U.S. occurred, affecting six southern California counties, including Santa Barbara County. The type of landslide was mostly debris flow from heavy rainfall. Over $800 million worth of damage resulted from this event.
- **1990s** – In the spring of 1995, La Conchita, located at the western border of Ventura County and adjacent to Santa Barbara County, experienced a landslide that destroyed several houses in its path. In 1998, a portion of the bank of the Cuyama River collapsed east of Santa Maria, affecting half a dozen cars and a tractor-trailer rig on Highway 166, which were caught in the slide. Two highway patrol officers were killed.
- **2005** – In January 2005, a powerful Pacific storm brought heavy rain, snow, flash flooding, high winds, and landslides to Central and Southern California. With such copious rainfall, flash flooding was a serious problem across Santa Barbara, Ventura, and Los Angeles counties. In Santa Barbara County, flash flooding and mudslides closed Gibraltar Road at Mt. Calvary Road, stranding several vehicles, while mudslides inundated 3 homes in Lake Casitas. The closure of the lower section of San Marcos Pass resulted in heavy use of San Marcos Road, which meets the Pass near its summit. By the evening of January 31, 2005, the entire slope had failed, covering 120 feet of San Marcos Road and portions of the adjacent property with an estimated 40,000 cubic yards of debris. Across Ventura County, flash flooding and mudslides closed down Creek Road at Hermosa Road. In addition, the Ventura Beach RV Resort was flooded and Highways 1 and 126 were closed due to flooding. In La Conchita adjacent to the County of Santa Barbara, a devastating mudslide killed 10 people, destroyed 15 homes, and damaged 12 other homes.

Incident Profile: 2005 San Marcos Landslide

On January 31, 2005, a slope failed covering 120 feet of San Marcos Road and portions of the adjacent property with an estimated 40,000 cubic yards of debris.

Photo: County of Santa Barbara

Probability of Occurrence

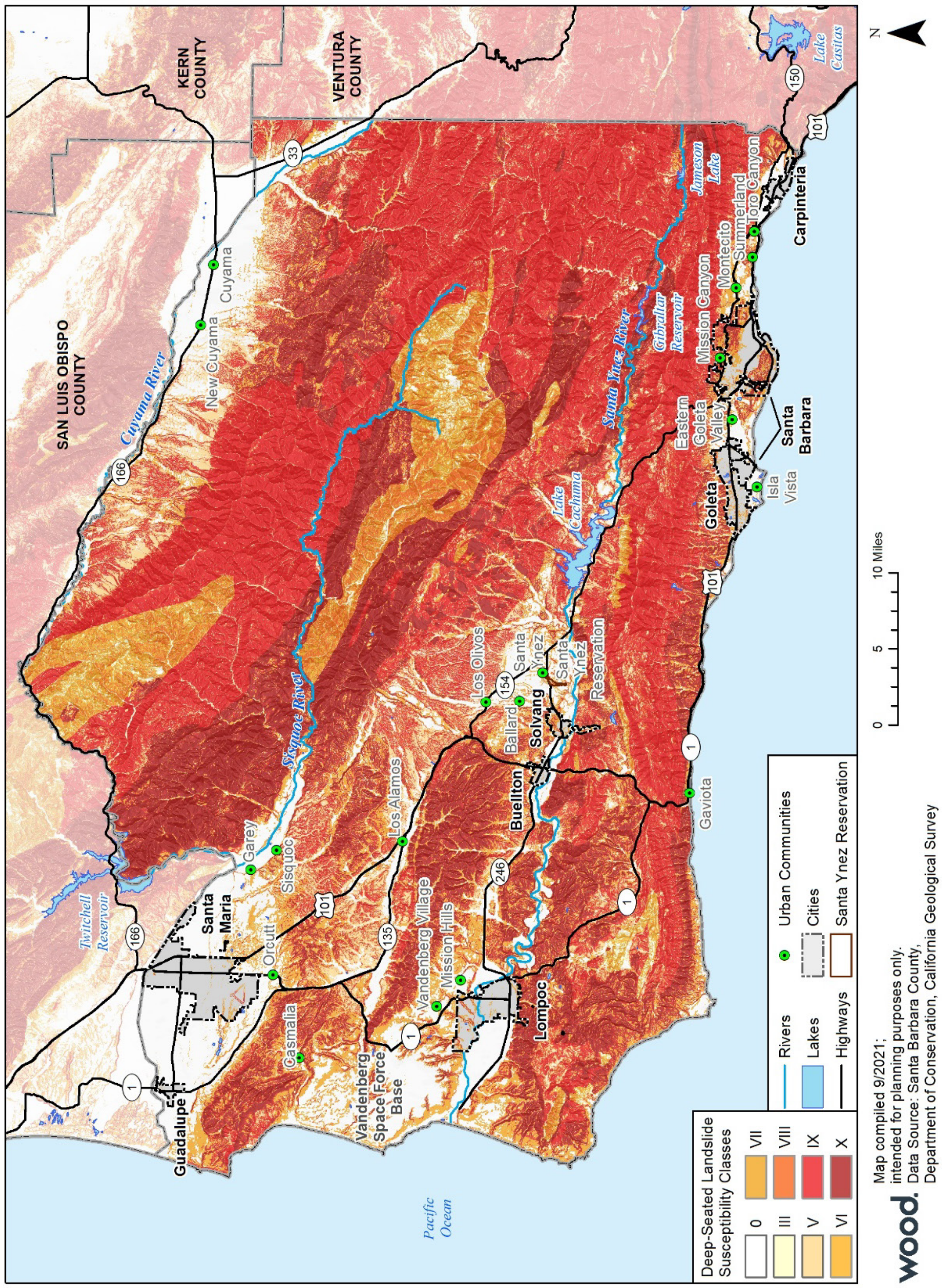
Occasional – Figure 5-19 shows the locations of deep-seated landslide susceptibility in Santa Barbara County as mapped by the California Geological Survey. This map shows the relative likelihood of deep landslide based on the three site factors that most determine susceptibility: prior failure (from a landslide inventory), regional estimates of rock or soil strength, and steepness of slopes. On the most basic level, weak rocks and steep slopes are more likely to generate landslides. The map uses detailed information on the location of past landslides, the location and relative strength of rock units, and the steepness of the slope in a methodology developed by Wilson and Keefer (1985). The result shows the distribution of one very important component of landslide hazard. It is intended to provide infrastructure owners, emergency planners, and the public with a general overview of where landslides are more likely. The map does not include information on landslide triggering events, such as rainstorms or earthquake shaking, nor does it address susceptibility to shallow landslides such as debris flows. Therefore, this map is not appropriate for the evaluation of landslide potential at any specific site (California Geological Survey 2019a). The areas shaded in darker red in Figure 5-19 are considered to have a higher probability of landslide occurrence than the low landslide risk areas in the county.

Climate Change Consideration

A 2021 study by the USGS finds that Southern California is likely to see increased post-wildfire landslides caused by climate change-induced shifts in the state's wet and dry seasons. Wildfires make the landscape more susceptible to landslides when rainstorms pass through as the water liquefies unstable, dry soil and burned vegetation. Geologists routinely conduct landslide hazard assessments after wildfires occur, but there is often not enough time between a fire and a rainstorm to implement an effective emergency response plan (USGS 2021b). Wildfire frequency, higher temperatures, and increased droughts projected to occur under climate change can reduce soil absorption capacity and kill vegetation that holds soil in place, making it unable to absorb as much water, further destabilizing slopes. The results also suggest more intense rainfall events could make landslides much more frequent. Slope failure is expected to become more frequent as more precipitation falls during fewer storm events (refer also to Section 5.3.4, *Flood*). Also, the increased heavy precipitation events may cause instability in areas where landslides were not as likely before. Therefore, resulting landslides may be larger or more widespread.

In the USGS study, historical fire, rainfall, and landslide data are combined with computer simulations to forecast where post-wildfire landslides are likely to occur in southern California, how big those landslides might be, and how often they can be expected to happen. The goal of the study was to map which regions of the state are most vulnerable to landslides before they happen, like how geologists map earthquake hazards. The USGS study results show small landslides can now be expected to occur almost every year in southern California. Major landslides capable of damaging 40 or more structures can be expected every 10 to 13 years – about as frequently as magnitude 6.7 earthquakes occur in California. Combined with recent research showing California's wildfire season is getting longer and the rainy season is getting shorter and more intense, the new findings suggest Californians face a higher risk of wildfires and post-wildfire landslides that can damage property and endanger people's lives (USGS 2021b).

Figure 5-19. Santa Barbara County Deep-Seated Landslide Susceptibility



5.3.8 Geologic Hazards

Description of Hazard

Land subsidence is defined by the USGS as the lowering of the land-surface elevation from changes that take place underground. Common causes of land subsidence from human activity are pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (i.e., sinkholes); the collapse of underground mines; drainage of organic soils; and initial wetting of dry soils (i.e., hydrocompaction). Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the space previously occupied by water or soluble minerals. Overdraft of aquifers is the major cause of subsidence in the southwestern U.S., and as groundwater pumping increases (such as during periods of drought), land subsidence also will increase. In many aquifers, groundwater is pumped from pore spaces between grains of sand and gravel. If an aquifer has beds of clay or silt within or next to it, the lowered water pressure in the sand and gravel causes slow drainage of water from the clay and silt beds. The reduced water pressure is a loss of support for the clay and silt beds. Because these beds are compressible, they compact (become thinner), and the effects are seen as a lowering of the land surface. Weight, including surface developments such as roads, reservoirs, and buildings, and manmade vibrations from such activities as blasting and heavy truck or train traffic can accelerate the natural processes of subsidence, or induce subsidence over manmade voids (USGS 2016).

Land subsidence causes serious, localized problems including:

- changes in elevation and slope of streams, canals, and drains;
- damage to bridges, roads, railroads, underground utilities (e.g., storm drains, sanitary sewers, pipelines, etc.), streams, canals, and levees;
- damage to private and public buildings; and
- failure of well casings from forces generated by compaction of fine-grained materials in aquifer systems.

In some coastal areas, subsidence has resulted in tides moving into low-lying areas that were previously above high-tide levels, increasing the effects of coastal hazards, such as coastal storm surges (USGS 2016).

Erosion is a geological process in which earthen materials (i.e., soil, rocks, sediments) are worn away and transported over time by natural forces (e.g., water, wind, ice), although sometimes this is sped up by poor management or other human impacts on land (e.g., farming, land clearing). Coastal erosion, which is caused by the ocean, is discussed under Section 5.3.6, *Coastal Hazards*. Soil erosion refers to the erosion of the top layer of dirt known as topsoil, the fertile material vital to life. The rate of soil erosion depends on many factors, including the soil's makeup, vegetation, and the intensity of wind and rain. Soil erosion occurs primarily when dirt is left exposed to strong winds, hard rains, flowing water, and ice. In some cases, human activities leave soil vulnerable to erosion. For example, when farmers till (plow) the soil before or after growing a season of crops, they may leave it exposed to the elements for weeks or months. The overgrazing of farm animals like cattle and sheep can also leave large areas of land devoid of ground-covering plants that would otherwise hold the soil in place. Another practice that causes soil erosion is deforestation, particularly clearcutting, which leaves the land exposed to wind and rain without the security of roots to prevent the soil from being swept away (Natural Resources Defense Council 2021).

Soil erosion reduces the quantity and the quality of soil ecosystems and arable land (i.e., land that can be used to grow crops). Severe soil erosion can result in the loss of food crops, negatively impact community resiliency and livelihoods, and even alter ecosystems by reducing biodiversity above, within, and below the topsoil. Approximately 60 percent of soil that is washed away ends up in rivers, streams, and lakes, along with whatever has been applied to that soil, including agrochemicals and other pollutants that can contribute to harmful algal blooms and polluted waterways. Dirt that enters water bodies can also clog their natural flow and increase flooding along the waterways (Natural Resources Defense Council 2021).

Expansive soils are soils that can undergo a significant increase in volume with an increase in water content and a significant decrease in volume with a decrease in water content. Changes in the water content of an expansive soil can result in severe distress to structures constructed upon the soil. Expansive soils tend to swell with seasonal increases in soil moisture in the winter months and shrink as soils become drier in the summer months. Repeated shrinking and swelling of the soil can lead to stress and damage to structures, foundations, fill slopes, retaining walls, and other associated facilities.

Location and Extent of Hazard in Santa Barbara County

Subsidence

Land subsidence is common in several areas of California, usually as a result of groundwater pumping, peat loss, or oil and gas extraction. DWR's Draft California Groundwater Update 2020 is a continuation of a series of earlier DWR Bulletin 118 publications and builds on the past progress and state of knowledge, synthesizes the most recent data to close the knowledge gap, including land subsidence information. The California Groundwater Update 2020 is the state's most up-to-date compendium of statewide data and information on the occurrence, nature, use, and conditions of California's groundwater resources and their management. In addition to the Draft California Groundwater Update 2020, DWR provides an interactive map with information about land subsidence in California (2009-2018) that is presented in California's Groundwater Update 2020. The point data in the map displays land elevation changes over varying periods as recorded by a collection of continuous global positioning system stations and is presented for groundwater basins within Santa Barbara County in Table 5-13 below.

Table 5-13. Land Subsidence for Groundwater Basins in Santa Barbara County (2018)

Groundwater Basin(s)	Vertical Displacement (feet)
Carpinteria	0
Montecito	0
Santa Barbara	0
Foothill	-0.15
Goleta	0
Santa Ynez River Valley	-0.04 to -0.08
San Antonio Creek Valley	-0.63
Santa Maria Valley	0.01
Cuyama Valley	-0.88

Source: DWR 2021b.

Erosion

Erosion can vary greatly in short distances, and thus, erosion has not been mapped or rated at the county level (County of Santa Barbara 2015). However, there are a few areas that are particularly susceptible to erosion given their basic granular characteristics. These include sea cliffs, recent and old dunes, the Fanglomerate, Terrace and Older Alluvium deposits, and the Casitas, Santa Barbara, Pico, Paso Robles, Careaga, and Orcutt Formations.

The Santa Barbara formation and old dunes are subject to erosion. The Santa Barbara formation occurs in patches on the coastal hills and the lower foothills from Carpinteria to Goleta. Because it is so soft and weakly cemented, the Santa Barbara Formation is rapidly gullied and washed away when vegetation is removed making it hazardous, especially on steep slopes. Old dunes in the northern part of the county extend into the eastern Santa Maria Valley and Santa Rita Valley and are subject to a similar degree of erosion as the Santa Barbara Formation. When short grass and other annuals are not present, the soft and uncemented sand is subject to wind erosion and gullying (County of Santa Barbara 2015).

The Santa Barbara County coastline is mainly subject to marine erosion. The western coastline is comprised of dunes and sea cliffs. The majority of exposed rocks in the sea cliffs are readily eroded by marine and non-marine processes (refer to Section 5.3.6, *Coastal Hazards*; County of Santa Barbara 2015).

Expansive Soils

Expansive soils can cause problems because they contain clay minerals that swell when the moisture content increases and shrink when the moisture decreases. Such soils are usually described as "adobe," and form ground cracks when they are allowed to dry out. The volume changes resulting from variable moisture conditions can cause movement and cracking of structures built on expansive soils. Soils beneath concrete floor slabs tend to increase in moisture content, thus causing heave. Soils under raised floors tend to dry out and shrink, causing settlement of the structure. Expansive soils are present in Santa Barbara County (County of Santa Barbara 2015). The most hazardous areas occur in a belt along the south coastal foothills, where geological formations are either highly expansive themselves or generate highly expansive topsoil. Expansive and shrinkable soils are found in the Rincon and Monterey Formations. Rincon mudstone is exposed on the south face and locally on the north flank of the Santa Ynez Mountains from near Point Conception eastward to the Santa Barbara County line at Rincon Creek. Rincon Creek has smooth, rounded slopes covered in grass, but the rock in this area breaks down into an unstable, heavy, clay soil that expands when wet and develops deep cracks when dry. Expansion and shrinkage affect flat areas, and slopes are affected by soil creep, slumps, and landslides. The soils on the Monterey Formation share some of the Rincon Creek's problems but are not as severe (County of Santa Barbara 2015).

History of Hazard in Santa Barbara County

Land subsidence, erosion, and expansive soils have been identified as issues in Santa Barbara County as described above. There is no history of acute, specific events associated with these hazards in the county.

Probability of Occurrence

Occasional – The frequency of future land subsidence incidents in the county will largely be dependent on the mitigation actions and pumping regulations initiated by the state, the county, and local regulations. Groundwater basins that are designated as high or medium priority by the DWR must have a Groundwater Sustainability Agencies (GSA) responsible for the development, implementation, and oversight of a Groundwater Sustainability Plan (GSP). GSP objectives require that future groundwater use does not cause undesirable results, including land subsidence (Santa Barbara County Public Works 2020). See also, Section 5.3.2, *Drought & Water Shortage*.

Climate Change Consideration

The most likely impact that climate change will have on land subsidence risk is the potential for extended and severe drought, which could likely result in more groundwater pumping and human-induced subsidence. In areas where climate change results in less annual precipitation and reduced surface-water supplies, communities will pump more groundwater. Also, an increasing population in California will increase demands on groundwater supplies. During periods of drought, water levels may be drawn too low. In the southern part of the U.S., including California, major aquifers include compressible clay and silt that can compact when groundwater is pumped. The water cannot recharge the layers, causing irreversible compaction of aquitards and diminishment of groundwater storage capacity. In the future, an increasing population may result in subsidence problems in metropolitan areas where subsidence could severely damage infrastructure (USGS 2016).

Climate is also a major driver of erosion. Changes in rainfall and water levels can shift soil, extreme fluctuations in temperature can make topsoil more vulnerable to erosion, and prolonged droughts can prevent plants from growing, leaving soil further exposed (Natural Resources Defense Council 2021).

There is also evidence that climate change may affect the impacts of expansive soils. Climate change effects on expansive soil movements are quantified using the Thornthwaite Moisture Index. The Thornthwaite Moisture Index is calculated from the moisture deficiency and surplus, both related to rainfall, and the potential evapotranspiration which is derived from temperature. Established relationships between the Thornthwaite Moisture Index and the depth and magnitude of soil suction changes for sites with and without the presence of trees, and the relationships between soil movement and soil suction changes, are used to predict the increase in soil movement for a site. It is shown that a significant increase in predicted soil movement is expected with climate change (Mitchell 2014).

5.3.9 Tsunami

Description of Hazard

A **tsunami** is a series of extremely long waves caused by a large and sudden displacement of the ocean, usually the result of an earthquake below or near the ocean floor. This force creates waves that radiate outward in all directions away from their source, sometimes crossing entire ocean basins. Unlike wind-driven waves, which only travel through the topmost layer of the ocean, tsunamis move through the entire water column, from the ocean floor to the ocean surface (NOAA 2018). Once a tsunami forms, its speed depends on the depth of the ocean. In the deep ocean, a tsunami can move as fast as a jet plane, over 500 mph, and its wavelength, the distance from crest to crest, could be hundreds of miles. Mariners at sea will not normally notice a tsunami as it passes beneath them; in deep water, the top of the wave rarely reaches more than three feet higher than the ocean swell. A tsunami only becomes hazardous when it approaches land. As a tsunami enters shallow water near coastal shorelines, it slows to 20 to 30 mph. The wavelength decreases, the height increases, and currents intensify (NOAA 2018).

Most tsunamis are caused by earthquakes on converging tectonic plate boundaries. According to the Global Historical Tsunami Database, since 1900, over 80 percent of likely tsunamis were generated by earthquakes (NOAA 2018). However, tsunamis can also be caused by:

- Large earthquakes that occur near or under the ocean,
- Volcanic eruptions,
- Submarine landslides, and
- Onshore landslides in which large volumes of debris fall into the water.

Scientists do not use the term "tidal wave" to describe tsunamis because these waves are not caused by tides. Tsunami waves are unlike typical ocean waves generated by wind and storms, and most tsunamis do not "break" like the curling, wind-generated waves (USGS 2021c).

Large tsunamis are significant threats to human health, property, infrastructure, resources, and economies. Rushing water from waves, floods, and rivers is incredibly powerful. Just six inches of fast-moving water can knock adults off their feet, and twelve inches can carry away a small car. Tsunamis can be particularly destructive because of their speed and volume. They are also dangerous as they return to the sea, carrying debris and people with them. Low-lying areas could experience severe inland inundation of water and deposition of debris. Effects can be long-lasting and felt far beyond the coastline. Tsunamis typically cause the most severe damage and casualties near their source, where there is little time for warning. But large tsunamis can also reach distant shorelines, causing widespread damage. The 2004 Indian Ocean tsunami, for example, impacted 17 countries in Southeastern and Southern Asia and Eastern and Southern Africa (NOAA 2018).

Location and Extent of Hazard in Santa Barbara County

As shown in Figures 5-20 and 5-21, areas prone to tsunami hazards in the county are limited to coastal areas and offshore areas. The cities of Santa Barbara and Carpinteria are most susceptible to tsunami hazards, given that they are located on or near several offshore geological faults, the more prominent faults being the Mesa Fault, the Santa Ynez Fault in the mountains, and the Santa Rosa Fault (refer to Section 5.3.3, *Earthquake and Liquefaction*). Other unnamed faults in the offshore area of the Channel Islands may present tsunami hazards. These faults have been active in the past and can subject the entire county coastal area to seismic action at any time.

Figure 5-20. Santa Barbara County Tsunami Hazard Area

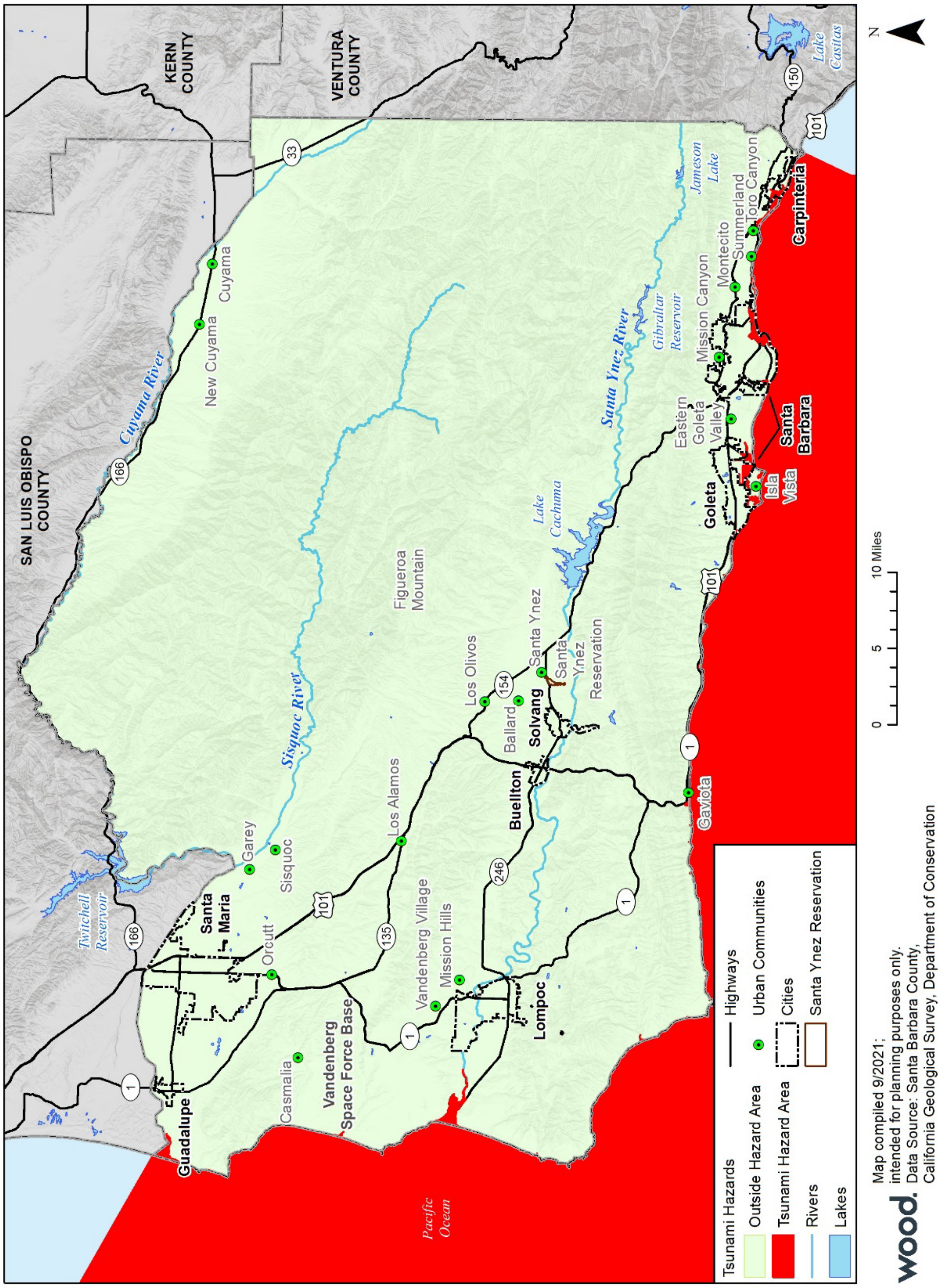
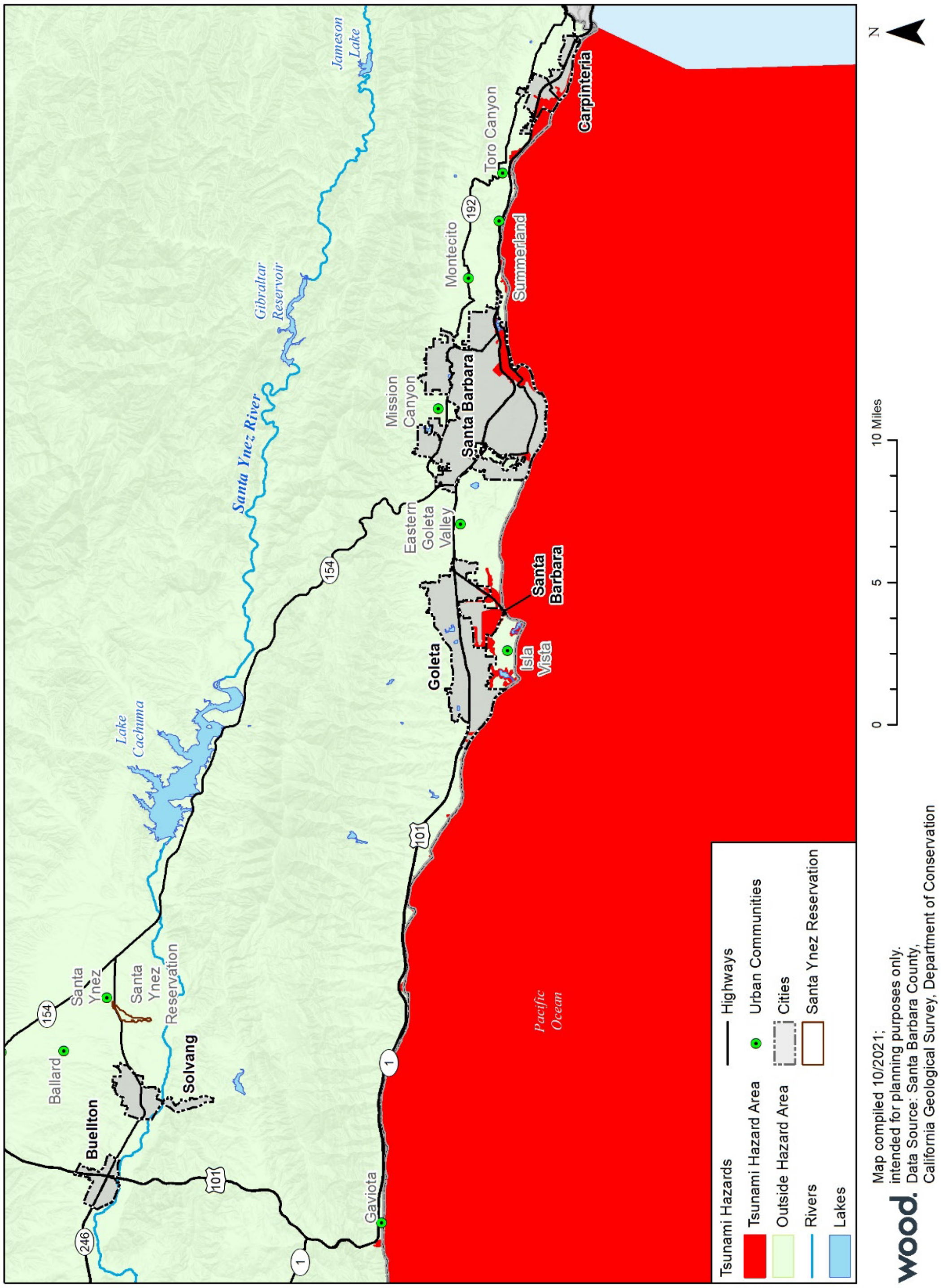


Figure 5-21. South Coast Tsunami Hazard Area



History of Hazard in Santa Barbara County

Earthquakes along the county's coast along submarine fault lines could generate large, destructive tsunamis. However, the relative threat of local tsunamis in the county can be considered low due to low recurrence frequencies. Major faults of the San Andreas zone, although capable of strong earthquakes, cannot generate any significant tsunamis. Only earthquakes in the Transverse Ranges, specifically the seaward extensions in the Santa Barbara Channel and offshore area from Point Arguello, can generate local tsunamis of any significance (Pararas-Carayannis 2007). The reason for this may be that earthquakes occurring in these regions result in a significant vertical displacement of the crust along these faults. Such tectonic displacements are necessary for tsunami generation. Most of the tsunamis observed in California have been small, causing a slight rise in water levels in coastal areas and little damage. Large, locally generated tsunamis are estimated to occur once every 100 years (Pararas-Carayannis 2007).

Thirteen possible tsunamis have been observed or recorded in the county from local earthquakes between 1812 and 1988; however, there have been no recorded locally generated tsunamis since 1988. Additionally, these tsunami events were poorly documented, and the precise extent of environmental and public impacts is uncertain.

- **December 1812.** Historical records indicate one or two tsunamis were generated from major earthquakes in the Santa Barbara region in December of 1812. Researchers have theorized that a landslide triggered by an earthquake caused the tsunami (NBC Los Angeles 2018). The size and extent of these tsunamis are relatively uncertain due to the lack of historical records; however, unconfirmed estimates in various literature and based on anecdotal history reports that the Gaviota Coast was impacted by 15-foot waves, the City of Santa Barbara received 30- to 35-foot waves, and Ventura County received waves of approximately 15 feet or more (Pararas-Carayannis 2007). Additionally, the USGS, in cooperation with Moss Landing Marine Laboratory, mapped the slopes of the Santa Barbara Channel using sonar and was able to link a large earthquake in 1812 to a tsunami, which wiped out many coastal villages and destroyed ships in the harbor (USGS 2003). Low lying areas of Santa Barbara and Ventura were flooded and damage was reported to nearby ships due to powerful waves (NBC Los Angeles 2018).
- **November 22, 1878**. A tsunami most likely caused by a submarine landslide occurred along the coast of California. One fatality occurred and three wharves were damaged at Point Sal and Avila Beach near San Luis Obispo. According to some sources, there was a 6-foot wave at Wilmington near the Port of Los Angeles. Waves, which did some damage, were observed in San Luis Obispo Bay, Surf, Sal Cape, Cape, at Port Harford, Pismo Beach, Avila, Morro Bay, and Cayucos (NOAA 2021c).
- **November 4, 1927.** A magnitude 7.3 earthquake occurred 22 miles northwest of Point Arguello, California. The arrival times and waveforms of the recorded tsunami of the 1927 Lompoc earthquake indicate that the earthquake occurred offshore, where the water depth is approximately 1000 meters deep. This earthquake was one of the largest offshore events in California, and the associated tsunami was recorded in Hawaii as well as on the California coast. Six-foot waves washed out sections of the railroad and flooded stations at Surf and Pismo. A tsunami arose, which was observed on the coast of California and was registered on the Hawaiian Islands. A railway employee at Port San Luis observed a fall and rise in water

level of 5 feet followed by oscillations in level for an hour. According to the lighthouse attendant in the same port, a rise occurred, followed by a drop of 4 feet, without subsequent substantial oscillations in sea level. An observer at Pismo Beach compared the tsunami with large storm waves (NOAA 2021c).

- **April 1, 1946**. An earthquake in the Alaska Subduction Zone generated this tsunami, which caused flooding about 1,000 feet inland in Half Moon Bay and along California's Central Coast (NBC Los Angeles 2018).
- **March 28, 1964**. The West Coast's most devastating tsunami on record was generated by a deadly magnitude 9.2 earthquake off the coast of Alaska. It caused powerful waves that slammed coastal areas, including the Northern California community of Crescent City, where 11 people were killed. A surge approximately 20-feet high flooded nearly 30 city blocks. A total of more than 100 people in the tsunami zone, from Alaska and down the Pacific coasts of Canada and the United States, were killed (NBC Los Angeles 2018).
- **February 27, 2010**. A magnitude 8.8 earthquake occurred along the central coast of Chile and produced a tsunami. For the coast of Southern California, it was one of the largest tsunami episodes since 1964. At Santa Barbara Pier, significant beach erosion was reported along with displacement of buoys. The tsunami surge lasted more than 20 hours. The most significant damage occurred along the coasts of Ventura and the south coast of the county. Numerous reports of dock damage were reported along with beach erosion.
- **March 11, 2011**. A magnitude 9.0 earthquake occurred off the Pacific coast of Tohoku, Japan. This earthquake devastated many communities in Japan and caused tsunami effects across the ocean in Santa Barbara County. The tsunami in the county only had a trace amount of surge and tidal fluctuations up to seven feet (The Independent 2011). Although not nearly as destructive as the 1964 tsunami, a magnitude-9.0 earthquake in the Tohoku region of Japan led to strong tsunami currents that damaged harbors along California's coast. One death was reported in connection with the tsunami. The worst damage was in Crescent City and Santa Cruz (NBC Los Angeles 2018). The only significant impact on Santa Barbara County was on the dredging contractor for the harbor.

Probability of Occurrence

Unlikely – The University of Southern California (USC) Tsunami Research Group has modeled areas in the county that could potentially be inundated in the event of a tsunami. In 2001, the Tsunami Research Group concluded the walls of the basin that form the Santa Barbara Channel are susceptible to submarine slope failures in at least two mapped locations (USC 2001). This model is based on potential earthquake sources and hypothetical extreme undersea, near-shore landslide sources. The data was mapped by the California Geological Survey and Cal OES for Tsunami Evacuation Planning. The maps and data are compiled with the best currently available scientific information and represent areas that could be exposed to tsunami hazards during a tsunami event. The tsunami inundation map helps to assist cities and counties in identifying their tsunami hazard areas. Figure 5-20 shows tsunami hazard areas of Santa Barbara County and Figure 5-21 provides a closer look at tsunami hazard areas of Santa Barbara County's south coast.

Based on the tsunami inundation map above, several areas along the coast of the county have the potential to be inundated by a tsunami. Given that there is a medium probability of an earthquake, which would result in high impacts including potential tsunami events in the county, the county is at risk of future tsunami events. However, the only documented major tsunami event occurred in 1812 and the county continues to develop and maintain emergency plans for tsunamis.

Climate Change Consideration

As previously described, tsunamis are created by earthquakes or other earth movements. To date, no direct relationship has been made between climate change and the occurrences of earthquakes or other earth movements (refer to Section 5.3.3, *Earthquakes and Liquefaction*).

5.4 SEVERE WEATHER AND STORM EVENTS

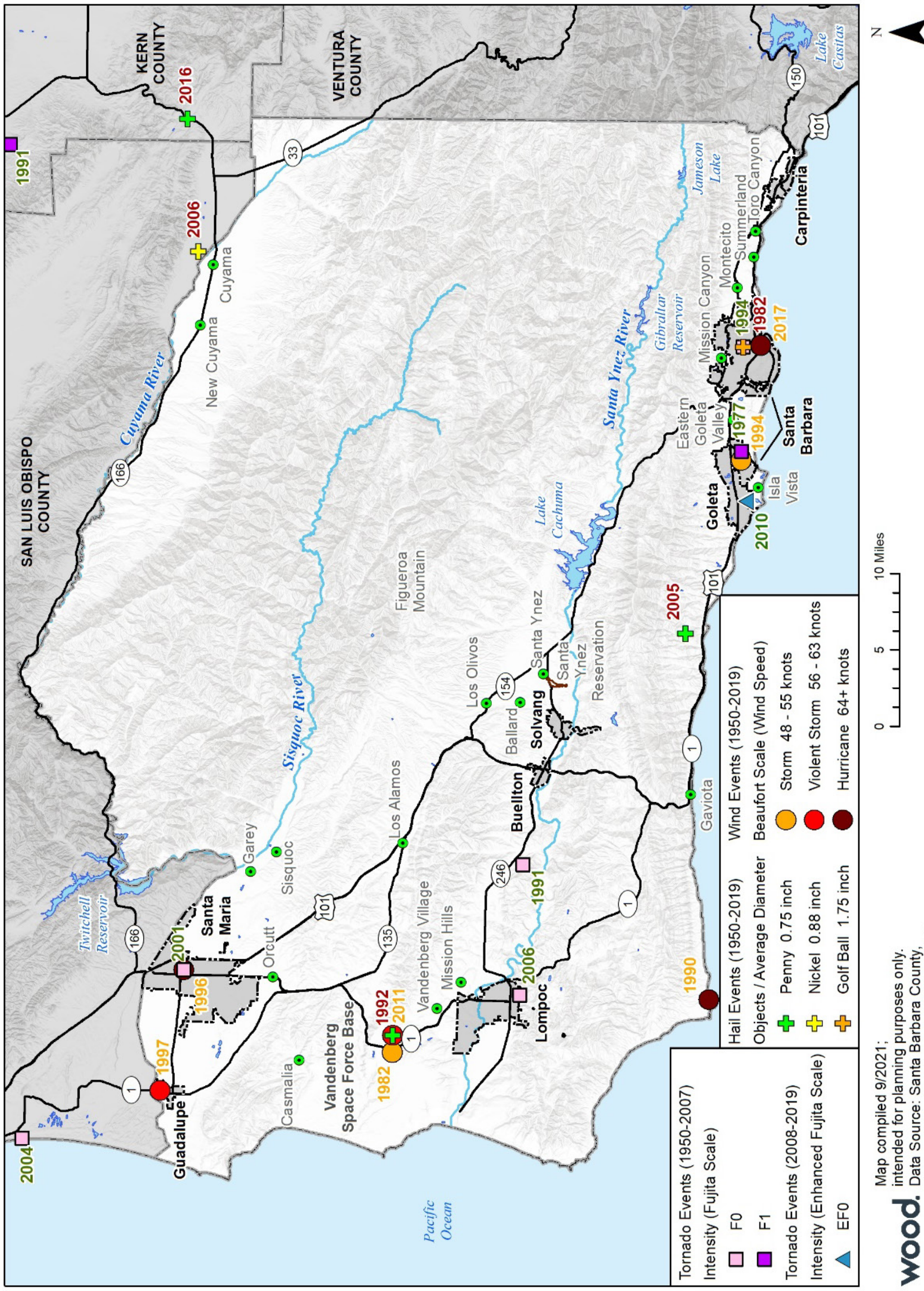
NASA defines weather as the way the atmosphere is behaving, mainly concerning its effects on life and human activities. The difference between weather and climate is that weather consists of short-term (minutes to months) changes in the atmosphere. Most people think of weather in terms of temperature, humidity, precipitation, cloudiness, brightness, visibility, wind, and atmospheric pressure, as in high and low pressure. In most places, weather can change from minute-to-minute, hour-to-hour, day-to-day, and season to season. Severe weather includes strong winds, hail, lightning, and heavy rainfall typically caused by intense storm systems, although types of strong winds, such as sundowners, can occur without a storm.

Climate, in contrast, is the average of weather over time and space. Long-term changes in the climate, especially those driven by the accumulation of anthropogenic GHGs in the atmosphere, are expected to change short-term weather patterns and thus change weather-related impacts, both short- and long-term. Most prominently, climate change is warming the average global temperatures, which will result in more frequent and intense extreme events related to changes in temperature and precipitation, such as heatwaves and flooding.

In the State Hazard Mitigation Plan, climate change is treated as a condition that will change and potentially exacerbate the impact of other hazards rather than being treated as a distinct hazard with unique impacts (Cal OES 2018). For example, extreme heat and heatwaves are existing hazards that will be exacerbated by climate change. Impacts of climate change on the frequency, timing, and magnitude of flooding vary with the geography throughout the state. Coastal areas experiencing sea level rise may be more greatly impacted by flooding. Weather and storm event hazards that have the potential to be affected by climate change are grouped in this subsection.

Figure 5-22 shows the locations of past severe weather events in the county. Detailed assessments of the types of extreme weather hazards that affect the county, including extreme heat or freeze, windstorms, hailstorms, tornadoes, and hurricanes, are provided in Sections 5.4.1 through 5.4.5 below.

Figure 5-22. Santa Barbara County Severe Weather Events



5.4.1 Extreme Heat/Freeze

Description of Hazard

Extreme heat is defined by FEMA as temperatures that hover 10 °F or more above the regional average high temperature or over 100 °F in California and last for at least three days or even as long as several weeks (FEMA 2021b). Extreme heat is a function of heat and relative humidity. A heat index describes how hot the heat-humidity combination makes the air feel. As relative humidity increases, the air seems warmer than it is because the body is less capable of cooling itself or regulating heat via evaporation of perspiration. As the heat index rises, so do health risks such as heat exhaustion, sunstroke, and heatstroke. Extreme heat can also threatens human health from potentially high levels of ground-level ozone in urban environments. Those at the greatest risk of heat-related stress and injuries include the elderly, small children, individuals who work outside, patients with chronic medical conditions, those on prescription medication therapy, and people with weight and alcohol problems, especially during heat waves in areas where moderate climate usually prevails.

Each year, approximately 107 people die in the U.S. from heat-related emergencies (NWS 2021a) The 2018 California State Hazard Mitigation Plan (SHMP) notes the 2006 severe heatwave led to 650 deaths in 13 days. In the past 15 years, heatwaves have claimed more lives in California than all other declared disaster events combined (Cal OES 2018). While the effects of extreme heat on human health can be severe, so too can its effects be on natural ecosystems, services, infrastructure, and various economic sectors (e.g., the agricultural sector). During periods of extreme heat, transportation, gas, power, and other services may be disrupted, and critical infrastructure may be destroyed or damaged (FEMA 2021b). The National Institute for Occupational Safety and Health (NIOSH), alongside OSHA, provides a Heat Safety Tool App that offers occupational safety and health recommendations based on the heat index (OSHA 2021). Each extreme heat day or heat wave can present an additional risk of other hazards present within the County but is primarily a direct contributor to wildfire hazards and risks (refer to Section 5.3.1, *Wildfire*).

Freeze conditions are defined as particularly cold weather spells caused by cold fronts where temperatures are sustained at 32 °F or below for a period of two or three days. Typically, frost can occur when the temperature falls below 36 °F, especially in rural areas and in the early mornings. It is a localized phenomenon and can be quite variable across a small area, and though infrequent, it can severely affect unsheltered homeless individuals and individuals who work outside. Freeze conditions can also severely impact the agriculture sector, one of the largest economic sectors in the County, around the winter and spring growing seasons when freeze can cause extensive crop damage.

Location and Extent of Hazard in Santa Barbara County

Extreme heat occurs when temperatures rise significantly above normal levels, and the key metric is the number of extreme heat events per year and heatwave duration. “Extreme heat” is a relative term—temperatures of 100 °F are normal in places like Palm Springs, but almost unprecedented in coastal areas of Santa Barbara County. The county has different extreme heat temperatures in different regions. On an extreme heat day, temperatures reach at least 88.7 °F in Los Alamos, 101.3 °F in Cuyama, and 87 °F in Montecito (Santa Barbara County Planning and Development Department 2021).

NWS Heat Index — Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution — Extreme Caution — Danger — Extreme Danger

The heat index, also known as the apparent temperature, is what the temperature feels like to the human body when relative humidity is combined with the air temperature. The human body feels warmer in humid conditions. There is direct relationship between the air temperature and relative humidity and the heat index, meaning as the air temperature and relative humidity increase (decrease), the heat index increases (decreases).

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Heat indices above 80 degrees Fahrenheit require caution for fatigue. Health dangers rapidly increase for heat indices above 90 degrees Fahrenheit, where heat stroke, cramps, and exhaustion become more likely. Source: NOAA National Weather Service

Coastal communities on average have lower temperatures compared to communities in the inland areas of the county and could be less at risk of extreme temperatures although potentially less acclimatized to high temperatures if they occur. The north county inland area has the potential for the highest extreme heat days. The highest average temperatures in the County during the summer months, between June and September. In the inland valleys, average monthly temperatures are more extreme and range from 60 °F to 95 °F. In the coastal areas, average monthly high temperatures more moderately range from 65 °F to 75 °F (Western Regional Climate Center [WRCC] 2021). However, higher temperatures are not uncommon across the entire county, and many days have exceeded 100 °F, particularly within the Santa Ynez and Cuyama valleys.

The date of the median first 32 °F freeze in the County from 1980 to 2010 typically occurred on November 21 or later (National Weather Service 2021). The earliest first freezes in that same time frame were November 1-10 in north county and November 11-20 in south county. The coldest average temperatures occur within the Cuyama Valley, between November and March when monthly average low temperatures range from 33 °F to 37 °F (U.S. Climate Data 2021). During inclement weather periods (very cold, or very cold with rain) Santa Barbara County contracts third parties to provide warming centers targeted at unsheltered homeless individuals. However, in the winter months of 2020, warming centers were severely limited amid safety concerns related to the Covid-19 pandemic (see Section 5.5.1, *Pandemic/Public Health Emergency*).

History of Hazard in Santa Barbara County

Santa Barbara County has experienced several extreme heat events in the past; however, they are not well documented. One documented event reported as "simoon", occurred on June 17, 1859, where a record temperature of 133 °F was taken during an extreme heat and wind event that struck Santa Barbara in the early afternoon (Noozhawk 2020). This event set the world record for the hottest temperature ever recorded on Earth, which was held for 75 years until the record was broken by one degree in Death Valley on July 10, 1913 (Guinness World Records 2021). More recently, according to the NOAA Storm Events Database, a combination of high pressure and high humidity caused temperatures to spike between 100 °F and 119 °F on July 22, 2006, throughout southern California, including the County (NOAA 2021d). In 2020, heatwaves in the Santa Ynez Valley with temperatures reaching 118 °F caused early grape harvests at wineries (Jervis 2020).

There have been two federally declared freeze events in the County. The first occurred from December 19, 1990, through January 3, 1991, and was federally declared on February 11, 1991 (DR-894-CA). The second occurred from January 11, 2007, through January 17, 2007, and was federally declared on April 20, 2007 (FEMA-1689-DR). Widespread freezing conditions were reported across agricultural areas of Santa Barbara County. Total crop damages in Santa Barbara County were estimated to be around $20 million (NOAA 2021d). In addition, the NOAA Storm Events Database reported a freeze event on December 21, 1998, that lasted three nights. The California Department of Food and Agriculture reported over $83 million in crop losses across a four-county area (NOAA 2021d).

Probability of Occurrence

Highly Likely - In any given year, Santa Barbara County can be subject to extreme heat or freeze conditions. The hottest months in the County are usually summer from June to September. The coldest months are typically December through February.

Climate Change Considerations

As temperatures rise due to climate change, Californians will face a greater risk of death from dehydration, heatstroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat. In California, spring is the fastest-warming season, stretching out the state's allergy season. By mid-century, extreme heat events in urban centers could cause two to three times more heat-related deaths than occurring today. Freezing spells are likely to become less frequent as climate temperatures increase; if emissions follow higher pathways, freezing events could occur only once per decade in a sizable portion of the state by the second half of the 21st century (Climate Central 2019).

According to the Environmental Protection Agency (EPA), southern California is warming faster than the rest of the state, warming 3.5°F over the last century (EPA 2016). Historically, Santa Barbara has experienced an average of four extreme heat days a year, however, this is expected to increase to 12 extreme heat events per year by 2030, 19 extreme heat events per year by 2060, and 34 extreme heat events per year by 2100 (Santa Barbara County Planning and Development Department 2021). Due to the rising temperatures, heat waves are likely to become more frequent, which will have direct impacts on human health in terms of heat-related illness. The county's large farming and viticulture production which employs thousands of outdoor laborers will be vulnerable to the rising temperatures and most at risk for heat-related illnesses. Residents in the coastal regions of the County will also be vulnerable to rising temperatures. Many of the homes on the coast do not have air conditioning units, as there was less of a need in the past. As a result, residents may be less prepared compared to the inland region of the county to adapt to extreme heat events.

Cascading impacts include increased stress on water quantity and quality, degraded air quality, and increased potential for more severe or catastrophic natural events such as heavy rain, droughts, and wildfire. Another cascading impact includes increased duration and intensity of wildfires with warmer temperatures. According to the 2013 document, "Preparing California for the Extreme Heat", CDPH projects that throughout California urban and rural population centers will experience an average of 40 to 53 extreme heat days by 2050 and an average of 40 days by 2099; compared to a historical average of 4 per year (CDPH 2013).

Extreme heat has also been shown to accelerate wear and tear on the natural gas system and electrical infrastructure. Projected increases in summer demand associated with rising temperatures may increase risks to energy infrastructure and may exceed the capacity of existing substations and distribution line infrastructure and systems.

For California, most projections of heat events have been conducted with cooperation from the Scripps Institute of Oceanography, University of California, San Diego (UCSD). Models have been consistent in projecting increases in the annual average temperature of up to 5° F by the 2030s and up to 10° F by the end of the century or sooner, although not every day will be hotter. This work has also indicated that extreme temperature events will occur more frequently. Minimum nighttime temperatures are also predicted to increase and should be considered.

5.4.2 Windstorm

Description of Hazard

High winds can cause damage to buildings and property either directly (e.g., damaging roof or siding materials) or as a result of falling trees or broken limbs. Wind can also lead to power or telecommunications outages when utility damage occurs. High winds can be destructive to vegetation and structures and increase airborne dust and particulates. The Beaufort Wind Scale estimates wind speeds and relative strengths on land and at sea. The scale starts at zero (calm) and increases to a force of 12 (hurricane).

Santa Barbara County is known to experience a unique, damaging wind known as a **sundowner**, which is a kind of offshore wind that occurs in the late afternoon or early evening along the southern slopes of the Santa Ynez mountains from Gaviota to Carpinteria. Sundowners occur when a north-south oriented high-pressure gradient develops directly north of the area and perpendicular to the Santa Ynez Mountains. They bring gusty, low humidity winds which can reach up to 80 mph and blow over the Santa Ynez Mountain range and descend towards the Pacific Ocean. Sundowner events are most prevalent in the spring and summer months but can strike at any time of the year. Sundowners are particularly dangerous during the wildfire season because the hot, dry air can fuel raging wildfires on the south coast. As the winds come up and over the mountain, they warm and dry the air (which is typically cool and moist along the coast) and gain speed coming down through the passes and coastal canyons causing a high wind speed. These winds often precede Santa Ana winds which are warm, dry, and can exceed 40 mph (Live Science 2012). Santa Ana winds are most prevalent in the autumn and winter months. These winds originate from cool, dry high-pressure air masses in the Great Basin. They come up, over, and are pulled southward down the eastern side of the Sierra Nevada Mountains and into the Southern California region (NWS 2021b).

Beaufort Wind Scale

The Beaufort Wind Scale was created in 1805 to estimate wind based on visual observations and is still used today.

Force	Speed (MPH)	Description
0	0-1	Calm
1	1-3	Light Air
2	4-7	Light Breeze
3	8-12	Gentle Breeze
4	13-18	Moderate Breeze
5	19-24	Fresh Breeze
6	25-31	Strong Breeze
7	32-38	Near Gale
8	39-46	Gale
9	47-54	Severe Gale
10	55-63	Storm
11	64-72	Violent Storm
12	72-83	Hurricane

Source: NOAA National Weather Service

Location and Extent of Hazard in Santa Barbara County

All of Santa Barbara County is susceptible to Santa Ana winds. Only the south county is susceptible to sundowner winds due to the unique east-west orientation of the Santa Ynez Mountains and the Pacific Coast which generates the required high-pressure gradient necessary for these winds to occur.

History of Hazard in Santa Barbara County

Sundowner winds have a complex history in the County. They have caused extreme heat bringing record-breaking temperatures to the area (such as the Simoon event in Goleta in 1859), as well as exacerbating fire weather and expanding already burning brush fires (such as the Painted Cave Fire in 1990, Gap and Tea Fire in 2008, Jesusita Fire in 2009, and Sherpa Fire in 2016). Santa Ana winds were strong and persistent during the Thomas Fire in 2017, causing a wind event on and off for a little over two weeks. Beyond extreme heat and dangerous fire weather conditions, winds can cause damage to critical infrastructure, crops/agriculture, and personal property.

Probability of Occurrence

Likely - Santa Barbara County is at risk of windstorms at any given time during the calendar year.

Climate Change Considerations

Climate change effects, although still being studied, will affect sundowner and Santa Ana windstorms in the future. Severe weather events, including strong winds and sundowners, are expected to become more frequent with climate change; however, recent studies suggest that climate change and global warming may decrease the frequency of Santa Ana wind events in the early and late season – fall and spring – but the peak season and intensity of these wind events likely to remain unchanged (Guzman-Morales and Gershunov 2019). Another 2019 study pointed to natural climate cycles and changing temperatures for the wind changes, suggesting that wind speeds declined by an estimated 8 percent between 1980 and 2010, but have significantly increased in the past decade, and are likely to continue to increase in the future (Zeng et al. 2019). Contradicting research suggests that in some areas wind speeds will increase while others decrease, possibly due to temperature changes caused by climate change.

Incident Profile: Wind-driven Alisal Wildfire

In 2021, after a long fire season, the Alisal Fire broke out on the southern slopes of the Santa Ynez Mountains along the Gaviota Coast. Intense, sundowner and Santa Ana winds, along with dense, dry chaparral vegetation, caused the fire to quick grow in size as the winds pushed the fire downslope towards the Pacific Ocean. Similar wind conditions have contributed to the spread of other wildfires along the Gaviota Coast in the past, including the 2016 Sherpa Fire and 2017 Whittier Fire.

Photo: Eliason 2021

5.4.3 Hailstorm

Description of Hazard

Hail is a type of precipitation that is formed when water droplets freeze together as they are thrown high into the upper atmosphere, collecting layers of water attaching and freezing to the droplet, by the violent internal forces of thunderstorms (NOAA National Severe Storms Library [NSSL] 2021). Hail is sometimes associated with severe storms within the County. Hailstones are usually less than two inches in diameter and the speed at which it falls depends on the size of the hailstones. Hailstones typically associated with a severe storm, which range from 1 inch to 1.75 inches in diameter, can fall at speeds between 25 and 40 mph, while much larger hailstones exceeding 4 inches in diameter can fall at speeds over 100 mph (NOAA NSSL 2021). Severe hailstorms producing larger size hail can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.

Incident Profile: 2021 Hailstorm

On March 10, 2021, a rain cell dropped hail on the downtown area of the City of Santa Barbara, blanketing the ground in finer-sized hailstones and creating difficult driving conditions.

Photo: Burciaga 2021

The extent of adverse weather, particularly severe storms that involve heavy rain and hail, can be measured according to hail by diameter sizes. The NWS classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population, such as a 0.75-inch diameter corresponding to the size of a dime.

There is no clear distinction between storms that do and do not produce hailstones. Nearly all severe thunderstorms probably produce hail aloft, though it may melt before reaching the ground. Multi-cell thunderstorms produce many hailstones, but not usually the largest hailstones. In the life cycle of the multi-cell thunderstorm, the mature stage is relatively short so there is not much time for the growth of the hailstone. Supercell thunderstorms have sustained updrafts that support large hail formation by repeatedly lifting the hailstones into the very cold air at the top of the thunderstorm cloud. In general, hail 2 inches (5 cm) or larger in diameter is associated with supercells (a little larger than golf ball size which the NWS considers to be 1.75 inches.). Non-supercell storms are capable of producing golf ball-sized hail.

Location and Extent of Hazard in Santa Barbara County

Hailstorms occur infrequently across the entire County and severe occurrences are very rare.

History of Hazard in Santa Barbara County

According to the NOAA Storm Events Database, on January 20, 1982, hail 1.75 inches in diameter fell from Buellton to Goleta, causing several accidents on San Marcos Pass (SR 154). Hail 0.75 inches in diameter fell throughout the County on February 13, 1992. On April 5, 2001, 0.25 diameter hail fell in the City of Carpinteria, accumulating up to one inch along Bates Road near the County border with Ventura County. 20 vehicles were damaged and one person was injured. On February 22, 2005, the California Highway Patrol reported 0.75-inch hail accumulating several inches on the road between El Capitan and Refugio Beaches on the Gaviota Coast. Two reports of nickel-sized hail in Cuyama were reported on May 17, 2006, from a severe thunderstorm (NOAA 2021d). On November 29, 2018, a cold front brought record rainfall to the Santa Maria area, as well as rain and dime-sized hail to other parts of the County (Burciaga 2018). On March 10, 2021, a small rainstorm dropped finer-size hail on the City of Santa Barbara (Hennessee 2021). Several other incidents have been reported across the County in the past decade, indicating that hailstorms happen irregularly and infrequently throughout the County, but generally occur during the winter rainy season.

Probability of Occurrence

Unlikely - In any given year, Santa Barbara County can be subject to hailstorm conditions; however, as demonstrated by historic weather conditions, hailstorms are unlikely in the county.

Climate Change Considerations

Hailstorms have the possibility of becoming more frequent with the climate temperatures increasing, and the atmosphere becoming more convective. According to a review published in Nature, it is generally anticipated that low-level moisture and convective instability will increase, raising hailstorm likelihood and enabling the formation of larger hailstones; the melting height will rise, enhancing hail melt and increasing the average size of surviving hailstones; and vertical wind shear will decrease overall, with limited influence on the overall hailstorm activity, owing to a predominance of other factors. Observations and modeling lead to the general expectation that hailstorm frequency will increase in Australia and Europe, but decrease in East Asia and North America, while hail severity will increase in most regions (Raupach et al. 2021).

5.4.4 Tornado

Description of Hazard

A **tornado** is defined as a violent rotating, funnel-shaped column of air extending downward from a cumulonimbus cloud to the ground (FEMA 2021c). Tornadoes can have the same pressure differential that fuels 300-mile-wide hurricanes across a path only 300-yards-wide or less and are capable of tremendous destruction with wind speeds of up to 300 mph, making them the most powerful storms that exist. Most tornadoes form from thunderstorms. They need warm, moist air from the Gulf of Mexico and cool, dry air from Canada. When these two air masses meet, they create instability in the atmosphere. A change in wind direction and an increase in wind speed with increasing height create an invisible, horizontal spinning effect in the lower atmosphere. Rising air within the updraft tilts the rotating air from horizontal to vertical. An area of rotation, 2-6 miles wide, now extends through much of the storm. Most strong and violent tornadoes form within this area of strong rotation. They can destroy large buildings, uproot trees and throw vehicles hundreds of yards. Damage paths can be more than one mile wide to 50 miles long.

Before February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and a better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. Table 5-14 shows the wind speeds associated with the Enhanced Fujita scale ratings and the damage that could result at different levels of intensity.

Table 5-14. Enhanced Fujita Tornado Scale Classification

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Speed Estimate (mph)	Potential Damage
EF0	65-85	Minor damage. Peels surface off some roofs; some damage to gutters or siding; branches break off trees; shallow-rooted trees are pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	Considerable damage. Roofs torn off from well-constructed houses; foundations of frame homes shifted; mobile homes destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged.
EF4	166-200	Devastating damage. Well-constructed and whole frame houses completely leveled; cars and other large objects thrown, and small missiles generated.
EF5	Over 200	Incredible damage. Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately 1 mile (1.6 km).

Location and Extent of Hazard in Santa Barbara County

Although highly unlikely, tornadoes have the potential to happen anywhere in the County. The five historical events described below occurred in Goleta, the unincorporated county between Buellton and Lompoc, Santa Maria, Lompoc, and Ellwood (NOAA National Centers for Environmental Information [NCEI] 2021a).

History of Hazard in Santa Barbara County

Based on the NOAA Storm Events Database, between 1950 and 2021 there have been a combined 5 tornado/funnel cloud events in the County (NOAA NCEI 2021a). Each of these events did not qualify as significant tornadoes and resulted in a combined total of $25,250 in property damage. The most damaging of these events took place on January 3rd, 1977, when a category EF0 waterspout (a weaker tornado that forms over water) 30 yards in width moved onshore near Goleta and damaged several hangers and small aircraft, and disrupted electrical service for many hours, resulting in an estimated $25,000 of damages. The second most damaging tornado event took place on December 29, 1991, when a smaller, EF0 category tornado 10 yards in width occurred in the Santa Rita Hills near the City of Buellton injured two persons and resulted in an estimated $250 in damages. On November 29, 2011, another EF0 tornado 0.1 miles in length and 2 yards in width struck Santa Maria, causing minor damage to three homes. On March 29, 2006, an EF0 tornado 4 yards in width touched down in Lompoc in a parking lot of a strip mall along North H street, causing no significant damage. Most recently, on January 19, 2010, a tornado 0.14 miles in length and 10 yards in width touched down in Isla Vista (NOAA NCEI 2021a). As a comparison, the State of California has experienced 464 tornado events between 1950 and 2021 causing an estimated $134,689,000 in property damage and $1,512,000 in crop damage, with the vast majority being EF0 and EF1 tornadoes (NOAA NCEI 2021b). On December 25, 2019, a tornado warning was issued for eastern portions of the city of Santa Barbara to Montecito to Carpinteria to Summerland due to a severe thunderstorm capable of producing a tornado moving over the water moving north at 45 mph (Padilla 2019). However, the tornado warning was later canceled.

Probability of Occurrence

Unlikely - A total of five tornado events have occurred in the County over 71 years of record-keeping, which equates to one tornado event every 14.2 years, on average, and a 7 percent change of a tornado event occurring in any given year. Therefore, although possible, Santa Barbara County is at very low risk of experiencing a significant tornado event.

Climate Change Considerations

Because climate change effects are still being studied, it is difficult to say if changing climate conditions will increase the chance of a significant tornado impacting the County in the future. There presently is not enough data or research to quantify the magnitude of change that climate change may have related to tornado frequency and intensity. Meteorologists are still trying to understand why exactly some thunderstorms generate tornadoes while others don't. Tornadoes are also difficult to model in climate projections due to their small size and short-lived nature. Due to these difficulties in modeling tornadoes in climate projections, scientists instead are studying the weather conditions that support the development of supercell thunderstorms (the type that produces tornadoes), including warm, moist air, an unstable atmosphere, and wind at different levels moving in different directions at different speeds, a phenomenon known as wind shear. Generally, scientists have found that as global temperatures rise, the hotter atmosphere can hold more moisture increasing atmospheric instability, a vital supercell ingredient. However, as the planet warms, wind shear (another vital ingredient) is likely to decrease. These two forces work against each other, and it is difficult to anticipate which might have a greater impact on tornado formation. Other studies have predicted that climate change could provide the opportunity for more severe thunderstorms to form. However, this does not necessarily mean that more tornadoes will occur, especially because only about 20 percent of supercell thunderstorms produce tornadoes, demonstrating a lack of clear consensus amongst the scientific community (National Geographic 2019). Because of uncertainty about the influence of climate change on tornadoes, future updates to the mitigation plan should include the latest research on how the tornado hazard frequency and severity could change. The level of significance of this hazard should be revisited over time.

5.4.5 Hurricane

Description of Hazard

A **hurricane** is a massive storm system that forms over warm ocean waters and moves towards land. They are an example of a tropical cyclone and can be up to 600 miles across and have maximum sustained surface wind speeds of 74 mph or more (FEMA 2021d). Each hurricane usually lasts for over a week, moving 10-20 miles per hour over the open ocean. Hurricanes gather heat and energy through contact with warm ocean waters. Hurricanes only form over really warm ocean water of 80°F or warmer. Evaporation from the seawater increases their power. Hurricanes rotate in a counterclockwise direction around an "eye" in the Northern Hemisphere and a clockwise direction in the Southern Hemisphere. The center of the storm or "eye" is the calmest part.

Hurricanes develop in stages, working their way up to hurricane status. They start as a tropical wave, a low-pressure trough with slow surface wind speeds, and gradually increase in size and severity as they form greater areas of low pressure, generating thunderstorms, heavy rain, and greater wind speeds.

Table 5-15. Hurricane Stages

Tropical Wave	A low-pressure trough moving generally westward with the trade winds.
Tropical Disturbance	An organized area of thunderstorms that usually forms in the tropics. Typically, they maintain their identity for 24 hours and are accompanied by heavy rains and gusty winds.
Tropical Cyclone	A generic term for any organized low pressure that develops over tropical and sometimes sub-tropical waters. Tropical depressions, tropical storms, and hurricanes are all examples of tropical cyclones.
Tropical Depression	An organized area of low pressure in which sustained winds are 38 mph or less.
Tropical Storm	A tropical cyclone with maximum sustained wind speeds that range from 39 to 73 mph.
Hurricane	A tropical cyclone with sustained surface winds of at least 74 mph.

Source: NOAA National Hurricane Center (NHC) 2021.

Once a hurricane forms, it is categorized by several key characteristics (winds, pressure, and damage) based on the Saffir-Simpson Hurricane Scale to indicate a hurricane’s intensity (see Table 5-16). These categories range from one to five, with Category 3 or higher hurricanes being classified as “major” hurricanes.

Table 5-16. Saffir-Simpson Hurricane Scale Classification

Saffir-Simpson Category	Sustained Wind Speed (mph)	Damage	Potential Damage
1	74-95	Moderate	Well-constructed frame homes could have damage to roofs, shingles, vinyl siding, and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Extensive	Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129	Devastating	Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156	Catastrophic	Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	>156	Catastrophic	A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA National Hurricane Center (NHC) 2021.

Location and Extent of Hazard in Santa Barbara County

Although highly unlikely, the entire county is subject to being hit by a hurricane.

History of Hazard in Santa Barbara County

Based on the NOAA Storm Events Database, between 1950 and 2021 no significant hurricanes have hit the County (NOAA NCEI 2021c). This is because tropical storm winds generally blow from east to west and the waters off the coast of Santa Barbara are cooler.

Probability of Occurrence

Unlikely - Although possible, Santa Barbara County is at very low risk of experiencing a significant hurricane event.

Climate Change Considerations

Because climate change effects are still being studied it is difficult to say if changing climate conditions will increase the chance of a significant hurricane impacting the County in the future. Ocean temperatures would need to rise significantly to provide suitable conditions for a hurricane off the County's coast.

5.5 URBAN AND HUMAN-CAUSED HAZARDS

5.5.1 Pandemic/Public Health Emergency

Description of Hazard

The amount of a particular disease that is usually present in a community is referred to as the baseline or endemic level of the disease. This level is not necessarily the desired level, which may be zero, but rather is the observed level. In the absence of intervention and assuming that the level is not high enough to deplete the pool of susceptible persons, the disease may continue to occur at this level indefinitely. Thus, the baseline level is often regarded as the expected level of the disease (Center for Disease Control and Prevention 2012).

While some diseases are so rare in a given population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), other diseases occur more commonly so that only deviations from the norm warrant investigation. **Sporadic** refers to a disease that occurs infrequently and irregularly. **Endemic** refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area. **Hyperendemic** refers to persistent, high levels of disease occurrence (CDC 2012).

Occasionally, the amount of disease in a community rises above the expected level. When diseases spread quickly and easily, they may be classified as an outbreak, epidemic, or pandemic. An **outbreak** is when there are more cases than would be normally expected, often suddenly, of an infectious disease in a more limited geographic area (e.g., a community or facility). An **epidemic** carries the same definition as an outbreak but affects a population of a large geographic area and may occur seasonally. A **pandemic** refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people (CDC 2012). Pandemics are larger than epidemics in terms of geographic area and the number of people affected. Pandemics are most often caused by new subtypes of viruses or bacteria to which humans have little or no natural resistance. Consequently, pandemics typically result in more deaths, social disruption, and economic loss than epidemics. Examples include pandemic influenza, Severe Acute Respiratory Syndrome (SARS), and the Coronavirus (COVID-19).

Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. More specifically, an epidemic may result from:

- A recent increase in the amount or virulence of the agent;
- The recent introduction of the agent into a setting where it has not been before;
- An enhanced mode of transmission so that more susceptible persons are exposed;
- A change in the susceptibility of the host response to the agent; and/or
- Factors that increase host exposure or involve introduction through new portals of entry (CDC 2012).

Three conditions trigger a pandemic declaration:

1. A new virus subtype must emerge that has not previously circulated in humans (and therefore there is no pre-existing immunity);
2. This new subtype must be able to cause disease in humans; and
3. The virus must be easily transmissible from human to human.

Pandemics may be caused by:

- Naturally occurring diseases spread person to person (e.g., measles, mumps, meningococcal disease, tuberculosis);
- Food-borne (e.g., salmonella, E. coli, botulinum toxin, etc.);
- Vectors such as a mosquito that spread disease (e.g., West Nile virus, dengue, Zika, malaria);
- Newly emerging infectious diseases (e.g., Ebola, Zika, SARS, MERS, avian influenza); and
- The intentionally caused spread of disease or toxins, known as bioterrorism (e.g., the contamination of restaurant food with E. coli in Oregon [1984].

Public health measures are used to control outbreaks, epidemics, or pandemics of infectious diseases, and are especially important for diseases with high morbidity or mortality and limited medical prophylaxis and/or rapid treatment. Measures to control disease include:

- Legal measures (e.g., isolation and quarantine of persons or products, and legal closure of food establishments);
- Control of contaminated food or water through recall of product or, for water, "Do Not Use", "Do Not Drink" or "Boil Water" orders issued by state or local health departments;
- Individual mandates (e.g., wearing masks) to prevent spreading respiratory droplets;
- Social measures (e.g., social distancing); and
- Vector control to eliminate vectors, such as mosquitos, that carry the disease from person to person.

Secondary impacts include significant economic disruption to a community's infrastructure due to loss of employee work time, essential services and products, and costs of treating or preventing the spread of the disease. The disease could affect the County's infrastructure, and the ability of the Emergency Operations Center and other County departments to respond due to disease-related loss of staff.

The Vector-Borne Disease Section of the California Department of Public Health reports risk or potential risk of exposure to the following vector-borne disease in California (California Department of Public Health 2021):

- Mosquito-Borne Diseases:
  - Zika
  - Chikungunya
  - Dengue
  - West Nile Virus
  - St. Louis Encephalitis Virus
  - Malaria
- Tick-Borne Diseases:
  - Lyme Disease
  - Anaplasmosis
  - Babesiosis
  - Ehrlichiosis
  - Rocky Mountain Spotted Fever
  - Pacific Coast Tick Fever
  - Tick Paralysis
  - Tularemia
- Flea-Borne Typhus
- Hantavirus Pulmonary Syndrome
- Plague

Location and Extent of Hazard in Santa Barbara County

Public health emergencies, such as infectious disease hazards or epidemics, occur not only on a county or state level but on a national and global scale. It is likely that most communities in Santa Barbara County would be affected, either directly or by secondary impacts. Some indirect consequences may be the diversion of resources that may be otherwise available. Often, poorer communities around the world, especially those in remote areas, lack easy access to care (World Health Organization [WHO] 2018).

History of Hazard in Santa Barbara County

Outbreaks, epidemics, or pandemics can occur when a new virus emerges to which the population has little immunity.

Pandemics

The 20th century saw three pandemics, the most notable of which was the 1918 Spanish influenza pandemic that was responsible for 40 to 50 million deaths throughout the world. Since the early 20th century, five pandemics have swept the globe. The most notable pandemic of the 21st century is the current COVID-19 pandemic, described further below:

- **1918** – The Spanish Flu, an H1N1 virus, was arguably the most severe pandemic in recent history. The number of deaths was estimated to be 40 to 50 million worldwide and 500,000 in the U.S. Its primary victims were mostly young, previously healthy adults. At one point, more than 10 percent of the American workforce was bedridden (U.S. Department of Health and Human Services 2005).
- **1957** – The H3N2 pandemic in 1957, which was referred to as the "Asian Flu," killed 1 to 2 million people worldwide, including approximately 70,000 people in the U.S., mostly infants, the elderly, and the chronically ill. Fortunately, the virus was quickly identified, and vaccine production began in May 1957 (U.S. Department of Health and Human Services 2005).
- **1968** – Another H3N2 pandemic occurred in 1968, which was commonly referred to as the "Hong Kong Flu." This virus killed 34,000 in the U.S. Again, the elderly were more severely affected. This pandemic peaked during school holidays in December, limiting student-related infections, which may have kept the number of infections down. Also, people infected by the Asian Flu ten years earlier may have gained some resistance to the new virus (U.S. Department of Health and Human Services 2005).
- **2009** –In the spring of 2009, a novel influenza A (H1N1) virus "Swine Flu" emerged. It was detected first in the United States and spread quickly across the U.S. and the world. This new H1N1 virus contained a unique combination of influenza genes not previously identified in animals or people. This virus was designated as influenza A (H1N1) pdm09 virus. The (H1N1) pdm09 virus was very different from the H1N1 viruses that were circulating at the time of the pandemic. Few young people had any existing immunity (as detected by antibody response) to the (H1N1) pdm09 virus, but nearly one-third of people over 60 years old had antibodies against this virus, likely from exposure to an older H1N1 virus earlier in their lives. Since the (H1N1) pdm09 virus was very different from circulating H1N1 viruses, vaccination with seasonal flu vaccines offered little cross-protection against (H1N1) pdm09 virus infection. While a monovalent (H1N1) pdm09 vaccine was produced, it was not available in large quantities until late November – after the peak of illness during the second wave had come and gone in the U.S. From April 12, 2009, to April 10, 2010, the CDC estimated there were 60.8 million cases, 274,304 hospitalizations, and 12,469 deaths in the U.S. due to the (H1N1) pdm09 virus. Additionally, the CDC estimated that 151,700-575,400 people worldwide died from (H1N1) pdm09 virus infection during the first year the virus circulated. Globally, 80 percent of (H1N1) pdm09 virus-related deaths were estimated to have occurred in people younger than 65 years of age. This differs greatly from typical seasonal influenza epidemics, during which about 70 percent to 90 percent of deaths are estimated to occur in people 65 years and older (CDC 2019). Within Santa Barbara County, the County Public Health Department coordinated the distribution of the initially limited supplies of H1N1 vaccine to medical providers. The vaccine distribution was targeted so that those providers that served the highest risk patients received the vaccine first. In addition, the department held numerous community vaccine clinics countywide

where free H1N1 vaccinations were given. Together with community response providers, more than 126,000 dosages of the vaccine against pandemic H1N1 flu were distributed countywide (County Public Health Department 2010).

- **2019-Ongoing** – The COVID-19 pandemic has severely impacted the economic, political, social, and environmental conditions of the county, California, the U.S., and the world. Older adults and people who have severe underlying medical conditions like heart or lung disease or diabetes seem to be at higher risk for developing more serious complications from COVID-19 illness; however, numerous stories were reported of young and healthy people who developed the disease and had serious complications. People with COVID-19 have had a wide range of symptoms reported – ranging from mild symptoms to severe illness. Symptoms of COVID-19 include fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion, runny nose, nausea, or vomiting, and diarrhea. Symptoms may appear 2-14 days after exposure to the virus. Anyone can have mild to severe symptoms (CDC 2021). On January 26, 2020, the CDC confirmed the first COVID-19 case in California, the third case in the U.S. As of January 2022, there have been 56,574 confirmed COVID-19 cases within the county and 575 deaths (Santa Barbara County Public Health Department 2021a). The peaks with the highest numbers of cases occurred in early May, July, and from December to February. As of January 2022, 74 percent of Santa Barbara County was fully vaccinated (Santa Barbara County Public Health Department 2021b).

Incident Profile: COVID-19 Pandemic

In late 2019, the Coronavirus disease 2019 (COVID-19) emerged and quickly spread across the globe. In March 2020, the World Health Organization declared COVID-19 to be a global pandemic. The Centers for Disease Control and Prevention confirmed the first US coronavirus case on January 21, 2020. The first positive COVID-19 case in Santa Barbara County was confirmed on March 15, 2020. Vaccinations began in December 2020. As of October 3, 2021, there have been 42,408 confirmed COVID-19 cases within the County and 504 deaths (Santa Barbara County Public Health Department 2021b).

Epidemics

- **2003** – SARS is a respiratory illness that affected many people worldwide in 2003. It was caused by a coronavirus, called SARS-associated coronavirus (SARS-CoV). SARS was first reported in China in February 2003. The illness spread to 29 countries, where 8,096 people got SARS, and 774 of them died. Only eight people in the U.S. got SARS and none of them died. The SARS global outbreak was contained in July 2003. Since 2004, there have not been any known cases of SARS reported anywhere in the world (CDC 2016).

Outbreaks

In addition to pandemics that impacted the world, food-borne and other outbreaks occur every few years in Santa Barbara County, commonly the result of Norovirus.

- **2013 –** In November 2013, a Serogroup B Meningococcal Disease outbreak occurred at UC Santa Barbara requiring a joint effort between the CDC, U.S. Food and Drug Administration (FDA), California Department of Public Health, and the Santa Barbara County Public Health Department. Symptoms of the disease include fever, myalgias, headache, new rash, vomiting, and photophobia. Meningococcal Disease has a 10- to 30-percent mortality rate; therefore, early treatment is essential for a good outcome. There were four cases of Meningococcal Disease at UC Santa Barbara, and all of the students survived (Santa Barbara County Public Health Department 2013). The FDA approved an investigational new drug to allow for a CDC-approved mass vaccination operation for students (Thoman 2013).
- **2015-2017** –In December 2015, a norovirus outbreak in a retirement community in Santa Barbara sickened more than 100 individuals (Cooper 2015). Again, in May 2017, north county schools in the Orcutt School District (specifically Alice Shaw, Joe Nightingale, Patterson Road, Pine Grove, and Ralph Dunlap Schools) and the Manzanita Charter School on Vandenberg SFB reported numerous cases of gastrointestinal symptoms consistent with a possible outbreak of Norovirus (Santa Barbara County Public Health District 2017). Norovirus is a highly contagious virus that causes gastrointestinal illness that induces vomiting, diarrhea, low-grade fevers, nausea, and generalized fatigue. It is known for sweeping through schools, office buildings, and other close quarters, and infecting a large number of people. Symptoms usually begin about 24 to 48 hours after close exposure (Noozhawk 2015).

Probability of Occurrence

Likely – Even before the COVID-19 pandemic began, most public health experts considered another major pandemic to be inevitable. Given the effects of globalization, the intense mobility of human populations, and the relentless urbanization, it is likely that the next emerging virus will also spread fast and far. It is impossible to predict the nature of this virus or its source, or where it will start spreading. Some indicators will be present, but not every new virus turns into a pandemic (WHO 2018). Based on the five pandemics that have affected the U.S. in roughly the last 100 years, a pandemic occurs on average approximately every 20 years.

Disease outbreaks and flu epidemics occur on an ongoing basis. As described above, food-borne outbreaks occur every year in Santa Barbara County, commonly the result of Norovirus. Occasionally, these outbreaks require the initiation of the Santa Barbara County Public Health Department Infectious Disease Response Plan but have required little to no support from the County Emergency Operations Center. There is a continued threat from a novel influenza virus or other emerging epidemic diseases that would require a disaster response at the Emergency Operations Center level.

Climate Change Consideration

It is widely accepted that the effects of climate change will facilitate increases in the frequency of infectious diseases. A recent publication by Harvard University states (Harvard University 2021):

> *"As the planet heats up, animals big and small, on land and in the sea, are headed to the poles to get out of the heat. That means animals are coming into contact with other animals they normally wouldn't, and that creates an opportunity for pathogens to get into new hosts.*

Many of the root causes of climate change also increase the risk of pandemics. Deforestation, which occurs mostly for agricultural purposes, is the largest cause of habitat loss worldwide. Loss of habitat forces animals to migrate and potentially contact other animals or people and share germs. Large livestock farms can also serve as a source for spillover of infections from animals to people."

According to the National Institute of Environmental Health Services, many vector-borne and zoonotic diseases are climate-sensitive and ecological shifts associated with climate change are expected to impact the distribution and incidences of these diseases (NIH 2018). While many vector-borne and zoonotic diseases, such as malaria, yellow fever, dengue, and murine typhus, are rarely seen in the U.S., the county is directly susceptible to vector-borne and zoonotic diseases that are found in warmer climates and vulnerable due to global trade and travel. Changes in temperature and precipitation directly affect vector-borne disease transmission through pathogen-host interaction, and indirectly through ecosystem changes and species composition. As temperatures increases, vectors can spread into new areas that were previously too cold. During warm weather, animal species that carry diseases typically become more active and insects and other pests reproduce more rapidly. As climate change causes warmer temperatures earlier in the spring and later in the autumn, these animals may be active for longer periods, increasing the time that diseases can be transmitted (NIH 2018).

Additionally, disruption and movement of the human population, such as global travel and new development in undisturbed areas, can expand the distribution of pathogens and increase exposure routes. As climate change alters temperatures, wildfires, and precipitation patterns, it causes a decrease in biodiversity, which subsequently alters predator-prey relationships. A decline in the predators of vectors can increase vector populations which spread vector-borne diseases (NIH 2018).

Further, climate-related natural disasters (e.g., wildfire, drought and water shortage, flood, coastal hazards) also increase the risk of infectious disease by disrupting health services and infrastructures and damaging water and sanitation networks (WHO 2018).

5.5.2 Cyber Threat

Description of Hazard

The 2018 California State Hazard Mitigation Plan defines cyber-attacks as "attempts by cyber criminals to attack a government, organization, or private party by damaging or disrupting a computer or computer network, or by or stealing data from a computer or computer network for malicious use." Cyber-attacks use malicious code to alter computer operations or data. The vulnerability of computer systems to attacks is a growing concern as people and institutions become more dependent upon networked technologies. The Federal Bureau of Investigation (FBI) reports that "cyber intrusions are becoming more commonplace, more dangerous, and more sophisticated," with implications for private- and public-sector networks. Cyber threats can take many forms, including:

- **Phishing attacks:** Phishing attacks are fraudulent communications that appear to come from legitimate sources. Phishing attacks typically come through email but may come through text messages as well. Phishing may also be considered a type of social engineering meant to exploit employees into paying fake invoices, providing passwords, or sending sensitive information.

- **Malware attacks:** Malware is malicious code that may infect a computer system. Malware typically gains a foothold when a user visits an unsafe site, downloads untrusted software, or may be downloaded in conjunction with a phishing attack. Malware can remain undetected for years and spread across an entire network.
- **Ransomware:** Ransomware typically blocks access to a jurisdiction's/agency's/ business' data by:
  - **Encrypting it.** Perpetrators will ask for a ransom to provide the security key and decrypt the data, although many ransomware victims never get their data back even after paying the ransom.
  - **Distributed Denial of Service (DDoS) attack:** Perhaps the most common type of cyber-attack, a DDoS attack seeks to overwhelm a network and causes it to either be inaccessible or shut down. A DDoS typically uses other infected systems and internet-connected devices to "request" information from a specific network or server that is not configured or powerful enough to handle the traffic.
  - **Data breach:** Hackers gaining access to large amounts of personal, sensitive, or confidential information has become increasingly common in recent years. In addition to networked systems, data breaches can occur due to the mishandling of external drives.
  - **Critical Infrastructure/SCADA System attack:** There have been recent critical infrastructure Supervisory Control and Data Acquisition (SCADA) system attacks aimed at taking down lifelines such as power plants and wastewater facilities. These attacks typically combine a form of phishing, malware, or other social engineering mechanisms to gain access to the system.

The 2018 California State Hazard Mitigation Plan states: "Nationally, cybersecurity incidents such as financial fraud and government database breaches have increased from 5,503 in 2006 to 67,168 in 2014." This is more than a 1,200 percent increase in occurrence over just 8 years. As this trend continues and society and government functions become ever more technologically dependent, this hazard is of increasing concern. In one recent attempt to combat this threat, the State of California adopted Senate Bill 327 in September of 2018. This bill seeks to improve information privacy, specifically on connected devices. Existing laws in California require businesses to take all reasonable steps to dispose of customer records within their custody containing personal information and also require businesses that own, license, or maintain personal information about a California resident to implement and maintain reasonable security procedures. Senate Bill 327, which went into effect on January 1, 2020, further requires the manufacturer of connected devices to equip the device with a reasonable security feature to protect user information.

Location and Extent of Hazard in Santa Barbara County

Cyber-attacks can and have occurred in every location regardless of geography, demographics, and security posture. Incidents may involve a single location or multiple geographic areas. A disruption can have far-reaching effects beyond the location of the targeted system; disruptions that occur far outside the state can still impact people, businesses, and institutions within the county.

The Santa Barbara County Grand Jury determined in 2020 that cyber-attacks and related threats are an ongoing security issue for all public entities within the county, which requires prompt and aggressive actions to prevent significant disruption (Santa Barbara County Grand Jury 2020). This hazard can occur anywhere within the county; however, cyber threats are generally targeted at larger corporations or the government.

History of Hazard in Santa Barbara County

Nationally, cybersecurity incidents such as financial fraud and government database breaches have increased from 5,503 in 2006 to 67,168 in 2014. This increase raises the question of whether there is a cybersecurity threat in California. Between 2012 and 2015, 50 million records of Californians were breached, and the majority of these breaches resulted from security failures, with malware and hacking; physical breaches constituted three-quarters of all events. As the use of digital information expands, Californians will increasingly become more vulnerable to the slow-moving, potential technological hazard of cyber damage (Cal OES 2018).

While there have been several smaller cyber threats and hacking, none have reached a level of significance within the county. However, in July 2019, the City of Los Angeles' computers were breached resulting in the theft of personal information from approximately 20,000 applicants to the police department, which compromised the privacy of individuals (Forbes 2019). Additionally, in October 2019, more than 140 ransomware demands had been reported in 2019 across the U.S., which were made on city, county, and state government systems including but not limited to health care systems and police departments (CNN 2019). Therefore, the county is at risk of facing similar cyber threats as nearby jurisdictions, including but not limited to the City of Los Angeles.

Probability of Occurrence

Likely – As described above, cyber threats are on the rise globally, nationally, and locally. The probability of occurrence of cyber threats is rapidly increasing, especially with increased reliance on the Internet and cloud-based computing. Small-scale cyber-attacks such as DDoS attacks occur daily, but most have negligible impacts at the local or regional level. Data breaches are also extremely common, but again most have only minor impacts on government services. Perhaps of greatest concern to Santa Barbara County are ransomware attacks, which are becoming increasingly common. It is difficult to predict the odds of Santa Barbara County being hit with a successful ransomware attack in any given year, but it is safe to say it is likely to be attacked in the coming years. The possibility of a larger disruption affecting systems within the county is a constant threat, but it is difficult to quantify the exact probability due to such highly variable factors as the type of attack and intent of the attacker. Major attacks specifically targeting systems or infrastructure in the county cannot be ruled out.

Climate Change Consideration

While there is no evidence to link climate change to an increase in occurrences of cyber threats, the target could be related to issues with individuals or companies perceived to affect the climate (i.e., GHG producers).

5.5.3 Invasive Species

Description of Hazard

Non-indigenous species are transported to new environments, both intentionally and unintentionally, through human activities (Cal OES 2018). The introduction of non-indigenous species into California and Santa Barbara County has fundamentally altered many of the county's environments and ecosystems ranging from the county's upland habitats (e.g., nonnative grasslands) to coastal marine and estuarine waters. A non-indigenous species is considered an invasive species when it becomes established in a new geographic location, causing impacts (Cal OES 2018). Invasive species can cause significant and enduring economic, human health, and environmental impacts.

Terrestrial Invasive Species

Plant invasive species can threaten vegetation native to the county. When exotic plants begin to colonize natural landscapes, each ecosystem is subject to changes that threaten the integrity and longevity of that system. As a result, the native flora and fauna are often displaced with less desirable species (Santa Barbara Botanic Garden 2021). Ecosystem damage caused by invasive plant species can include competition with native species, changes in hydrology and soil chemistry, hazards for natives due to loss of food supply, protective cover, physical harm, and potentially devastating new diseases or insect pests.

Aquatic Invasive Species

In coastal environments, commercial shipping is the most significant vector for species introductions. Ships transfer organisms to California waters from throughout the world. Once introduced, invasive species could become a permanent part of an ecosystem and may flourish, creating environmental imbalances, presenting risks to human health, and causing significant economic problems. The introduction of nonindigenous species into California's marine, estuarine, and freshwater environments can cause significant economic, human health, and ecological impacts (Cal OES 2018). Biofouling organisms are aquatic species attached to or associated with submerged or wetted hard surfaces, such as pipes or piers.

The quagga mussel and closely related zebra mussel are two of the most devastating aquatic pests in the U.S. The small freshwater mussels grow on hard surfaces such as water pipes and can cause major problems for water infrastructure. They can also negatively impact ecosystems and fisheries by feeding on microscopic plants and animals that support the food web. First appearing in North America in the 1980s, they appeared in California in 2007. The cost of managing these mussels is estimated at billions of dollars since their introduction into the U.S. (UC Santa Barbara 2019).

Location and Extent of Hazard in Santa Barbara County

Terrestrial Invasive Species

All of Satna Barbara County, including wildlands, are subject to invasive plant species. Non-indigenous species occur throughout the County and are often very prevalent within the County's grassland and riparian woodland habitats, with Mediterranean annual species such as wild oats (*Avena fatua*) dominating the County's grasslands displacing perennial native bunch grasses, Harding grass occupying much of the undeveloped land on More Mesa and species such as giant reed and salt cedar impacting local creeks and rivers. These riparian invasive species even reach the Sisquoc River, deep in the heart of the San Rafael Wilderness (Santa Barbara County Agricultural Commissioner's Office 2011). The Cachuma Resource Conservation District provides a list of some of the most comment and/or problematic invasive plant species in Santa Barbara County (Table 5-17). It should be noted that this is not an exhaustive list of all invasive plant species, as there are over 700 non-native plant species that occur in wildlands in Santa Barbara County (Cachuma Resource Conservation District 2021).

Table 5-17. Comment Invasive Plant Species in Santa Barbara County

Common Name	Scientific Name	Common Name	Scientific Name
Scotch Broom	*Cytisus scoparius*	Black Mustard	*Brassica nigra*
French Broom	*Genista monspessulana*	Broad Leaved Pepper Grass	*Lepidium latifolium*
Spanish Broom, Gorse	*Spartium junceum*	Hoary Cress	*Cardaria draba*
Bermuda Grass	*Cynodon dactylon*	Mediterranean Hoary Mustard	*Hirschfeldia incana*
Crimson Fountaingrass	*Pennisetum setaceum*	Saharan Mustard	*Brassica tournefortii*
European Beach Grass	*Ammophila arenaria*	White Top	*Cardaria pubescens*
Feathertop	*Pennisetum villosum*	Wild Radish	*Raphanus sativus*
Giant Reed	*Arundo donax*	Artichoke Thistle, Cardoon	*Cynara cardunculus*
Harding Grass	*Phalaris aquatica*	Bull Thistle	*Cirsium vulgare*
Kikuyugrass	*Pennisetum clandestinum*	Woolly Distaff Thistle	*Carthamus lanatus*
Medusa Head	*Taeniatherum caput-medusae*	Italian Thistle	*Carduus pycnocephalus*
Mexican Feathergrass	*Stipa tenuissima*	Milk Thistle	*Silybum marianum*
Onionweed	*Asphodelus fistulosus*	Red/Purple Star Thistle	*Centaurea calcitrapa*
Pampas Grass	*Cortaderia selloana*	Tocalote	*Centaurea melitensis*
Purple Pampas Grass	*Cortaderia jubata*	Yellow Star Thistle	*Centaurea solstitialis*
Smilograss	*Piptatherum miliaceum*	Lollypop Tree, Ngaio Tree	*Myoporum laetum*
Perennial Veldt Grass	*Ehrharta calycina*	Peruvian Peppertree	*Schinus molle*
Upright Veldt Grass	*Ehrharta erecta*	Saltcedar, Tamarisk	*Tamarix ramosissima*
Common Iceplant	*Mesembryanthemum crystallinum*	Sticky Snakeroot, Thoroughwort	*Ageratina adenophora*
False Ice Plant	*Conicosia pugioniformis*	Tasmanian Bluegum	*Eucalyptus globulus*
Hottentot Fig	*Carpobrotus edulis*	Tree Of Heaven, Ailanthus	*Ailanthus altissima*
Sea Fig	*Carpobrotus chilensis*	Tree Tobacco	*Nicotiana glauca*
Cape-Ivy	*Delairea odorata*	Calla Lily	*Zantedeschia aethiopica*
English Ivy	*Hedera helix*	Castorbean	*Ricinus communis*
Greater Periwinkle	*Vinca major*		

Source: Cachuma Resource Conservation District 2021.

Aquatic Invasive Species

According to a 2019 scientific article published by UC Santa Barbara, Santa Barbara County's waters have so far been clear of the invasive quagga and zebra mussels, thanks to aggressive measures to prevent contamination (UC Santa Barbara 2019).

While the county's waters are clear of invasive mollusks, the NOAA National Marine Sanctuaries reports that, although invasive species do not appear to be much of an issue at present, there are several algal species (including *Undaria pinnatifida* and *Caulacanthus ustulatus*) that are appearing in Southern California and have proliferated at Santa Catalina Island and other areas the Channel Islands. The Channel Islands National Marine Sanctuary is a NOAA sentinel site spanning 1,470 square miles and surrounding five of the Channel Islands: San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara. The Channel Islands National Marine Sanctuary is vulnerable to introduced marine invasive species due to its location near a major metropolitan area, adjacent to commercial shipping lanes, and the fact that it is frequented by commercial and recreational boaters. *Sargassum horneri* is present along the mainland from Baja California to Santa Barbara, and at three of the five Channel Islands (i.e., Anacapa, Santa Cruz, and Santa Barbara). The Japanese brown alga *Undaria pinnatifida* has been found in Santa Barbara and Ventura Harbors and the brown alga *Sargassum horneri* has been found at Santa Catalina Island. The Asian red alga *Caulacanthus ustulatus* has been observed at one site at Anacapa Island. If these species become established and widespread on the islands, they could outcompete native species and adversely affect species richness and diversity patterns in the invaded habitats. Several ongoing monitoring programs record observations of invasive species as part of their standard procedures, so the sanctuary is hopeful that early detection can be achieved (NOAA National Marine Sanctuaries 2021).

History of Hazard in Santa Barbara County

The history of invasive species in Santa Barbara since at least the time of Spanish exploration and settlement in the 1700s is well documented. The Spanish brought with them the seeds of Mediterranean grasses in the fur of their horses, sheep, and cattle while species like black mustard may have been used to trace remote trails back to Mexico. Eucalyptus trees were imported from Australia and planted in large groves in the late 1800s to support the production of timber for uses such as railroad ties while pampas grass was imported as a decorative ornamental early in the 20th century. A frequent urban animal, the Virginia opossum (*Didelphis virginiana*), was introduced to Los Angeles in the 1890s and soon spread to Santa Barbara County, while the eastern fox squirrel (*Sciurus niger)* was introduced in the 1800s and now threatens to displace the California native western grey squirrel in some areas (Torrey Pines State Natural Reserve 2021). The non-native red fox was imported from the East Coast in the 1870s as a hunting animal and a source for the fur trade, can displace the county's native grey fox and now threatens ground-nesting birds such as the federally threatened west snowy plover (Mercury News 2017).

The County of Santa Barbara Parks Division staff has been conducting aquatic invasive species inspections on vessels being launched at Cachuma Lake since 2008. As described above, to date, staff has no indications that Santa Barbara County's waters, including Cachuma Lake, have been exposed to quagga or zebra mussels, and early detection monitoring has detected no mussels. In December 2013, mussels were discovered in Lake Piru in Ventura County, located 55 miles from

Cachuma Lake. Lake Piru is the first lake infected by the quagga mussel that is not fed by the Colorado River system. As a result, the County of Santa Barbara Parks Division staff began enforcing day-of inspection and an initial 30-day vessel quarantine on all trailered boasts, crafts, and other vessels entering Cachuma Lake, which was an extension of the previous 14-day quarantine period, to provide additional protections against aquatic invasive species (The Independent 2014; Santa Barbara County 2019).

Sargassum horneri, a non-native alga, was discovered in the Santa Barbara Channel in the fall of 2009. This alga can grow in dense patches and can block out sunlight from reaching other native species like kelp. In addition, the Japanese brown alga (*Undaria pinnatifida*) is currently found in mainland harbors and is a potential colonizer in the Channel Islands National Marine Sanctuary (NOAA National Marine Sanctuaries 2021).

Probability of Occurrence

Occasional – While the probability of future occurrence is usually calculated based on experience, different invasive species have different recidivism rates across the county. Based on past occurrences, invasive species will continue to present a constant threat to the county and its jurisdictions.

Climate Change Consideration

According to the International Union for Conservation of Nature (IUCN), globalization over the recent decades has increased the movement of people and goods around the world, leading to a rise in the number of species introduced to areas outside their natural ranges. A 2017 study found that over one-third of all introductions in the past 200 years occurred after 1970 and the rate of introductions is showing no sign of slowing down. A 2020 study predicts that the number of established alien species will increase by 36 percent between 2005 and 2050 (IUCN 2021).

The impacts of invasive species can be compounded by climate change. Extreme climatic events resulting from climate change, such as hurricanes, floods, and droughts can transport invasive species to new areas and decrease the resistance of habitats to invasions. Climate change is also opening up new pathways for the introduction of invasive species. For example, emerging Arctic shipping passages due to melting ice caps will greatly reduce the time taken for ships to travel from Asia to Europe. This will increase the risk of invasive species surviving the journey (IUCN 2021).

Many invasive species can expand rapidly to higher latitudes and altitudes as the climate warms, out-pacing native species. Invasive species that are regularly introduced by humans but have so far failed to establish may succeed in doing so thanks to climate change, creating new sets of invaders.

Some habitats, such as temperate forests and freshwater systems that currently have thermal barriers limiting the establishment of invasive species will become more suitable for alien species as the climate changes (IUCN 2021).

5.5.4 Civil Disturbance

Description of Hazards

The term **civil disorder** is defined by 18 U.S. Code Section 232 as any public disturbance involving acts of violence by assemblages of three or more persons, that causes an immediate danger of or results in damage or injury to the property or person of any other individual. Civil disturbance can range from unlawful forms of protest against socio-political problems to riots.

Civil disorders occur in California sporadically and last from a few days to months. Loss of life and loss of property have occurred in the last 25 years. There are various causes for civil disturbance, all human-caused. All begin as local events. (Cal OES 2018).

As described in the State Hazard Mitigation Plan, the majority of significant civil disorder events in California started in response to violence against people of color, as well as the acquittal of police officers and other persons on trial for committing violence against people of color. For example, the 1992 Los Angeles Riots occurred in response to the acquittal of police officers for the beating of Rodney King. The 2012 Anaheim Protests occurred in response to two fatal shootings by police officers. The 2013 Oakland Riots occurred following the acquittal of George Zimmerman in the shooting death of Trayvon Martin. A series of riots and civil disturbances occurred in Oakland in 2014 following the decision of a Grand Jury in St. Louis to not charge Darren Wilson in the shooting death of black teenager Michael Brown in Ferguson, Missouri (Cal OES 2018).

More recently, in the summer of 2020, a string of peaceful protests as well as violent riots took place across the country in response to graphic images of the killing of George Floyd under a police officer's knee. The anti-racism and anti-police brutality protests resulted in hundreds of reports of police brutality and excessive force used during the protests. In Philadelphia, police sprayed tear gas on a crowd of mainly peaceful protesters trapped on an interstate who had nowhere to go and no way to breathe. In Chicago, officers were given arrest kits so old that the plastic handcuffs were decayed or broken. Los Angeles officers were issued highly technical foam-projectile launchers for crowd control, but many of them had only two hours of training; one of the projectiles bloodied the eye of a homeless man in a wheelchair. Nationally, at least eight people were blinded after being hit with police projectiles (New York Times 2021).

More than a dozen after-action evaluations have been completed, looking at how police departments responded to the demonstrations – some of them chaotic and violent, most peaceful – that broke out in hundreds of cities between late May and the end of August. Across U.S. cities, the reports reveal the extensiveness of police forces that were poorly trained, heavily militarized, and stunningly unprepared for the possibility that large numbers of people would surge into the streets in response to the killing of George Floyd (New York Times 2021).

Incident Profile: George Floyd Protests

Nationwide protests surged following the murder of George Floyd, an unarmed black man, by a Minneapolis police officer. Among them, local members of the area Black Lives Matter chapter and Juneteenth Santa Barbara organized a peaceful protest outside the Santa Barbara Courthouse with thousands in attendance.

Photo: Independent.com

Those first days of protest after Mr. Floyd's killing presented an extraordinary law enforcement challenge, experts say, one that few departments were prepared to tackle. Demonstrations were large, constant, and unpredictable, often springing up organically in several neighborhoods at once. While the vast majority of protests were peaceful, in cities like New York, Philadelphia, Minneapolis, and Portland, buildings were looted and fires were set, and demonstrators hurled firecrackers and Molotov cocktails at law enforcement officers. At least six people were killed; hundreds were injured; thousands were arrested (New York Times 2021).

Departments also were criticized for not planning for protests, despite evidence that they would be large. In Los Angeles, "the lack of adequate planning and preparation caused the Department to be reactive, rather than proactive," inhibiting the officers' ability to control the violence committed by small groups of people. The lack of training and mistakes that were made transcended geography, staffing levels, and financial resources. Almost uniformly, the reports said departments need more training in how to handle large protests (New York Times 2021).

News reports and social media repeatedly blamed police departments for escalating violence instead of taming it. Responding officers often treated all protesters the same, instead of differentiating between peaceful protesters and violent rioters or looters. In part, reports acknowledged, that was because of the chaos. But it was also because the protests pitted demonstrators against officers, who became defensive and emotional in the face of criticism, some reports said (New York Times 2021).

Location and Extent of Hazard in Santa Barbara County

Civil disturbance can occur in any part of the county; however, this hazard generally occurs within larger metropolitan areas, such as the City of Santa Barbara or the City of Santa Maria.

History of Hazard in Santa Barbara County

Santa Barbara's urban communities have on occasion experienced civil unrest, with the college town of Isla Vista perhaps having the most notable disturbances. The most famous act of such civil disturbance occurred on February 25, 1970, where thousands of Vietnam antiwar war protesters rioted, burned the community's Bank of America building to the ground, and then occupied the Santa Barbara Airport to prevent then-Governor Ronald Regan from landing. The National Guard was deployed to respond to the riot. This riot sparked the first of three related disturbances the same year, which encountered smoke, tear gas, arrests, beatings, and brutality. Hundreds of protesters were arrested, and one was killed (The Independent 2020a).

Since that time, major street parties in Isla Vista, such as Halloween and Deltopia have occasionally turned into riots leading to strong law enforcement responses, including barricading the community against nonresidents during such periods and deploying hundreds of police to patrol the town. Most notable is the Deltopia spring break party that turned into a violent riot in the streets of Isla Vista on April 5, 2014. A major disturbance broke out after a UC Santa Barbara police officer was hit in the head with a backpack full of liquor bottles. Law enforcement officers from nearby San Luis Obispo and Ventura counties responded to help the Santa Barbara County deputies already on the scene. Six officers were injured. The entire Deltopia event resulted in 100 arrests and 44 hospitalizations. Stop signs were torn down, small fires were ignited (mostly couches and mattresses), and property was damaged, including street signs and several civilian and police vehicles (CNN 2014; KCBX 2014).

In 2020, footage of the murder of George Floyd incited violent riots and peaceful protests nationwide, including Minneapolis, New York, Los Angeles, and cities within the county, such as Santa Barbara and Santa Maria. Members of the local Black Lives Matter Chapter and Juneteenth Santa Barbara organized peaceful demonstrations, which attracted over a few thousand attendees, to demand a local declaration that racism was a public health emergency in the county and to address ongoing racism in the police (The Independent 2020). In the City of Santa Barbara, after nearly four hours of speeches at the courthouse's Sunken Garden, the protesters walked onto the streets, starting on Anacapa Street and marching down to Figueroa Street and turning to State Street. While nearly all protestors wore masks as a precaution against the COVID-19 virus, the large crowd size made social distancing impossible. Although the protests themselves were peaceful, sporadic post-demonstration vandalism (e.g., spray-painting buildings) and disturbances occurred both in the City of Santa Barbara and the City of Santa Maria (The Independent 2020b). In the City of Santa Maria, some protesters pulled down the American flag in front of City Hall, and others lit a fire at Cook Street and Broadway. Multiple fights reportedly broke out in the area, with drivers in cars and trucks doing donuts around the fire set in the middle of the street as crowds watched. Some vandalism also reportedly occurred at the Town Center Mall (Santa Maria Times 2020).

The City of Santa Barbara saw a difference in the overall mood at anti-racism protests in the summer of 2020. During one protest on May 31, 2020, police arrived in riot gear and a dramatic scene occurred during which Santa Barbara's then-Mayor, Cathy Murillo, attempted to speak at the event at the courthouse and was sent away. A week later, another protest, in which police officers did not wear riot gear or put up police tape to guard the police station, served as a start contrast. Kyle Brown, one of the event organizers, spoke from the stage and immediately set the tone that any civil unrest would not be welcome. He told anyone who wanted to start violence that they should leave immediately. During this event, police officers on motorcycles led the march along State Street to the dolphin fountain and generally supported the protest (Noozhawk 2020b; 2020c).

Probability of Occurrence

Likely – There are no studies that predict the probability of civil disturbance occurrences. However, major national events such as the Vietnam War and anti-racism protests are associated with spillover disturbances into urban areas, such as the City of Santa Barbara. Annual street parties such as Halloween and Deltopia in Isla Vista have all led to past disturbances and unrest in the county. As a result, local law enforcement adopts robust responses to such large community events with hundreds of law enforcement personnel typically deployed to maintain order.

Climate Change Consideration

Climate change results in stresses and long-term reduction in a range of natural resources, such as potable water, food, and arable land. United Nations has declared stresses on natural resources increase the likelihood of conflict (United Nations Education, Scientific, and Cultural Organization [UNESCO] 2021). The potential for climate change-induced migration is now recognized internationally as people flee their home countries due to drought, floods, and other factors with the U.S. southern border being impacted more frequently by new climate refuges from Central America. While such migrants are typically nonviolent and seeking relief from the dire circumstances in their homeland and improved lives for their families, the movements of large numbers of often desperate people can create the potential for civil unrest. The county continues to evaluate and model future climate risk and vulnerability of the environment and community to reduce the likelihood of future impacts, including civil disturbance.

5.5.5 Agricultural Pests

Description of Hazard

Agricultural pests and disease infestation occur when an undesirable organism inhabits an area in a manner that causes serious harm to agriculture crops, livestock or poultry, and wild land vegetation or animals. Countless insects and diseases live on, in, and around plants and animals in all environments. Most are harmless but some can cause significant damage and loss. Under some conditions, insects and diseases that have been relatively harmless can become hazardous. For example, severe drought conditions can weaken trees and make them more susceptible to destruction from insect attacks than they would be under normal conditions. Pest exclusion is the best prevention strategy to keep exotic pests out of California, including California's Border Protection Stations (BPS).

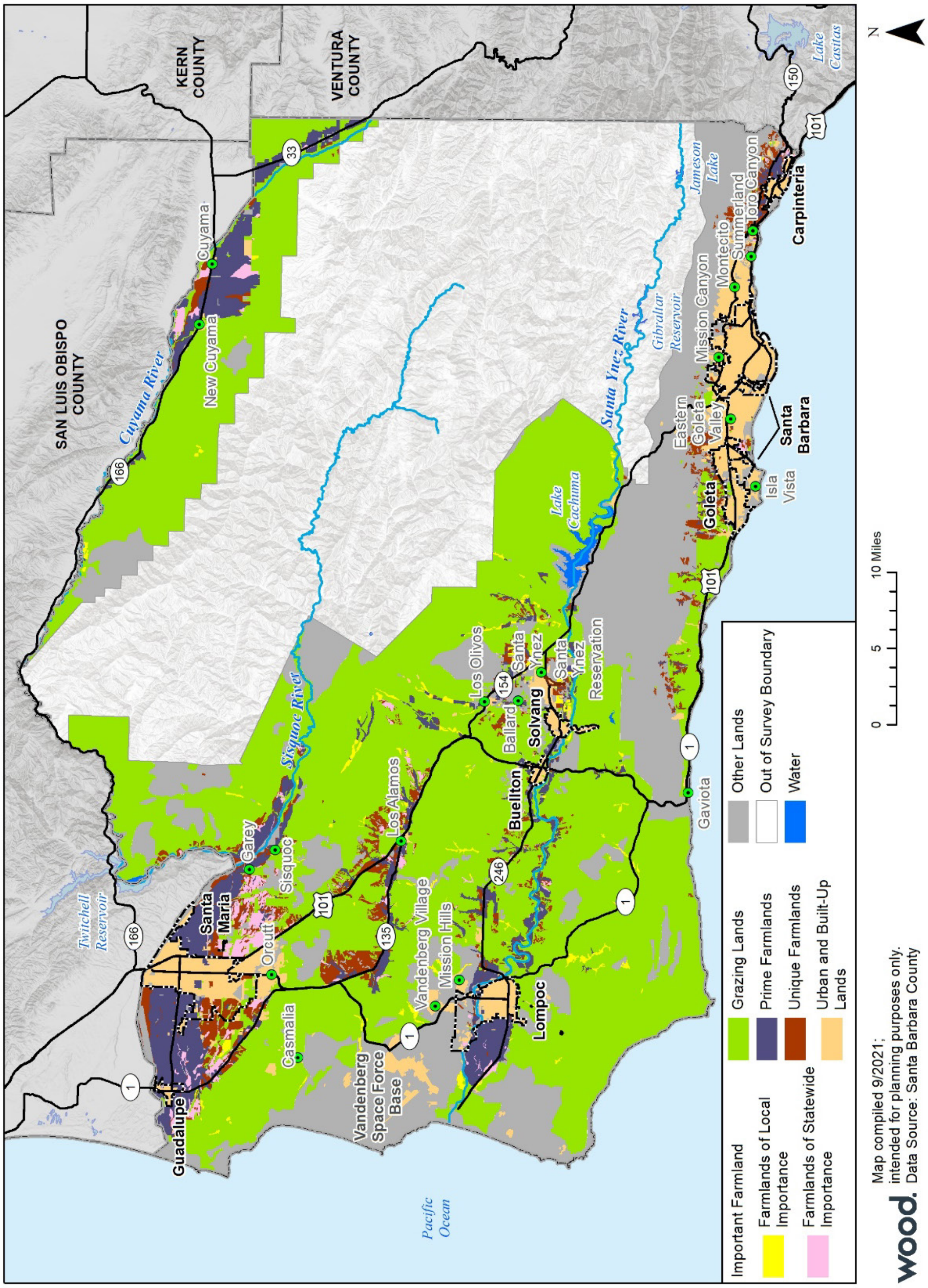
Different pests can impact different crops in different ways; while there is no scale to define the extent of an infestation, a pest could have a major economic impact on the value of infested crops. Another large factor that may influence crop yield is the spread of invasive plants, which may compete with crops for resources and in some cases also introduce pests. According to California Invasive Plant Council (Cal-IPC), invasive plants cost California $82 million every year in control, monitoring, and outreach; estimated actual impacts can reach into the billions. Based on the USDA's Risk Management Agency (RMA) Crop Indemnity Reports, between 2007 and 2019 (no losses were reported in 2020), there were 734.6 acres lost due to plant disease and insects and $256,962 indemnity payments made (Cal-IPC 2021).

Agricultural pests and pathogens (e.g., insects, fungi, bacteria, viruses, and invasive plants) cause injury or severe destruction to crops or livestock. From exotic fruit flies to noxious weeds, California's agriculture can be impacted by a wide variety of invasive pests and pathogens. These pests pose significant threats to the state's crops, farm workers, economy, food supply, and native habitat. Agricultural pests and diseases also weaken crops, vineyards, and livestock, which makes them more susceptible to harm from extreme heat, wildfire, and drought. They can also result in increases in food prices for consumers. The number of invasive pests and pathogens newly detected in California and the rest of the U.S. has increased at alarming rates in recent years, and that trend is projected to continue. Insect pests and diseases, such as bark beetles and Sudden Oak Death in trees, can also destroy forests and oak woodland habitats in Santa Barbara County, which can, in turn, increase the fuel load and lead to greater fire risk.

Location and Extent of Hazard in Santa Barbara County

Figure 5-23 shows agricultural, farm, and grazing lands in the county, which are susceptible to agricultural pests and diseases. Agriculture and open space land use comprise the majority of the land within the north county subregion. This subregion has abundant agricultural land that includes strawberries, vineyards, livestock, and row crops. In addition to open space and oil and gas extraction, agriculture makes up a majority of land use in the Cuyama Valley. The subregion has abundant agricultural land that grows carrots, alfalfa, olives, and row crops. Agriculture also occurs throughout the South Coast subregion in the Carpinteria Valley, Goleta Valley, and along the Gaviota Coast.

Figure 5-23. Santa Barbara County State Important Farmland (2018)



According to the 2020 County of Santa Barbara Crop Report, agriculture and livestock had total gross production of over $1.8 billion in 2020, with strawberries being the largest-grossing crop. Agricultural pests and diseases can affect crop plants, vineyards, and livestock throughout the county. This hazard is measured by the number of pests and disease incidents (Santa Barbara County Planning and Development Department 2021). In 2020, 217 pests were intercepted through the County of Santa Barbara's Pest Exclusion Program, the most commonly intercepted species being the Lesser Snow Scale (*Pinnaspis strachani*) (County of Santa Barbara 2020).

These pests and diseases, such as the light brown apple moth, white peach scale, Asian citrus psyllid, Pacific mealybug, and avian influenza, can retard the growth of plants and animals, damage them so that their products are less appealing and harder to sell, or even kill them (Santa Barbara County Planning and Development Department 2021). Between November 15, 2019, to July 7, 2020, the California Department of Food and Agriculture (CDFA) confirmed the presence of Asian Citrus Psyllid in the county (CDFA 2020). Asian citrus psyllids are a harmful exotic insect pest and a vector of Huanglongbing (HLB) disease, one of the most devastating citrus diseases. In response to this infestation, CDFA conducted insecticide treatments within a 400-meter radius around the Asian citrus psyllids detection site (California Department of Food and Agriculture 2020). Though there are treatment options for many agricultural pests and diseases, some have no cure (Santa Barbara County Planning and Development Department 2021).

History of Hazard in Santa Barbara County

Santa Barbara County has a demonstrated vulnerability to insect infestation. Infestations of Mediterranean Fruit Fly, Oriental Fruit Fly, Gypsy Moth, Glassy-winged Sharpshooter, Asian Citrus Psyllid, and Light-Brown Apple Moth have all occurred in the last 30 years. Diseases such as Chrysanthemum White Rust and Pierce's Disease of Grapes have also threatened local crops in the past 10 to 20 years, though there are no recent reports. The devastating citrus disease Huanglongbing is spread by the feeding action of Asian Citrus Psyllid. Additionally, UC Riverside and the UC Cooperative Extension recently sent out notification warnings about the invasive black fig fly, which has spread to Santa Barbara County (UC Riverside and the UC Cooperative Extension 2021).

Probability of Occurrence

Occasional – Due to its interaction with the global economy, its mild Mediterranean climate, and its diversified agricultural and native landscape, Santa Barbara County currently experiences and will continue to experience periodic losses due to agricultural pests and diseases. Many pests and organisms that carry diseases are most active during warmer months, so the threat of infection or infestation is higher during that time of year (Santa Barbara County Planning and Development Department 2021).

Climate Change Consideration

California farmers contend with a wide range of crop-damaging pests and pathogens. Continued climate change is likely to alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates. For example, the pink bollworm, a common pest of cotton crops, is currently a problem only in southern desert valleys because it cannot survive winter frosts elsewhere in the state. However, if winter temperatures rise, the pink bollworm's range would likely expand northward, which could lead to substantial economic and ecological consequences for the state (Allen-Diaz 2009). While the county does not produce cotton, this example demonstrates how the range of pests can change as climatic conditions change. Projection trends show temperatures getting warmer earlier in the year and remaining warmer until later in the year due to increases in air temperature, which creates a wider activity window for pests and diseases (Santa Barbara County Planning and Development Department 2021).

Temperature is not the only climatic influence on pests. For example, some insects are unable to cope in extreme drought, while others cannot survive in extremely wet conditions. Furthermore, while warming speeds up the lifecycles of many insects, suggesting that pest problems could increase, some insects may grow more slowly as elevated carbon dioxide levels decrease the protein content of the leaves on which they feed (California Climate Change Center 2006). However, more recent research paints a more complicated picture – some plants might increase in protein content, becoming more nutritious for insects. The diseases that impact insect pests, such as those caused by bacteria, may shift in different ways than the insects, further complicating the impacts on insects globally. Changing precipitation patterns causing more rain in some areas and droughts in others could also have varying effects on insect pests.

California's Fourth Climate Change Assessment (2018) notes that "climate change impacts terrestrial ecosystems and wildlife in multiple ways, including invasion by exotic species, the prevalence of wildlife disease, and loss of native habitats." Changing climate conditions can impact viable living areas of species and cause migration; shift the spread of pests and disease northward by changing habitat temperatures and making previously undesirable habitats welcoming for new species and lengthen habitable seasons (California Natural Resources Agency 2018). Longer growing seasons may also allow agricultural pests to persist longer, which can increase the severity of infestations on agricultural operations. Further, weather events have become more numerous and more severe. Changes in weather patterns can also have dramatic impacts on the ecosystem, including agriculture systems, and more severe impacts can be expected in the future.

5.5.6 Terrorism

Description of Hazard

Terrorism refers to intentional, criminal malicious acts. There is no single, universally accepted definition of terrorism, and the term can be interpreted in many ways. This federal definition for terrorism found in the Code of Federal Regulations (28 CFR, Section 0.85) is "*...the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives*." The 2018 California State Hazard Mitigation Plan refers to terrorism as the use of weapons of mass destruction, including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and cyber terrorism (refer to Section 5.5.2, *Cyber Threat* for a detailed discussion of cyber-attacks; Cal OES 2018).

Terrorist threats are difficult to predict. Many different groups use terrorist attacks for various reasons. Two things are clear from the perspective of hazard mitigation: the most often used weapons of terrorists in California are incendiary bombs, and the greatest potential for loss is from active shooters or weapons of mass destruction. Additional concerns include the use of chemical and biological weapons (Cal OES 2018).

Location and Extent of Hazard in Santa Barbara County

Terrorism can occur throughout the entire county but due to its intended purpose would most likely happen in more populous urban areas where more devastation and panic would ensue, such as the City of Santa Barbara, Isla Vista, or the City of Santa Maria.

History of Hazard in Santa Barbara County

Terrorist events have continued to occur in California. From 2001 to 2011, there were 207 terrorist attacks in the U.S. California was the leading state in terrorist events with 40 attacks, followed by 19 in New York State. The leading cities were New York (12), Washington, D.C. (9), and Los Angeles (8). The most common weapons used in the 207 terrorist attacks in the U.S. from 2001 to 2011 were incendiary devices and explosives. From 2001 to 2011, the most common targets of terrorists in the U.S. were businesses (62 attacks), private citizens and property (59 attacks), and government (43 attacks) (Cal OES 2018).

The county has seen several recent events of mass casualties brought on by disgruntled or distraught individuals; however, none of them can be categorized as terrorism. However, on May 23, 2014, a gunman killed six individuals and wounded 13 others in Isla Vista before taking his own life. The gunman had prepared and trained for the shooting event for over one year and targeted some specific individuals (his roommates) and had over 600 rounds of ammunition to target specifically women in Isla Vista (Los Angeles Times 2014).

Probability of Occurrence

Occasional – The County government and facilities could be targets for terrorist acts. Airports and Vandenberg SFB, for example, could become targets for terrorism. However, the county has never experienced a terrorist attack and there are no major government buildings, financial centers, transportation facilities, or infrastructural systems, which reduces the likelihood of terrorism in the county.

Climate Change Consideration

Climate change is and will continue to cause increased resource scarcity including, energy, water, and arable land globally, which is likely to result in increased global terrorism (United Nations 2019). While resource scarcity is not an immediate challenge for Santa Barbara County, sea level rise predictions, growing wildfire threat, and drought will result in mid-term climate change impacts, as previously described.

5.5.7 Well Stimulation & Hydraulic Fracturing

Description of Hazard

Hydraulic fracturing, commonly called "fracking," is a specific type of well stimulation treatment that involves the high-pressure injection of water, sand, and chemical additives to cause fracturing of sub-surface rock resulting in the release of gas or oil trapped inside. As defined in California state statute, hydraulic fracturing means a well stimulation treatment that, in whole or in part, includes the pressurized injection of hydraulic fracturing fluid or fluids into an underground geologic formation to fracture or with the intent to fracture the formation, thereby causing or enhancing the production of oil or gas from a well. Fracking is a type of well-stimulation treatment that is known to boost oil and gas production. **Acid well stimulation**, another type of well stimulation treatment also used to increase oil and gas production, introduces one or more acids (applied at any pressure) to a well or geologic formation, either alone or in combination with hydraulic fracturing treatments. The California oil and gas industry uses a large number of hazardous chemicals during hydraulic fracturing and acid treatments. The use of these chemicals underlies all significant potential direct impacts of well stimulation in California (Cal OES 2018).

Hazards and environmental impacts that could result from fracking and well stimulation include 1) contamination of groundwater with chemicals, 2) air pollution from dispersion of chemicals and gases, and 3) contamination of subsurface rock formations from the injected chemicals. These concerns exist anywhere fracking is used as a gas and oil extraction method (Cal OES 2018).

Steam injection (e.g., cyclic steaming, steam flooding) is a technique that heats the targeted production zone to make heavy oils flow more readily to the well bore. The intent is not to break (i.e., fracture) the oil-holding formation (which is usually sandy in composition so doesn't need to be broken), but to heat it and make the oil therein less viscous. Possible environmental impacts that could result from well stimulation treatments include effects on water and air quality and seismic safety, which are considered potential hazards and require further study.

As a result of the increase in fracking activities in California, on September 20, 2013, the state legislature passed Senate Bill 4, which is intended to regulate well stimulation treatments, including fracking.

In November 2019, the California Geologic Energy Management Division (CalGEM; formerly Division of Oil, Gas and Geothermal Resources [DOGGR]) announced a halt of approvals of new oil extraction wells that use high-pressure steam to break oil formations below the ground, a process linked to recent oil leaks in Kern County. This moratorium prohibits new extraction wells that use a high-pressure cyclic steaming process to break apart a geological formation to extract oil. During the moratorium, regulators will consult with experts to examine records from recent leaks of oil and water, known as surface expressions, in the Cymric oil field in Kern County to determine whether high-pressure cyclic steaming can be done safely and in compliance with recent regulations that make surface expressions illegal. Oil and gas regulators could require certain safety practices, update regulations to impose new rules, or prohibit the practice altogether. This moratorium does not affect well stimulation that uses cyclic steaming at lower pressures (California Department of Conservation 2019).

In April 2021, Governor Newsom directed CalGEM to initiate a regulatory action to end the issuance of new permits for fracking by January 2024. Additionally, Governor Newsom requested that the California Air Resources Board (CARB) analyze pathways to phase out oil extraction across the state by no later than 2045 (Office of Governor 2021).

<u>Location and Extent of Hazard in Santa Barbara County</u>

Well stimulation treatments have occurred for many years throughout oilfields in California, mostly within Kern, Ventura, and Los Angeles Counties, with the majority (approximately 90 percent) in Kern County on diatomite-type soils (Cal OES 2018). The County Planning and Development

Department confirms that, while fracking can be allowed within the county with a Production Plan permit, no onshore oil operators have proposed to use fracking to extract oil given that oil-bearing formations in the county cannot be economically fracked. Cyclic steaming techniques have been used in Santa Barbara County, mainly in the Cat Canyon oilfield in the Santa Maria Valley. More recently, cyclic steaming has also been used in the Orcutt Hill oilfield (Personal Comm. Errin Briggs, County Planning and Development 2021).

History of Hazard in Santa Barbara County

Oil producers have not used hydraulic fracturing offshore in Santa Barbara County so there is no history to identify.

Cyclic steaming has been used in the Cat Canyon oilfield in the Santa Maria Valley since the 1960s. Cyclic steaming has also been used in the Orcutt oilfield since 2007 (Santa Barbara County Planning Commission 2016). Surface expressions (oil seeps) have occurred primarily at Orcutt Hill, which is operated by Pacific Coast Energy Company (PCEC). Oil seeps have historically occurred throughout the Orcutt Hill oilfield site, increasing in frequency since the beginning of steaming activities in 2007. Seeps are releases of crude oil from the ground surface originating from an oil-bearing zone in the shallow Careaga Formation (located above the diatomite portion of the Sisquoc Formation, which is the target formation for oil production). Although seeps are associated with the Careaga Formation, the specific location of individual seeps is unpredictable. While able to flow to the surface, stimulation increases the frequency of occurrence and volume with the addition of steam. The frequency of new oil seeps occurring at the site increased substantially once PCEC started its steam injection program in 2007 but has since subsided due to the implementation of revised field practices (Santa Barbara County Planning Commission 2016).

PCEC has implemented a system of seep cans and French drains to collect seep oil. A seep can is a temporary receptacle consisting of a perforated galvanized culvert placed vertically in the ground to collect and contain seep oil to prevent it from further damaging the environment. While installation of seep cans limits the direct impacts of oil on the environment, installation of the cans and associated access roads have been documented to result in the removal of native vegetation and impacts on sensitive species. Installation of the existing seep cans began in 2008; as of April 2016, 99 seep cans have been installed at the Orcutt Hill oilfield site (Santa Barbara County Planning Commission 2016).

Probability of Occurrence

Unlikely – The County Department of Planning and Development confirms that hydraulic fracturing is not currently being conducted onshore in Santa Barbara County. An operator proposing to frack is required to go through an extensive environmental analysis and obtain a discretionary permit before implementing this technique. Therefore, hazards associated with hydraulic fracturing are low. Cyclic steaming as a well-stimulation technique is currently in use, as described above; therefore, there is a potential for surface expressions; however, the probability is low given existing regulations and safety measures mandated by the County and the State of California.

Climate Change Consideration

There are no known direct linkages between climate change effects on hazards from well stimulation techniques used in Santa Barbara County. However, as described above, Governor Newsom directed CalGEM to initiate a regulatory action to end the issuance of new permits for fracking by January 2024 and requested that the CARB analyze pathways to phase out oil extraction across the state by no later than 2045 to address climate change concerns related to fossil fuel use (Office of Governor 2021).

5.6 INFRASTRUCTURE FAILURES

5.6.1 Energy Shortage & Resiliency

Description of Hazard

Energy shortages (or disruptions) are considered a form of lifeline system failure. While the electrical power industry does not have a universal agreement for classifying disruptions, disruptions can be the consequence of another hazard or can be a primary hazard, absent of an outside trigger. A failure could involve one, or a combination of the potable water system, power system, natural gas system, wastewater system, communication system, or transportation system. Most power blackouts are not human-caused. They are often the result of situations involving unintended events, such as an overwhelming need for power due to weather conditions, equipment failure, or accidents. They may also fail due to natural hazards such as earthquakes, floods, and landslides. These outages can last anywhere from a few minutes to several weeks.

The County has two electric service providers. Pacific Gas and Electric (PG&E) provides electricity in the northern part of the County, with the termination of services north of the Gaviota area. Southern California Edison (SCE) provides power to the southern parts of the county, with the termination of services in Gaviota. The two systems are not connected. Thus, if there is a major interruption of service along either utility line, a portion of the Santa Barbara area would likely be without power, but not all of it. Both power companies are aware of the restrictions on their systems and are making planned systematic changes to address the shortcomings. SCE offers several programs to customers experiencing outages, such as hotel discounts, rebates for portable power devices, and providing customers who rely on medical equipment with portable backup batteries (SCE 2021). PG&E also offers support to customers who rely on electrical power for medical needs and opens daytime community resource centers with bathrooms, internet, and electricity access in communities affected by outages (PG&E 2021). PG&E and SCE offer power outage alerts via phone and email to alert customers of outages.

Electrical power disruptions can be generally grouped into two categories: intentional and unintentional. There are four types of intentional disruptions:

- **Planned:** Some disruptions are intentional and can be scheduled based on maintenance or upgrading needs.
- **Unscheduled:** Some intentional disruptions must be done "on the spot" in response to an emergency.
- **Demand-Side Management**: Some customers (i.e., on the demand side) have agreed with their utility provider to curtail their demand for electricity during periods of peak system loads.
- **Load Shedding**: When the power system is under extreme stress due to heavy demand and/or failure of critical components, it is sometimes necessary to intentionally interrupt the service to

selected customers to prevent the entire system from collapsing. These intentional interruptions result in rolling blackouts.

Unintentional or unplanned disruptions are outages that come with no advance notice. This type of disruption is the most problematic. The following are categories of unplanned disruptions:

- Accident by the utility, utility contractor, or others
- Malfunction or equipment failure
- Equipment overload (utility company or customer)
- Reduced capability (equipment that cannot operate within its design criteria)
- Tree contact other than from storms
- Vandalism or intentional damage
- Weather, including lightning, wind, earthquake, flood, and broken tree limbs taking down power lines
- A wildfire that damages transmission lines

Due to recent massive wildfires throughout California and their ignition originating from utility infrastructure and high winds, the electric utilities have initiated a program to conduct Public Safety Power Shutdowns (PSPSs) to prevent wildfire ignitions. These are classified as intentional, unscheduled disruptions. Power can be off for multiple days and can be especially difficult on individuals that require power for health, safety, and independence. A PSPS outage will last as long as the potentially dangerous weather conditions exist, plus the amount of time it takes for power company workers to inspect and repair their equipment in the affected area(s). Residents need to be prepared to endure a power outage lasting 5-7 days. PSPS events can disrupt digital communications, HVAC systems, security systems, transportation systems, and water and sanitation services. Retail, restaurants, banks, gas stations, pharmacies, and grocery stores may be closed. Medical equipment such as ventilators or oxygen concentrators may not work. Building amenities such as refrigerators, elevators, and electric gates and doors may be unavailable. The utilities are currently working with the County to minimize power delivery interruption while managing wildfire hazards, such as grid hardening to reduce the need for PSPS events and the risk of wildfire.

Location and Extent of Hazard in Santa Barbara County

The entire county is subject to energy shortages, which can vary in size and area of disruption for electrical services from a large area to a small number of service connections. Electricity service is also highly vulnerable because it is highly dependent on electrical transmission lines and substations functioning properly. **Electrical substations** are facilities that convert electricity from one voltage to another, making them suitable for long-distance transmission or use by homes, businesses, and other electrical customers.

There are 34 substations in the county-owned and operated by PG&E, SCE, and other owners. **Electrical transmission lines** carry high-voltage electricity over long distances between power plants and electrical customers. Transmission lines in the county are owned and operated by SCE, PG&E, and others. **Power plants** generate large amounts of electricity that are distributed through the state and regional electrical grid. There are 15 power plants in the unincorporated areas (not including small-scale facilities, such as rooftop solar panels), including the large Cuyama Solar

Project and Lompoc Strauss Wind Energy Project power plants (Santa Barbara County Planning and Development Department 2021).

Additionally, **communication facilities** in the county are run by electricity and therefore, are dependent on electricity. Communication facilities include public radio and television transmitters, cell phone towers, emergency communication antennae, and a wide range of other public and private communication infrastructure systems. There are 23 known cell towers in the county, as well as smaller towers and additional communication facilities (e.g., radio, TV, etc.) (Santa Barbara County Planning and Development Department 2021).

History of Hazard in Santa Barbara County

One of the largest events affecting electric and natural gas services in the county in recent years was the 2017 Thomas Fire, during which the transmission system running from Ventura County to the City of Goleta was shut down, leaving more than 85,000 customers without power for an extended period during the emergency (SCE 2017). An additional 3,400 SCE customers in Montecito were left without power following the 2018 Montecito debris flows, which resulted from the Thomas Fire (Scully 2018). The Thomas Fire was caused by a SCE power line that sparked and ignited dry vegetation. Similar service disruptions, though not quite as extensive, are common throughout the County in areas affected by wildfires and other disasters or emergencies. Small-scale energy disruptions have occurred regularly in Santa Barbara County.

While there were 20 PSPS events in California in 2021, three events involved Santa Barbara County (California Public Utilities Commission 2022):

- On June 14, 2021, SCE responded to a high threat event with the potential for the use of proactive PSPS (de-energization). Sundowner winds and elevated fire potential across Santa Barbara County were initially forecasted for Monday afternoon 6/14 through Tuesday 6/15 and ultimately arrived on Tuesday, 6/15, from 3 pm to 9 pm. Sustained winds during this time were forecasted to be 20-35 mph with gusts near 50 mph. The National Weather Service issued a Red Flag Warning, Wind Advisory, High Wind Warning, and Excessive Heat Watch and Warning for Santa Barbara County, causing the potential for fire risk to be elevated across the coastal slopes of the Santa Ynez mountains. Ultimately, actual humidity levels were higher than originally forecast and wind conditions that would necessitate de-energization did not materialize during the period of concern. As a result, no circuits or customers were de-energized during this high threat event (SCE 2021).
- On October 11 and 12, 2021, PG&E's service territory throughout California was experiencing an extreme-to-exceptional drought with fuel moisture levels at record lows for the time of year. Maximum wind gusts in Santa Barbara County were 62 miles per hour near Point Conception. Based on the state of the fuels, warnings issued from three federal forecast agencies on the fire risk, and weather forecast models showing a wind event Monday, October 11 through Tuesday, October 12, PG&E initiated a PSPS event, which affected 29 customers in Santa Barbara County, including 10 near Sisquoc and 19 near Zaca Lake (PG&E 2021).
- On October 14 through 16, 2021, PG&E's service territory throughout California continued to experience dry, hot, and gusty conditions. Santa Barbara County was a candidate for a PSPS, but PG&E mitigated and therefore avoided the de-energization of county customers in the final scope through the use of sectionalization devices and backup power support (PG&E 2021).

Probability of Occurrence

Likely - In any given year, Santa Barbara County can be subject to energy shortages. A large disruption due to a power failure or rotating brownout is highly likely. PSPS events are likely during the high fire season in Santa Barbara County when gusty sundowner winds occur.

Climate Change Considerations

With increased changes in weather and climate, energy demands will shift too. The increased prevalence of extreme heat can drive energy demand and increase the need for intentional, unscheduled power shutoffs. Further, the resiliency of power systems can be threatened during a wildfire. As wildfire occurrences associated with climate change increase so does the risk for utility failure. Energy demand and management are critical during disaster response. PSPS events are also likely to become more frequent as climate change increases periods of drought, high wind events, and longer high fire seasons in the county. Under these conditions in 2021, the county experienced one limited PSPS and two canceled PSPSs. It is reasonable to assume that this scenario could occur annually with more frequent PSPSs as climate change progresses.

5.6.2 Hazardous Materials Release

Description of Hazard

Hazardous waste/materials are defined under the U.S. Congress' original statutory definition under the Resource Conservation and Recovery Act (RCRA) as substances with physical or chemical properties of flammability, corrosivity, reactivity, or toxicity, which because of quantity, concentration, or physical, chemical, or infection characteristics may cause or significantly contribute to increased mortality or serious illness (RCRA Section 1004(5)). Hazardous waste/ materials are widely used or created at facilities, such as hospitals, wastewater treatments plants, universities, and industrial/manufacturing warehouses.

Both mobile and external hazardous materials releases can spread and affect a wide area, through the release of plumes of chemical, biological, or radiological elements or leaks or spills. Conversely, internal releases are more likely to be confined to the structure the material is stored in. It is also common to see hazardous materials releases as escalating incidents resulting from other hazards, such as floods, wildfires, and earthquakes. The release of hazardous materials and waste can greatly complicate or even escalate the response to a natural hazards disaster that caused the spill. Hazardous materials and waste may pose a substantial present or potential hazard to human health and/or the environment when improperly treated, transported, stored, disposed of, or otherwise managed. Chemicals may also be corrosive or otherwise damaging over time. A hazardous materials release could also result in fire or explosion. Contamination may be carried out of the immediate area of the incident by people, vehicles, wind, and water. Weather conditions can increase the size and intensity of the Hazardous Materials Release. Typography, such as hills and canyons, can increase the size of the release or make it more difficult to contain.

The EPA has developed a regulatory definition and process that identifies specific substances known to be hazardous and provides criteria for the regulation of hazardous waste. Several household products, such as cleaning supplies and paint are also considered hazardous materials. The County regulates approximately 350 substances subject to the California Code of Regulations, Title 19, which include:

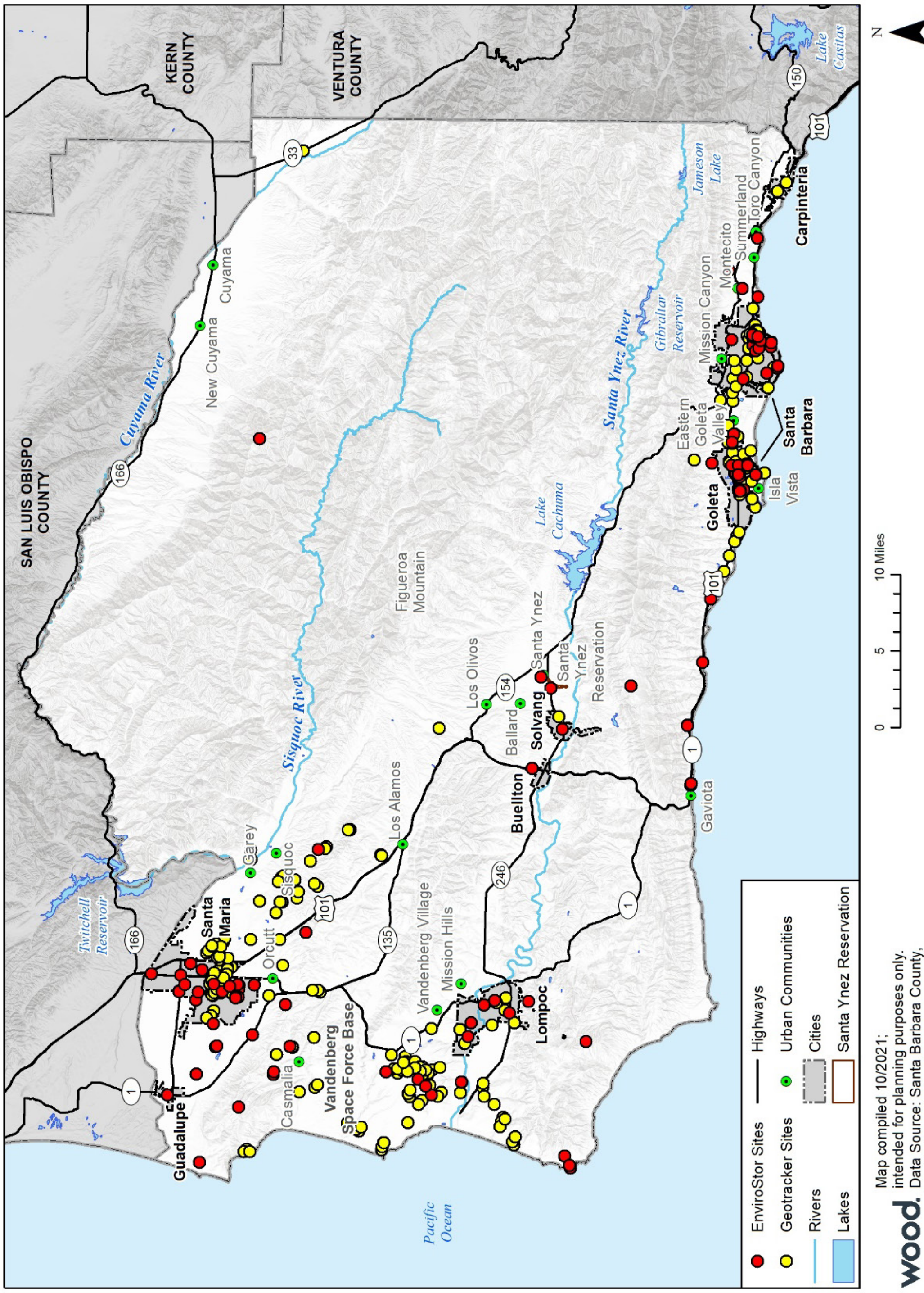
- Explosives;
- Compressed gases: flammable, non-flammable, and poisonous gases;
- Flammable liquids: flammable or combustible
- Flammable solids: spontaneously combustible, and dangerous when wet;
- Oxidizers and organic peroxides;
- Toxic materials, poisonous materials, and infectious agents;
- Radioactive materials; and
- Corrosive materials: the destruction of human skin, corrodes steel.

The U.S. Department of Transportation (DOT), EPA, and OSHA all have responsibilities relating to the transportation, storage, and use of hazardous materials and waste. The National Response Center (NRC) is a part of the federally established National Response System and is staffed 24 hours a day by the U.S. Coast Guard. It is the designated federal point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment, anywhere in the United States and its territories. The NRC is a primary source of information on the use and storage of hazardous materials, as well as data regarding spills and releases.

The California Environmental Protection Agency (CalEPA) and the Department of Toxic Substances Control (DTSC) are authorized by the U.S. EPA to enforce and implement federal hazardous materials laws and regulations within the state. EnviroStor is DTSC's online data management system for tracking their cleanup, permitting, enforcement, and investigation efforts at hazardous waste facilities and sites with known or suspected contamination issues. Additionally, the State Water Board GeoTracker information system provides online access to environmental data from water quality regulatory programs, including oil and gas monitoring-related activities. EnviroStor and GeoTracker sites within the county are shown in Figure 5-24.

At the local level, the County's Environmental Health Services Division within the County Public Health Department is the approved Certified Unified Program Agency (CUPA) responsible for the administration of permitting, inspections, and enforcement for hazardous waste and hazardous materials programs. The CUPA administers the Hazardous Material Business Plan (HMBPs), California Accidental Release Prevention (Cal-ARP) program, and the Aboveground Storage Act, as well as permitting and inspection activities for hazardous waste generators, onsite hazardous waste treatment facilities, and underground storage tanks. The Seismic Safety and Safety Element of the Santa Barbara County Comprehensive Plan includes goals, policies, and implementation measures for hazardous materials.

Figure 5-24. Hazardous Sites (Envirostor/Geotracker)



Location and Extent of Hazard in Santa Barbara County

The locations and identity of facilities that store hazardous materials are reported to local and federal governments. Many facilities have their own hazardous materials guides and response plans, including transportation companies that transport hazardous materials. Figure 5-24 shows the location of hazardous material sites. Some of the most notable hazardous material sites in the County include various industrial sites within the cities of Lompoc, Goleta, Santa Barbara, Santa Maria, Vandenberg SFB, and oil processing facilities along the South Coast. In addition, one superfund site – a contaminated hazardous waste dumping site regulated under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) – exists within the County: the Casmalia Hazardous Waste Management Facility (also known as the "Casmalia Resources Superfund Site"). It is located in the north county near the small, unincorporated community of Casmalia and is a 252-acre inactive commercial hazardous waste treatment, storage, and disposal facility whose operations caused contaminated soil, soil vapor, surface water, sediment, and groundwater with hazardous chemicals. Since its designation as a superfund site in the early 1990s, the EPA has prepared a Remedial Investigation and Proposed Plan outlining the cleanup of the site. The Proposed Plan was approved by the EPA on June 28, 2018 (EPA 2021b).

The release of hazardous materials into the environment can cause a multitude of problems. Although these incidents can happen almost anywhere, certain areas of the County are at higher risk, such as near roadways that are frequently used to transport hazardous materials and locations with industrial facilities that use, store, and/or dispose of such materials. Areas crossed by railways, waterways, airways, and pipelines also have increased potential for mishaps.

History of Hazard in Santa Barbara County

Several significant hazardous material incidents have occurred in the County in the past century, and include the oil spills which occurred in 1969, 1997, 2007, 2008, 2015, and 2020 (refer to Section 5.6.7, *Oil Spill* for a detailed discussion of these incidents and risks associated with oil spill-related hazards). Table 5-18 breaks down 759 hazardous materials incidents reported to the Cal OES Warning Center from 2006 through 2021 based on location. These incidents include both transportation and fixed-facility incidents. This list does not capture all hazardous material spills within the county, only those that were significant enough to be reported to Cal OES. The data indicates that hazardous materials incidents can occur across the County with a greater frequency in the more developed areas.

Table 5-18. Hazardous Materials Incidents in Santa Barbara County by Location and Type

Location	Incidents		Type	Incidents
Buellton	2		Chemical	25
Carpinteria	8		Chemical (Vapor)	3
Casmalia	1		Other	16
Goleta	38		Petroleum	479
Guadalupe	4		Petroleum (Unspecified)	1
Isla Vista	1		Petroleum (Vapor)	2
Lompoc	4		Radiological	1
Los Olivos	4		Railroad	62

Table 5-18. Hazardous Materials Incidents in Santa Barbara County by Location and Type (Continued)

Location	Incidents		Type	Incidents
Montecito	11		Sewage	118
Orcutt	5		Unspecified	28
Santa Barbara	550		Vapor	24
Santa Maria	55			
Santa Ynez	4			
Summerland	3			
Unincorporated	69			

Source: Cal OES 2021, analysis by Wood.

Probability of Occurrence

Occasional – The County experiences multiple hazardous materials incidents every month; however, the vast majority of the incidents are minor and have highly localized impacts. Incidences can occur during the production, storage, transportation, use, or disposal of hazardous materials. Communities can be at risk if a chemical is used unsafely or released in harmful amounts into the environment. Hazardous materials can cause death, serious injury, long-lasting health effects, and damage to buildings, the environment, homes, and other property. However as described above, a range of federal and state regulations exist to limit the risk of upset during the use, transport, handling, storage, and disposal of hazardous waste and materials including the EPA, DTSC, OSHA, and DOT. Additionally, the Regional Water Quality Control Board is responsible for prevention and enforcement in California for hazardous materials associated with water quality. Additionally, OSHA regulates hazardous materials and potential exposure to workers to prevent impacts on human health, and DOT is responsible for the regulation of the transport of hazardous materials and waste to avoid accidental spills and exposure to the public through transport.

Climate Change Consideration

There are no known effects of climate change on human-caused hazards including hazardous material and waste incidents.

5.6.3 Dam Failure

Description of Hazard

Dam failure can occur due to prolonged periods of rainfall and flooding that exceed a dam's design requirements. Dam failures can also result from any one or a combination of the following: old age, poor design, structural damage, improper siting, improper maintenance, landslides flowing into a reservoir, or terrorist actions. Structural damage is often a result of a flood, erosion, or earthquake. A catastrophic dam failure generates a substantial degree of energy and can cause flooding downstream with catastrophic impacts on life and property. The force of the water from dam failure is large enough to carry boulders, trees, automobiles, and even houses along a destructive path downstream. The potential for casualties, environmental damage, and economic loss is great. Damage to electric generating facilities and transmission lines could impact life support systems in communities outside the immediate hazard area. Additionally, the associated water supply and water quality may be affected resulting in supply challenges and potential health concerns.

Location and Extent of Hazard in Santa Barbara County

There are 14 dams in the county, which are overseen and under the jurisdiction of the DWR DSOD as well as the USBR (Table 5-19). As described above, federal dams are not subject to DWR DSOD jurisdiction and are exceptions; however, USBR uses its form of risk analysis and best practices guidance to avoid potential dam failure events (USBR 2021). These dams range in purpose from water supply to flood control.

Table 5-19. Santa Barbara County Dams Summary

Dam Name	Owner Name	Year Built	Reservoir Capacity	Impacted Communities
Alisal Creek Dam	The Alisal Ranch	1971	2,342 acre-feet	Solvang
Dos Pueblos Dam	Standard Portfolios Asset Management Company (private)	1946	300 acre-feet	Unincorporated area west of Goleta
Edwards Reservoir Dam	Regents of CA	1985	596 acre-feet	Unincorporated area west of Goleta
Gibraltar Dam	City of Santa Barbara	1920	9,998 acre-feet	Santa Ynez Riverbed between Gibraltar and Cachuma
Juncal Dam	Montecito Water District	1930	6,140 acre-feet	Santa Ynez Riverbed between Jameson and Gibraltar
Lake Los Carneros Dam	City of Goleta	1932	168 acre-feet	Unknown
Rancho Del Ciervo	Santa Barbara Mountain Water Co. LLC	1938	165 acre-feet	Goleta
Santa Monica Debris Basin	County Flood Control District	1978	N/A	Unincorporated area east of Santa Barbara
Twitchell Dam	USBR	1958	224,300 acre-feet	Garey, Santa Maria, Guadalupe
Bradbury Dam	USBR	1953	205,000 acre-feet	Solvang, Lompoc, Vandenberg SFB
Carpinteria Dam	USBR	1953	40 acre-feet	Carpinteria
Glen Anne Dam	USBR	1953	N/A	Goleta, Santa Barbara Airport
Lauro Dam	USBR	1952	640 acre-feet	Goleta, Santa Barbara
Ortega Dam	USBR	1956	60 acre-feet	Summerland

Source: DWR DSOD 2021b, USBR 2021.

Per California Code of Regulations Section 335.4, the DWR DSOD classifies dams into four categories based on the size of the dam's reservoir and the population that would be impacted by a dam failure; it does not reflect the condition of the dam or its structures:

- **Low Hazard Potential:** No probable loss of human life and low economic and environmental losses. Losses are expected to be principally limited to the owner's property.

- **Significant Hazard Potential:** No probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts.
- **High Hazard Potential:** Expected to cause loss of at least one human life.
- **Extremely High Hazard Potential:** Expected to cause loss of at least one human life and one of the following:
  - Result in an inundation area with a population of 1,000 persons or more, or
  - Result in the inundation of facilities or infrastructure, the inundation of which poses a significant threat to public safety as determined by the department on a case-by-case basis.

All 14 dams in the county are identified by the DWR DSOD as high-hazard dams (Figure 5-25). Since 2017, California Legislature has required all state jurisdictional dams, except low hazard dams, to develop inundation maps and emergency action plans. The DWR DSOD mapped inundation zones show that portions of southern Santa Barbara County may be inundated should a dam catastrophically fail. Dam failure inundation zones mapped by the State of California indicate areas that would be inundated should a dam fail catastrophically. Figure 5-25 displays the dam locations and dam inundation areas.

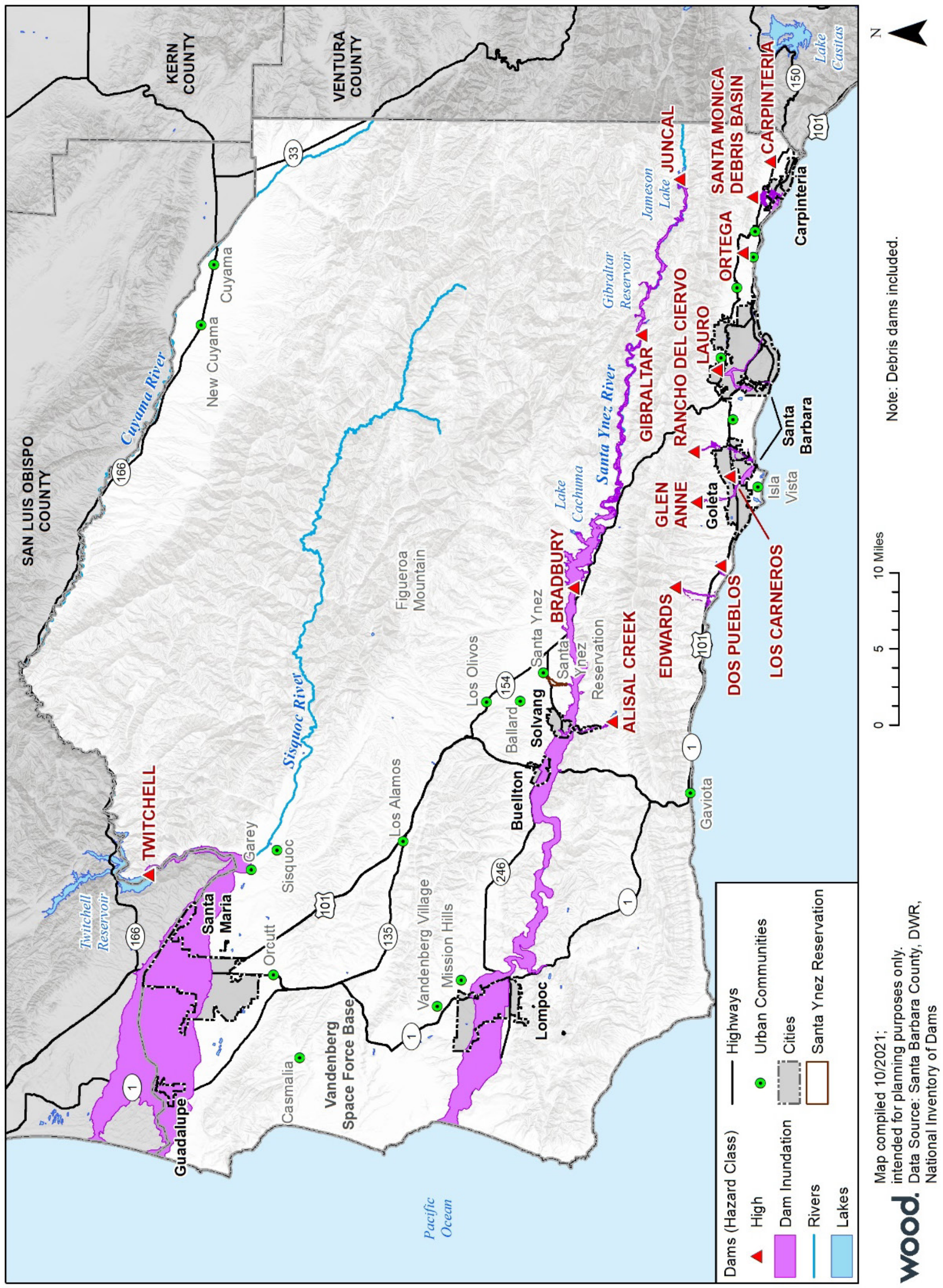
History of Hazard in Santa Barbara County

The county has experienced one incident of catastrophic dam failure, which occurred in the community of Mission Canyon. The Sheffield Dam, constructed in 1917, was located at the base of the Santa Ynez Mountains at the northern end of the City of Santa Barbara. Sheffield Dam failed in 1925 during a 6.3 magnitude earthquake, releasing 30 million gallons of water. The dam failed due to the liquefaction of the underlying soil bed. This event is particularly unique as it is one of the few instances in the U.S. when a dam failed during an earthquake; as a result, it is used as a case study for designing dams that are reinforced to resist seismic activity (Santa Barbara County Planning and Development Department 2015).

Since 1929, the DWR Division of Safety of Dams (DSOD) has regulated dams to prevent failure, safeguard life, and protect property, under the California Water Code. The DWR DSOD provides oversight to the design, construction, and maintenance of jurisdictional-sized dams in California, which ensures proper planning in event of failure and reduces the risk of failure. Jurisdictional sized dams are defined as dams greater than 6 feet and impound 50 acre-feet or more of water, or if the dam is 25 feet or higher and impounds more than 15 acre-feet of water. DWR DSOD has exemptions to jurisdictional dams, including but not limited to levees, barriers off-stream for agricultural uses, and federal dams. Due to the DWR DSOD, many potential dam issues have been addressed and/or resolved (DWR DSOD 2021a).

A Safety Evaluation of Existing Dams (SEED) report released in 1983 contained seismotectonic studies which suggested that Twitchell Dam is in an area of potential seismic activity. It is located near "blind thrust" faults capable of quakes of 7.0 magnitude or more. Since this report was released, the dam has been seismically reinforced so that the safety and classification grade of the dam is satisfactory.

Figure 5-25. Santa Barbara County Dam Inundation



In 2005 and 2006, the Santa Barbara County Civil Grand Jury investigated the County Public Works Department to determine the effectiveness of the Department's flood control programs in protecting the county. The investigation revealed that the USBR, responsible for oversight of all the federal dams in the county, responds quickly and efficiently when a problem is identified. The USBR has improved systems to ensure that peak releases during heavy inflows do not result in excessive downstream flows, which reduces the possibility of inundation from overflows (Santa Barbara County Planning and Development Department 2015).

Probability of Occurrence

Unlikely - Dam failure events are infrequent and usually coincide with the events that cause them, such as earthquakes, landslides, and excessive rainfall and snowmelt; therefore, the probability of future occurrence is unlikely. There is a "residual risk" associated with dams; residual risk is the risk that remains after safeguards have been implemented. For dams, the residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of occurrence of any type of dam failure event is considered to be low in today's regulatory and dam safety oversight environment.

Climate Change Considerations

The potential for climate change to affect the likelihood of dam failure is not fully understood at this point. There is potential for increased precipitation events as a result of climate change conditions to present a future increased risk of dam failure if large inflows to reservoirs occur. However, this could be offset by generally lower reservoir levels if storage water resources become more limited or stretched in the future due to climate change, drought, and/or population growth.

5.6.4 Natural Gas Pipeline Rupture & Storage Facility Incidents

Description of Hazard

The U.S. is heavily dependent on transmission pipelines to distribute energy and fuel sources. Virtually all-natural gas, which accounts for approximately a third of the energy consumed annually, is transported by transmission pipelines (California Public Utilities Commission [CPUC] 2021a). Energy demand in the U.S. continues to increase. Although California is a leader in exploring and implementing alternative energy sources such as wind and solar, the expansion and continued use of traditional energy sources, including natural gas, is ongoing

Most of the natural gas used in California comes from out-of-state natural gas basins. It is delivered to California via the interstate natural gas pipeline system. In 2017, California customers received 38 percent of their natural gas supply from basins in the Southwest, 27 percent from Canada, 27 percent from the Rocky Mountains, and 8 percent from California (CPUC 2021a).

Generally speaking, transmission lines are large-diameter steel pipes carrying natural gas at high pressure and compressed to provide a higher carrying capacity. Transmission lines are both interstate and intrastate, with the latter connecting to smaller distribution lines delivering gas directly to homes and businesses.

Significant failure, including pipe breaks and explosions, can result in loss of life, injury, property damage, and environmental impacts. Causes of and contributors to pipeline failures include construction errors, material defects, internal and external corrosion, operational errors, control system malfunctions, outside force damage, subsidence, and seismicity. Additionally, Hydrogen Sulfide (H_2S) gas is a product of natural gas and oil production and is very poisonous, corrosive, flammable, and explosive.

Location and Extent of Hazard in Santa Barbara County

Natural gas is transported via the interstate pipelines, and some of the California-produced natural gas, is delivered into the Pacific Gas & Electric (PG&E) and Southern California Gas (SoCal Gas) intrastate natural gas transmission pipeline systems (commonly referred to as California's "backbone" natural gas pipeline system) (CPUC 2021a). Natural gas on the utilities' backbone pipeline systems is then delivered into the local transmission and distribution pipeline systems or to natural gas storage fields. PG&E and SoCal Gas own and operate several natural gas storage fields that are located in Northern and Southern California. Locally, SoCal Gas operates a natural gas storage field, the La Goleta Storage Field, at More Ranch Road in the Eastern Goleta Valley. SoCal Gas purchases market-quality natural gas when prices are low and stores it in a depleted gas reservoir located at this field.

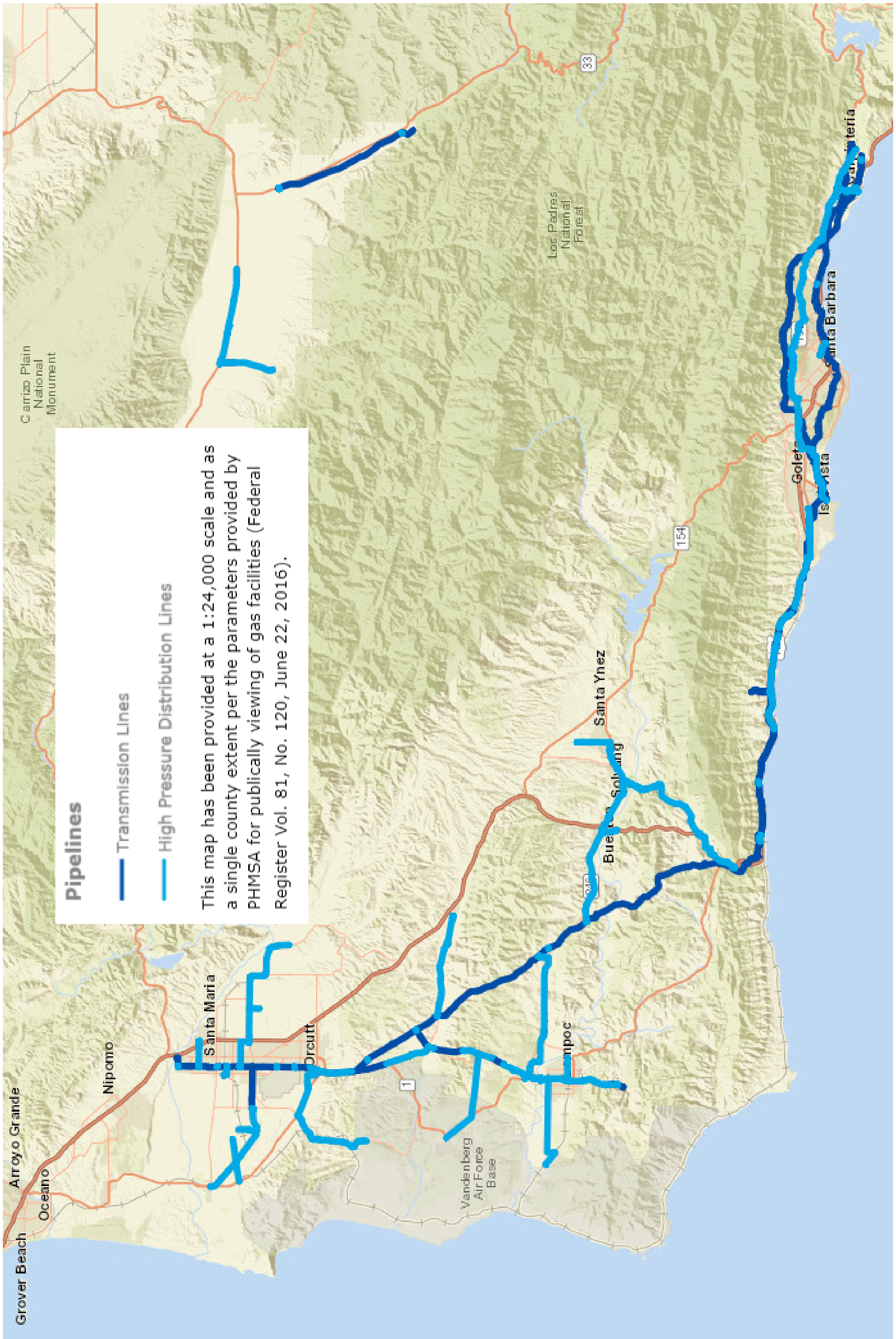
Data compiled by the Pipeline and Hazardous Materials Safety Administration (PHMSA) report a total of 203,442 miles of gas pipelines in California, of which 12,080 miles are classified as gas transmission lines, 156 miles are gas-gathering lines, and the majority, 107,899 miles, are for gas distribution (PHMSA 2020). Figure 5-26 shows the location and ownership of the natural gas pipeline system. Many of the pipelines are located in areas with high seismic activity, crossing many active faults. Further, in Santa Barbara County, H_2S odors come from natural oil and gas seeps (inland and offshore), agricultural irrigation water well drilling activities, and oil and gas production and processing facilities.

The Petroleum Unit of the Planning and Development Department, Energy Division regulates onshore oil and gas activities within the County by performing annual inspections of onshore wells, facilities, pipelines, and other pertinent equipment throughout oil production leases. The Petroleum Unit's purpose is to protect the health, safety, public welfare, physical environment, and natural resources of the County by the reasonable regulation of onshore petroleum facilities and operations, including but not limited to exploration (drilling), production, storage, processing, disposal, well plugging, and well abandonment (County of Santa Barbara 2018).

History of Hazard in Santa Barbara County

There have been no significant historical events to report to date in the county. However, the post-Thomas Fire debris flows in Montecito on January 9, 2018, caused the failure of a natural gas line that runs along East Mountain Drive and a massive explosion caused several homes to catch fire (Herrick 2018). Historically, the 1925 earthquake that shook the county and had particularly destructive effects on Santa Barbara could have been much more destructive had it not been for a gas company engineer who shut off the city's gas supply and prevented fires like those that destroyed San Francisco in 1906 (Santa Barbara Historical Museum 2022).

Figure 5-26. Natural Gas Pipeline in Santa Barbara County



Regionally, on October 23, 2015, SoCal Gas crews discovered a leak at the natural gas storage well at Aliso Canyon, the largest natural gas storage facility in California. The storage facility is located in the Santa Susana Mountains of Los Angeles County. After several attempts, SoCalGas stopped the leak on February 12, 2016, sealing the well on February 15, 2016. It was plugged and abandoned before being reopened at reduced capacity in July 2017 (CPUC 2021b). At least 109,000 metric tons of methane emissions were released from the leak during the nearly 5-month period (California Air Resources Board 2021). The Aliso Canyon leak released mostly methane gas but also toxic pollutants including cancer-causing benzene, odorants called mercaptans that are added to the gas to give it a rotten egg smell, and other sulfur-containing compounds that can cause health problems. Residents not only inhaled air pollutants but were also exposed to toxic chemicals, metals such as barium, and oil residue that settled inside their homes, as shown by dust sampling. More than 8,000 families were forced to relocate long-term, as many complained of headaches, nosebleeds, nausea, dizziness, and shortness of breath (Los Angeles Times 2021).

Probability of Occurrence

Occasional – Increased urbanization is resulting in more people living and working closer to existing gas transmission pipelines that were placed before government agencies adopted and implemented land use and other pipeline safety regulations. Compounding the potential risk is the age and gradual deterioration of the gas transmission system due to natural causes. Growth in population, urbanization, and land development near transmission pipelines, together with the addition of new facilities to meet new demands, may increase the likelihood of pipeline damage due to human activity and the exposure of people and property to pipeline failures.

Climate Change Consideration

Climate change will not have a direct effect on natural gas pipelines; however, the 2016 California Legislation (Senate Bill 32) to reduce emissions to 40 percent below 1990 levels by 2030 could reduce the demand and use of natural gas across California. Further, in a decision issued on November 1, 2019, CPUC now requires all energy utility companies, including PG&E and SoCal Gas to file vulnerability assessments, which include consideration of climate change (CPUC 2019). This decrease in demand, as well as mandatory evaluation of the climate change vulnerabilities for local natural gas service providers and the identification of strategies for achieving climate resiliency, may reduce the number of pipeline ruptures and release events.

5.6.5 Train Accident

Description of Hazard

Train accidents are defined as any accidents involving public or private trains carrying passengers or cargo along the rail corridor. Train accidents, like other transportation accidents, are less likely to lead to a state or federal disaster declaration than other hazards described in this MJHMP. Train accidents are generally localized, and the incidents result in limited impacts at the community level. However, if there are toxic, volatile, or flammable substances on the train and the train is in a highly populated or densely forested area, death, injuries, and damage to homes, infrastructure, and the environment, including forest fires, can occur (refer to Section 5.6.2, *Hazardous Materials Release* for a full discussion of hazards related to release of hazardous materials and substances).

Location and Extent of Hazard in Santa Barbara County

Santa Barbara County has three railroads. The UPRR carries both freight and passengers through the coastal areas. The Santa Maria Valley and Lompoc Industrial Lead railroads carry primarily freight. The county is served by two Amtrak train routes for passenger-only services along the UPRR: the Pacific Surfliner and Coast Starlight (Santa Barbara 2021). The Pacific Surfliner runs adjacent to Highway 101 and the coastline with stops in San Diego, Orange, Los Angeles, and Ventura counties (Santa Barbara 2021). Connecting thruway bus service is offered from the train station in Downtown Santa Barbara to the UC Santa Barbara Campus, Solvang-Santa Ynez Valley, and Santa Maria. The Coast Starlight connects Seattle and Los Angeles, traveling south from Seattle with stops in Portland, the San Francisco Bay Area, Sacramento, Paso Robles, San Luis Obispo, and Santa Barbara.

In addition to passenger-only rail services, the Downtown Santa Barbara train station receives train movements from the shipment of commodities, such as hazardous materials, fuel (including oil), agriculture, meats, and non-consumables. Train accidents are generally localized and the incidents result in limited impacts at the community level. However, if there are volatile or flammable substances on the train and the train is in a highly populated, death, injuries, and damage to homes, infrastructure, and the environment, including forest fires, can occur. Additionally, a hazardous materials incident on the rails or roadway has the potential to shut down both rail and highway transportation routes, such as Highway 101, where the two are within proximity to one another.

History of Hazard in Santa Barbara County

No major train accidents have occurred in the county. However, in the last thirty years, numerous train accidents have occurred throughout the southern California region. For example, in 1991 the Seacliff Incident occurred in Ventura County when a train released 440 gallons of aqueous hydrazine (used to make agricultural, metal, and plastics processing chemicals) and naphthalene (industrial solvent) (Los Angeles Times 1991). The accident required the evacuation of the nearby Seacliff Community along with the shutting down of Highway 101 and took 5 days to cleanup. In 2005 in Glendale, California an SUV was left on train tracks during an aborted suicide attempt, and a UPRR freight train and northbound commuter struck the car killing 11 people and injuring 180 passengers (County of Santa Barbara Water Resources Daily News 2016).

Probability of Occurrence

Occasional – Given that no known train accidents have occurred in the county, the probability of occurrence is low. While neither of the train accidents described above occurred within the county, due to the scale and scope of train transportation for people and commodities, such events have the potential to occur.

Climate Change Consideration

There is no known linkage between climate change and train accidents; however, because of railroad track proximity to the Pacific Ocean within the County, sea level rise could impact service. Current estimates project the range of sea level in the County will be between 27.2 and 30 inches by 2060 (refer to Section 5.3.6, *Coastal Hazards*)

5.6.6 Aircraft Crash

Description of Hazard

Aircraft crashes are defined as any accident of private, commercial, or military aircraft on land or over the sea. Aircraft crashes, like other transportation accidents, are less likely to lead to a state or federal disaster declaration, than other hazards previously and aforementioned.

Location and Extent of Hazard in Santa Barbara County

In addition to being within the flight pattern of many airports providing regional flights (i.e., Los Angeles International, San Francisco International, Oakland, San Jose International, Burbank Airport, John Wayne Airport, Long Beach Airport, Ontario International Airport), Santa Barbara County has 5 general aviation airports: 1) Lompoc, 2) Santa Barbara, 3) Santa Maria Public, 4) Santa Ynez, and 5) New Cuyama Airport, and one military aircraft base, Vandenberg SFB (previously known as Vandenberg Air Force Base). However, as of September 8, 2019, New Cuyama Airport's runways were closed indefinitely due to unsafe potholes and overgrown weedy vegetation (SkyVector 2021).

Airport influence zones Santa Barbara Municipal Airport, Santa Ynez Airport, Lompoc Airport, Santa Maria Airport, and New Cuyama Airport are represented in Figure 5-27, Figure 5-28, Figure 5-29, Figure 5-30, and Figure 5-31, respectively. The U.S. Air Force (USAF) operates military aircraft at Vandenberg SFB, which supports West coast launch activities for the USAF, Department of Defense, National Aeronautics and Space Administration, and other national programs. Vandenberg SFB supports the processing and launch of a variety of aircraft vehicles including but not limited to ballistic missiles and planes (Vandenberg SFB 2021).

The Santa Barbara Airport (SBA) is located near Goleta and operated by the City of Santa Barbara. SBA encompasses 952 acres and services five major airlines with 12 non-stop destinations. SBA served nearly 786,0000 passengers in 2018 and is the 13th largest airport in California (Santa Barbara Airport 2021). SBA has approximately 32 daily non-stop flights including to Chicago, Dallas, Denver, Las Vegas, Los Angeles, Oakland, Phoenix, Portland, Sacramento, Salt Lake City, San Francisco, and Seattle.

The Santa Maria Airport (SMX) is located just southwest of downtown Santa Maria. The airport provides facilities for two regional airlines, United and Allegiant. United operates flights to San Francisco and Denver, and Allegiant operates flights to Las Vegas, Phoenix, and Portland. SMX also serves as a home base for over 200 general aviation aircraft (Santa Maria Airport 2021). Effective for the 9 months between December 2020 and September 2021, the airport had 27,486 general aviation aircraft operations, 424 air carrier operations, 6,132 air taxi operations, and 1,259 military aviation operations (U.S. Department of Transportation Federal Aviation Administration [FAA] 2021a). A total of 194 single-engine, eleven multi-engine, four jets, nine helicopters, one glider, and one ultra-light aircraft were based at the airport during that time (FAA 2021a).

Figure 5-27. Santa Barbara Airport Influence Zone

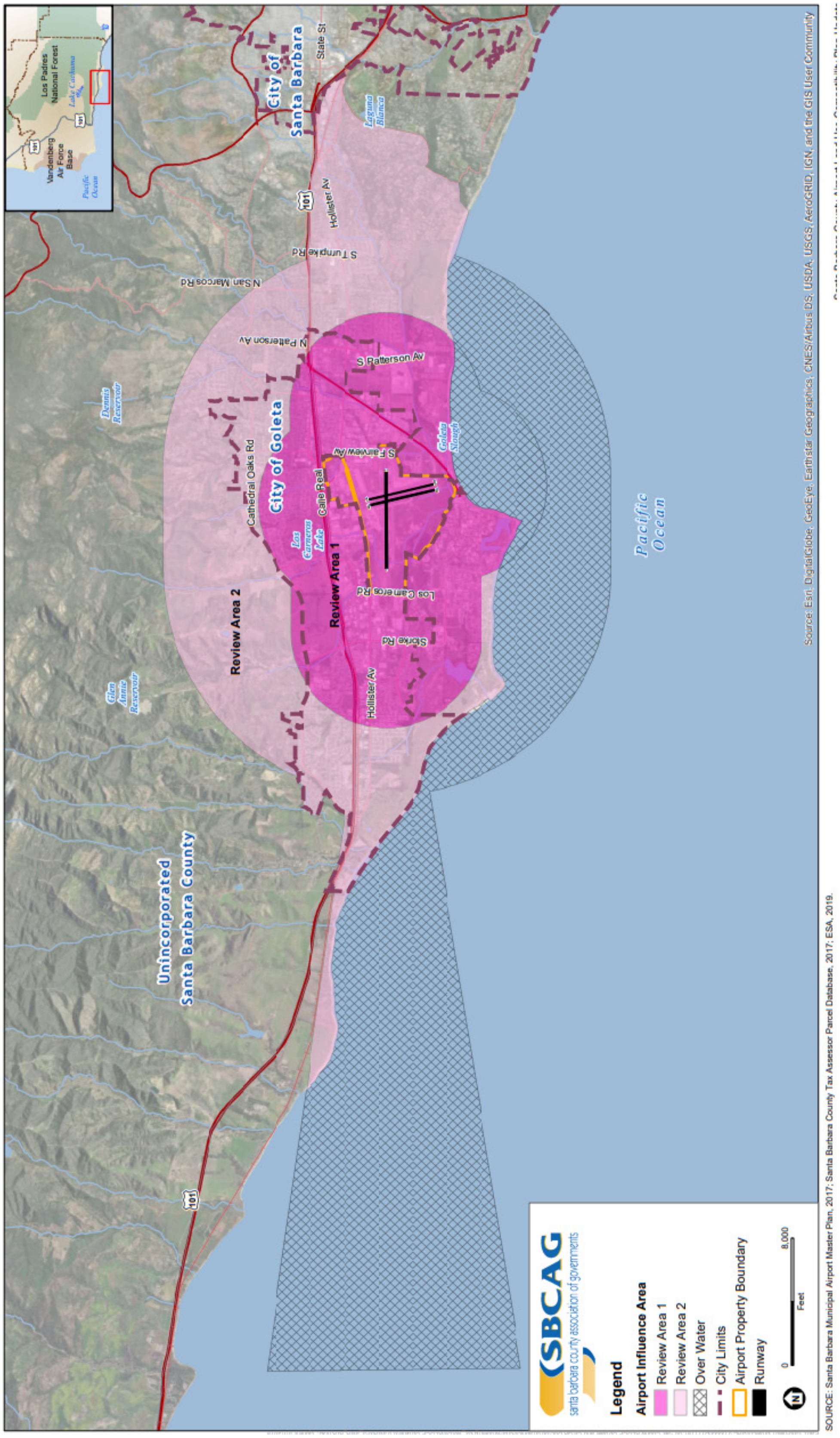


Figure 5-28. Santa Ynez Airport Influence Zone

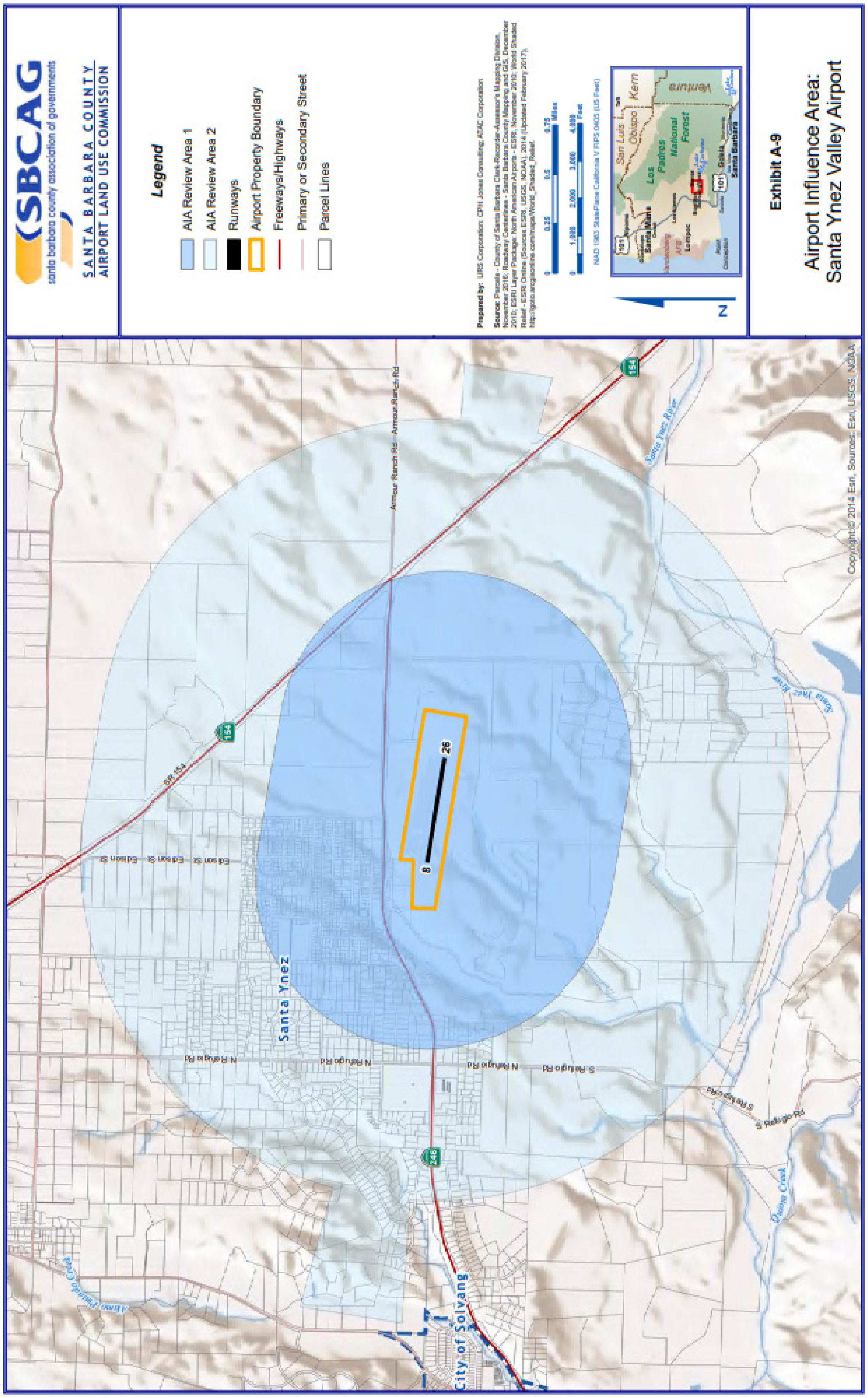


Figure 5-29. Lompoc Airport Influence Zone

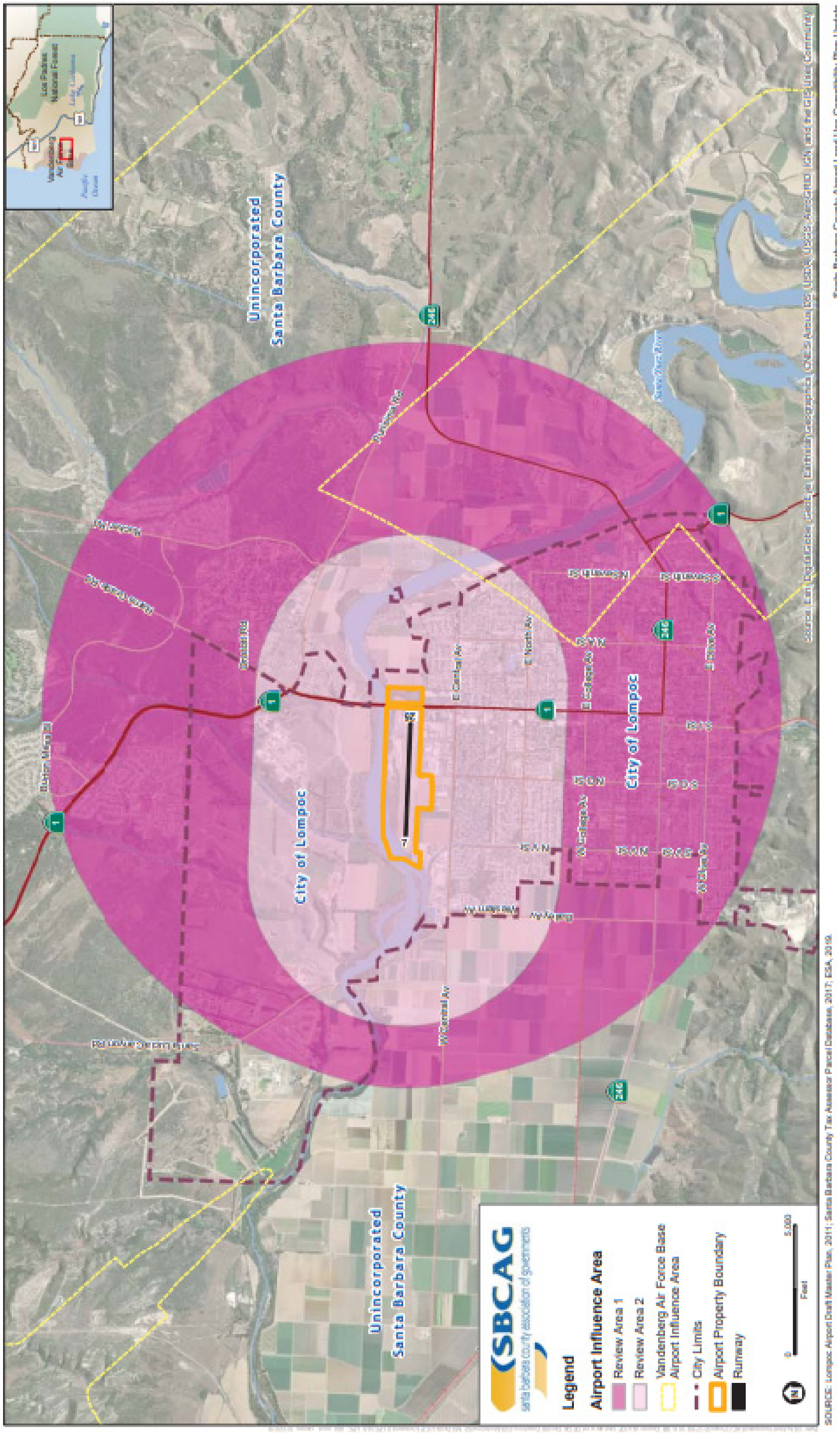


Figure 5-30. Santa Maria Public Airport Influence Zone

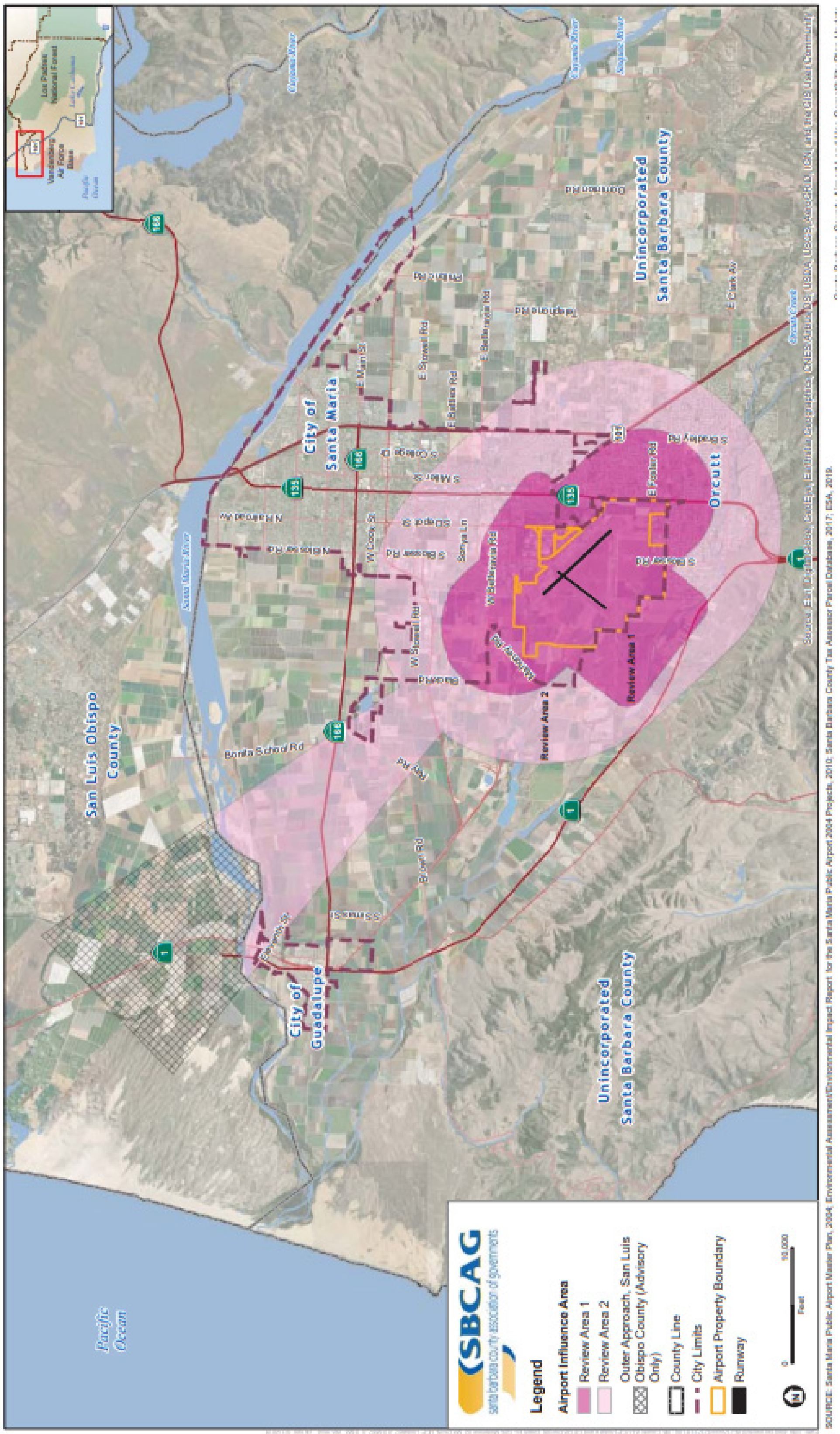
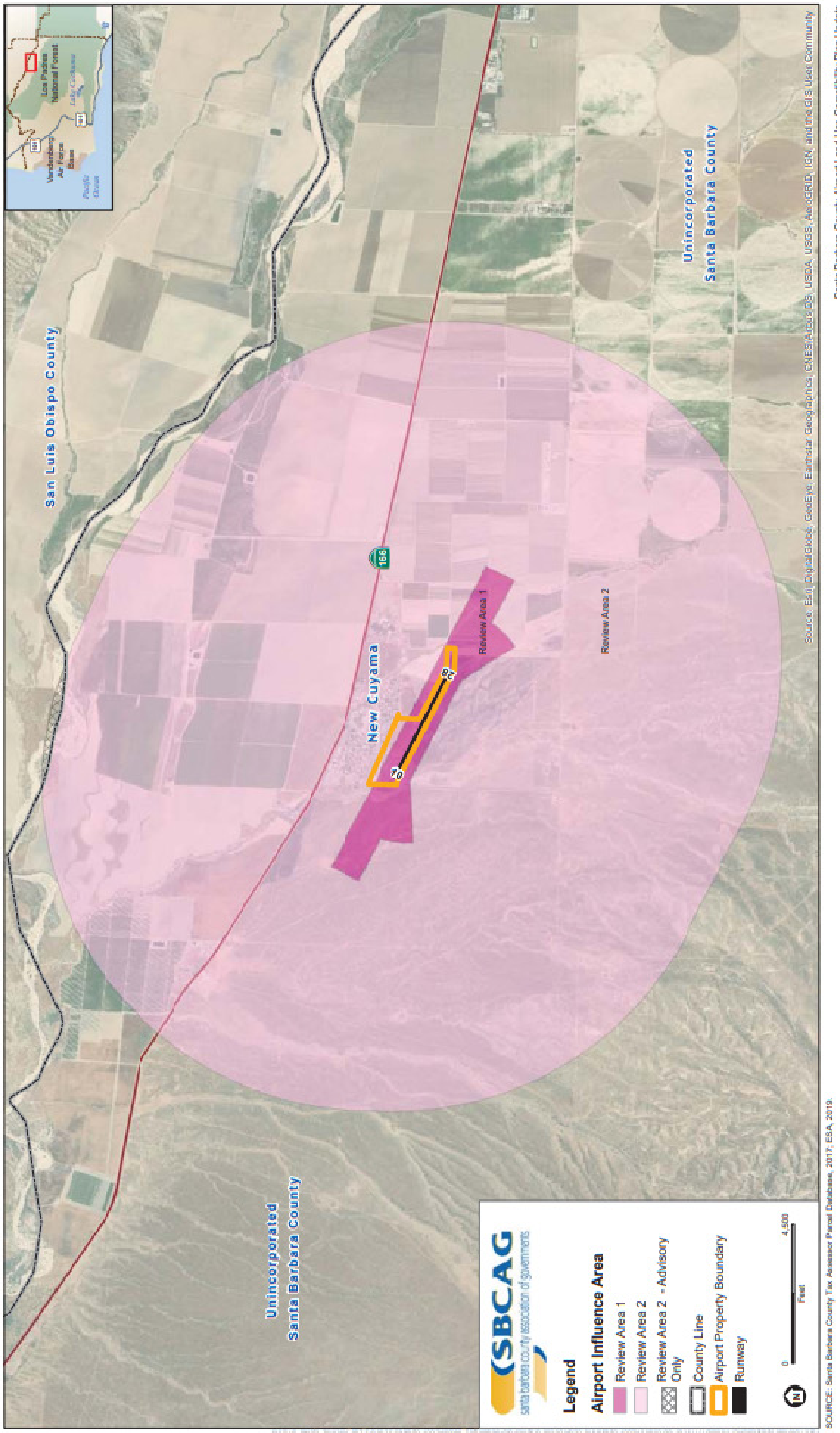


Figure 5-31. New Cuyama Airport Influence Zone



The Lompoc Airport (LPC) is located on the north side of Lompoc. LPC only serves private aircraft and is not open for commercial flights. Effective for 9 months between December 2020 and September 2021, the airport had 30,000 general aviation aircraft operations and 0 military aviation operations, and 21 single-engine planes were based at the airport during that time (FAA 2021b). Skydiving operations are held at Skydive Santa Barbara.

The Santa Ynez Airport (IZA) is located just southeast of Santa Ynez. As of 2021, the airport serves three main functions: private aircraft owners use it as a hub for storing their planes and for refueling, the airport boasts one of the best gliding locations in Southern California, and the airport serves as the staging ground for the anta Barbara County Sheriff's Department helicopters. Effective for the 9 months between December 2020 and September 2021, the airport had 29,820 general aviation aircraft operations, 450 air taxi operations, and 130 military aviation operations (FAA 2021c). A total of 38 single-engine, four multi-engine, and three helicopters were based at the airport during that time (FAA 2021c).

The New Cuyama Airport (L88) is a privately-owned airport located immediately south of the town of New Cuyama and Highway 166. The FAA's Airport Master Record for the Airport reports that there were 500 annual, or approximately 42 monthly, operations at the airport as of the 12 months ending May 18, 2016. However, as of 2019, there were fewer than two operations per day at this airport. All operations at the airport were itinerant general aviation operations, as there are no aircraft based at the airport. Although the New Cuyama Airport is currently closed indefinitely, the airport may open at any time and could present hazards related to aircraft crashes (Santa Barbara Council Association of Governments [SBCAG] 2019).

History of Hazard in Santa Barbara County

No significant historical commercial aircraft crashes have occurred within the county, though there have been recent incidents involving small and/or private aircraft.

- On August 25, 2019, just before 10:30 p.m., a Lockheed C-130A Hercules owned by International Air Response, which was is typically used for disaster relief including oil spills, experienced multiple system failures shortly after takeoff from Santa Maria Public Airport and made an emergency landing at the Santa Barbara Airport. International Air Response operated the airplane as a cross-country flight with 2 flight crew and 5 passengers. All were employees of IAR and were not injured. The airplane sustained substantial damage and fire damage from a postcrash fire (Edhat 2019).
- On September 27, 2020, a small Cessna plane crashed into the ocean about 2 miles off Goleta Beach about 10 minutes after taking off from Santa Barbara Airport. The crash led to days of searching by the Santa Barbara County Sheriff's Office with assistance from the Los Angeles County Sheriff's dive team. The wreckage was located about 200 feet below the surface and was recovered several days later. The pilot did not survive the crash.
- On December 6, 2016, a small ultralight aircraft (i.e., motorized hang glider) crashed into a carport and parked car at the Willow Springs Apartments near Hollister Avenue and Los Carneros Road in Goleta. The aircraft took off from the Santa Barbara Airport at 10:04 a.m. and crashed at 10:09 a.m. The aircraft crashed 2,000 feet from the Santa Barbara Airport tower (Magnoli 2016).

The County maintains Airport Approach Overlay Districts to regulate land uses within airport clear and approach zones consistent with the adopted Airport Land Use Plan for the county to protect the safety of the public in the air and on the ground and to reduce and avoid noise and safety conflicts between airport operations and surrounding land uses (City of Goleta 1997).

According to the State Hazard Mitigation Plan, one plane crash occurred in the City of Cerritos, Los Angeles County in 1986. The crash resulted in 13 fatalities and 67 injuries as well as over $407.5 million in damages. The occurrence received a State Emergency Proclamation and Federal Disaster Declaration (Cal OES 2018).

Probability of Occurrence

Occasional – Given that no known commercial aircraft crashes have occurred in the county, the probability of occurrence is low. However, there have been several small aircraft incidents since the 2017 MJHMP was developed. Further, with the number of general aviation operations, military flights, and its position between Los Angeles/San Diego and the Bay Area, there is a possibility of Santa Barbara County experiencing an airline crash. While plane fatality rates are approximately 1 death per every 100,000 hours, fatality rates in personal flights increased by 25 percent from 2007 to 2017, which were generally caused by weather and pilot error. Private aircraft flights have substantially higher rates of accidents and fatalities than commercial flights (commercial airplanes have 0.27 fatal accidents per million flights in 2020) due to lesser safety features and redundancies, such as co-pilots and extra engines (Shepardson 2021; Pappas 2017).

Climate Change Consideration

There is no known linkage between climate change and airline crashes. Although bad weather does play a factor in some airline crashes, current aviation technology, and safety standards greatly reduce the risk of potential public and environmental safety concerns, including from weather.

5.6.7 Oil Spill

Description of Hazard

An oil spill is a release of liquid petroleum hydrocarbon into the environment due to human activity or technological error that results in pollution of land, water, and air. Oil releases also occur naturally through oil seeps either on land or underwater. Marine oil spills, whether accidental or intentional, can result from the release of crude oil from offshore oil platforms, drilling rigs, wells, underwater pipelines, tank trucks, marine tank vessels (tankers), and even supply pipelines on land. Refined petroleum products such as gasoline, diesel, and heavier fuels such as bunker fuel used by cargo ships are also sources of potential oil spill releases (Cal OES 2018).

Oil spills have immediately visible consequences on animals and habitats. Depending on the origin, size, and duration of the release, an oil spill can have serious impacts on air and water quality, public health, plant and animal habitat, and biological resources. Oil in the water can be deadly for animals. Oil is toxic when ingested. When birds get oil on their feathers, it impairs the important waterproofing that is necessary to keep a bird warm. A bird may also lose its ability to float in the water or to fly if it is covered in oil. Oiled marine mammals may suffer from hypothermia. Oil may cause reproductive problems and genetic abnormalities in fish. Contaminants may enter the food chain and result in seafood that is unfit for people to eat (California Coastal Commission 2019).

Clean-up and recovery are time and cost-consuming, and dependent on weather conditions such as wind and rain. Tidal and current conditions may also make the spill more dynamic, which causes further difficulties with clean-up activities.

Many state and federal agencies are involved in preventing and responding to oil spills. Platforms in federal waters are regulated by the U.S. Department of the Interior's Minerals Management Service. Facilities located in state waters less than 3 nautical miles from shore are regulated by the California State Lands Commission and Cal GEM, under the jurisdiction of the California Department of Conservation (Cal OES 2018). After the large Exxon Valdez oil spill in Alaska in 1989, both the U.S. and California governments enacted laws to help prevent oil spills. The International Safety Management Code, enforced since 1998, requires ships entering U.S. ports to meet certain standards, including procedures for reporting accidents and requiring qualified crew. In 1990, the U.S. enacted the Oil Pollution Act (OPA). One of the things OPA did was require that oil tankers be double-hulled and requires the phase-out of existing single-hull tankers. A double hull further protects a ship from damage to its cargo tank, reducing the risk of oil spilling during an accident. California enacted the Oil Spill Prevention and Response Act in 1990, which established the Office of Oil Spill Prevention and Response within the Department of Fish and Game, which is authorized to direct spill response, cleanup, and natural resource damage assessment activities, as well as regulate all private vessels over 300 gross tons (672,000 pounds) that enter California ports (California Coastal Commission 2019).

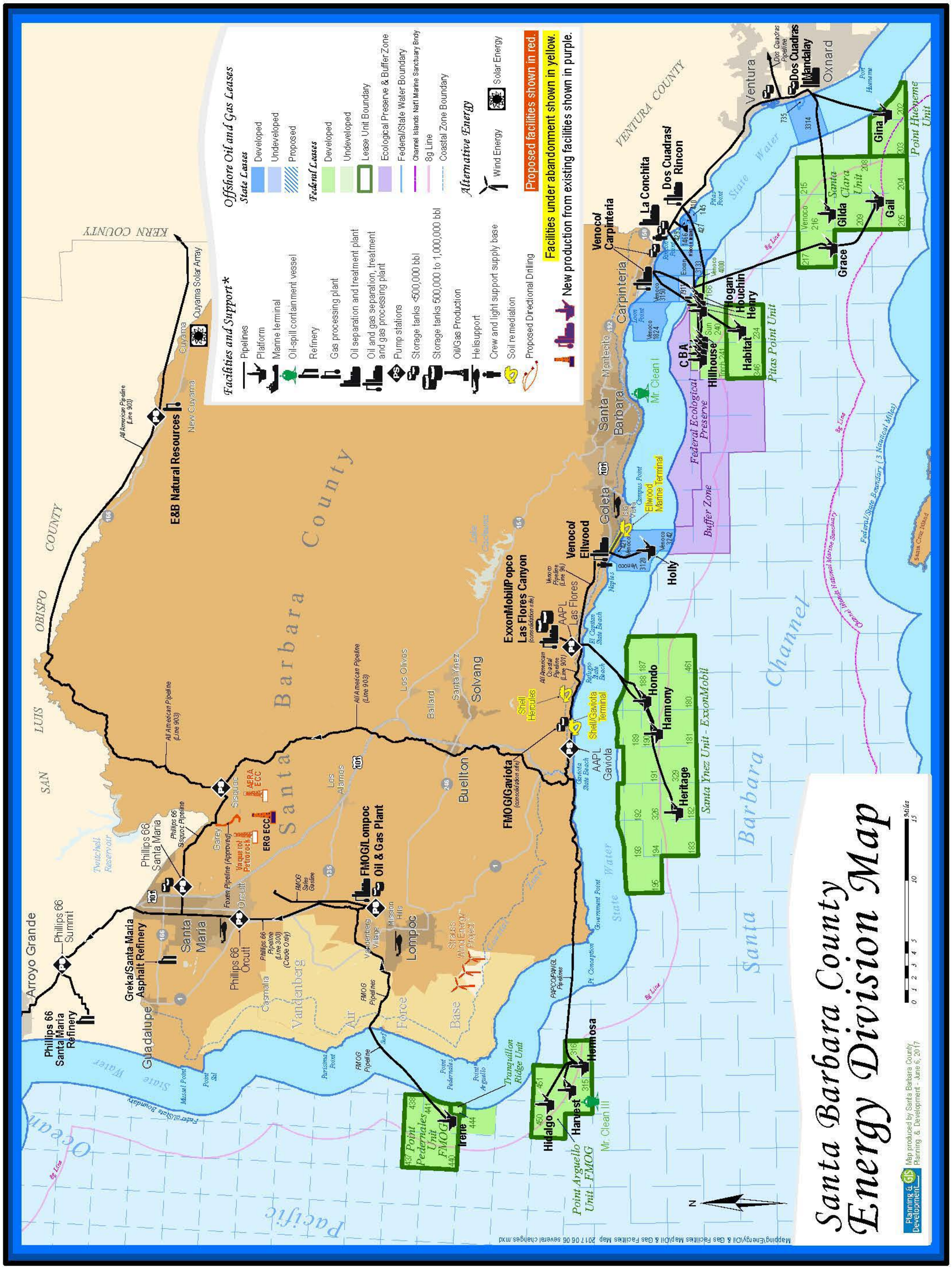
Location and Extent of Hazard in Santa Barbara County

The Santa Barbara County Department of Planning & Development, Energy, Minerals and Compliance Division oversees oil and gas activities in offshore Santa Barbara County, the onshore facilities that support those offshore operations, onshore oil and gas development, surface mining, and renewable energy projects. The Energy Division's oversight includes planning, policy development, permit processing, environmental review, permit compliance, and public outreach. The purpose of the Energy Division is to provide comprehensive reviews of permit applications, condition compliance, implement mitigation programs, and respond to various policy issues (County 2018).

This hazard can occur in any part of Santa Barbara County where existing oil and gas operations are located, either onshore through supply pipelines and well facilities or offshore where there are several platforms and undersea pipelines. Currently, there are 19 offshore oil platforms off the coast of Santa Barbara County as well as two onshore refineries and six oil separation and treatment plants (see Figure 5-32; County Department of Planning and Development 2017).

The longest line in Santa Barbara County, the Plains All-American Pipeline, consists of two segments spanning roughly 130 miles. Line 901 stretches from Las Flores to Gaviota. Line 903 shoots north from Gaviota to Pentland Station in Kern County. After the 2015 spill described below, Line 901, the line that ruptured, was shut down. Since then, seven offshore oil platforms have been shut down, including, from north to south, Hidalgo, Harvest, Hermosa, Heritage, Harmony, Hondo, and Holly (Zemoudeh 2016).

Figure 5-32. Oil Platform Map of Santa Barbara Coast



History of Hazard in Santa Barbara County

Santa Barbara County has experienced several large oil spills:

Incident Profile: 1969 Santa Barbara Oil Spill

In 1969, a blowout of a Union Oil drilling rig platform off the coast of Santa Barbara resulted in a spill of 4.2 million gallons of crude oil into the ocean and onto nearby shores. This disaster is considered to have been a catalyst for the modern environmental movement.

Photo: vcstar.com

- **1969:** The Santa Barbara oil spill occurred in January and February 1969 in the Santa Barbara Channel, near the city of Santa Barbara in Southern California. On January 28, 1969, pressure built up in a 3,500-foot-deep well on Platform A of a Union Oil drilling rig platform off the coast of Santa Barbara as a pipe was being extracted. A burst of natural gas blew out the drilling mud that was being pumped into the well, split the steel casing, and caused cracks to form in the seafloor surrounding the well. The large volume of oil and gas being released caused a "blowout" of the well, releasing approximately three million gallons of oil over 11 days. Workers pumped chemical mud down the 3,500-foot shaft at a rate of 1,500 barrels an hour. It was then topped by a cement plug. Although capped, gas continued to escape and another leak sprung up weeks later, releasing oil for several more months. Union Oil drilled a relief well and pumped cement into a leaking wellbore, thereby killing it. However, small amounts of oil continue to leak from fractures in the seafloor to this day. An estimated total of 100,000 barrels (4.2 million gallons) of crude oil was spilled into the ocean and onto nearby shores over several months, impacting over forty miles of coastline Platform A of the Union Oil drilling rig is still in operation (Cal OES 2018; California Coastal Commission 2019).

  The cause of the blowout and spill was attributed to the inadequate protective casing allowed by the U.S. Geological Survey waiver. Investigators postulated that more steel pipe sheathing inside the drilling hole would have prevented the rupture (Cal OES 2018).

  It was the largest oil spill in U.S. waters by that time and now ranks third after the 2010 Deepwater Horizon and 1989 Exxon Valdez spills. The incident received international attention. The spill influenced the passage of major state and federal legislation, such as the National Environmental Policy Act (NEPA), Clean Water Act, California Environmental Quality Act (CEQA), California Coastal Initiative in 1972 (Proposition 20), and California Coastal Act of 1976. According to these and other statutes, development permits for onshore or offshore oil and gas facilities cannot be issued without provisions to protect terrestrial, marine, visual, recreational, and air resources (Cal OES 2018). This disaster is considered to have been a catalyst for the modern environmental movement and modern environmental law in the United States (California Coastal Commission 2019; Santa Barbara Channelkeeper 2021).

- **1997:** On September 28, 1997, off the coast of northern Santa Barbara County, an undersea pipeline, linking the offshore oil platform Irene with the mainland, ruptured, releasing an estimated 163 barrels (6,846 gallons) of oil into the ocean and then washing ashore. Over 700 birds were killed and sandy and rocky shoreline habitats and recreational beach use were impacted (CDFW 2014).
- **1998:** The storm events of 1998 caused the failure of an oil pipeline near Vandenberg Village, resulting in a spill (County Flood Control 1998).
- **2007/2008:** Greka Energy had six spills at multiple facilities within Santa Barbara County between July 1, 2007, and February 28, 2008. Two of the largest spills include:
  - 1) 89,000 gallons of crude oil; and
  - 2) 50,400 gallons of oil.
  - CDFW/OSPR formed a Multi-Agency Coordinating Committee of interested federal, state, and local agencies to assure Greka Energy complies with all environmental and safety regulations. The investigations into the causes and environmental impacts of the spills are continuing (CDFW 2014).
- **2008:** On December 8, 2008, approximately 1,200 gallons of oil spilled into the Santa Barbara Channel from a hole in a pump at Platform A, which sits 6 miles offshore of Santa Barbara. A majority of the oil was recovered with skimmers, and none reached the coastline (CDFW 2014).
- **2015:** Another tragic oil spill blackened the shores of Santa Barbara County at Refugio on May 19, 2015, when a 24-inch subterranean pipeline (Line 901) owned and operated by Plains All America Pipeline ruptured on the Gaviota Coast, west of Refugio State Park. Much of the crude oil spilled ran down a storm drain and into a ravine under the freeway and entered the ocean. The size of the spill ranged from 100,000 to 140,000 gallons, covering the Santa Barbara County coastline and extending nearly 9 miles out into the ocean. Various agencies, including local, county, state, and federal partners, were involved in response and recovery efforts, with the participation of approximately 1,300 field personnel and 325 incident command post personnel. Notifications from the county to state and federal partners were aligned with the Santa Barbara Operational Area Oil Spill Contingency Plan and Los Angeles-Long Beach Area Contingency Plan. The incident command post remained operational for the first 13 days of the incident.

  Interagency field teams conducted a National Resource Damage Assessment to document dead fish, invertebrates, and other wildlife in the oiled areas following the spill. NOAA and its state and federal natural resource co-trustees investigated the extent to which the incident may have caused harm to birds (e.g., brown pelicans, common murres, Pacific loons, snowy plovers), marine mammals (including California sea lions), fish (especially surf perch and grunion), and marine invertebrates along with their habitats. The spill also shut down fisheries, closed multiple beaches, and affected recreational uses such as camping, non-commercial fishing, and beach visits.

Three bills were signed into law in response to the spill. Under a new law, the California Fire Marshal will be required to review the oil pipelines conditions every year, while federal regulations only mandate a review every five years. Another new law provides for making oil spill response times faster and more effective. The third will force intrastate pipelines to use the best-known technology such as automatic shut-off valves (Cal OES 2018).

- **2020:** In August 2020, a small oil leak was discovered in a pipe emerging from a well that was built back in 1882 by the Occidental Oil Company. An estimated 420 to 630 gallons of oil were leaked into Toro Canyon Creek. According to the County, the pipe appears to have been damaged during the Thomas Fire (NPG 2021).
- **2020:** Approximately 25 barrels of crude oil spilled from at an HVI Cat Canyon oil facility on Zaca Station Road in the 5000 block of Zaca Station Road near Los Alamos on October 27, 2020, when a sample cock was left open. The spill was captured in a secondary container and did not reach any waterways or sensitive environmental habitats, according to the Santa Barbara County Fire Captain Daniel Bertucelli (Lompoc Record 2020).

Probability of Occurrence

Occasional – In any given year, Santa Barbara County could be subject to oil spills onshore or offshore. Given that 11 spills occurred between 1969 and 2020, there is an approximately 21.6 percent probability of oil spill occurrence in Santa Barbara County.

Climate Change Considerations

With increased changes in weather, climate, and economics, the demands for oil and gas production may shift. This shift in demand could increase the production, distribution, and transportation of oil products; thus, increasing the potential for oil spill occurrences.

5.6.8 Levee Failure

Description of Hazard

In California and Santa Barbara County, levees are typically used to protect adjacent communities and farmland from peak flood levels along some rivers and major creeks. Shoreline and coastal levees are not typically used in the County, although raised rock revetments exist in many locations along the shoreline and some minor levees run along channels in the Carpinteria Salt Marsh. Levees should be designed to withstand peak flood levels that in Santa Barbara County are typically generated by intense rainfall within the watershed, with snowmelt typically comprising a minor part of such flood flows.

Failure of levees is defined as conditions that breach and/or degrade the levees and can occur due to a levee being undermined due to issues such as construction defects, deterioration of a levee over time (e.g., rodent burrows), higher than anticipated flood flows or blockage in the channel from debris that directs or diverts flood flows toward the levee potentially creating a breach or overtopping. A catastrophic flood control structural failure could easily overwhelm local response capabilities to save lives and require mass evacuations. The breaching or overtopping of a levee can also expose urban and agricultural land to flood flows. Impacts on life safety will depend on the warning time and the resources available to notify and evacuate the public. Loss of life could result, and there could be associated health concerns as well as negative effects on local buildings and infrastructure.

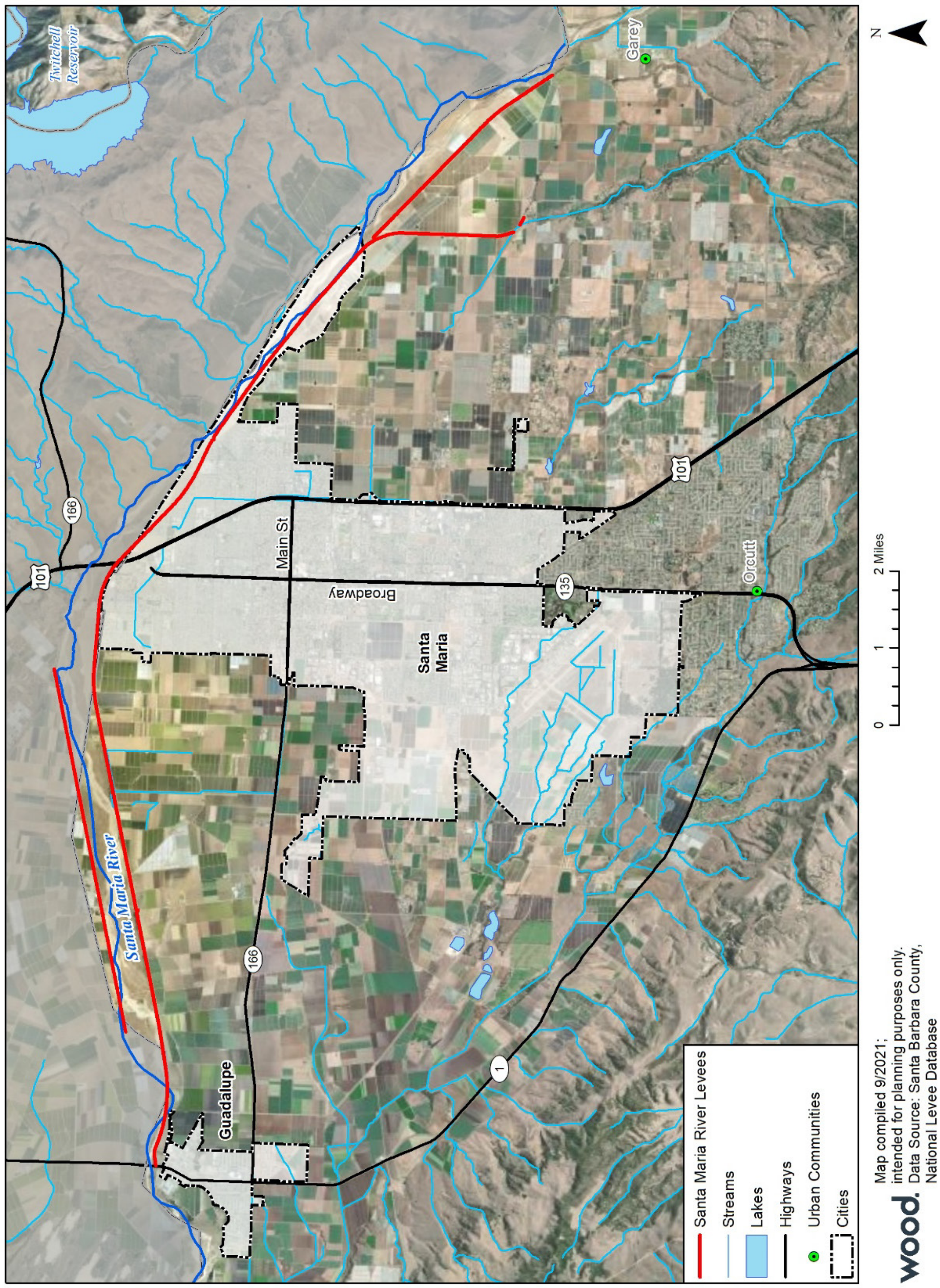
Location and Extent of Hazard in Santa Barbara County

Santa Barbara County supports one main established levee system and scattered informal levees. The Santa Maria River Levee System is located in the northern portion of the county, to the north of the City of Santa Maria, and extends from the City of Guadalupe to the community of Garey. The levee system consists of 17 miles of a stone-revetted levee along the south side of the Santa Maria River, which protects the City of Santa Maria, and approximately 5 miles of stone-revetted levee along the north side of the river, which largely protects agricultural land (see Figure 5-33; USACE 2007). The Santa Maria River is formed by the confluence of the Cuyama and Sisquoc Rivers. The Santa Maria River Levee System was designed to convey the peak flow of the design flood on the Santa Maria River from the confluence of the Cuyama and Sisquoc Rivers downstream to the Highway 1 bridge (USACE 2011). Runoff from the Cuyama River watershed is largely controlled by Twitchell Dam which is located upstream of the confluence. When combined with the flood retention capacity of Twitchell Dam, this levee system protects the City of Santa Maria; including the main business district, commercial, industrial and residential property, as well as agricultural lands in the Santa Maria Valley. However, about 500 square miles above the levee project including the entire Sisquoc River watershed is uncontrolled (USACE 2007). Less well development levees constructed by private landowners to protect agricultural land and other development exist on some segments of the Santa Ynez River and segments of some of the county's creeks. The City of Guadalupe on the Santa Maria River and the City of Lompoc on the Santa Ynez River, as well as surrounding agricultural lands are not protected by fully developed levee systems.

History of Hazard in Santa Barbara County

The construction of the Santa Maria River Levee was completed in 1963 by the USACE. The Santa Maria River Levee was designed to protect Santa Maria Valley from a standard project flood ranging in magnitude from 150,000 cf) (USACE 2007). The Santa Maria Valley Levees have been repeatedly damaged by low to moderate flows that are concentrated in narrower sub-channels that meander and strike the levee at sharp angles. The river flows as low as 8,000 cfs (5-year flow) have caused significant damage to the levee in 1966,1969,1978, 1980, 1983, 1995, 1998, and 2001. Damages from each of these floods occurred at different locations, under relatively low flow conditions, and were caused by flow impingement on the levee structure. In 1981, about a fourth of the levee was reinforced with groins (i.e., rigid hydraulic structures built perpendicularly from an ocean shore or a riverbank) and other features; however, a subsequent 600-foot breach in 1998 in a reach without groins indicated the potential for future levee failure.

Figure 5-33. Santa Maria River Levee



In March 2006, the USACE declared that the Santa Maria River Levee could no longer be certified to withstand major storm flows in the Santa Maria River. It was placed on a nationwide list of levees at risk of failure. FEMA shared with City of Santa Maria officials its preliminary revised flood maps that would put approximately 80 percent of the City of Santa Maria and a significant portion of the Santa Maria Valley in the 100-year flood zone. FEMA identified 20,000 parcels and 17,000 structures within the City of Santa Maria that would be in its revised flood plain. Most of the city's property owners would be required to buy flood insurance, based on the preliminary FEMA maps. The approximate area covers land from Betteravia Road north and east to the Santa Maria River Levee (Santa Maria News 2007).

In 2009, the USACE began the Santa Maria River Levee Improvement Project to strengthen an approximately 6.5-mile reach of the existing south levee with sheet pile and soil cement to address the above-described deficiency in preventing flooding from Blosser Road to the Bradley Canyon confluence (USACE 2009). In 2013, the Bradley Canyon Levee Extension project was approved and implemented to strengthen approximately 3,700 feet of the Bradley Canyon Levee, which is a part of the Santa Maria Levee Rehabilitation and provides comprehensive flood protection for the Santa Maria Valley and substantially reduces historical flood risk (USACE 2013).

Probability of Occurrence

Unlikely - Several floods have occurred since the levees were constructed, each with relatively low peak discharges. Because the natural channel averages about 2,000 feet in width, the floods did not fill the channel but meandered and impinged against the existing levees. This impingement undermined the levee toe causing considerable damage and jeopardized adjacent properties, demonstrating that the levee was vulnerable to smaller discharges and as a result would not provide the protection for which it was designed. The recent improvements by the USACE to the Santa Maria River Levee have greatly reduced the probability of impinging flows undermining the levee in critical areas. The remaining portions of the levee that were not improved will still be subject to the possibility of undermining and failure (USACE 2015). However, the probability of catastrophic failure is low considering the current condition and maintenance of the levee.

Climate Change Consideration

Increased rainfall, runoff, and snowpack melt from climate change could generate more water than the Santa Maria River Levees were designed to support. Additionally, as previously described, intense wildfires that burn hotter remove all vegetation and can melt surface soils creating hydrophobic soils which do not allow rainfall to percolate, increasing the threat of other disasters such as flooding and mud or debris flows (refer to Section 5.3.1, *Wildfire*). For example, the Wellman wildfire burned 29 percent of the Sisquoc River watershed above the Santa Maria Valley levees in the summer of 1966. Later that year, a relatively small amount of rainfall (less than 2-year frequency) generated a relatively large peak flow (approximately 20-year) given the hydrophobic soils in the watershed that caused significant damage to the south levee. It was later concluded that the only reason the levee did not fail was because of the short duration of the peak flow (USACE 2007). In the summer of 2007, approximately 26 percent of the Sisquoc River watershed (24 percent of all of the uncontrolled watershed area) burned during the Zaca wildfire. To prepare for the fall and winter rainfall, the County and USACE conducted emergency Advance Measures before the approaching flood season to address the risk of levee failure and reduce the significant flood threat to the City of Santa Maria. The Advance Measures consisted of constructing a pilot channel to direct low flows away from the south levee, stockpiling sufficient quantities of large rock at strategic locations to flood fight an impending levee breach, and preparation of a flood-fighting plan of action (USACE 2007). Therefore, as climate change results in hotter, more intense wildfires in the Santa Barbara County Watersheds, the levees within the county remain at risk for breaches during post-wildfire rainfall events.

5.6.9 Radiological Accident

Description of Hazard

Radioactive material, for transportation, is defined as any material which has a specific activity greater than 0.002 microcuries per gram (U.S. Nuclear Regulatory Commission [NRC] 2021). Radioactive materials are routinely transported in California, including medical and industrial material sources described below, as well as wastes that have radioactive components. Many of the radioactive waste shipments in the U.S. come from research and cleanup efforts at national laboratories and nuclear power plants. Radiological accidents that result in the release of radioactive materials may result in long-term health risks and contamination of state resources, including air and water supply, groundwater, and agricultural lands.

Federal regulations require nuclear power plants (NPPs), states, and surrounding counties to have a federally tested and approved emergency response plan. FEMA is responsible for ensuring adherence to emergency planning and exercise requirements by emergency response organizations outside of the power plant boundaries which is referred to as “offsite”. The NRC is responsible for the regulatory application of these guidelines at the nuclear power plant which is referred to as “onsite”. Radiation releases are monitored and controlled by strict EPA guidelines to keep the public and emergency responders safe (Cal OES 2021a).

The NRC’s goals and guidance manual are designed to ensure safety in routine handling situations for minimally hazardous materials and ensure integrity under all circumstances for highly dangerous materials, given it is not feasible to prevent all transportation accidents. Radiological accidents are minimized by focusing on regulations and policies related to packaging, including containing the radioactive material (to prevent leaks), preventing unusual occurrences, and reducing external radiation to safe levels (e.g., shielding) (NRC 2021).

In the event of an NPP incident, the power plant (utility company) immediately notifies the California State Warning Center and counties in the Plume Exposure Pathway Emergency Planning Zones (EPZs). The Warning Center continues the notification process to other agencies according to procedures for NPP incidents. The power plant provides the emergency classification level (ECL) and information to the Warning Center for updates along the notification chain (Cal OES 2021a).

Federal guidelines classify emergency conditions at U.S. nuclear power plants into four levels. They are listed below in order from the least to the most serious (Cal OES 2021a):

- **Notification of Unusual Event (NOUE):** Indicates a potential problem with the operation of the plant. Officials are notified but no public action is needed.

- **Alert:** Indicates an event that could reduce the plant's level of safety. Any release of radioactivity would be a small fraction of the federal guidelines. Designated Emergency Operations Centers and facilities may be activated. No public action is needed.
- **Site Area Emergency (SAE):** Indicates a problem that substantially reduces the plant's level of safety. The release of radioactivity outside the plant site would not be expected to exceed federal guidelines. Those who live and work in the EPZ should monitor the situation on television or radio. Limited actions to protect the public may be needed.
- **General Emergency (GE):** Indicates a problem affecting safety systems in the plant that could lead to a release of radiation that would exceed the federal guidelines outside the plant. Warning sirens will sound. Officials may order protective action for those who live in the EPZ.

The ECLs must be used as a foundation for emergency response, planning, training, and exercises. The vast majority of events reported to NRC are routine and handled outside of the incident response program.

The EPZ is the area surrounding a nuclear power plant for which plans/procedures exist to ensure that prompt and effective actions occur to protect the health and safety of the public in case of an incident. FEMA recognizes two types of EPZs for planning purposes: the plume exposure pathway EPZ and the ingestion exposure pathway EPZ. Additionally, California has established a third planning zone called the public education zone (Cal OES 2021a).

- **Plume Exposure Pathway (EPZ):** The federal government requires that communities within approximately ten miles of a nuclear power plant be included in this zone. Based on site-specific studies in 1980 for CA nuclear power plants, EPZs around the nuclear plant sites were established. The DCPP Plume Exposure Pathway EPZ is approximately 18 to 22 miles from the plant. The SONGS Plume Exposure Pathway EPZ is approximately 10 to 14 miles from the plant. All residents within the EPZ annually receive instructions about emergency plans, including protective action measures, evacuation routes, and shelter locations.
- **Public Education Zone (PEZ):** The State of California has also defined a broader area between 10 – 35 miles from a plant as Public Education Zones. Within this zone, the utility informs the public of preparedness plans. The distance from the plant, however, would make evacuation unnecessary.
- **Ingestion Pathway Zone (IPZ):** The federal government defines the IPZ as a geographic area, approximately 50 miles in radius surrounding a commercial nuclear power plant where exposure to radiation by ingestion of contaminated water or food might be possible. The IPZ for DCPP includes the counties of San Luis Obispo, Santa Barbara, and Monterey Counties.

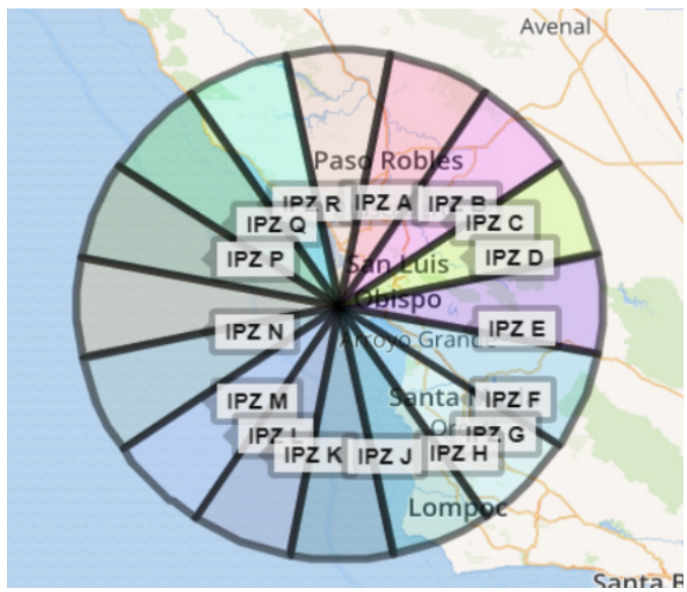
Location and Extent of Hazard in Santa Barbara County

There are a few medical and industrial sources within the county that generate radioactive material such as UC Santa Barbara and the Ridley-Tree Cancer Center. However, transportation of radiological hazards results in evaluation at a multi-county scale. The Diablo Canyon Power Plant in San Luis Obispo County is the only operating NPP in California. The Diablo Canyon NPP is proposed to close in 2025 in agreement with labor and environmental groups. The decision was made in part due to the new state requirement for state-regulated utilities to obtain 50 percent of electricity from renewable energy sources by 2030. However, the Diablo Canyon NPP site will remain a radioactive materials site for decades due to the level of contamination for nuclear production (PG&E 2016).

The Diablo Canyon NPP contains two power-generating units, both of which are operational. Each unit is a pressurized water reactor having an electric power generating capacity of over 1,000 megawatts. The plant is designed to use slightly enriched uranium dioxide (UO2) as a fuel. This fuel poses no major concern in its un-irradiated state as it has very lower radioactivity. However, after being in the core during the operation of the reactor, the fuel becomes extremely radioactive from fission by-products. These highly radioactive by-products are the main hazard in an NPP accident (San Luis Obispo County Office of Emergency Services 2014).

The Diablo Canyon EPZ is divided into 12 PAZs and a 5 and 10 nautical mile safety zone (see Figure 5-34; Table 5-20). PAZs help organize emergency planning and response actions into areas that are familiar to emergency response agencies and the public. If there is a major emergency, residents in a PAZ may be directed to take protective actions, such as evacuation or shelter in place. It is unlikely an emergency at Diablo Canyon would affect the entire EPZ. Surrounding the 12 PAZs are three PEZs. Residents in these areas are not likely to be affected by an emergency at Diablo Canyon NPP. However, since residents in the PEZ (Zones 13 through 15) are generally near the EPZ, general information about Diablo Canyon NPP is also provided to them (Santa Barbara County Office of Emergency Services 2021).

The Ingestion Pathway Zone (IPZ) extends to a 50-mile radius around Diablo Canyon Power Plant. The purpose of the IPZ is to control the movement and ingestion of potentially contaminated food and agricultural products following a radiological emergency. The IPZ includes San Luis Obispo County and parts of Monterey, Santa Barbara, and Kern counties. The IPZ extends into the north county and encompasses Lompoc, Vandenberg Village, Los Alamos, Santa Maria, Guadalupe, and surrounding rural areas. In a nuclear event, actions that may be directed to protect the food supply will be communicated by PAZ, Agricultural Sector, or a defined geographical area (PG&E 2022).



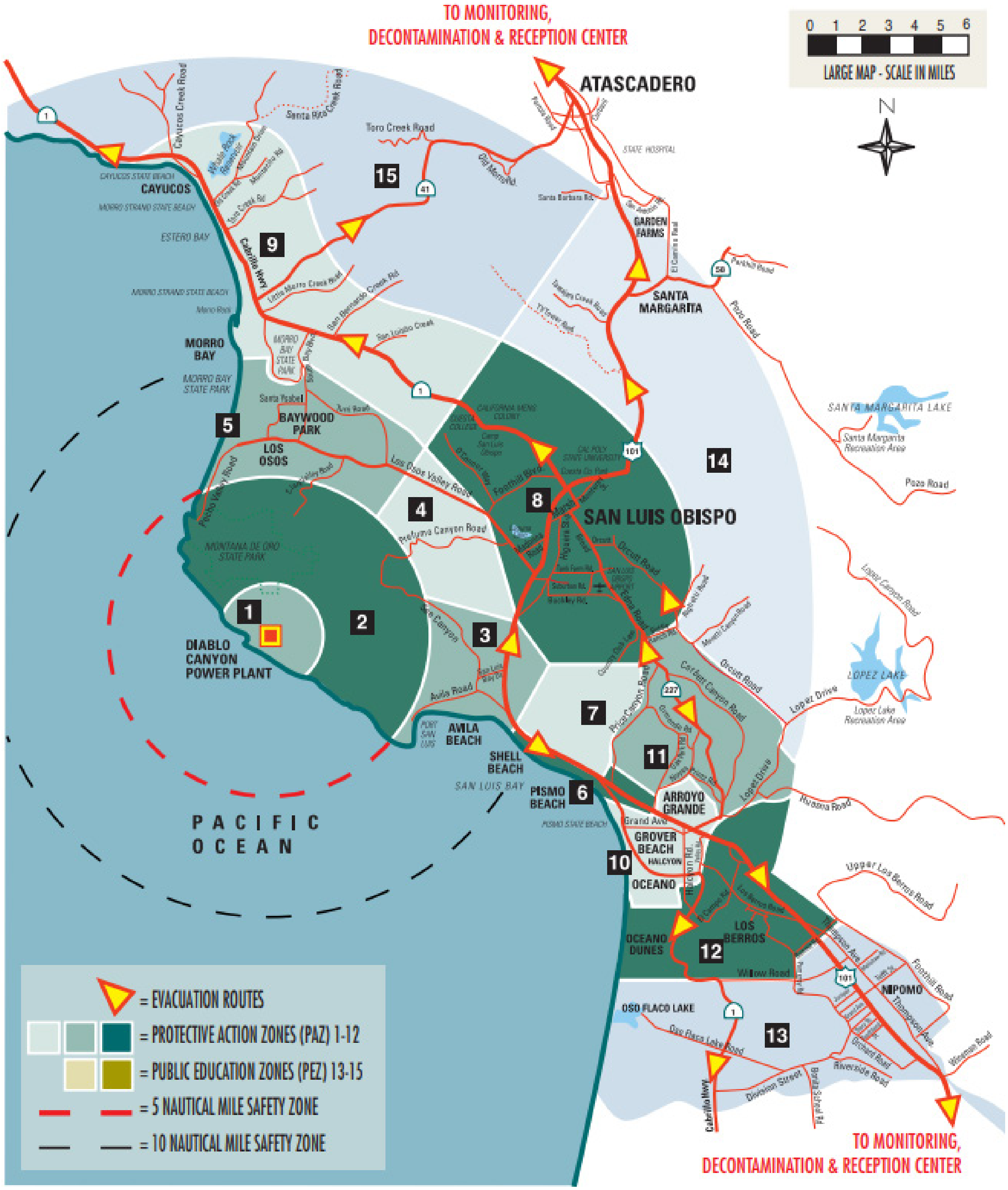
The IPZ for the Diablo Canyon Power Plant extends over a radius of 50 miles, including northern portions of Santa Barbara County in the Santa Maria Valley and Lompoc Valley. Source: prepareslo.org

Table 5-20. Diablo Canyon Nuclear Power Plant Emergency Planning Zones

Zone #	Zone Area	Zone Description
Protective Action Zones (PAZs)		
PAZ 1	2-mile radius from the NPP	Identified residences and isolated hill areas within a two-mile radius from the NPP.
PAZ 2	6-mile radius from the NPP	Identified residences, plant access road, upper segments of See Canyon and Prefumo Canyon Road, Montaña de Oro State Park, and isolated hill areas extending out to a 6-mile radius from the NPP.
PAZ 3	Avila, San Luis Bay, See Canyon, Sunset Palisades, Shell Beach, Squire Canyon	Avila Beach, Port San Luis, Pirate's Cove, San Luis Bay Estates, Avila Road, San Luis Bay Drive, See Canyon Road outside the 6-mile limit, Squire and Gragg Canyons, Sunset Palisades/Shell Beach. North of Spyglass Drive.
PAZ 4	Prefumo Canyon, Los Osos Valley	Prefumo Canyon Road outside the 6-mile limit, Los Osos Valley Road between Turri Road and Foothill Boulevard extending out to approximately 10 miles from the NPP.
PAZ 5	Baywood, Los Osos	Baywood Park, Los Osos, Turri Road, Los Osos Valley Road west of Turri Road, Clark Valley extending to the north approximately 10 miles from the NPP.
PAZ 6	City of Pismo Beach	City of Pismo Beach, Shell Beach south of Spyglass Drive (including adjacent beaches). This area is more than 10 miles from the NPP.
PAZ 7	Indian Knob, Price Canyon	Price Canyon Road and isolated hill areas north of Pismo Beach. This area is more than 10 miles from the NPP.
PAZ 8	San Luis Obispo Area	City of San Luis Obispo, Cal Poly, California Men's Colony, Camp San Luis Obispo, Cuesta College, O'Connor Way, Orcutt Road north of East Corral de Piedra Creek, Edna, Country Club, Crestmont Drive & Davenport Creek area. This area is more than 10 miles from the NPP.
PAZ 9	Morro Bay, Cayucas	Highway 1 west of Cuesta College, Morro Bay, Cayucos, Whale Rock Reservoir area. This area is more than 10 miles from the NPP.
PAZ 10	Five Cities (Southern Portion)	City of Arroyo Grande, City of Grover Beach, Oceano, Halcyon, and Pismo State Beach. This area is more than 10 miles from the NPP.
PAZ 11	Orcutt Road, Lopez Drive, Route 227	Canyon area north of Five Cities (bounded by Price Canyon, Orcutt Road, Huasna Creek, and northern limits of Arroyo Grande and Pismo Beach). This area is more than 10 miles from the NPP.
PAZ 12	Nipomo, North of Willow Road	Nipomo Mesa north of Willow Road, Cienega Valley, Oceano Dunes State Vehicle Recreational Area. This area is more than 10 miles from the NPP.
Public Education Zones (PEZs)		
PEZ 13	Nipomo	Nipomo Mesa (south of Willow Road), Nipomo Valley, Santa Maria Valley (north of Santa Maria), and Cuyama Rivers.
PEZ 14	Cuesta Pass, Santa Margarita	US 101 north of San Luis Obispo, Santa Margarita, isolated hill areas north and east of San Luis Obispo within 20 miles of the NPP.
PEZ 15	Route 41, Old Creek Road	Highway 1 north of Cayucos, Old Creek Road, Highway 41, isolated hill areas north and east of Cayucos and Morro Bay within 20 miles of the NPP.

Source: NRC 2021.

Figure 5-34. Emergency Planning Zone (EPZ) for Diablo Canyon Nuclear Facility



History of Hazard in Santa Barbara County

No significant radiological incidents have occurred to date in the county or the State of California.

Probability of Occurrence

Unlikely - No radiological incidents have occurred to date in the county and the probability of occurrence is low. Additionally, the decommissioning of the Diablo Canyon NPP in 2025 will greatly reduce radiological accident risk to Santa Barbara County. Due to strict regulation of nuclear power plants in the U.S., significant nuclear power incidents that can cause harm to the public have a low probability of occurrence. The probability of a catastrophic event involving a nuclear power plant is low and these plants are extremely well protected. However, as evidenced by the March 2011 events at the Fukushima Daiichi plant in Japan, caused by the Tohoku Earthquake and Tsunami, the consequences of a severe accident or a successful terrorist attack on a nuclear power plant that results in a release of radioactive materials could be very significant.

However, as described above, smaller radiological accidents, such as through transportation occur with greater frequency and therefore, have a greater probability of occurrence.

Climate Change Consideration

While there is little evidence to link climate change to increased occurrences of radiological material releases, natural and destructive hazards (e.g., earthquakes, flooding) have the potential to increase the risk of radiological accidents through unforeseen upset to regular operations and transportation of radiological material. However, Diablo Canyon NPP's emergency planning considers such a disaster. Further, the planned decommissioning would reduce the risk of radiological material release.

5.0 HAZARDS ASSESSMENT REFERENCES

Barbara H. Allen-Diaz. 2009. Climate Change Affects Us All. California Agriculture, 63/2: 51–3. University of California, Agriculture and Natural Resources.

Burciaga, M. 2018. “Storm brings hail, heavy rains to Santa Barbara County; breaks 112-year record at Santa Maria Airport.” Santa Maria Times, November 29, 2018, updated February 27, 2019. Accessed: 4 November 2021. Retrieved from: https://santamariatimes.com/news/local/storm-brings-hail-heavy-rains-to-santa-barbara-county-breaks-112-year-record-at-santa/article_649076db-46cb-5997-971a-9c82f36b2ecf.html.

Cachuma Resource Conservation District. 2021. Most Common Invasive Plants. Cachuma Resource Conservation District. Accessed: 4 October 2021. Retrieved from: https://www.rcdsantabarbara.org/most-common-invasive-plants

California Climate Change Center. 2006. Climate Change: Challenges and Solutions for California Agricultural Landscapes.

California Coastal Commission. 2019. Oil Spills. Accessed: 26 October 2021. Retrieved from: https://www.coastal.ca.gov/publiced/oilspills.html

California Department of Conservation. 2019. California Announces New Oil and Gas Initiatives. Retrieved from: https://www.conservation.ca.gov/index/Pages/News/California-Establishes-Moratorium-on-High-Pressure-Extraction.aspx

California Department of Fish and Wildlife (CDFW). 2014. Major Oil Spills and Incidents in California. Accessed: 26 October 2021. Retrieved from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=29364&inline

California Department of Food and Agriculture. 2020. Official Notice - Amendment Notice of Treatment for the Asian Citrus Psyllid.

California Department of Forestry and Fire Protection (CAL FIRE). 2017. CAL FIRE SLO Twitter. Accessed: 26 October 2021. Retrieved from: https://twitter.com/CALFIRE_SLO/status/883810939446771712

———. 2021. Emergency Fund Fire Suppression Expenditures.

California Department of Public Health (CDPH). 2013. Preparing California for Extreme Heat: Guidance and Recommendations. Accessed: 4 November 2021. Retrieved from: https://healthyplacesindex.org/wp-content/uploads/2018/02/2013_cph_preparing_california_for_extreme_eat.pdf.———. 2021. Vector-Borne Disease Section. Accessed: Retrieved from: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/VBDS.aspx

California Department of Water Resources (DWR). 2021a. Best Available Map (BAM). Accessed: 1 November 2021. Retrieved from: https://gis.bam.water.ca.gov/bam/#skip-to-content

———. 2021b. California’s Groundwater Online. Accessed: 3 November 2021. Retrieved from: https://storymaps.arcgis.com/stories/2a301109fd984ab98b0217c7c6a6e754

——. 2021c. Drought. Accessed: 27 October 2021. Retrieved from: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Water-Basics/Drought/Files/Publications-And-Reports/DroughtBrochure2021update_ay11.pdf

——. 2021d. Drought in California. Accessed: 27 October 2021. Retrieved from: https://water.ca.gov/Programs/All-Programs/Drought

California Energy Commission. 2018. Annual Averages. Accessed: 28 October 2021. Retrieved from: https://cal-adapt.org/tools/annual-averages/.

California Geological Survey. 2019a. Landslides. Accessed: 1 November 2021. Retrieved from: https://www.conservation.ca.gov/cgs/landslides#debrisflows

——. 2019b. Post-Fire Debris Flow Facts. Accessed: 1 November 2021. Retrieved from: https://www.conservation.ca.gov/index/Pages/Fact-sheets/Post-Fire-Debris-Flow-Facts.aspx

California Invasive Plant Council (Cal-IPC). 2021. About invasive plants. Retrieved from: https://www.cal-ipc.org/plants/impact/

California Natural Resources Agency. 2018. California's Fourth Climate Change Assessment. Accessed: 26 October 2021. Retrieved from: https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf

California Office of Emergency Services (Cal OES). 2018. California State Hazard Mitigation Plan. Accessed: 26 October 2021. Retrieved from: https://www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/hazard-mitigation-planning/state-hazard-mitigation-plan

——. 2021a. Nuclear Power Preparedness Program. Accessed: 26 October 2021. Retrieved from: https://www.caloes.ca.gov/cal-oes-divisions/planning-preparedness/nuclear-power-preparedness-program

——. 2021b. Hazardous Materials Spill Reports – Santa Barbara County, Reporting Period 2006 to 2021. Accessed: 5 November 2021. Retrieved from: https://w3.calema.ca.gov/operational/malhaz.nsf/f1841a103c102734882563e200760c4a?SearchView.

California Public Utilities Commission (CPUC). 2019. Decision 19-10-054. Accessed: 5 November 2021. Retrieved from: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M319/K075/319075453.PDF.

——. 2021a. Natural Gas and California. Accessed: 5 November 2021. Retrieved from: https://www.cpuc.ca.gov/natural_gas/.

——. 2021b. Aliso Canyon Well Failure. Retrieved from: https://www.cpuc.ca.gov/regulatory-services/safety/pipeline-safety/aliso-canyon-well-failure

Cayan, D. R., Bromirski, P., Hayhoe, K., Tyree, M., Dettinger, M., & Flick, R. 2006. 'Abstract: Projecting Future Sea Level' (Other Report). Projecting future sea level, p. 64. California

Climate Change Center. Accessed: 5 October 2021. Retrieved from: http://pubs.er.usgs.gov/publication/70157139

CBS Los Angeles. 2021. Drenching Rain Forces Alisal Fire Burn Area Residents In Santa Barbara County To Evacuate. Accessed: 26 October 2021. Retrieved from: https://losangeles.cbslocal.com/2021/10/25/residents-in-santa-barbara-near-alisal-fire-burn-area-brace-for-approaching-rain-storm/

Center for Disease Control and Prevention (CDC). 2012. Lesson 1: Introduction to Epidemiology. Retrieved from: https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html

——. 2016. SARS (10 Years After). Retrieved from: https://www.cdc.gov/dotw/sars/index.html

——. 2017. Coastal Flooding, Climate Change, and Your Health: What You Can Do to Prepare.

——. 2019. 2009 H1N1 Pandemic (H1N1pdm09 virus). Retrieved from: https://www.cdc.gov/flu/pandemic-resources/2009-h1n1-pandemic.html

——. 2021. Symptoms of COVID-19. Retrieved from: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html

Charity Thoman. 2013. Meningococcal Outbreak at UC Santa Barbara. Santa Barbara Independent.

City of Carpinteria. 2019. Sea Level Rise Vulnerability Assessment and Adaptation Plan. Accessed: 1 November 2021. Retrieved from: https://carpinteriaca.gov/city-hall/community-development/planning/general-plan-local-coastal-plan-update/.

City of Goleta. 1997. Coastal Zoning Ordinance – Chapter 35, Article II. Accessed: 26 October 2021. Retrieved from: https://www.cityofgoleta.org/home/showdocument?id=120.

——. 2015. Coastal Hazards Vulnerability Assessment and Fiscal Impact Report. Accessed: 1 November 2021. Retrieved from: https://www.cityofgoleta.org/home/showpublisheddocument/11317/635908658293030000.

City of Santa Barbara. 2012. Certified Final Program Environmental Impact Report for the Plan Santa Barbara General Plan Update. Accessed: 4 November 2021. Retrieved from: https://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=16926.

——. 2021. Sea-Level Rise Adaptation Plan. Accessed: 1 November 2021. Retrieved from: https://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=229622.

Climate Central. 2019. AMERICAN WARMING: The Fastest-Warming Cities and States in the U.S. Accessed: 4 November 2021. Retrieved from: https://www.climatecentral.org/news/report-american-warming-us-heats-up-earth-day

CNN. 2014. 'Deltopia' party in California turns violent; dozens arrested. Retrieved from: https://www.cnn.com/2014/04/06/us/california-street-party-melee/index.html

——. 2019. In the last 10 months, 140 local governments, police stations, and hospitals have been held hostage by ransomware attacks. Retrieved from: https://www.cnn.com/2019/10/08/business/ransomware-attacks-trnd/index.html

Colorado Geological Survey. 2021. Debris and Mud Flows. Accessed: 1 November 2021. Retrieved from: https://coloradogeologicalsurvey.org/hazards/debris-flows/

Community Environmental Council. 2020. Raise the Red Flag on the Causes of Wildfire. Accessed: 26 October 2021. Retrieved from: https://resource.cecsb.org/raise-the-red-flag-on-causes-of-wildfire/

County of Santa Barbara. 2017. Coastal Resiliency Project: Sea Level Rise and Coastal Hazards Vulnerability Assessment. Accessed: 1 November 2021. Retrieved from: https://cosantabarbara.app.box.com/s/uon3kzbfsviq8xoevcxeeke64c2tk87f.

——. 2018. Petroleum Unit. Accessed: 5 November 2021. Retrieved from: https://www.countyofsb.org/plndev/energy/onshore.sbc.

County of Santa Barbara Planning and Development Department. 2021. Climate Change Vulnerability Assessment. Accessed: 4 November 2021. Retrieved from: https://s3-us-west-2.amazonaws.com/mysocialpinpoint/uploads/redactor_assets/documents/8c4aa5d7d81a96f8896bce055b229c2e7ec3c010a9866b35a18b7ae86aef7067/44589/SantaBarbaraCounty_CCVA_Report_PublicDraft_withExecSummary__09-21-21_reduced.pdf.

Community Environmental Council, Santa Barbara County Water Agency, and Satna Barbara County Flood Control District. 2003. Santa Barbara County Creek Care Guide, What you can do to protect our creeks. Accessed: 1 November 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/content/Water/Environmental/Creekcare%20Web%20version.pdf.

Department of Water Resources (DWR) Division of Safety of Dams (DSOD). 2021a. Division of Safety of Dams. Accessed: 5 November 2021. Retrieved from: https://water.ca.gov/programs/all-programs/division-of-safety-of-dams.

——. 2021b. Dams within Jurisdiction of the State of California Listed Alphabetically by County. Accessed: 5 November 2021. Retrieved from: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Dams-Within-Jurisdiction-of-the-State-of-California-Listed-Alphabetically-by-County-September-2021.pdf.

Earthquake Track. 2021. Recent Earthquakes near Santa Barbara, California, United States. Accessed: Retrieved from: https://earthquaketrack.com/us-ca-santa-barbara/recent.

Eliason, M. [@EliasonMike]. (2021. October 12, 2021) #*Alisal Fire-Fire activity Tuesday morning in Refugio Canyon as the 6,000-acre fire continues to churn the bone dry vegetation. A Croman Corp. Sikorsky SH-3 heads back to refill its tank & head back to make another water drop on the fire* [Tweet]. Twitter. https://twitter.com/EliasonMike/status/1447982887370825732.

Environmental Protection Agency (EPA). 2016. What Climate Change Means for California. Accessed: 4 November 2021. Retrieved from: https://www.epa.gov/sites/default/files/2016-09/documents/climate-change-ca.pdf.

——. 2021a. Climate Adaptation and Saltwater Intrusion. Accessed: 27 October 2021. Retrieved from: https://www.epa.gov/arc-x/climate-adaptation-and-saltwater-intrusion.

——. 2021b. Superfund Site: Casmalia Resources, Casmalia, CA Cleanup Activities. Accessed 5 November 2021. Retrieved from: https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0901257#bkground.

Federal Emergency Management Agency (FEMA). 2020. Flood Zones. Accessed: 29 October 2021. Retrieved from: https://www.fema.gov/glossary/flood-zones

FEMA. 2021a. Coastal Hazards & Flood Mapping, A Visual Guide. Accessed: 29 October 2021. Retrieved from: https://www.fema.gov/sites/default/files/documents/fema_coastal-glossary.pdf

——. 2021b. Protective Actions Research: Extreme Heat. Accessed: 3 November 2021. Retrieved from: https://community.fema.gov/ProtectiveActions/s/article/Extreme-Heat.

——. 2021c. Protective Actions Research: Tornado. Accessed: 4 November 2021. Retrieved from: https://community.fema.gov/ProtectiveActions/s/article/Tornado.

——. 2021d. Protective Actions Research: Hurricane. Accessed: 5 November 2021. Retrieved from: https://community.fema.gov/ProtectiveActions/s/article/Hurricane.

FloodList. 2021. USA – Deadly Flooding and Mudslides in California (Updated). Accessed: 29 October 2021. Retrieved from: https://floodlist.com/america/usa/flood-mudslide-california-january-2018

Forbes. 2019. Cyberattack On LAPD Confirmed: Data Breach Impacts Thousands Of Officers. Retrieved from: https://www.forbes.com/sites/zakdoffman/2019/07/30/lapd-cyberattack-police-department-confirms-it-has-been-hacked/?sh=859b2da14bec

Goleta Water District. 2021. Lake Cachuma: Our Largest Water Supply Source. Accessed: 27 October 2021. Retrieved from: https://www.goletawater.com/water-supply/lake-cachuma

Guinness World Records. 2021. Highest recorded temperature on Earth. Accessed: 4 November 2021. Retrieved from: https://www.guinnessworldrecords.com/world-records/highest-recorded-temperature/.

Guzman-Morales, J. and Gershunov, A. 2019. "Climate change suppresses Santa Ana winds of Southern California and sharpens their seasonality." Geophysical Research Letters 46, no. 5 (2019): 2772-2780. Retrieved from: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GL080261.

Harvard University. 2021. Coronavirus, Climate Change, and the Environment A Conversation on COVID-19 with Dr. Aaron Bernstein, Director of Harvard Chan C-CHANGE. Retrieved from: https://www.hsph.harvard.edu/c-change/subtopics/coronavirus-and-climate-change/.

Henessee, S. 2021. "Hail hits Santa Barbara". KEYT, March 10, 2021. Accessed: 4 November 2021. Retrieved from: https://keyt.com/news/2021/03/10/hail-hits-santa-barbara/.

Hodgson, M. 2019. "Santa Barbara County supervisors poised to declare end of drought-caused emergency" Lompoc record, March 16, 2019, updated May 20, 2019. Accessed: 15 May 2022. Retrieved from: https://lompocrecord.com/news/local/santa-barbara-county-supervisors-poised-to-declare-end-of-drought-caused-emergency/article_9e79969e-f2fe-54ca-bd4d-9acf925ca88f.html

International Union for Conservation of Nature (IUCN). 2021. Invasive alien species and climate change. Retrieved from: https://www.iucn.org/resources/issues-briefs/invasive-alien-species-and-climate-change

Jervis, L. 2020. "Laurie Jervis: Late Season Extreme Heat Leads to Accelerated Grape Harvest". Noozhawk, November 2, 2020. Accessed: 5 November 2021. Retrieved from: https://www.noozhawk.com/article/laurie_jervis_late_season_extreme_heat_leads_to_accelerated_grape_harvest.

Jesse Roman, Angelo Verzoni, & Scott Sutherland. 2020. Greetings from the 2020 Wildfire Season. Accessed: 18 October 2021. Retrieved from: http://www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2020/November-December-2020/Features/Wildfire

KCBX. 2014. Riot breaks out at Deltopia in Isla Vista, 26 hospitalized. Retrieved from: https://www.kcbx.org/santa-barbara-county/2014-04-06/riot-breaks-out-at-deltopia-in-isla-vista-26-hospitalized

Keon Zemoudeh. 2016. MAP: Where oil runs in Santa Barbara. KCRW. Accessed: Retrieved from: https://www.kcrw.com/culture/shows/curious-coast/map-where-oil-runs-in-santa-barbara

Lara Cooper. 2015. Norovirus Outbreak Sickens Hundreds in Santa Barbara County. Noozhawk.

Live Science. 2012. Dangerous Sundowner Winds Explained. Accessed: 4 November 2021. Retrieved from: https://www.livescience.com/18508-dangerous-sundowner-winds-explained.html.

Lompoc Record. 2020. 25-barrel crude oil spill reported at HVI Cat Canyon facility near Los Alamos. Accessed: 26 October 2021. Retrieved from: https://lompocrecord.com/news/local/25-barrel-crude-oil-spill-reported-at-hvi-cat-canyon-facility-near-los-alamos/article_be5cb530-ff64-52b5-9d63-7ddfa2606bf9.html

——. 2015. Flash flood shuts down Highway 166; more than 100 vehicles stranded. Accessed: 29 October 2021. Retrieved from: https://lompocrecord.com/news/local/flash-flood-shuts-down-highway-166-more-than-100-vehicles-stranded/article_e01bf6d9-ea67-5751-b6f5-fcc4b5797ca9.html

Los Angeles Times. 1991. Most of Toxic Chemical Taken From Crash Site: Derailment. Retrieved from: https://www.latimes.com/archives/la-xpm-1991-08-02-mn-226-story.html

——. 2014. Isla Vista shooting suspect targeted sorority, neighbors. Retrieved from: https://www.latimes.com/local/lanow/la-me-ln-isla-vista-shooting-witnesses-describe-gunman-20140524-story.html

——. 2021. Utilities Commission approves gas storage plan at Aliso Canyon over residents' objections. Retrieved from: https://www.latimes.com/california/story/2021-11-05/utilities-commission-approves-gas-storage-plan-at-aliso-canyon-site-over-residents-objections

Mercury News. 2017. Don't be distracted by the red fox's beauty; it has a darker side. Retrieved from: https://www.mercurynews.com/2017/09/27/dont-be-distracted-by-the-red-foxs-beauty-it-has-a-darker-side/

Mitchell, P.W. 2014. Climate Change Effects on Expansive Soil Movements. Accessed: 5 October 2021. Retrieved from: https://www.cfms-sols.org/sites/default/files/Actes/1159-1162.pdf

National Aeronautics and Space Administration (NASA). 2017. NASA Data Show California's San Joaquin Valley Still Sinking. Accessed: 5 October 2021. Retrieved from: http://www.nasa.gov/feature/jpl/nasa-data-show-californias-san-joaquin-valley-still-sinking

National Drought Mitigation Center. 2021. Types of Drought. Accessed: 27 October 2021. Retrieved from: https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx

National Interagency Fire Center. 2021. Wildland Fire Open Data. Accessed: 26 October 2021. Retrieved from: https://data-nifc.opendata.arcgis.com/

National Geographic. 2015. Worst Drought in 1,000 Years Predicted for American West. Accessed: 26 October 2021. Retrieved from: https://www.nationalgeographic.com/science/article/150212-megadrought-southwest-water-climate-environment

———. 2019. Tornadoes and Climate Change. Accessed: 5 November 2021. Retrieved from: https://www.nationalgeographic.org/article/tornadoes-and-climate-change/

National Research Council (NRC). 2012. Sea Level Rise for the Coasts of California, Oregon, and Washington. Accessed: 1 November 2021. Retrieved from: https://www.adaptationclearinghouse.org/resources/sea-level-rise-for-the-coasts-of-california-oregon-and-washington-past-present-and-future.html

National Weather Service (NWS). 2021a. Weather-Related Fatality and Injury Statistics. Accessed: 3 November 2021. Retrieved from: https://www.weather.gov/hazstat/#.

———. 2021b. Mountain and Valley Winds. Accessed: 4 November 2021: Retrieved from: https://www.weather.gov/safety/wind-mountain-valley.

National Institute for Occupational Safety & Health (NIOSH). 2021. OSHA-NIOSH Heat Safety Tool App. Accessed: Retrieved from: https://www.cdc.gov/niosh/topics/heatstress/heatapp.html

National Institute of Environmental Health Services (NIH). 2018. Vectorborne and Zoonotic Diseases. Retrieved from: https://www.niehs.nih.gov/research/programs/climatechange/health_impacts/vectorborne/index.cfm

National Oceanic and Atmospheric Administration (NOAA). 2005. Storm Data and Unusual Phenomena with Late Reports and Corrections. Accessed: 29 October 2021. Retrieved from: https://books.google.com/books?id=PoaQUEKivqkC&pg=RA1-PA120&lpg=RA1-PA120&dq=Santa+Barbara+County,+flash+flooding+and+mudslides+closed+down+Highway+101+at+Bates+Road+2005&source=bl&ots=ZDdp2KHs2m&sig=ACfU3U03Be

QPsHNV8rIaMA4QgbcFjD5zMw&hl=en&sa=X&ved=2ahUKEwjnvNSswvfzAhWEaDABHfAMAugQ6AF6BAgREAM#v=onepage&q=Santa%20Barbara%20County%2C%20flash%20flooding%20and%20mudslides%20closed%20down%20Highway%20101%20at%20Bates%20Road%202005&f=false

——. 2018. Tsunamis. Accessed: 18 October 2021. Retrieved from: https://www.noaa.gov/education/resource-collections/ocean-coasts/tsunamis

——. 2021a. Drought Conditions for Santa Barbara County. Accessed: 18 October 2021. Retrieved from: https://www.drought.gov/states/California/county/Santa%20barbara

——. 2021b. Drought Impacts on Wildfire Management. Drought.gov. Accessed: 18 October 2021. Retrieved from: https://www.drought.gov/sectors/wildfire-management

——. 2021c. Natural Hazards Viewer. Accessed: 3 November 2021. Retrieved from: https://www.ncei.noaa.gov/maps/hazards/?layers=0

——. 2021d. Storm Events Database – Santa Barbara County – January 1, 1990, to August 31, 2021. Accessed: 4 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Frost%2FFreeze&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=1990&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=SANTA%2BBARBARA%3A83&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

NOAA National Centers for Environmental Information (NCEI). 2021a. Storm Events Database – Tornado Search Results for Santa Barbara County, California Reporting Period 7/1/1950 to 7/31/2021. Accessed: 5 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Tornado&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=SANTA%2BBARBARA%3A83&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

——. 2021b. Storm Events Database – Tornado Search Results for California Reporting Period 7/1/1950 to 7/31/2021. Accessed: 5 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Tornado&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=ALL&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

——. 2021c. Storm Events Database – Hurricane (Typhoon) Search Results for Santa Barbara County, California Reporting Period 7/1/1950 to 7/31/2021. Accessed: 5 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Hurricane+%28Typhoon%29&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=SANTA%2BBARBARA%3A83&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

NOAA National Hurricane Center (NHC). 2021. Saffir-Simpson Hurricane Wind Scale. Accessed: 5 November 2021. Retrieved from: https://www.nhc.noaa.gov/aboutsshws.php.

NOAA National Integrated Drought Information System (NIDIS). 2021. Current U.S. Drought Monitor Conditions for California. Accessed: 27 October 2021. Retrieved from: https://www.drought.gov/states/california.

NOAA National Severe Storms Library (NSSL). 2021. Severe Weather 101 – Hail Basics. Accessed: 4 November 2021. Retrieved from: https://www.nssl.noaa.gov/education/svrwx101/hail/.

NBC Los Angeles. 2018. List: Historic Tsunamis on California's Coast. Retrieved from: https://www.nbclosangeles.com/news/earthquakes/earthquake-tsunami-california-waves-history-damage/178803/

New York Times. 2021. In City After City, Police Mishandled Black Lives Matter Protests. Retrieved from: https://www.nytimes.com/2021/03/20/us/protests-policing-george-floyd.html

Noozhawk. 2015. Norovirus Outbreak Sickens Hundreds in Santa Barbara County. Retrieved from: https://www.noozhawk.com/article/norovirus_outbreak_sickens_hundreds_in_santa_barbara_county

———. 2020a. Neal Graffy: Santa Barbara's Hottest Day, and a Record High of 133 Degrees. Retrieved from: https://www.noozhawk.com/article/santa_barbaras_hottest_day_and_a_record_high_of_133_degrees_20200617

———. 2020b. Dramatic Moments Mark George Floyd Protest as Thousands Rally in Santa Barbara. Retrieved from: https://www.noozhawk.com/article/thousands_march_in_protest_of_george_floyd_death_santa_barbara_20200531

———. 2020c. Santa Barbara Police Stand in Solidarity with Protesters Calling for an End to Brutality. Retrieved from: https://www.noozhawk.com/article/santa_barbara_ally_march_for_george_floyd_20200606

NPG of California, LLC. 2021. Oil cleanup underway at Toro Canyon Creek near Summerland. Julia Nguyen. Accessed: 26 October 2021. Retrieved from: https://keyt.com/news/santa-barbara-s-county/2021/08/13/oil-cleanup-underway-at-toro-canyon-creek-near-summerland/

Occupational Safety and Health Administration (OSHA). 2021. Heat Illness Prevention Campaign: Heat Safety Tool. Accessed: 3 November 2021. Retrieved from: https://www.osha.gov/heat/heat-app.

Ocean Protection Council (OPC). 2017. Rising Seas in California: An Update on Sea-Level Rise Science. Accessed: 1 November 2021. Retrieved from: https://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf.

——. 2018. State of California Sea-level Rise Guidance – 2018 Update. Accessed: 4 November 2021. Retrieved from: https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf.

Office of Governor. 2019. Wildfires and Climate Change: California's Energy Future, A Report from Governor Newsom's Strike Force. Accessed: 26 October 2021. Retrieved from: https://www.gov.ca.gov/wp-content/uploads/2019/04/Wildfires-and-Climate-Change-California%E2%80%99s-Energy-Future.pdf

——. 2021. Governor Newsom Takes Action to Phase Out Oil Extraction in California. Retrieved from: https://www.gov.ca.gov/2021/04/23/governor-newsom-takes-action-to-phase-out-oil-extraction-in-california/

One Ocean. 2019. Invasive Species. Accessed: 5 October 2021. Retrieved from: https://www.oceanprotect.org/resources/issue-briefs/invasive-species/

Pacific Gas & Electric (PG&E). 2016. In Step With California's Evolving Energy Policy, PG&E, Labor and Environmental Groups Announce Proposal to Increase Energy Efficiency, Renewables and Storage While Phasing Out Nuclear Power Over the Next Decade. Accessed: 1 October 2021. Retrieved from: https://www.pge.com/en/about/newsroom/newsdetails/index.page?title=20160621_in_step_with_californias_evolving_energy_policy_pge_labor_and_environmental_groups_announce_proposal_to_increase_energy_efficiency_renewables_and_storage_while_phasing_out_nuclear_power_over_the_next_decade.

——. 2021. Public Safety Power Shutoff: PSPS Support. Accessed: 5 November 2021. Retrieved from: https://www.pge.com/en_US/residential/outages/public-safety-power-shuttoff/psps-support.page?.

Pipeline and Hazardous Materials Safety Administration (PHMSA). 2020. Pipeline Mileage and Facilities. Accessed: 5 November 2021. Retrieved from: https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-mileage-and-facilities.

Padilla, G. 2019. "Tornado Warning for Santa Barbara County Cancelled". KEYT, December 26, 2019. Accessed: 5 November 2021. Retrieved from: https://keyt.com/news/2019/12/25/tornado-warning-for-central-santa-barbara-county/.

Pararas-Carayannis, George. 1967. The Santa Barbara, California, Earthquakes and Tsunami(s) of December 1812. Retrieved from: http://www.drgeorgepc.com/Tsunami1812SantaBarbara.html

Raiza Giorgi. 2019. Highway 154 closed indefinitely as crews clear culvert. Santa Ynez Valley Star.

Raupach, Timothy H., Olivia Martius, John T. Allen, Michael Kunz, Sonia Lasher-Trapp, Susanna Mohr, Kristen L. Rasmussen, Robert J. Trapp, and Qinghong Zhang. 2021. "The effects of climate change on hailstorms." Nature Reviews Earth & Environment 2, no. 3 (2021): 213-226. Accessed: 4 November 2021. Retrieved from: https://www.researchgate.net/profile/Qinghong-Zhang-

6/publication/349143679_The_effects_of_climate_change_on_hailstorms/links/61484143a3df59440b9be252/The-effects-of-climate-change-on-hailstorms.pdf.

San Luis Obispo County Office of Emergency Services. 2014. San Luis Obispo County/Cities Nuclear Power Plant Emergency Response Plan. Retrieved from: https://www.slocounty.ca.gov/Departments/Administrative-Office/Emergency-Management/Forms-Documents/Nuclear-Power-Plant-Plans/Nuclear-Power-Plant-Administrative-Plan.pdf

——. 2021. Emergency Planning Zone Information. Accessed: 26 October 2021. Retrieved from: https://www.prepareslo.org/en/emergency-planning-zone-information.aspx.

Santa Barbara Botanical Gardens. n.d. Plants of Concern Worst Invasive Plants in Santa Barbara County.

Santa Barbara Council Association of Governments (SBCAG). 2019. Draft New Cuyama Airport Land Use Compatibility Plan. Retrieved from: https://files.ceqanet.opr.ca.gov/254433-3/attachment/79Cd-vwVuobfrq2KXFPs4XN7kZzOjbW2-dZOK5zWJosFocRObiSEltFNYHwfF9uW5eloJoC9rGEa5gEl0

Santa Barbara County. 2017. County of Santa Barbara Coast Resiliency Project: Sea Level Rise and Coastal Hazards Vulnerability Assessment. Accessed: 28 October 2021. Retrieved from: http://longrange.sbcountyplanning.org/programs/Coastal%20Resiliency%20Project/documents/FinalVulnAssessment.pdf

——. 2018. Planning and Development – Energy Division. Accessed: 26 October 2021. Retrieved from: https://www.countyofsb.org/plndev/energy.sbc

——. 2019. Santa Barbara County Parks Division Cachuma Lake Recreation Area AIS Protection Boat Launch Protocol. Retrieved from: https://www.countyofsb.org/parks/asset.c/1224

Santa Barbara County Agricultural Commissioner's Office. 2011. Invasive and Noxious Weeds of Rangeland in Santa Barbara County. Retrieved from: https://livestockandland.org/PDF/Rangeland_Weeds.pdf

Santa Barbara County IRWM Cooperating Partners. 2019. Santa Barbara County Integrated Regional Water Management Plan. Accessed: 26 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/IRWMP/IRWM-PLAN-UPDATE-Final_MASTER.pdf

Santa Barbara County Fire Department. 2021a. 2020 Statistical Summary. Accessed: 4 October 2021. Retrieved from: https://www.sbcfire.com/annual-statistics

——. 2021b. Notable Incidents and Deployments of 2019. Accessed: 26 October 2021. Retrieved from: https://www.sbcfire.com/notable-incidents

Santa Barbara County Flood Control and Water Conservation District (County Flood Control District). 1974. Flood Plain Information, Montecito Streams, Vicinity of Montecito, Santa Barbara County, California. USACE. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/MontStreamsRpt1974.pdf

——. 1993. 1993 precipitation report and hydrology methods. Accessed: 29 October 2021. Retrieved from: https://www.worldcat.org/title/1993-precipitation-report-and-hydrology-methods/oclc/37488149

——. 1995. 1995 Floods. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/1995FloodsRpt.pdf

——. 1998. 1998 Flood Report. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/1998FloodRpt.pdf

——. 2011. Santa Barbara County Hydrology Report: Precipitation, Rivers/Streams, & Reservoirs, 2010-2011. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/2011%20Hydrology%20Report%20-%20Final-WPost(1).pdf

——. 2021. Rainfall and Reservoir Summary. Accessed: 9 November 2021. Retrieved from: http://www.countyofsb.org/pwd/water/downloads/hydro/rainfallreports/rainfallreport.pdf

Santa Barbara County Grand Jury. 2020. Juveniles in Gangs in Santa Barbara County has Accountability Been Forgotten? Accessed: 3 October 2021. Retrieved from: http://sbcgj.org/2020/JuvenileGangs.pdf

Santa Barbara County Planning and Development Department. 2015. Seismic Safety and Safety Element - Santa Barbara County Comprehensive Plan. Accessed: 21 July 2017. Retrieved from: http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Seismic.pdf

——. 2017. Santa Barbara County Energy Division Map. Accessed: 26 October 2021. Retrieved from: https://www.sbck.org/wp-content/uploads/2018/08/Oil-Gas-Facilites-Map-2017-06-06.pdf?fbclid=IwAR2BGG3EzFarXDBulEgsni5Vv7TEhzuof-AnWQzCZw1AxU2EWbW6i7S9fI8

——. 2021. Draft Climate Change Vulnerability Assessment. Accessed: 26 October 2021. Retrieved from: https://s3-us-west-2.amazonaws.com/mysocialpinpoint/uploads/redactor_assets/documents/8c4aa5d7d81a96f8896bce055b229c2e7ec3c010a9866b35a18b7ae86aef7067/44589/SantaBarbaraCounty_CCVA_Report_PublicDraft_withExecSummary__09-21-21_reduced.pdf

Santa Barbara County Planning and Development Department, Energy Division. 2018. Venoco. Accessed: 28 October 2021. Retrieved from: http://www.sbcountyplanning.org/energy/projects/venoco.asp

Santa Barbara County Planning Commission. 2016. Staff Report for Orcutt Hill Resource Enhancement Plan. Retrieved from: http://docplayer.net/129623719-Santa-barbara-county-planning-commission-staff-report-for-orcutt-hill-resource-enhancement-plan.html

Santa Barbara County Public Health Department. 2010. Experience with Pandemic H1N1 Flu in Santa Barbara County. Retrieved from: https://www.countyofsb.org/phd/documents/Press_Release/2010-04-06%20H1N1%20Recap%20Press%20Release.pdf

——. 2013. Provider Alert: Meningococcal Disease Outbreak in UC Santa Barbara Students. Retrieved from: https://www.countyofsb.org/phd/documents/Press_Release/Urgent_Press_Release/Meningococcal%20Outbreak%20Nov%202013.pdf

——. 2017. SUSPECTED NOROVIRUS IN COUNTY SCHOOLS: Numerous instances of student gastro-intestinal upset in North County. Retrieved from: http://www.countyofsb.org/phd/documents/Press_Release/2017_Press_Releases/2017-05-26%20Suspected%20Norovirus%20PR.pdf

——. 2021. Santa Barbara County Community Data Dashboard. Accessed: Retrieved from: https://experience.arcgis.com/experience/030e625c69a04378b2756de161f82ef6

Santa Barbara County Public Works. 2018. Resource Recovery & Waste Management Division. Accessed: 28 October 2021. Retrieved from: http://www.countyofsb.org/pwd/rrwmd.sbc

——. 2020. 'County of Santa Barbara 2020 Groundwater Basins Summary Report'. Accessed: Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/WaterAgency/GW%20Data%20Report%202020.pdf

Santa Barbara County Public Works, Resource Recovery and Waste Management. 2018. Laguna County Sanitation District. Accessed: 28 October 2021. Retrieved from: http://www.countyofsb.org/pwd/laguna.sbc

Santa Barbara County Water Agency. 2000. Water Resources of Santa Barbara County. Accessed: 28 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/WaterAgency/Water%20Resources%20of%20Santa%20Barbara%20County%202000.pdf

——. Where Does Your Water Come From? Accessed: 28 October 2021. Retrieved from: http://www.waterwisesb.org/where.wwsb

Santa Maria Airport. 2021. History. Accessed: 1 October 2021. Retrieved from: http://www.santamariaairport.com/about-the-airport/history/

Santa Maria News. 2007. Santa Maria River Levee is Topic of City TV Show. Accessed: 27 October 2021. Retrieved from: https://www.cityofsantamaria.org/Home/ShowDocument?id=1374

Santa Maria Times. 2020. Update: Peaceful afternoon protest turns destructive Sunday night in Santa Maria. Retrieved from: https://santamariatimes.com/news/local/update-peaceful-afternoon-protest-turns-destructive-sunday-night-in-santa-maria/article_e9e14adb-d296-54da-81d3-f13167407b68.html

——. 2021. Judith Dale: Wildfires in Santa Barbara County, 2016 to 2019. Accessed: 26 October 2021. Retrieved from: https://santamariatimes.com/lifestyles/judith-dale-wildfires-in-santa-barbara-county-2016-to-2019/article_ba567bff-ad16-5a6e-9d85-226bcb76cce9.html.

Scully, J. 2018. "Santa Barbara County Warns of Extended Power, Gas, Potable Water Outages in Montecito Area," *Noozhawk,* January 9, 2018. Accessed: 5 November 2021. Retrieved from:

https://www.noozhawk.com/article/santa_barbara_county_montecito_utility_outages_edison_socalgas_water.

Sean Breslin. 2017. Dangerous Flooding Strikes California, Arizona; Several Rescues Reported. The Weather Channel.

Southern California Edison (SCE). 2017. News Release: Thomas Fire Leads to Santa Barbara Area Outage. Accessed: 5 November 2021. Retrieved from: https://newsroom.edison.com/releases/releases-20171210.

——. 2021. Wildfire Safety: Customer Resources & Support. Accessed: 5 November 2021. Retrieved from: https://www.sce.com/wildfire/customer-resources-and-support.

State of California Natural Resources Agency Department of Water Resources. 2015. California's Groundwater Update 2013. Accessed: 5 October 2021. Retrieved from: https://cawaterlibrary.net/wp-content/uploads/2017/05/GWU2013_Ch5_CentralCoast_Final.pdf

Texas State Historical Association. 2018. Texas Droughts. Accessed: 27 October 2021. Retrieved from: https://texasalmanac.com/topics/environment/texas-droughts

The Tribune. 2017. Alamo Fire grows to 24,000 acres, now largest fire burning in California. Accessed: 26 October 2021. Retrieved from: https://www.sanluisobispo.com/news/local/article160383799.html

The Independent. 2014. Cachuma Lake Given Maximum Protection from Invasive Species Santa Barbara County Extends Vessel Quarantine to 30 Days. County of Santa Barbara Community Services Department. Retrieved from: https://www.independent.com/2014/04/18/cachuma-lake-given-maximum-protection-from-invasive-species-santa-barbara-county-extends-vessel-quarantine-30-days/

——. 2020a. The Bank of America Burning in Isla Vista on the 50th Anniversary. Retrieved from: https://www.independent.com/2020/02/25/the-bank-of-america-burning-in-isla-vista-on-the-50th-anniversay/

——. 2020b. Thousands at Santa Barbara Courthouse Protest the Murder of George Floyd. Retrieved from: https://www.independent.com/2020/06/01/thousands-at-santa-barbara-courthouse-protest-the-murder-of-george-floyd/

Timothy H. Raupach, Olivia Martius, John T. Allen, Michael Kunz, Sonia Lasher-Trapp, Susanna Mohr, Kristen L. Rasmussen, et al. 2021. The effects of climate change on hailstorms. Nature Reviews Earth & Environment, 2: 213–26. DOI: https://doi.org/10.1038/s43017-020-00133-9

Tom Bolton. 2020. Highway 154 Briefly Shut Down Near Santa Barbara by Mud-Rock Slide. Noozhawk.

Tyler Hayden. 2017. Understanding Power Outages During the Thomas Fire. The Santa Barbara Independent. Accessed: 6 October 2021. Retrieved from: https://www.independent.com/2017/12/14/understanding-power-outages-during-thomas-fire/

U.S. Army Corps of Engineers (USACE). 1978. Report on Floods of February and March 1978 in Southern California. Accessed: 2 November 2021. Retrieved from: https://books.google.com/books?id=EsUPAQAAIAAJ&pg=PR3&lpg=PR3&dq=1978+mudslides+in+santa+barbara+county&source=bl&ots=-5Hfc_ig40&sig=ACfU3U08MAE3CqP-Nk20qWhyfneUzjEtxw&hl=en&sa=X&ved=2ahUKEwjpvfCYgfrzAhWZLc0KHZWoBycQ6AF6BAgrEAM#v=onepage&q=1978%20mudslides%20in%20santa%20barbara%20county&f=true

——. 2007. Advanced Measures Report Based on Technical Assistance Investigation, Santa Maria Valley Levees Santa Barbara County, CA. Accessed: 27 October 2021. Retrieved from: http://www.countyofsb.org/pwd/DMA2000/INFO_files/SantaMaria_PIR.pdf

——. 2009. Environmental Assessment for the Santa Maria River Levee Improvement Project. Accessed: 27 October 2021. Retrieved from: https://ceqanet.opr.ca.gov/2009044003

U.S. Bureau of Reclamation (USBR) 2021. Reclamation / Projects & Facilities / Dams. Accessed: 5 November 2021. Retrieved from: https://www.usbr.gov/projects/facilities.php?type=Dam#C.

U.S. Climate Data. 2021. California Climate Data – New Cuyama. Accessed: 3 November 2021. Retrieved from: https://www.usclimatedata.com/climate/new-cuyama/california/united-states/usca0757.

U.S. Department of Agriculture (USDA) and U.S. Geological Survey (USGS). 2018. The Increasing Wildfire and Post-Fire Debris-Flow Threat in Western USA, and Implications for Consequences of Climate Change. Accessed: 2 November 2021. Retrieved from: https://link.springer.com/chapter/10.1007%2F978-3-540-69970-5_9

U.S. Department of Commerce. 1994. Climate of Santa Barbara, California. NOAA Technical Memorandum NWS WR-225. Accessed: 29 October 2021. Retrieved from: https://www.weather.gov/media/wrh/online_publications/TMs/TM-225.pdf

U.S. Geological Survey (USGS). 2003. Tsunami Hazards in the Santa Barbara Channel. Accessed: 29 October 2021. Retrieved from: https://www.usgs.gov/centers/pcmsc/science/tsunami-hazards-santa-barbara-channel?qt-science_center_objects=0#qt-science_center_objects

——. 2016. Land Subsidence From Ground-Water Pumping. Accessed: 27 October 2021. Retrieved from: https://geochange.er.usgs.gov/sw/changes/anthropogenic/subside/

——. 2018. Santa Barbara and Foothill groundwater basins Geohydrology and optimal water resources management—Developed using density dependent solute transport and optimization models. Accessed: 27 October 2021. Retrieved from: https://pubs.er.usgs.gov/publication/sir20185059

——. 2021a. Land Subsidence. Accessed: 27 October 2021. Retrieved from: https://www.usgs.gov/special-topic/water-science-school/science/land-subsidence?qt-science_center_objects=0#qt-science_center_objects

——. 2021b. Post-wildfire Landslides Becoming More Frequent in Southern California. Accessed: 2 November 2021. Retrieved from: https://www.usgs.gov/news/post-wildfire-landslides-becoming-more-frequent-southern-california

——. 2021c. What are tsunamis? Accessed: 2 November 2021. Retrieved from: https://www.usgs.gov/faqs/what-are-tsunamis?qt-news_science_products=0#qt-news_science_products

U.S. Department of Health and Human Services. 2005. HHS Pandemic Influenza Plan. Retrieved from: https://www.cdc.gov/flu/pdf/professionals/hhspandemicinfluenzaplan.pdf.

U.S. Nuclear Regulatory Commission (NRC). 2021. Transportation of Radioactive Material. Accessed: 30 September 2021. Retrieved from: https://www.nrc.gov/reading-rm/basic-ref/students/for-educators/11.pdf

——. 2021. Diablo Canyon, Emergency Planning Zone Map. Accessed: 26 October 2021. Retrieved from: https://www.nrc.gov/docs/ML1203/ML120380327.pdf

University of California, Santa Barbara (UC Santa Barbara). 2019. Integrated approach for managing aquatic invasive species in California. Retrieved from: https://www.sciencedaily.com/releases/2019/12/191202190410.htm

Ventura County Fire Department. 2019. VCFD Determines Cause of the Thomas Fire. Accessed: 26 October 2021. Retrieved from: https://vcfd.org/news/vcfd-determines-cause-of-the-thomas-fire/.

Western Regional Climate Center (WRCC). 2021. Cooperative Climatological Data Summaries – Southern California – Santa Barbara FAA COOP. Accessed 4 November 2021. Retrieved from: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7905.

Zeng, Zhenzhong, Alan D. Ziegler, Timothy Searchinger, Long Yang, Anping Chen, Kunlu Ju, Shilong Piao et al. "A reversal in global terrestrial stilling and its implications for wind energy production." Nature Climate Change, Nature Publishing Group, 2019, 9 (12), pp.979-985. ff10.1038/s41558-019-0622-6ff. ffhal-02440789. Accessed 4 November 2021. Retrieved from: https://hal.archives-ouvertes.fr/hal-02440789/document.

6.0 VULNERABILITY ASSESSMENT

6.1 PURPOSE & METHODOLOGY

The purpose of this section is to estimate the potential vulnerability (impacts) of hazards within the county on the built environment (residential, non-residential, critical facilities, etc.) and population. This assessment informs the development of mitigation strategies to avoid or lessen potential impacts through the 2022 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Update. To accomplish this, three different approaches are used:

1. Application of scientific loss estimation models (i.e., Hazus);
2. Analysis of exposure of critical facilities to hazards; and
3. A qualitative estimate of the impacts to hazards.

These approaches are employed for hazards that are countywide or those that can occur in specific locations within the county. It is important to note that the first two approaches can only be applied to hazards that have an exposure area (i.e., footprint). This hazard footprint can be georeferenced and mapped relative to critical facilities and property features within the county. For those hazards where an exposure layer does not exist (e.g., pandemics, civil disturbances), a qualitative assessment of the potential vulnerability is presented.

This section describes the methodologies and approaches employed in the assessment of vulnerabilities contained in Sections 6.2 through 6.5.

6.1.1 Scientific Loss Estimation Models

The scientific loss estimation modeling effort provided in Section 6.2 below uses the Federal Emergency Management Agency (FEMA) Hazus-MH 5.0 model. Hazus-MH is a nationally applicable standardized methodology that estimates potential losses based on available data, including earthquakes, floods, winds, and hurricanes. Hazus-MH uses state-of-the-art Geographic Information Systems (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of earthquakes and floods on populations. Local, state, and federal government officials use Hazus for preparedness, emergency response, and mitigation planning. Estimating losses is essential to decision-making at all levels of government, providing a basis for developing mitigation plans and policies, emergency preparedness and response, and recovery planning. Hazus standard configuration allows for "out-of-the-box" regional or community-wide loss assessment using the default (Level 1) building inventory databases, aggregated to the Census tract (earthquake) or Census block (flood) level.

Given available data in the county, Hazus modeling was completed for earthquake hazards only (Appendix C). This is a change in methodology from the 2017 Santa Barbara County MJHMP, which included a Hazus Level 1 Flood Assessment using the Hazus software to develop approximate flood hazard areas based on the 1-percent annual chance of flooding. These results are typically not as accurate and do not always coincide with the regulatory FEMA Flood Insurance Rate Maps (FIRM) or local flood mapping because a Hazus Level 1 Flood Assessment often yields an overestimation of flood risk and an approximate count of structures at risk. Similarly, a Hazus Level 1+ Flood Assessment would result in problematic results in the county due to limited data available on the precise extent of flood hazards and associated uncertainty. Therefore, this update employed a more accurate, GIS-based methodology to evaluate the potential vulnerabilities in the county and did not include a Hazus Level 1 Flood Assessment as done for the 2017 MJHMP.

Further, to complete a Hazus Level 2 Flood Assessment with refined flood hazard and refined inventory, the flood depth grids based on the FEMA flood study models would be required. These flood depth grids were not available at the time of analysis. Therefore, a Hazus Level 2 Flood Assessment could also not be completed.

In the absence of the depth grids, proven GIS methods were used to estimate flood risk to structures where GIS is used to overlay the FEMA flood mapping on parcel-based inventory data, as described in Section 6.1.3 below. This approach yields a more accurate count and types of structures at risk. Loss estimates assume a 2-foot-deep flood, using FEMA depth damage relationships. For planning purposes, although flood depths in certain locations could potentially exceed these depths, this yields a reasonable projection of flood vulnerability given the available data. This GIS flood mapping method was also chosen because it uses a consistent inventory database that is also used for quantitative analysis of other hazards (e.g., wildfire, dam inundation, landslide, etc.).

6.1.2 Approach to Earthquake Vulnerability Assessment

Earthquake loss estimation for the 2022 MJHMP Update utilizes FEMA's Hazus-MH 5.0 natural hazard loss estimation software. A Level 1 and two Level 1+ Hazus analyses were performed, which estimate damage based on an inventory database compiled at a national level. Hazus also uses Census data to estimate loss using 2010 Census tracts and for estimating population by multiplying the number of Residential and Multi-Use parcels by average household size by jurisdiction. As with any model, there are uncertainties, and the results should be considered approximate for broad hazard mitigation planning purposes.

To evaluate potential losses associated with earthquake activity in the county, three Hazus scenarios were run, including a Hazus 2,500-year probabilistic scenario, a Magnitude 7.4 – Red Mountain Fault ShakeMap Scenario, and a Magnitude 7.2 – San Luis Range ShakeMap scenario.

The earthquake loss estimation analysis in Section 6.2.1, *Earthquake* is broken into two subsections:

1. **Hazus 2,500-year probabilistic scenario**: the assesses the regional vulnerabilities to ground shaking based on overall seismic probabilities in the county under a magnitude 7.0 event; and
2. **Magnitude 7.4 – Red Mountain Fault ShakeMap Scenario** and **Magnitude 7.2 – San Luis Range ShakeMap Scenario**: these assess the unique vulnerabilities that may exist between north county and south county if the epicenter for an earthquake was located either north or south of the Santa Ynez Mountains.

The vulnerability assessment includes Hazus results broken into respective sections, including Property, People, Critical Facilities and Infrastructure, and Economy. The impacts of earthquakes on historic, cultural, and natural resources, as well as future development, are discussed after these two subsections.

See Section 6.2.1, *Earthquake (Ground shaking)* for a discussion of the county's vulnerabilities to ground shaking hazards.

6.1.3 Approach to Flood Vulnerability Assessment

To assess flood vulnerability and loss estimations, a flood vulnerability assessment was performed for the county, including incorporated and unincorporated areas, using the following GIS methodology. The county's parcel layer and associated assessor's building improvement valuation data were provided by the County in 2021 and were used as the basis for the inventory. Santa Barbara County's effective Digital FIRM (DFIRM) was used as the hazard layer. A DFIRM is FEMA's flood risk data that depicts the 1-percent annual chance (100-year) and the 0.2-percent annual chance (500-year) of flood events; this data is incorporated into the National Flood Hazard Layer (NFHL). Santa Barbara County's effective FEMA DFIRM, dated September 28, 2018, was determined to be the best available floodplain data. Table 6-1 summarizes the flood zones included on these maps.

Table 6-1. Santa Barbara County Community Information System Policies in Force by Flood Zone and Jurisdiction

Flood Zone	County	City of Buellton	City of Carpinteria	City of Goleta	City of Guadalupe	City of Lompoc	City of Santa Barbara	City of Santa Maria	City of Solvang
A01-30 & AE Zones	427	18	126	164	0	0	442	0	26
A Zones	105	0	76	2	0	0	58	15	4
AO Zones	48	1	0	33	0	0	7	1	0
AH Zones	32	0	0	0	0	0	426	0	0
AR Zones	0	0	0	0	0	0	0	0	0
A99 Zones	0	0	0	0	0	0	0	0	0
V01-30 & VE Zones	18	0	0	0	0	0	0	0	0
V Zones	0	0	0	0	0	0	0	0	0
D Zones	6	0	0	0	0	0	0	0	0
B, C & X Zone									
Standard	152	1	93	22	0	2	167	3	9
Preferred	926	13	128	109	5	53	316	125	17
Total	**1,714**	**33**	**423**	**330**	**5**	**55**	**1,416**	**144**	**56**

Using the County's parcel layer, a parcel centroid layer was created using GIS.[1] Only parcels with improvement values greater than zero were used in the analysis; this method assumes that improved parcels have a structure of some type. The DFIRM flood zones were overlaid in GIS on the parcel

[1] Centroids in GIS are point features that represent the geometric center (centroid) for multipoint, line, and area features.

centroid points to identify structures that would likely be inundated during a coastal 1-percent annual chance (e.g., storm/ high tide inundation), riverine 1-percent annual chance, and riverine 0.2-percent annual chance flood event. The extent of the FEMA floodplain is shown in Figure 6-11.

Building improvement values and counts for those points that intersected the flood layer were then extracted from the parcel/Assessor's data and summed for the unincorporated county and incorporated jurisdictions. The County Assessor's Parcel database represents the best available data related to property values and existing improvements for taxation purposes in the county. Property type refers to the land use of the parcel and includes agricultural, commercial, exempt, industrial, mixed-use, residential, and vacant. A loss estimate analysis was also performed based on depth damage functions developed by the U.S. Army Corp of Engineers (ACOE) and FEMA. The loss curves depict the expected flood losses associated with the depth of flooding at a structure. Contents values were estimated as a percentage of building value based on their occupancy type, using FEMA's Hazus-estimated content replacement values. These Hazus-estimated content replacement values include 100 percent of the structure value for agricultural, commercial, exempt (i.e., vacant or untaxed), and open space structures, 50 percent for multi-residential and residential structures, and 150 percent for industrial structures. Building and contents values were totaled to obtain total exposure.

There are different flood depth-damage curves for structure and content losses. For this planning-level analysis, an average flood depth of two feet is assumed. A depth damage ratio of 25 percent was used for structural loss, based on the FEMA damage curves, assuming a 2-foot-deep flood. A loss ratio was also calculated to express the estimated losses relative to the total value of all property in the jurisdiction, including property values not exposed to the floodplain boundaries.

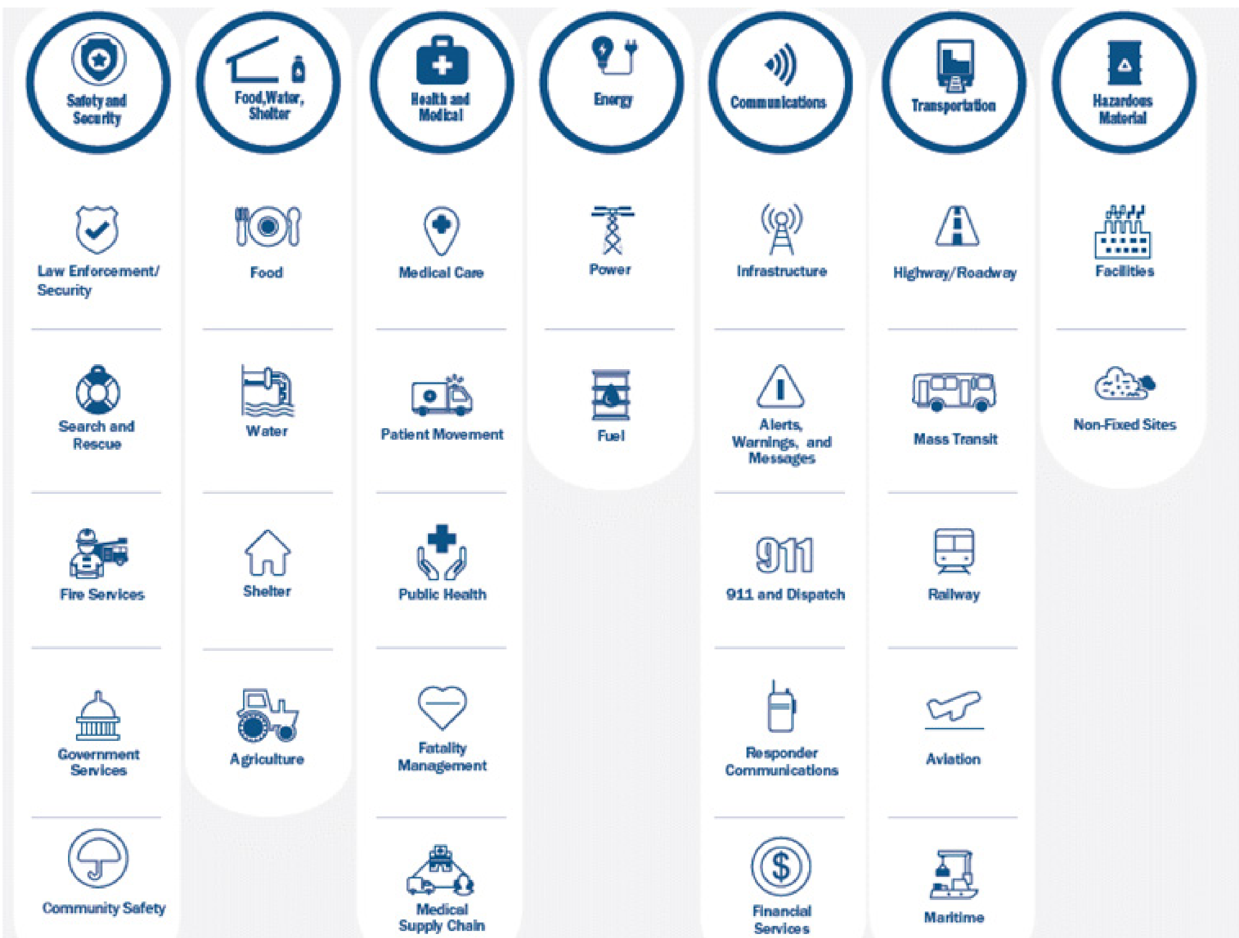
The result is an inventory of the number and types of improved parcels subject to flooding. Results are presented for the unincorporated areas of the county and incorporated jurisdictions. Detailed tables show counts of parcels by jurisdictions and land use type (i.e., agricultural, commercial, exempt, industrial, multi-residential, open space, and residential) within each flood zone. It is important to note that there could be more than one structure or building on an improved parcel (e.g., a condo complex occupies one parcel but might have several structures). This flood loss analysis does not account for business disruption, emergency services, environmental damages, or displacement costs, thus actual losses associated with flooding would likely exceed the estimate shown. Conversely, this analysis does not differentiate parcels that may have been developed since when the county and cities adopted floodplain regulations, which would be mitigated to the 1-percent annual chance of flood if developed per local floodplain regulations.

See Section 6.3.4, *Flood* for a discussion of the county's vulnerabilities to flood hazards.

6.1.4 Approach to Analysis of Exposure of Critical Facilities to Hazards

Critical facilities are key support facilities and structures most necessary to withstand the impacts of and respond to natural hazards. Examples of these critical facility types include utilities, transportation infrastructure, and emergency response and services facilities. Failures of components along major lifelines or even closures or inaccessibility to key emergency facilities could limit if not completely cut off the transmission of commodities, essential services, and other potentially catastrophic repercussions. FEMA has further categorized critical facilities into Community Lifelines, which, according to FEMA, enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security. As depicted below, FEMA Lifelines include facilities and services that support:

- Safety and security
- Food, water, and shelter
- Health and medical services
- Energy
- Communications
- Transportation
- Hazardous materials management



In addition to the FEMA Community Lifelines, the Santa Barbara County Mitigation Advisory Committee (MAC) and Local Planning Team (LPT) reviewed and updated their lists of critical facilities and generated a summary of the facilities by major categories: Law Enforcement, Fire, Public Works (including transportation and flood control facilities), Health and Human Services, Administrative, Communications, and Other. This list of critical facilities presents the buildings and structures that are the county's primary concern for ensuring resiliency focused on emergency responders and public services; they include both publicly owned or operated facilities as well as some privately owned and operated facilities. Information for publicly owned or operated facilities (building replacement cost and building content costs) was reviewed and updated as needed; where available the same information was reviewed and updated for the privately owned or operated facilities.

Hazus uses U.S. Census data to estimate loss and was utilized in the earthquake analysis by default and used 2010 Census tracts. The only other way Census data was used in this analysis was for estimating the population by multiplying the number of Residential and Multi-Use parcels by Average Household Sizes by jurisdiction, based on 2019 American Community Survey (ACS) data.

A GIS analysis of exposed critical facilities was conducted, similar to the parcel analysis, using Homeland Infrastructure Foundation-Level Data (HIFLD) and data from the National Inventory of Bridges (NIB). Using GIS software, the location of each critical facility was then used to identify facilities within the various hazard exposure areas (footprint). The results were a map and a table summarizing the total number of exposed critical facilities by the major categories; and a total of the building replacement cost and building content costs for county-owned or operated facilities. This approach was done for Wildfire, Earthquake-Induced Liquefaction, Flood, Dam Failure, Landslide, Coastal Hazards, and Tsunamis.

Table 6-2. Critical Facilities in Santa Barbara County by Jurisdiction and FEMA Lifeline

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Other	Total Count	Total Value
Buellton	-	-	3	-	3	7	6	-	19	$3,502,993
Carpinteria	2	2	14	1	7	17	14	-	57	$158,785,816
Goleta	-	1	2	2	11	21	33	-	70	$22,948,787
Guadalupe	1	-	5	2	5	4	-	-	17	$42,500,000
Lompoc	2	2	2	2	30	37	9	3	87	$16,866,163
Santa Barbara	3	-	18	-	40	84	88	-	233	$117,303,136
Santa Maria	3	5	1	9	25	53	22	-	118	$94,509,416
Solvang	1	-	18	-	8	5	2	-	34	$15,453,685
Unincorporated	91	9	18	12	49	139	268	-	586	$191,452,736
Total	**103**	**19**	**81**	**28**	**178**	**367**	**442**	**3**	**1,221**	**$663,322,732**

6.1.5 Approach to Qualitative Estimate of Impacts

The approach used to complete this effort involves utilizing readily available data (i.e., U.S. Census) to extrapolate and estimate potential vulnerability. In some cases, the estimation would build upon historic events but it may also include projecting worst-case potentials. The MAC and LPT summarized the remaining hazards to which the county is vulnerable and assessed the amount and type of damage that could be expected. This approach of qualitative assessment was done for the following hazard types in Section 6.3 through Section 6.5 below:

- Drought & Water Shortage
- Mudflow and Debris Flow
- Geologic Hazards
- Extreme Heat/Freeze
- Windstorm
- Hailstorm
- Tornado
- Hurricane
- Pandemic/Public Health Emergency
- Cyber Threat
- Invasive Species
- Civil Disturbance
- Agricultural Pests
- Terrorism
- Well Stimulation & Hydraulic Fracturing
- Energy Shortage & Resiliency
- Hazardous Materials Release
- Natural Gas Pipeline Rupture & Storage Facility Incident
- Train Accident
- Aircraft Crash
- Oil Spills

6.2 SCIENTIFIC LOSS ESTIMATION (HAZUS) ANALYSIS

6.2.1 Earthquake (Ground shaking)

Hazus 2,500-year probabilistic scenario

The 2,500-year scenario considers general seismicity from multiple faults in the region and a 7.0 magnitude event. The methodology utilizes probabilistic seismic hazard contour maps developed by the U.S. Geological Survey (USGS) for the 2018 update of the National Seismic Hazard Maps that are included with Hazus-MH. The USGS maps provide estimates of potential ground acceleration and spectral acceleration at periods of 0.3 seconds and 1.0 seconds, respectively. The 2,500-year return period analyzes ground shaking estimates from the various seismic sources in the area with a two percent probability of being exceeded in 50 years. The International Building Code uses this level of ground shaking for building design in seismic areas.

Santa Barbara County is located in a high seismic activity zone in the Transverse Range geologic province (County of Santa Barbara 2015). As such, all residents and structures in Santa Barbara County are susceptible to earthquake hazards, including direct damage to buildings and infrastructure from ground shaking and liquefaction and indirect hazards caused by utility outages and structural fires. Hazus estimates the number of people displaced, the number of buildings and facilities/infrastructure damaged, the number of casualties, and the damage to transportation systems and utilities. Results produced by Hazus are reported at the Census tract level.

Hazus Results

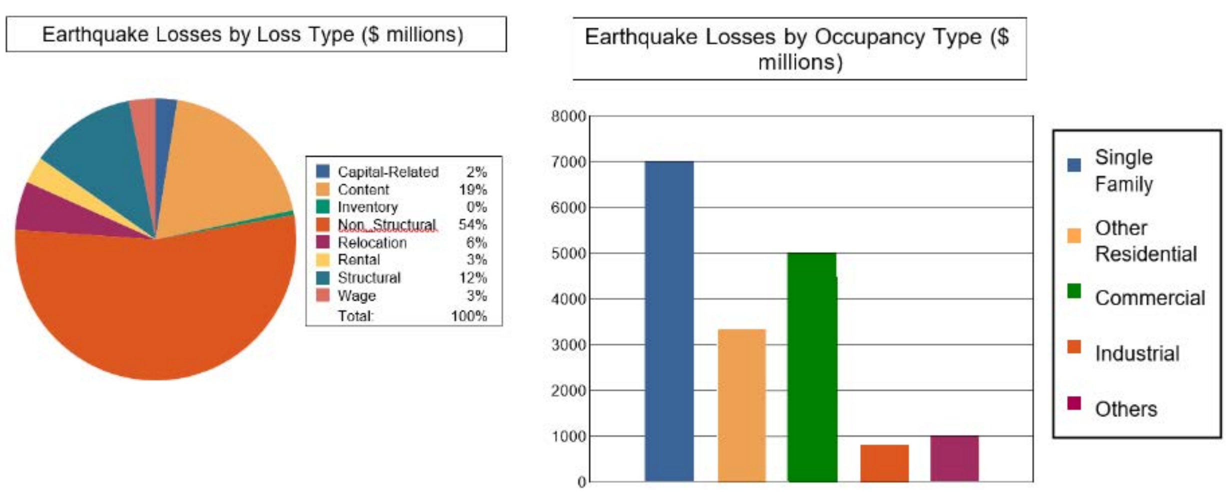
Property

There are an estimated 127,000 buildings in the county with a total building replacement value (excluding contents) of $52.7 billion. In terms of building construction types found in the county, wood frame construction makes up 85 percent of the building inventory.

The potential building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

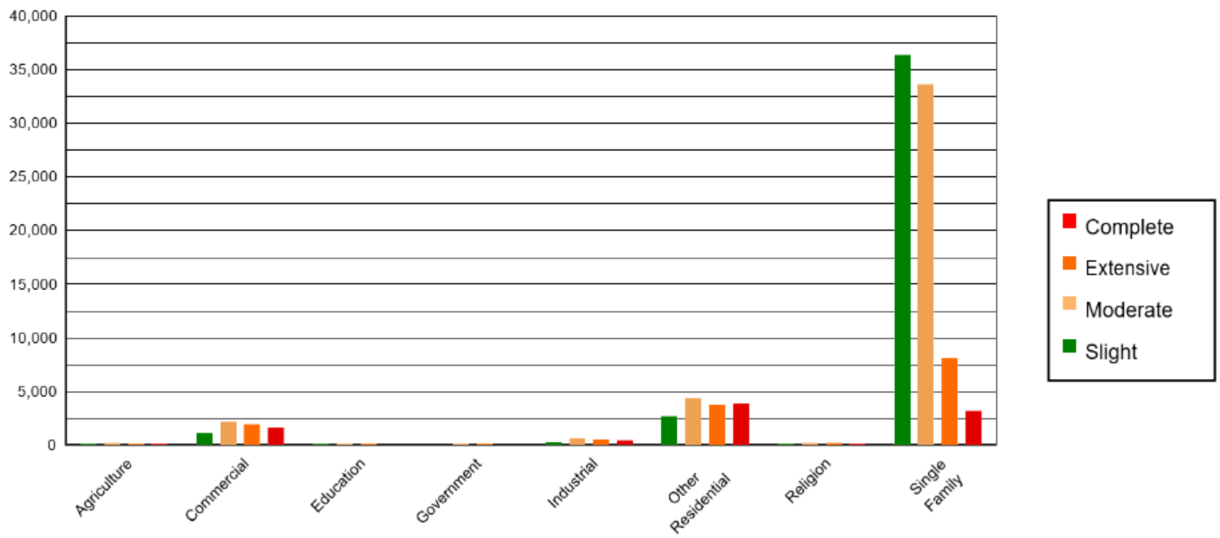
The total potential building-related losses were $16.7 billion. By far, the largest loss would be sustained by the residential occupancies, which made up over 62 percent of the total loss. Charts 6-1 and 6-2 below provide a summary of the losses associated with the building damage.

Chart 6-1. Earthquake Losses by Loss Type and Occupancy Type (in Millions of Dollars)



Source: Hazus-MH 5.0

Chart 6-2. Hazus 2,500 Probabilistic Earthquake Scenario Structure Damage by Occupancy Type



Source: Hazus-MH 5.0

Hazus estimates that about 65,266 buildings would be at least moderately damaged. This is over 51 percent of the total number of buildings in the region. There are an estimated 9,320 buildings that would be damaged beyond repair. Table 6-3 summarizes the expected damage by property occupancy type in more detail, whereas Table 6-4 contains the results of the expected building damage by building material type.

Table 6-3. Expected Building Damage by Occupancy Class

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	71.56	0.33	129.72	0.32	194.32	0.47	124.64	0.85	95.76	1.03
Commercial	602.23	2.81	1064.83	2.62	2152.92	5.22	1925.49	13.10	1579.53	16.95
Education	34.90	0.16	60.83	0.15	98.65	0.24	66.71	0.45	41.91	0.45
Government	17.09	0.08	28.42	0.07	52.52	0.13	48.53	0.33	41.44	0.44
Industrial	126.23	0.59	238.75	0.59	546.90	1.33	538.30	3.66	483.82	5.19
Other Residential	1134.48	5.29	2641.29	6.50	4359.26	10.57	3778.64	25.72	3816.34	40.95
Religion	81.53	0.38	131.09	0.32	206.86	0.50	160.02	1.09	123.49	1.32
Single Family	19396.32	90.37	36346.85	89.43	33642.20	81.55	8050.57	54.79	3138.06	33.67
Total	**21,464**		**40,642**		**41,254**		**14,693**		**9,320**	

Source: Hazus-MH 5.0

Table 6-4. Expected Building Damage by Building Material (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	20437.07	95.21	38878.39	95.66	36464.48	88.39	8823.20	60.05	3507.16	37.63
Steel	135.64	0.63	235.34	0.58	694.66	1.68	837.42	5.70	705.64	7.57
Concrete	197.26	0.92	386.35	0.95	697.00	1.69	609.62	4.15	506.49	5.43
Precast	120.48	0.56	213.65	0.53	571.48	1.39	593.27	4.04	502.41	5.39
RM	487.08	2.27	535.58	1.32	1135.41	2.75	1018.24	6.93	682.09	7.32
URM	27.56	0.13	57.56	0.14	152.27	0.37	183.59	1.25	305.16	3.27
MH	59.24	0.28	334.91	0.82	1538.31	3.73	2627.58	17.88	3111.39	33.38
Total	**21,464**		**40,642**		**41,254**		**14,693**		**9,320**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Source: Hazus-MH 5.0

The distribution of buildings across the various construction classes given in Table 6-4 is estimated using Hazus default relationships. The actual distribution of buildings across these construction types may be different. For example, the California Seismic Safety Commission (CSSC) published results of unreinforced masonry building surveys, which indicate that the 23 unreinforced masonry (URM) buildings in unincorporated Santa Barbara County have been retrofitted (CSSC 2006). Further, the County also finished a $1 million seismic retrofit to its superior court complex in Santa Barbara, funded by FEMA's Hazard Mitigation Grant Program, which provided money to structurally reinforce court buildings after the 2003 San Simeon Earthquake. According to the County's Architect, all 800 County buildings, including those with unreinforced masonry, comply with their respective state seismic safety codes (Cooley 2011).

Unreinforced masonry building type structures consist of buildings made of unreinforced concrete and brick, hollow concrete blocks, clay tiles, and adobe. Buildings constructed of these materials are heavy and brittle and typically provide little earthquake resistance. In small earthquakes, unreinforced buildings can crack, and in strong earthquakes, they tend to collapse. These types of structures if unreinforced pose the greatest structural risk to the life and safety of all general building types. Due to the public safety risks that are posed by unreinforced masonry buildings, the California legislature passed Senate Bill 547 (Government Code Section 8875 et seq.). This legislation went into effect on January 1, 1987, and required all cities and counties located in Seismic Zone 4, which includes Santa Barbara County, to conduct an inventory of potentially hazardous structures, including unreinforced masonry buildings.

To comply with the requirements of SB 547, the County of Santa Barbara has adopted the California Building Code as part of Chapter 10 (BUILDING REGULATIONS) of the County Code.

It is notable that a more accurate risk assessment could be conducted if additional facility information was collected, such as structural system, the number of stories, year of construction/seismic code used for design, building square footage, building replacement value, and content replacement value. It should also be noted that the Hazus-MH default database represents each school campus with a single building record of an assumed construction type. In reality, most public schools are multi-building campuses, built over years (i.e., buildings may be designed to different seismic codes). To improve the risk assessment for public schools, information on each building would need to be collected (see also, Chapter 7.0, *Mitigation Plan*).

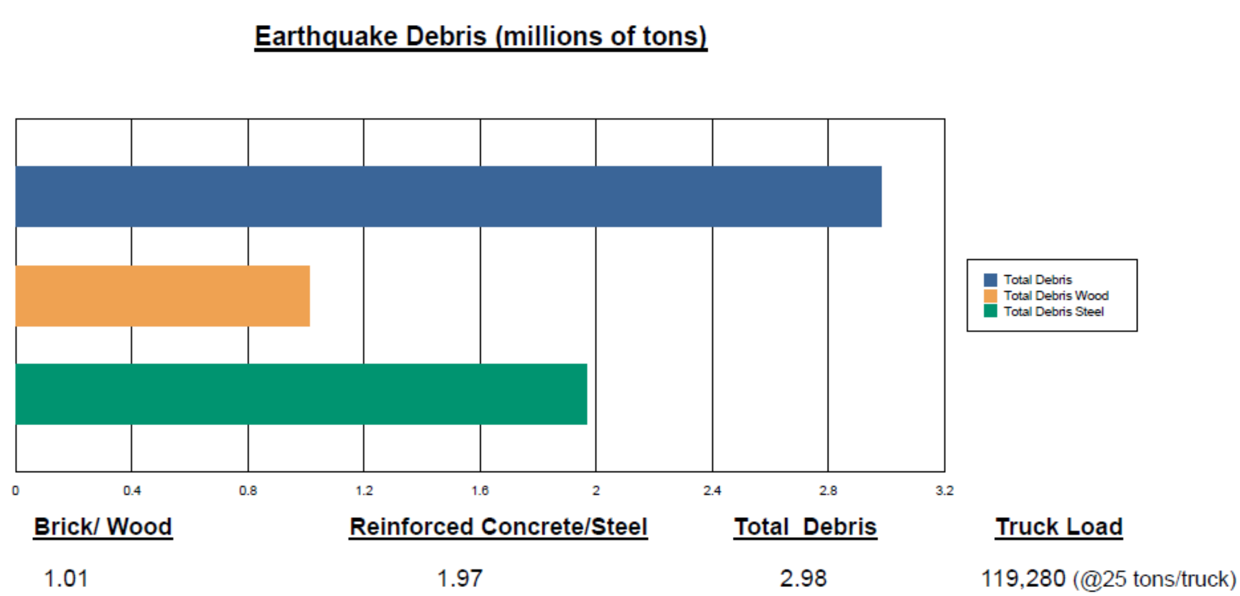
Further, fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus estimates that there could be 9 ignitions that will burn about 0.19 sq. mi (0.01 %) of the county's total area, causing about $252 million in building damage.

A map that shows the total countywide building loss is produced. As shown in Figure 6-1, areas near the cities of Santa Barbara, Carpinteria, Solvang, and Buellton, and also some areas near Santa Maria would have the highest total building loss. This potential loss reflects population centers with a diversity of building types, including higher value structures.

Hazus also estimates the total debris that would be generated by the earthquake event analyzed. The model subdivides the debris into two general categories: a) Brick/Wood, and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

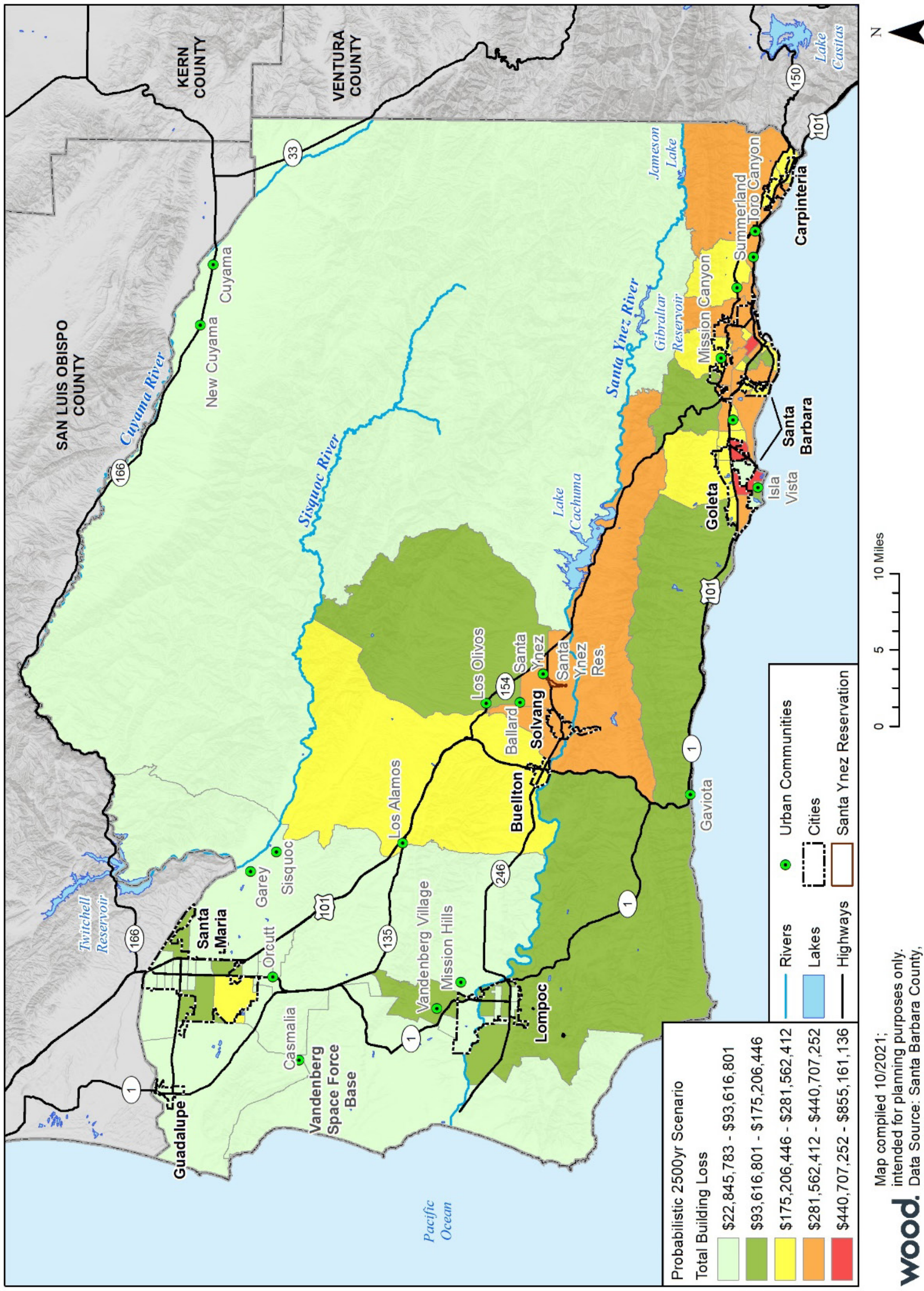
The model estimates that a total of 2.98 million tons of debris would be generated. Of that total amount, Brick/Wood comprises 34 percent of the debris, while the remainder would be Reinforced Concrete/Steel. If the debris tonnage was converted to estimates of truckloads required to remove it, the debris generated would convert to about 119,280 truckloads, with each truckload carrying 25 tons. Chart 6-3 summarizes the debris generation and material type for this earthquake event.

Chart 6-3. Debris Generation in Millions of Tons and by Material Type



Source: Hazus-MH 5.0

Figure 6-1. Santa Barbara County Hazus 2,500-year Probabilistic Scenario Total Building Loss



People & Population

Displacement and Shelter Requirements: While all Santa Barbara County residents are vulnerable to earthquake hazards, a portion of residents would experience more severe effects, including displacement from homes. Further, some displaced residents may need emergency shelter. Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that would require accommodations in temporary public shelters (Table 6-5). Of 423,895 residents, the model estimates 14,729 households or roughly 29,500 individuals to be displaced due to the potential worst-case forecast earthquake. Of these, standard FEMA methodology projects 10,674 people (out of a total countywide population of 423,895; 2.5 percent) would seek temporary shelter in public shelters. The model also estimates that the fires caused by the earthquake would displace an additional 2,598 people. Assuming the same percentage, 65 people displaced by fire would require temporary shelter.

Table 6-5. Shelter Requirements for 2,500-year Probabilistic Scenario

Red Mountain Fault ShakeMap Scenario	
Total Population (2010 Census)	423,895
Total Displaced Households	14,729
Total People Seeking Temporary Shelter	10,674
Total People Displaced by Structure Fires	2,598

Source: Hazus-MH 5.0

Casualties: Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking (Maine Emergency Management Agency 2021).

Hazus estimates the number of people that would be injured and killed by the earthquake. The casualties are broken down into four severity levels that describe the extent of the injuries. The levels are described as follows:

- **Severity Level 1**: Injuries would require medical attention, but hospitalization is not needed.
- **Severity Level 2**: Injuries would require hospitalization but are not considered life-threatening.
- **Severity Level 3**: Injuries would require hospitalization and can become life-threatening if not promptly treated.
- **Severity Level 4**: Victims are killed by the earthquake.

The casualty estimates are provided for three times of day: 2:00 AM, 2:00 PM, and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is at its maximum. The 2:00 PM estimate considers that the educational, commercial, and industrial sector loads are at their maximum. The 5:00 PM represents peak commute time. The worst-case outcome is projected for a 2:00 PM earthquake with total casualties of 9,053 individuals, including 593 deaths. These estimates of casualties are broken down in Table 6-6.

Table 6-6. Hazus Earthquake Casualty Estimates from Santa Barbara County

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	67.63	20.56	3.42	6.76
	Commuting	0.32	0.58	0.79	0.16
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	67.55	20.34	3.27	6.44
	Other-Residential	1508.01	400.57	49.93	95.30
	Single Family	1043.39	193.81	11.31	19.10
	Total	**2,687**	**636**	**69**	**128**
2 PM	Commercial	4032.92	1218.67	202.43	397.75
	Commuting	2.86	5.24	7.12	1.47
	Educational	1246.08	377.83	64.15	125.23
	Hotels	0.00	0.00	0.00	0.00
	Industrial	497.82	149.43	24.13	47.03
	Other-Residential	285.57	75.35	9.54	17.51
	Single Family	218.23	40.51	2.81	3.93
	Total	**6,283**	**1,867**	**310**	**593**
5 PM	Commercial	2925.71	878.73	146.15	283.93
	Commuting	48.45	88.56	120.50	24.81
	Educational	266.94	82.49	14.13	27.71
	Hotels	0.00	0.00	0.00	0.00
	Industrial	311.13	93.40	15.08	29.40
	Other-Residential	574.36	152.22	19.49	35.82
	Single Family	412.25	76.80	5.33	7.47
	Total	**4,539**	**1,372**	**321**	**409**

Source: Hazus-MH 5.0

Critical Facilities and Infrastructure

Critical Facility Inventory: Hazus breaks critical facilities into two groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations, and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants, and hazardous material sites.

Essential Facility Damage: Based on Hazus modeling, 10 hospitals in the region may be affected by an earthquake with a total capacity of 1,054 beds. There are 179 schools, 45 fire stations, 21 police stations, and three emergency operation facilities such as the County's Emergency Operations Center (EOC). The inventory also includes 10 hazardous material sites, 0 military installations, and 0 nuclear power plants.

On the day of the earthquake, hospital capabilities could be limited, including bed spaces. The model estimates that only 139 hospital beds (13 percent) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 32 percent of the beds would be back in service. By 30 days, 66 percent would be operational. The essential facility inventory and expected damages from the earthquake event are provided in Table 6-7.

Transportation Systems Inventory: Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. Seven transportation systems include highways, railways, light rail, buses, ports, ferries, and airports. Six utility systems include potable water, wastewater, natural gas, crude & refined oil, electric power, and communications. The transportation systems inventory and expected damages from the earthquake, in terms of the number of structures and locations affected, are provided in Table 6-8, while losses in millions of dollars are summarized in Table 6-9. The total value of the lifeline inventory is over $9.93 billion. This inventory includes over 596 kilometers (370.34 miles) of highways, 421 bridges, and 24,075 kilometers (14,959.5 miles) of pipes.

Utility Lifeline Systems Inventory: The replacement value of the transportation and utility lifeline systems combined is estimated to be $6.2 billion and $3.7 billion, respectively. The expected utility system facility damages in terms of total structures or systems affected, along with the inventory of this dataset, are summarized in 6-14. Economic losses in millions of dollars are found in Table 6-10. Site-specific expected utility system pipeline damages (including their inventory) are included in Table 6-17, while the potable water and electric power system performance limitations, damages, and inventory would be in Table 6-18. Communication and wastewater facilities would be most vulnerable but would be mostly back in service by day 7 following the earthquake. Potable water and electricity service would also be vulnerable; nearly 80 percent of households would be without these essential services on the day of the earthquake. Electricity would be restored relatively quickly with 12 percent of households still without service after 30 days. Restoring potable water service could be more challenging, leaving nearly 70 percent of households without water after 30 days and 23 percent of households after 90 days (Table 6-18).

Table 6-7. Essential Facility Inventory and Expected Damage

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	10	8	0	0
Schools	179	126	25	0
EOCs	3	3	0	0
PoliceStations	21	14	2	0
FireStations	45	26	5	0

Source: Hazus-MH 5.0

Table 6-8. Transportation Systems Inventory and Expected Damage by Number of Locations

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	270	0	0	270	270
	Bridges	421	189	12	243	374
	Tunnels	1	1	0	1	1
Railways	Segments	212	0	0	212	212
	Bridges	105	19	0	86	105
	Tunnels	0	0	0	0	0
	Facilities	5	5	0	1	2
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	8	8	0	1	5
Ferry	Facilities	3	0	0	3	3
Port	Facilities	9	8	4	1	3
Airport	Facilities	5	5	0	2	4
	Runways	9	0	0	9	9

Source: Hazus-MH 5.0

Table 6-9. Transportation System Economic Losses in Millions of Dollars

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	3299.4164	0.0000	0.00
	Bridges	936.7868	183.9879	19.64
	Tunnels	10.2986	2.2947	22.28
	Subtotal	**4246.5018**	**186.2826**	
Railways	Segments	481.4893	0.0000	0.00
	Bridges	600.6724	90.1993	15.02
	Tunnels	0.0000	0.0000	0.00
	Facilities	13.3150	8.6050	64.63
	Subtotal	**1095.4767**	**98.8043**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	14.6449	9.1675	62.60
	Subtotal	**14.6449**	**9.1675**	
Ferry	Facilities	3.9930	0.0000	0.00
	Subtotal	**3.9930**	**0.0000**	
Port	Facilities	32.5392	22.8899	70.35
	Subtotal	**32.5392**	**22.8899**	
Airport	Facilities	80.7110	50.9802	63.16
	Runways	775.6488	0.0000	0.00
	Subtotal	**856.3598**	**50.9802**	
	Total	**6,249.52**	**368.12**	

Source: Hazus-MH 5.0

Table 6-10. Expected Utility System Facility Inventory and Damages

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	12	12	2	0	0
Natural Gas	5	5	0	0	1
Oil Systems	2	2	0	0	0
Electrical Power	5	5	0	0	1
Communication	42	42	1	8	29

Source: Hazus-MH 5.0

Table 6-11. Utility System Economic Losses in Millions of Dollars

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	299.2486	54.7134	18.28
	Subtotal	**299.2486**	**54.7134**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	1963.3406	1255.7397	63.96
	Distribution Lines	179.5492	27.4839	15.31
	Subtotal	**2142.8898**	**1283.2236**	
Natural Gas	Pipelines	106.0214	0.0000	0.00
	Facilities	10.0112	6.1624	61.56
	Distribution Lines	119.6994	9.4158	7.87
	Subtotal	**235.7320**	**15.5782**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.2360	0.1129	47.84
	Subtotal	**0.2360**	**0.1129**	
Electrical Power	Facilities	995.4000	573.9148	57.66
	Subtotal	**995.4000**	**573.9148**	
Communication	Facilities	4.9560	2.5098	50.64
	Subtotal	**4.9560**	**2.5098**	
	Total	**3,678.46**	**1,930.05**	

Source: Hazus-MH 5.0

Table 6-12. Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	9,297	12159	3040
Waste Water	5,578	6108	1527
Natural Gas	84	59	15
Oil	0	0	0

Source: Hazus-MH 5.0

Table 6-13. Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	142,104	112,974	112,174	110,492	98,280	32,130
Electric Power		118,727	90,381	54,020	16,684	142

Source: Hazus-MH 5.0

Bridges. The County currently has 110 bridges in the inventory. Caltrans inspects bridges 20 feet or longer, of which the County has 95 total. All other bridges (15 total) are inspected by County staff. All County bridges are inspected regularly at varying intervals, depending on age, type, location, seismic vulnerability, and undermining potential. Most County bridges are constructed with reinforced concrete; some with a composite of reinforced concrete supported by structural steel; and a few are constructed from timber. Bridge Maintenance work includes repairing damage caused by collisions, floods, earthquakes, and deterioration. The County of Santa Barbara Road Maintenance Annual Plan reports a $58 million backlog in needed bridge repairs countywide, potentially leaving some bridges vulnerable to earthquakes or other extreme events.

Economy

Hazus estimates the long-term economic impacts on the region. The model quantifies this information in terms of income and employment changes within the region. The total economic loss estimated for the worst-case forecast earthquake is $19 billion, which includes building and lifeline-related losses based on the region's available inventory. An estimated 14 percent of losses computed by Hazus were related to the business interruption of the region.

Building-related losses, which summarize estimates costs to fix or replace structures and damages to properties and their contents, are estimated in Table 6-2. However, business interruption losses are summarized herein. They included the temporary living expenses for people displaced from their homes because of the earthquake event. These business-related economic losses are included in 6-18 below.

Table 6-14. Business-Related Economic Loss Estimates in Millions of Dollars

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	81.0565	400.3163	10.6929	19.8484	511.9141
	Capital-Related	0.0000	34.5099	360.7310	6.4979	6.7521	408.4909
	Rental	124.9831	170.9103	174.0342	4.0975	11.6139	485.6390
	Relocation	446.4992	106.1587	261.9696	20.3578	92.5155	927.5008
	Subtotal	**571.4823**	**392.6354**	**1197.0511**	**41.6461**	**130.7299**	**2333.5448**
Capital Stock Losses							
	Structural	898.9734	361.4638	525.9427	95.6397	165.5179	2,047.5375
	Non_Structural	4236.4226	2084.9822	1847.9181	395.7058	450.1184	9,015.1471
	Content	1296.0576	504.0714	908.3306	262.7699	243.7722	3,215.0017
	Inventory	0.0000	0.0000	18.2789	34.7121	7.5758	60.5668
	Subtotal	**6431.4536**	**2950.5174**	**3300.4703**	**788.8275**	**866.9843**	**14338.2531**
	Total	**7002.94**	**3343.15**	**4497.52**	**830.47**	**997.71**	**16671.80**

Source: Hazus-MH 5.0

ShakeMap Scenarios: Red Mountain Fault (Magnitude 7.4) and San Luis Range (Magnitude 7.2)

Two additional deterministic earthquake scenarios were modeled using Hazus for Santa Barbara County. A deterministic scenario predicts the outcome of a specific earthquake event. These two deterministic scenarios used USGS provided ShakeMap datasets to model what a Magnitude 7.4 earthquake of the Red Mountain Fault and a Magnitude 7.2 earthquake of the San Luis Range would generate in terms of damages and losses for the chosen area of interest (i.e., southern and northern Santa Barbara County respectively). The datasets used to import into Hazus 5.0 for these scenarios included four USGS-provided key data layers in a geospatial format: peak ground velocity, peak ground acceleration, peak spectral acceleration for 0.3 seconds (0.3 percent gravitational velocity [g]), and peak ground acceleration for 1.0 seconds (1.0 percent g). The epicenters of these two USGS modeled scenarios are located at latitude 34.43 North and 119.84 West, with a depth of nine kilometers for the Red Mountain Fault, and latitude 35.03 North and 120.38 West, with a depth of 7.7 kilometers for the San Luis Range, respectively.

Figures 6-2 and 6-3 are the ShakeMaps produced for these two scenarios. As shown in the figures, in the Red Mountain Fault ShakeMap Scenario, the southern edge of the county would perceive much stronger shaking and would likely receive the most severe damage when compared to the rest of the county. On the other hand, in the San Luis Range ShakeMap scenario, the north and central parts of the county would perceive much stronger shaking and would likely receive the most severe damage when compared to the rest of the county.

Figure 6-2. Santa Barbara County Red Mountain Fault 7.4 Magnitude ShakeMap

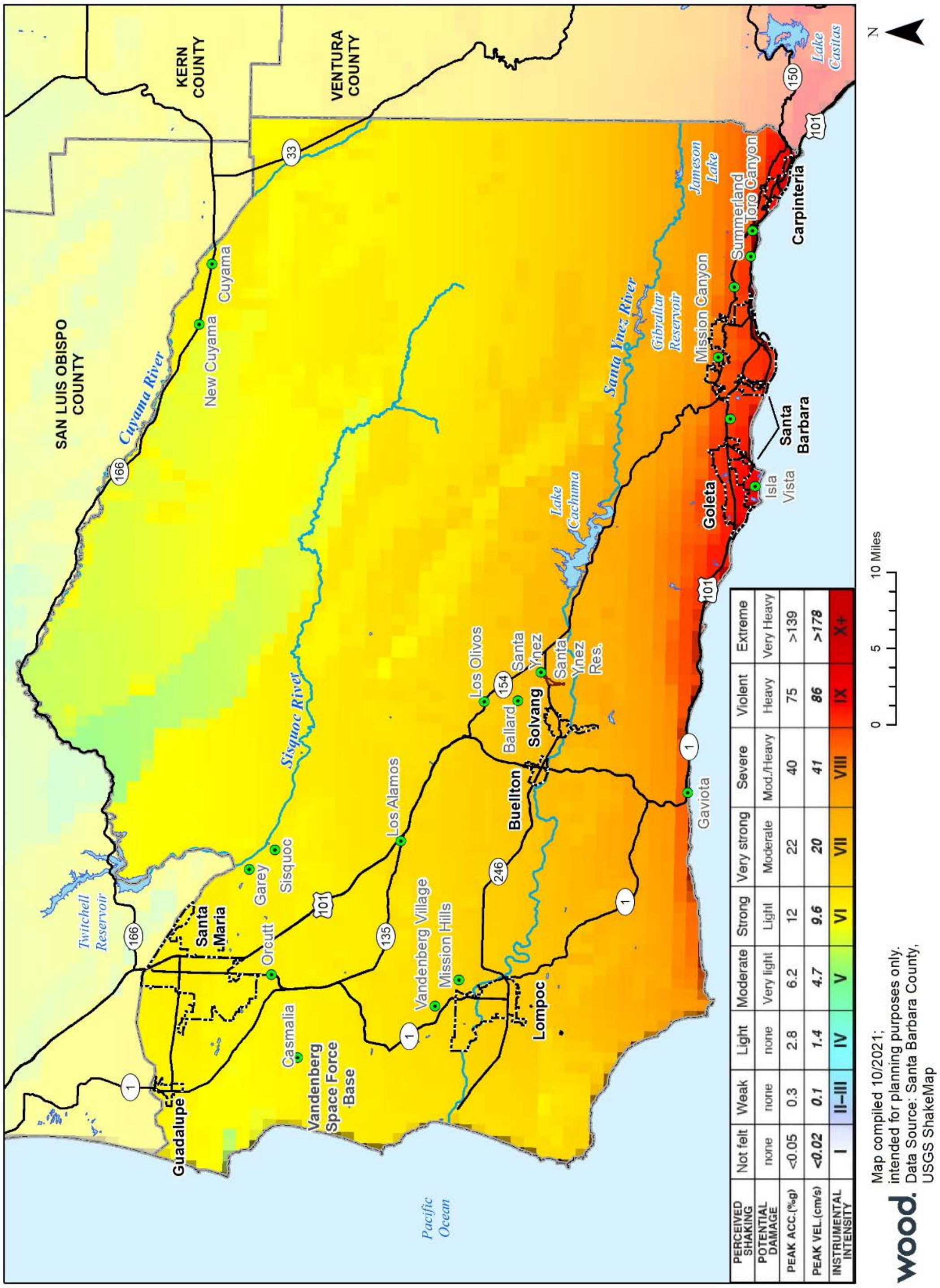
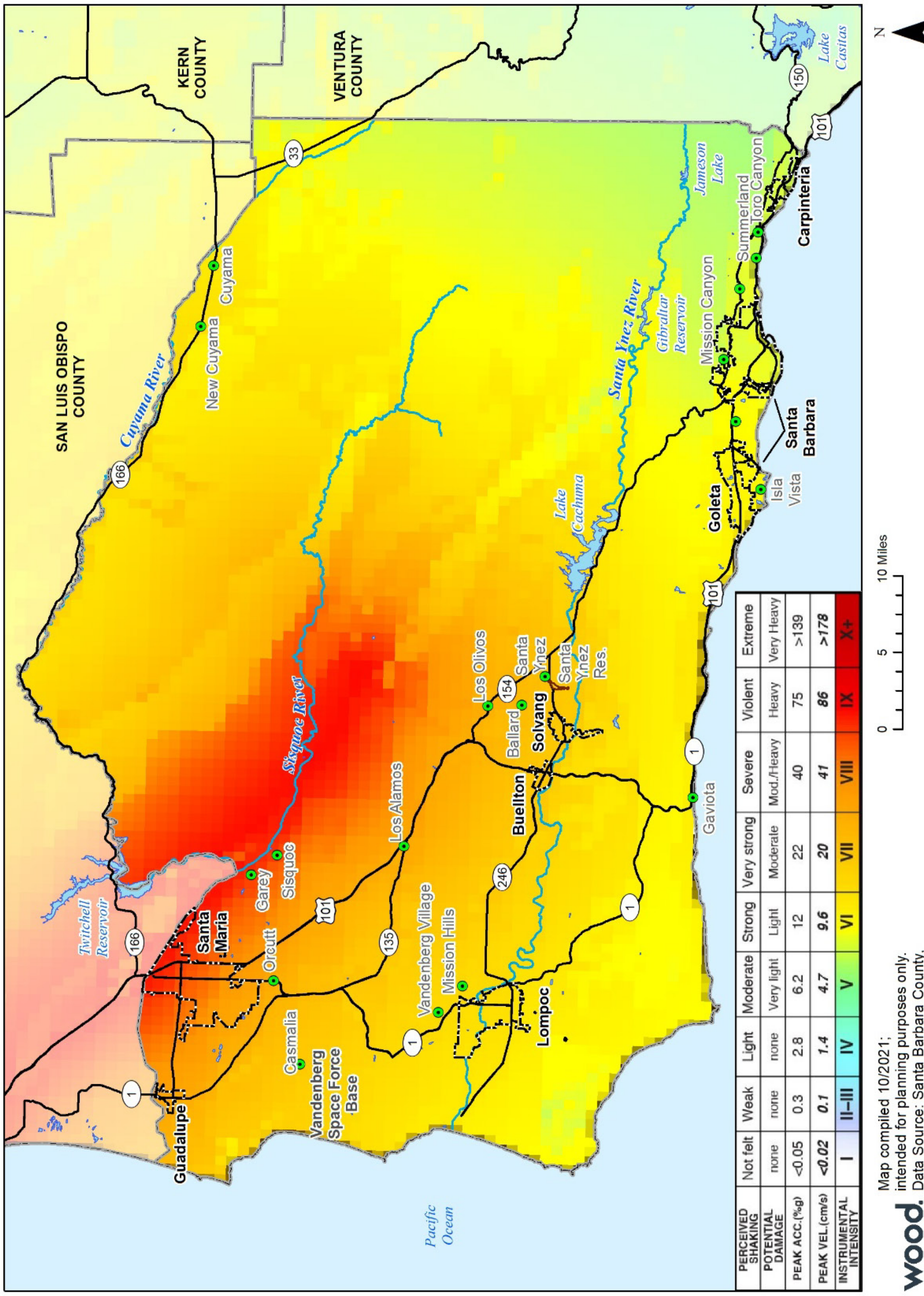


Figure 6-3. Santa Barbara County San Luis Range 7.2 Magnitude ShakeMap



Loss estimates and vulnerability assessment were completed based on the following subsections, similar to the previous scenario: property; people; economy; critical facilities and infrastructure; historic, cultural, and natural resources.

Property

Hazus estimates the number of buildings that would be damaged during a modeled earthquake, and these estimates are provided in the tables below. For each scenario, the majority of structures would either not be damaged or suffer slight to moderate damage. The Red Mountain Fault ShakeMap Scenario is expected to produce more severe building damage than the San Luis Range ShakeMap Scenario. For example, an earthquake from the Red Mountain Fault could demolish 835 homes compared to 149 homes from the San Luis Range. This indicates generally that the South Coast is more vulnerable to earthquakes generated by local faults.

Table 6-15. Expected Building Damage by Occupancy –Red Mountain Fault ShakeMap Scenario

	None		Slight		Moderate		Extensive		Complete	
	Count	**(%)**	**County**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	242.78	0.41	129.89	0.37	130.60	0.56	68.45	1.08	44.29	1.19
Commercial	2545.11	4.31	1171.74	3.36	1596.29	6.82	1196.17	18.85	815.70	22.01
Education	108.41	0.18	63.18	0.18	69.99	0.30	39.72	0.63	21.70	0.59
Government	65.67	0.11	30.95	0.09	40.04	0.17	30.48	0.48	20.86	0.56
Industrial	584.82	0.99	285.75	0.82	440.67	1.88	356.99	5.63	265.77	7.17
Other Residential	5387.26	9.12	3468.06	9.95	3305.38	14.12	1922.57	30.30	1646.73	44.43
Religion	297.68	0.50	128.45	0.37	134.28	0.57	86.04	1.36	56.55	1.53
Single Family	49847.58	84.37	29561.62	84.85	17684.59	75.57	2645.70	41.69	834.51	22.52
Total	**59,079**		**34,840**		**23,402**		**6,346**		**3,706**	

Source: Hazus-MH 5.0

Table 6-16. Expected Building Damage by Occupancy – San Luis Range ShakeMap Scenario

	None		Slight		Moderate		Extensive		Complete	
	Count	**(%)**	**County**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	402.19	0.46	102.94	0.39	71.17	0.67	27.34	1.05	12.37	1.07
Commercial	4830.75	5.57	1044.46	3.97	872.13	8.17	394.84	15.18	182.82	15.87
Education	227.81	0.26	41.66	0.16	23.45	0.22	7.53	0.29	2.55	0.22
Government	130.31	0.15	26.13	0.10	19.20	0.18	8.44	0.32	3.92	0.34
Industrial	1255.98	1.45	278.40	1.06	244.06	2.29	108.06	4.15	47.50	4.12
Other Residential	9011.71	10.40	2419.46	9.20	2117.52	19.84	1444.59	55.54	736.72	63.96
Religion	459.99	0.53	111.67	0.42	79.33	0.74	35.40	1.36	16.61	1.44
Single Family	70338.24	81.17	22262.95	84.69	7248.43	67.90	574.98	22.10	149.39	12.97
Total	**86,657**		**26,288**		**10,675**		**2,601**		**1,152**	

Source: Hazus-MH 5.0

Maps that show the total countywide building loss for these two scenarios are produced. Potential building losses would likely be clustered within built communities and downtown areas where structures are older and denser. As shown in Figure 6-4, for the Red Mountain Fault ShakeMap Scenario, areas near the City of Santa Barbara, the City of Carpinteria, and the City of Goleta would have the highest total building loss As shown in Figure 6-5, for the San Luis Range ShakeMap Scenario, areas near the City of Solvang, City of Buellton, City of Santa Maria, and Los Alamos would have the highest total building loss.

People

Loss of utility services would have a major impact on the people of the county. Under both scenarios, the expected damage to the county's utility system would include 12 wastewater facilities, 5 natural gas lines, 5 electrical power facilities, and 42 communication facilities. Nearly all these utilities would have low functionality 7 days post-event. Further, the following tables indicate the number of projected households that would experience power and water loss, and the number of days the loss would last. For example, this analysis shows that after a week, more than 25,000 households (50,00 residents) would remain without potable water and almost 16,000 households (32,000 residents) would remain without electricity 7 days after an earthquake generated by the Red Mountain Fault. The Red Mountain Fault ShakeMap Scenario is expected to cause a long delay in the recovery of potable water and electric power systems as well as cause more people to be without potable water or electric power compared to the San Luis Range ShakeMap Scenario.

Table 6-17. Expected Potable Water and Electric Power System Performance – Red Mountain Fault ShakeMap Scenario

	Total Number of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	142,104	34,774	31,601	25,212	147	0
Electric Power		52,860	35,121	15,945	3,378	68

Table 6-18. Expected Potable Water and Electric Power System Performance – San Luis Range ShakeMap Scenario

	Total Number of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	142,104	22,060	18,934	12,970	0	0
Electric Power		9,177	5,068	1,758	288	14

Source: Hazus-MH 5.0

Figure 6-4. Santa Barbara County Red Mountain Fault ShakeMap Scenario Total Building Loss

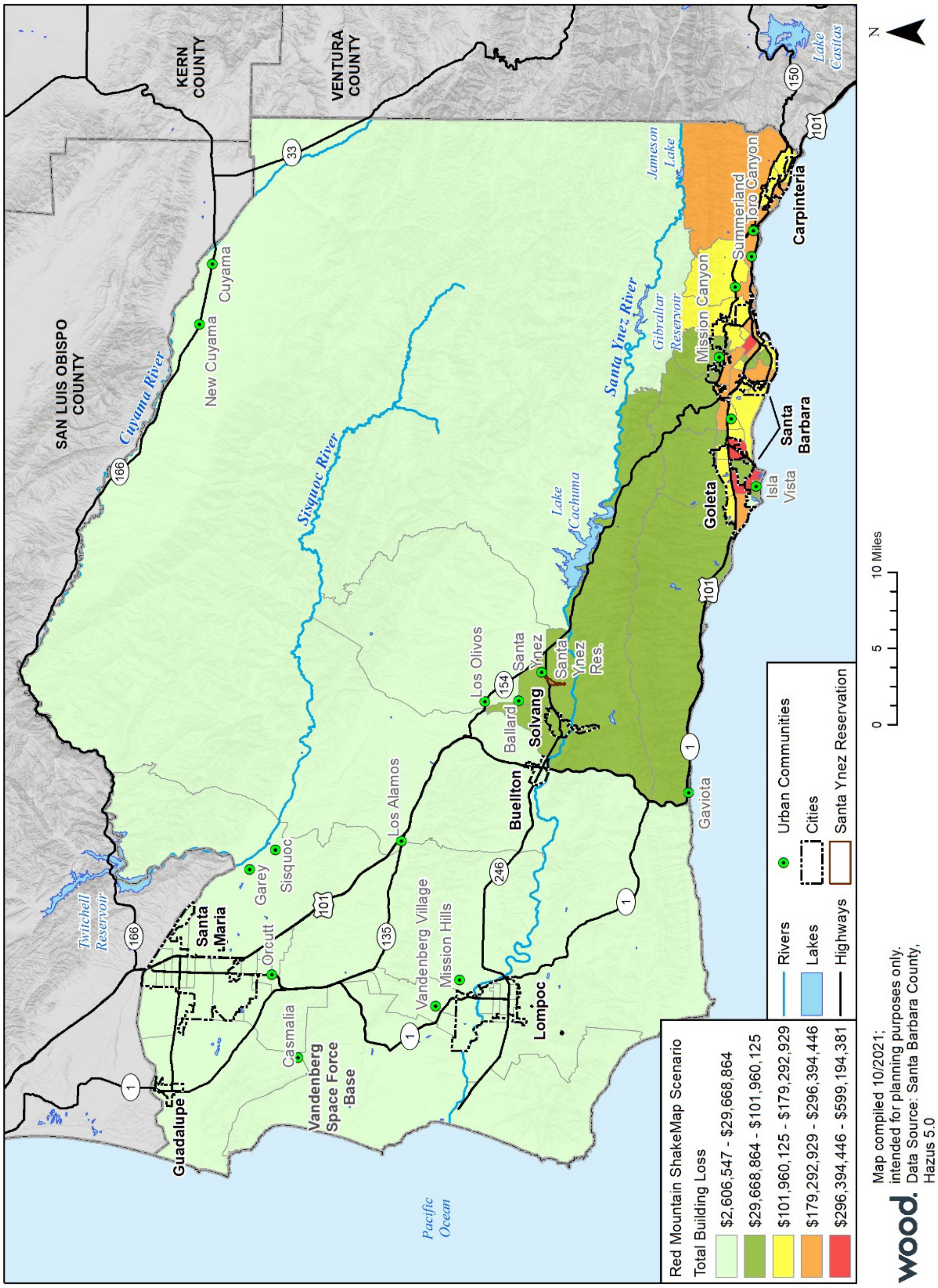
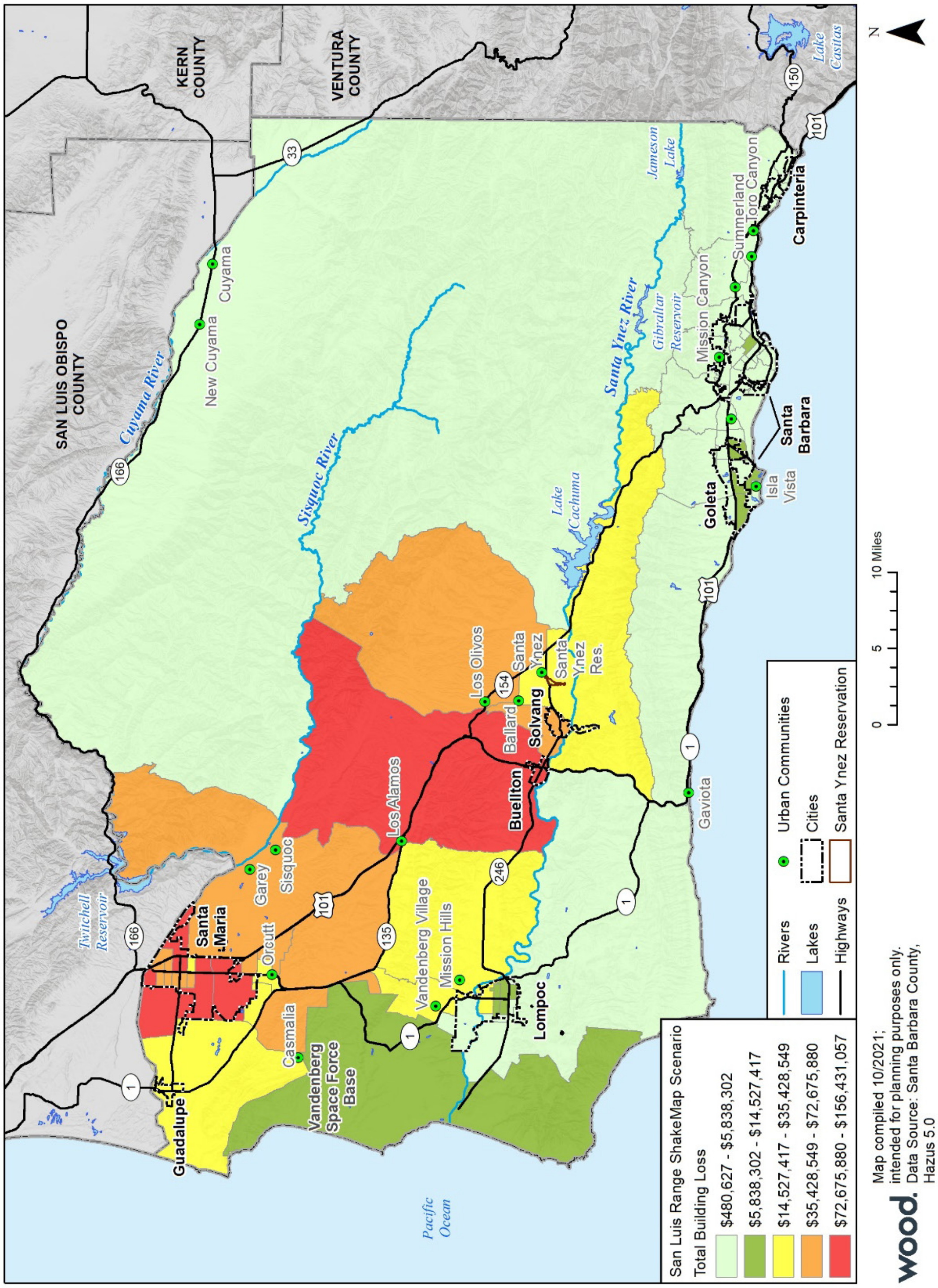


Figure 6-5. Santa Barbara County San Luis Range ShakeMap Scenario Total Building Loss



Sheltering is another concern during an earthquake – people may be displaced from their homes due to the earthquake, and those displaced people may need accommodations in temporary public shelters. The following table shows projected total displacement and projected shelter needs for each scenario. The total number of residents seeking shelter could range from 1,129 to 4.531. The Red Mountain Fault ShakeMap Scenario is expected to result in more displaced households and also people seeking shelter than the San Luis Range ShakeMap Scenario. Displaced households that do not seek shelter may require other evacuation services as well.

Table 6-19. Shelter Requirements for Red Mountain Fault and San Luis Range ShakeMap Scenarios

Red Mountain Fault ShakeMap Scenario		San Luis Range ShakeMap Scenario	
Total Population (2010 Census)	423,895	Total Population (2010 Census)	423,895
Total Displaced Households	6,451	Total Displaced Households	1,150
Total Seeking Shelter	4,531	Total Seeking Shelter	1,129

Source: Hazus-MH 5.0

The Hazus models potential casualty numbers, based on magnitude and time of occurrence for the earthquake. Casualties are broken out by occupancy class, and severity is separated into one of four categories.

- **Level 1:** Injuries would require medical attention but hospitalization is not needed
- **Level 2:** Injuries would require hospitalization but are not considered life-threatening
- **Level 3:** Injuries would require hospitalization and can become life-threatening if not promptly treated
- **Level 4:** Victims are killed by the earthquake

Hazus estimates are provided for three times of day – 2:00 AM, 2:00 PM, and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial, and industrial sector loads are maximum, and 5:00 PM represents peak commute time.

The following tables show casualty estimates for the different times of day for each scenario. In both scenarios, an earthquake at 2:00 PM would cause the most casualties (between 1,337 and 4,546) and deaths (between 75 and 296). The Red Mountain Fault ShakeMap Scenario is expected to result in more casualties and also more severe casualties than the San Luis Range ShakeMap Scenario.

Table 6-20. Casualty Estimates – Red Mountain Fault ShakeMap Scenario

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	35.80	10.64	1.76	3.47
	Commuting	0.14	0.28	0.37	0.08
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	34.70	10.27	1.65	3.25
	Other- Residential	769.33	204.68	27.37	52.82
	Single Family	376.05	61.14	3.50	6.08
	Total	**1,216**	**287**	**35**	**66**
2 PM	Commercial	2049.11	606.20	100.02	196.71
	Commuting	1.30	2.48	3.29	0.68
	Educational	646.46	192.91	32.75	63.94
	Hotels	0.00	0.00	0.00	0.00
	Industrial	255.68	75.44	12.16	23.73
	Other- Residential	139.86	36.88	4.96	9.25
	Single Family	77.10	12.58	0.83	1.22
	Total	**3,170**	**926**	**154**	**296**
5 PM	Commercial	1,449.03	426.64	70.55	137.13
	Commuting	22.84	42.49	57.16	11.81
	Educational	172.81	52.59	9.00	17.67
	Hotels	0.00	0.00	0.00	0.00
	Industrial	159.80	47.15	7.60	14.83
	Other- Residential	292.79	77.83	10.62	19.85
	Single Family	146.75	24.04	1.59	2.35
	Total	**2,244**	**671**	**157**	**204**

Source: Hazus-MH 5.0

Table 6-21. Casualty Estimates – San Luis Range ShakeMap Scenario

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	9.88	2.66	0.41	0.82
	Commuting	0.05	0.08	0.12	0.02
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	11.80	3.08	0.44	0.86
	Other- Residential	230.64	52.95	5.55	10.40
	Single Family	146.83	18.64	0.91	1.61
	Total	**399**	**77**	**7**	**14**
2 PM	Commercial	0.42	0.75	1.04	0.21
	Commuting	192.62	51.78	8.26	16.17
	Educational	0.00	0.00	0.00	0.00
	Hotels	86.87	22.60	3.25	6.29
	Industrial	47.26	10.96	1.18	2.17
	Other- Residential	30.97	4.02	0.23	0.34
	Single Family	0.42	0.75	1.04	0.21
	Total	**969**	**254**	**39**	**75**

Table 6-21. Casualty Estimates – San Luis Range ShakeMap Scenario (Continued)

		Level 1	Level 2	Level 3	Level 4
5 PM	Commercial	461.74	123.71	19.32	37.38
	Commuting	7.05	12.33	17.27	3.52
	Educational	16.32	4.22	0.66	1.30
	Hotels	0.00	0.00	0.00	0.00
	Industrial	54.29	14.13	2.03	3.93
	Other- Residential	85.39	19.72	2.13	3.91
	Single Family	56.22	7.27	0.41	0.62
	Total	**681**	**181**	**42**	**51**

Source: Hazus-MH 5.0

Economy

Depending on its location and magnitude, an earthquake could have a devastating impact on the county's economy. In general, impacts would be related to debris cleanup and management, building and infrastructure damage, and losses related to business and infrastructure interruption.

Hazus estimates economic impacts for earthquakes modeled. Losses estimated include building-related losses, and transportation and utility lifeline losses. The model estimates loss over 15 years after the incident.

Table 6-22. Economic Losses (Millions of Dollars)

Red Mountain Fault ShakeMap Scenario						
Category	**Single Family**	**Other Residential**	**Commercial**	**Industrial**	**Others**	**Total**
Income Losses	237.28	218.14	739.21	26.9	78.41	1300
Capital Stock Losses	2,615.21	1,482.9	1,845.58	452.33	461.77	6,957.8
Total	**2,852.49**	**1,701.03**	**2,584.79**	**479.23**	**540.18**	**8,157.73**

San Luis Range ShakeMap Scenario						
Category	**Single Family**	**Other Residential**	**Commercial**	**Industrial**	**Others**	**Total**
Income Losses	74.69	45.95	207.99	8.09	17.41	354.13
Capital Stock Losses	874.11	327.01	474.61	107.75	108.23	1,891.7
Total	**948.8**	**372.96**	**682.59**	**115.84**	**125.64**	**2,245,83**

Source: Hazus-MH 5.0

- **Red Mountain Fault ShakeMap Scenario:** The total building-related losses were $8.16 billion. Sixteen percent of the estimated losses were related to the business interruption in the region. By far, the largest loss was sustained by the residential occupancies, which made up over 56 percent of the total loss.
- **San Luis Range ShakeMap Scenario**: The total building-related losses were $2.25 billion. Sixteen percent of the estimated losses were related to the business interruption in the region.

By far, the largest loss was sustained by the residential occupancies, which made up over 59 percent of the total loss.

The Red Mountain Fault ShakeMap Scenario is expected to result in more economic losses than the San Luis Range ShakeMap Scenario.

Table 6-23. Lifeline System Losses – Transportation and Utility (Millions of Dollars)

Red Mountain Fault ShakeMap Scenario		
System	**Inventory Value**	**Economic Loss**
Highway	$4,246.5	$100,97
Railways	$1,095.47	$60.24
Light Rail	$0	$0
Bus	$14.64	$4.01
Ferry	$3.99	$0.34
Port	$32.54	$11.8
Airport	$856.36	$24.8
Potable Water	$299.25	$15.31
Wastewater	$2,142.89	$573.55
Natural Gas	$235.73	$5.85
Oil Systems	$0.24	$0.05
Electrical Power	$995.4	$234.48
Communication	$4.96	$0.87

San Luis Range ShakeMap Scenario		
System	**Inventory Value**	**Economic Loss**
Highway	$4,246.5	$15.98
Railways	$1,095.47	$2.01
Light Rail	$0	$0
Bus	$14.64	$2.29
Ferry	$3.99	$0.07
Port	$32.54	$1.38
Airport	$856.36	$9.43
Potable Water	$299.25	$11.82
Wastewater	$2,142.89	$46.69
Natural Gas	$235.73	$2.37
Oil Systems	$0.24	$0.02
Electrical Power	$995.4	$34.7
Communication	$4.96	$0.42

Source: Hazus-MH 5.0

The Red Mountain Fault ShakeMap Scenario is also expected to result in more lifeline system losses than the San Luis Range ShakeMap Scenario.

Critical Infrastructure Impacts

An earthquake could have a major impact on critical infrastructure. Hazus estimates the impacts on critical facilities including hospitals, schools, EOCs, police stations, and fire stations. 40 percent of these facilities would sustain at least moderate damage from the Red Mountain Fault while only 9 percent would sustain moderate damage from the San Luis Range.

Table 6-24. Expected Damage to Critical Facilities – Red Mountain Fault ShakeMap Scenario

Classification	Total	Number of Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on Day 1
Hospitals	10	3	0	5
Schools	179	78	12	85
EOCs	3	0	0	2
Police Stations	21	4	1	11
Fire Stations	45	17	2	23
Total	**258**	**102**	**15**	**126**

Table 6-25. Expected Damage to Critical Facilities – San Luis Range ShakeMap Scenario

Classification	Total	Number of Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on Day 1
Hospitals	10	0	0	9
Schools	179	16	1	138
EOCs	3	1	0	2
Police Stations	21	2	0	17
Fire Stations	45	3	0	35
Total	**258**	**22**	**1**	**201**

Source: Hazus-MH 5.0

The Red Mountain Fault ShakeMap Scenario is expected to cause more damage and also more severe damage to critical facilities, as well as result in delays for the critical facilities to recover than the San Luis Range ShakeMap Scenario. The more extreme damage to critical facilities would require additional time to repair and ensure safe operation post-earthquake.

Other Earthquake Vulnerabilities

Social Vulnerability. Earthquake is a high significance hazard across the county based on past event history as well as due to the prominent presence of faults (including portions of active and potentially active faults). Because of this, the entire county's population is exposed in some way to this hazard.

Based on the Social Vulnerability Index (SoVI) data presented and discussed in Section 4.1.3, *Environmental Justice and Social Vulnerability*, some of the most socially vulnerable areas of the county are also exposed to earthquake hazards. This includes the cities of Santa Maria and

Guadalupe (and surrounding communities) near the Garey Fault and Lions Head and the Cuyama Valley near the South Cuyama Fault, identified by the Center for Disease Control's (CDC's) Agency for Toxic Substances and Disease Registry (ATSDR). Some of the "frontline" communities identified by the County's Climate Change Vulnerability Assessment (CCVA) are also located near quaternary and late quaternary faults, including Isla Vista, Eastern Goleta Valley, El Sueno (a neighborhood in Eastern Goleta Valley), and western Carpinteria in the South Coast, near the Mission Ridge – Arroyo Parida Fault; southern Santa Ynez Valley near the Santa Ynez River Fault; and areas northwest of Santa Maria (near City of Guadalupe) (CDC/ATSDR 2021).

Populations most vulnerable to earthquake hazards would be those that rely on specific services or electrical power, which may not be available during or after a quake, such as health care patients, ADFN community members, and the elderly. Some residents would likely have a difficult time receiving emergency notifications or evacuating due to age or disability, houselessness, language barriers, or impact on energy and communications infrastructure. Such socially vulnerable and sometimes financially disadvantaged households may not have the financial resiliency to cope with both short-term post-earthquake issues such as paying for lodging and clean up as well as potentially lacking resources to address longer-term issues such as major structural repairs or replacement.

Historic, Cultural, and Natural Resources. Earthquake effects on the environment, natural resources, and historic and cultural assets could be very destructive depending on the type of seismic activity experienced and secondary/cascading effects from an event (e.g., wildfire). The biggest impact would likely be on older properties such as wooden or masonry buildings, though reinforced masonry structures would be much more resilient during earthquakes. However, an earthquake-triggered event such as a rockslide could impact natural foothill or mountain habitats.

Future Development. Future development in the county is not anticipated to significantly affect vulnerability to earthquakes when designed according to modern building codes. However future development would result in a slight increase in exposure of the population, building stock, and related infrastructure to earthquakes.

6.3 NATURAL AND DESTRUCTIVE HAZARDS

6.3.1 Wildfire

As described in Section 5.3.1, *Wildfire*, the county has extensive areas within mapped Fire Hazard Severity Zones and Wildland-Urban Interface (WUI) areas. These hazard areas generate vulnerability for life and structures, including critical facilities, throughout the county, but most severely within rural foothills areas where dry vegetation, steep slopes, and difficult access combine to create a high probability of wildfire.

Three measures were evaluated to assess wildfire vulnerability for critical facilities in the county:

- The first measure for wildfire vulnerability is whether a critical facility is within the Fire Hazard Severity Zone, as mapped by the California Department of Forestry and Fire Protection (CAL FIRE).

- The second measure for wildfire vulnerability is whether a critical facility is within the WUI. For this analysis, "within the WUI" represents those critical facilities that are in the geographical area where the three factors of "threat to people", "communities at risk", and "distance to developed areas" intersect. Therefore, the WUI is the potential treatment zone where mitigation could be implemented to reduce wildland fire threats to people
- The third measure for wildfire vulnerability is "Fire Threat." Fire Threat is a combination of the factors of fire likelihood/frequency and potential fire behavior, which includes factors such as vegetation density and flammability (e.g., old-growth chaparral), topography, and susceptibility to high wind events (e.g., "sundowners"). The two factors are combined to create five threat classes ranging from "Little or No Threat" to "Extreme" (see Tables 6-26 and 6-27 for summaries of the total acreage of exposure to these three measures).

Table 6-26. Fire Threat by Planning Region

Threat Level	Planning Region	Fire Threat Acres	Total Planning Region Acres	Percent
Extreme Wildfire Threat	South Coast	1.1	77,020	0.001%
	Total	**1**	**77,020**	**0.001%**
Very High Wildfire Threat	Cuyama Valley	44,555	112,783	39.51%
	Lompoc Valley	38,169	195,287	19.55%
	Santa Maria Valley	37,949	178,146	21.30%
	Santa Ynez Valley	118,355	252,907	46.80%
	South Coast	13,604	77,020	17.66%
	Total	**252,633**	**816,143**	**30.95%**
High Wildfire Threat	Cuyama Valley	33,479	112,783	29.68%
	Lompoc Valley	72,430	195,287	37.09%
	Santa Maria Valley	35,500	178,146	19.93%
	Santa Ynez Valley	63,651	252,907	25.17%
	South Coast	8,668	77,020	11.25%
	Total	**213,728**	**816,143**	**26.19%**
Moderate Wildfire Threat	Cuyama Valley	2,418	112,783	2.14%
	Lompoc Valley	38,118	195,287	19.52%
	Santa Maria Valley	17,475	178,146	9.81%
	Santa Ynez Valley	6,411	252,907	2.53%
	South Coast	5,115	77,020	6.64%
	Total	**69,538**	**816,143**	**8.52%**
Low Wildfire Threat	Cuyama Valley	10,752	112,783	9.53%
	Lompoc Valley	28,814	195,287	14.75%
	Santa Maria Valley	35,015	178,146	19.66%
	Santa Ynez Valley	45,175	252,907	17.86%
	South Coast	6,524	77,020	8.47%
	Total	**126,281**	**816,143**	**15.47%**

Table 6-27. Fire Threat in Unincorporated Areas

Threat Level	Fire Threat Acres	Percent
Extreme Wildfire Threat	14,762	1.02%
Very High Wildfire Threat	704,633	48.51%
High Wildfire Threat	482,094	33.19%
Moderate Wildfire Threat	103,726	7.14%
Low Wildfire Threat	147,329	10.14%
Total	**1,452,545**	**100.00%**

Table 6-28. Fire Threat by City

Threat Level	Planning Region	Fire Threat Acres	Total Planning Region Acres	Percent
Extreme Wildfire Threat	**Total**	**None**	**None**	**0%**
Very High Wildfire Threat	Buellton	9	1,026	0.90%
	Carpinteria	1	1,643	0.07%
	Goleta	4	5,049	0.08%
	Santa Barbara	321	12,614	2.55%
	Santa Maria	41	15,002	0.27%
	Solvang	46	1,561	2.96%
	Total	**423**	**36,895**	**1.15%**
High Wildfire Threat	Buellton	63	1,026	6.12%
	Carpinteria	35	1,643	2.12%
	Goleta	52	5,049	1.02%
	Guadalupe	21	848	2.53%
	Lompoc	684	7,488	9.13%
	Santa Barbara	746	12,614	5.91%
	Santa Maria	427	15,002	2.84%
	Solvang	127	1,561	8.13%
	Total	**2,154**	**45,231**	**4.76%**
Moderate Wildfire Threat	Buellton	77	1,026	7.50%
	Carpinteria	148	1,643	9.04%
	Goleta	599	5,049	11.86%
	Guadalupe	68	848	8.04%
	Lompoc	1,666	7,488	22.25%
	Santa Barbara	942	12,614	7.47%
	Santa Maria	1,554	15,002	10.36%
	Solvang	99	1,561	6.37%
	Total	**5,154**	**45,231**	**11.39%**

Table 6-28. Fire Threat by City (Continued)

Threat Level	Planning Region	Fire Threat Acres	Total Planning Region Acres	Percent
Low Wildfire Threat	Buellton	99	1,026	9.64%
	Carpinteria	8	1,643	0.49%
	Goleta	267	5,049	5.28%
	Guadalupe	71	848	8.40%
	Lompoc	919	7,488	12.28%
	Santa Barbara	94	12,614	0.74%
	Santa Maria	2,317	15,002	15.45%
	Solvang	181	1,561	11.59%
	Total	**3,956**	**45,231**	**8.75%**

Table 6-29. Santa Barbara County Properties at Risk to Fire Threat

Jurisdiction	Property Type	Extreme Parcel Count	Very High Parcel Count	High Parcel Count	Moderate Parcel Count	Low Parcel Count	Total Improved Parcel Count	Total Value	Population
Buellton	Agricultural	0	0	0	1	0	1	$31,648	
Buellton	Commercial	0	0	0	5	3	8	$20,234,206	
Buellton	Exempt	0	0	0	1	0	1	$3,030	
Buellton	Industrial	0	0	0	3	9	12	$68,976,330	
Buellton	Mixed Use	0	0	0	0	0	0	$0	0
Buellton	Residential	0	0	0	115	62	177	$165,242,040	487
Buellton	Improved Vacant	0	0	0	0	0	0	$0	
Buellton	**Total**	**0**	**0**	**0**	**125**	**74**	**199**	**$254,487,254**	**487**
Carpinteria	Agricultural	0	0	0	2	0	2	$325,500	
Carpinteria	Commercial	0	0	0	1	0	1	$130,660	
Carpinteria	Exempt	0	0	0	0	0	0	$0	
Carpinteria	Industrial	0	0	1	0	0	1	$138,693	
Carpinteria	Mixed Use	0	0	0	0	0	0	$0	0
Carpinteria	Residential	0	0	47	80	28	155	$88,158,491	425
Carpinteria	Improved Vacant	0	0	0	0	0	0	$0	
Carpinteria	**Total**	**0**	**0**	**48**	**83**	**28**	**159**	**$88,753,343**	**425**

Table 6-29. Santa Barbara County Properties at Risk to Fire Threat (Continued)

Jurisdiction	Property Type	Extreme Parcel Count	Very High Parcel Count	High Parcel Count	Moderate Parcel Count	Low Parcel Count	Total Improved Parcel Count	Total Value	Population
Goleta	Agricultural	0	0	0	1	2	3	$1,126,116	
	Commercial	0	0	0	12	0	12	$132,850,720	
	Exempt	0	0	0	3	2	5	$2,520,690	
	Industrial	0	0	0	6	0	6	$24,089,715	
	Mixed Use	0	0	0	0	0	0	$0	0
	Residential	0	0	1	624	1	626	$716,067,794	1,709
	Improved Vacant	0	0	0	0	0	0	$0	
	Total	**0**	**0**	**1**	**646**	**5**	**652**	**$876,655,035**	**1,709**
Guadalupe	Agricultural	0	0	0	0	0	0	$0	
	Commercial	0	0	0	1	0	1	$1,050,296	
	Exempt	0	0	0	0	0	0	$0	
	Industrial	0	0	0	1	0	1	$1,134,365	
	Mixed Use	0	0	0	0	0	0	$0	0
	Residential	0	0	7	74	20	101	$32,554,110	397
	Improved Vacant	0	0	0	0	0	0	$0	
	Total	**0**	**0**	**7**	**76**	**20**	**103**	**$34,738,771**	**397**
Lompoc	Agricultural	0	0	0	0	1	1	$4,214	
	Commercial	0	0	0	0	0	0	$0	
	Exempt	0	0	1	1	1	3	$4,206,432	
	Industrial	0	0	0	0	3	3	$17,281,255	
	Mixed Use	0	0	0	0	0	0	$0	0
	Residential	0	0	59	49	63	171	$62,617,740	498
	Improved Vacant	0	0	0	0	4	4	$100,000	
	Total	**0**	**0**	**60**	**50**	**72**	**182**	**$84,209,641**	**498**
Santa Barbara	Agricultural	0	1	0	0	0	1	$90,528	
	Commercial	0	0	1	6	0	7	$48,704,948	
	Exempt	0	0	1	3	0	4	$4,194,834	
	Industrial	0	0	0	1	0	1	$69,301,580	
	Mixed Use	0	0	0	0	0	0	$0	0
	Residential	0	60	198	253	33	544	$562,254,207	1,333
	Improved Vacant	0	0	3	1	0	4	$2,935,184	
	Total	**0**	**61**	**203**	**264**	**33**	**561**	**$687,481,281**	**1,333**

Table 6-29. Santa Barbara County Properties at Risk to Fire Threat (Continued)

Jurisdiction	Property Type	Extreme Parcel Count	Very High Parcel Count	High Parcel Count	Moderate Parcel Count	Low Parcel Count	Total Improved Parcel Count	Total Value	Population
Santa Maria	Agricultural	0	0	0	0	2	2	$2,495,160	
	Commercial	0	0	5	25	12	42	$551,198,784	
	Exempt	0	0	0	5	4	9	$12,167,656	
	Industrial	0	0	2	12	27	41	$297,281,323	
	Mixed Use	0	0	0	0	0	0	$0	0
	Residential	0	0	77	267	720	1,064	$542,399,237	3,969
	Improved Vacant	0	0	0	2	4	6	$3,401,194	
	Total	**0**	**0**	**84**	**311**	**769**	**1,164**	**$1,408,943,353**	**3,969**
Solvang	Agricultural	0	0	0	0	0	0	$0	
	Commercial	0	0	0	2	1	3	$184,772	
	Exempt	0	0	0	1	1	2	$5,250,202	
	Industrial	0	0	0	0	0	0	$0	
	Mixed Use	0	0	0	0	0	0	$0	0
	Residential	0	0	55	62	139	256	$217,296,242	612
	Improved Vacant	0	0	1	1	1	3	$482,770	
	Total	**0**	**0**	**56**	**66**	**142**	**264**	**$223,213,986**	**612**
Unincorporated	Agricultural	0	332	327	120	304	1,083	$1,977,259,482	
	Commercial	0	5	10	12	12	39	$90,536,808	
	Exempt	0	7	15	21	15	58	$425,171,014	
	Industrial	0	0	0	2	7	9	$16,238,123	
	Mixed Use	0	0	0	1	1	2	$1,538,294	6
	Residential	1	767	1,496	1,102	1,635	5,001	$6,115,866,432	14,403
	Improved Vacant	0	24	43	28	37	132	$69,033,442	
	Total	**1**	**1,135**	**1,891**	**1,286**	**2,011**	**6,324**	**$8,695,643,595**	**14,409**
	Grand Total	**1**	**1,196**	**2,350**	**2,907**	**3,154**	**9,608**	**$12,354,126,258**	**23,837**

The majority of properties that occur in Fire Hazard Severity Zones are residential, however, properties in unincorporated territories also include agriculture properties. For example, 767 unincorporated residential properties and 332 unincorporated agricultural properties are located in Very High fire hazard zones. In the county's unincorporated territory, there are also 1,496 residential properties and 327 agricultural properties that are located in High fire hazard zones. The City of Santa Barbara is similarly vulnerable to wildfire, with 60 residential properties located in the Very High fire hazard zone. 198 residential properties in the City of Santa Barbara are located in High fire threat zones. The City of Carpinteria and City of Lompoc are both also vulnerable with 47 and 59 residential properties, respectively, located in the High fire hazard zone.

As shown in Table 6-30, 466,361 acres within the county are located within a High or Very High fire threat area, and one acre and one residential facility in unincorporated South Coast territory are located within an Extreme fire threat area. Table 6-31 shows the total number of properties located within fire hazard severity zones and estimated values. As shown therein, unincorporated territory and the City of Santa Barbara have the greatest number of parcels within High and Very High fire threat zones.

Table 6-30. Critical Facilities with Very High Fire Threat by Planning Region

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Cuyama Valley	1	-	-	-	1	1	2	5	$309,420
Lompoc Valley	1	-	-	-	-	-	2	3	$0
Santa Maria Valley	3	-	-	-	-	-	5	8	$0
Santa Ynez Valley	2	-	1	-	-	1	4	8	$228,047
South Coast	-	-	-	-	-	1	3	4	$1,208,931
Unincorporated	26	-	1	-	-	-	5	32	$500,000
Total	**33**	**0**	**2**	**0**	**1**	**3**	**21**	**60**	**$2,246,398**

Note: Unincorporated areas include Vandenberg SFB and Los Padres National Forest

Table 6-31. Critical Facilities with Very High Fire Threat by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Buellton	-	-	1	-	-	-	-	1	$228,047
Carpinteria	-	-	-	-	-	-	-	0	$0
Goleta	-	-	-	-	-	-	-	0	$0
Guadalupe	-	-	-	-	-	-	-	0	$0
Lompoc	-	-	-	-	-	-	-	0	$0
Santa Barbara	-	-	-	-	-	-	1	1	$0
Santa Maria	-	-	-	-	-	-	-	0	$0
Solvang	-	-	-	-	-	-	-	0	$0
Unincorporated	33	-	1	-	1	3	20	58	$2,018,351
Total	**33**	**0**	**2**	**0**	**1**	**3**	**21**	**60**	**$2,246,398**

Table 6-32. Critical Facilities with High Fire Threat by Planning Region

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Cuyama Valley	-	-	-	-	-	-	-	0	$0
Lompoc Valley	6	-	1	1	-	8	17	33	$1,346,760
Santa Maria Valley	1	1	1	-	-	5	5	13	$3,929,072
Santa Ynez Valley	3	-	6	-	-	8	24	41	$11,316,148
South Coast	1	1	1	-	-	1	8	12	$1,167,943
Unincorporated	10	-	-	-	1	1	7	19	$0
Total	**21**	**2**	**9**	**1**	**1**	**23**	**61**	**118**	**$17,759,923**

Note: Unincorporated areas include Vandenberg SFB and Los Padres National Forest

Table 6-33. Facilities with High Fire Threat by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Buellton	-	-	-	-	-	-	-	0	$0
Carpinteria	-	-	-	-	-	-	-	0	$0
Goleta	-	-	-	-	-	-	-	0	$0
Guadalupe	-	-	-	-	-	-	-	0	$0
Lompoc	-	-	-	-	-	-	1	1	$0
Santa Barbara	-	-	-	-	-	-	-	0	$0
Santa Maria	-	1	1	-	-	5	1	8	$3,929,072
Solvang	-	-	1	-	-	-	-	1	$535,623
Unincorporated	21	1	7	1	1	18	59	108	$13,295,228
Total	**21**	**2**	**9**	**1**	**1**	**23**	**61**	**118**	**$17,759,923**

Table 6-34. Facilities with Moderate Fire Threat by Planning Region

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Cuyama Valley	-	-	-	-	-	-	-	0	$0
Lompoc Valley	3	-	-	-	-	2	5	10	$2,838,203
Santa Maria Valley	4	1	-	1	-	1	4	11	$0
Santa Ynez Valley	-	-	1	-	-	-	5	6	$736,483
South Coast	-	-	4	-	4	11	10	29	$17,423,053
Unincorporated	5	-	1	1	1	-	2	10	$0
Total	**12**	**1**	**6**	**2**	**5**	**14**	**26**	**66**	**$20,997,739**

Note: Unincorporated areas include Vandenberg SFB and Los Padres National Forest

Table 6-35. Facilities with Moderate Fire Threat by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Buellton	-	-	-	-	-	-	1	1	$0
Carpinteria	-	-	-	-	-	-	-	0	$0
Goleta	-	-	1	-	-	-	-	1	$2,000,000
Guadalupe	-	-	1	-	-	-	-	1	$0
Lompoc	-	-	1	-	-	-	1	2	$0
Santa Barbara	-	-	1	-	1	-	4	6	$0
Santa Maria	1	1	-	-	-	-	-	2	$0
Solvang	-	-	-	-	-	-	-	0	$0
Unincorporated	11	-	5	2	4	11	20	53	$18,997,739
Total	**12**	**1**	**9**	**2**	**5**	**11**	**26**	**66**	**$20,997,739**

As shown in the tables above, 60 critical facilities are located in very high fire hazard severity zones, 33 of which are communications and 21 are transportation, which include facilities such as cell towers, local roads, and state highways (e.g., SR 192). As shown in the tables above, 118 critical facilities are located in High fire threat zones, 61 of which are transportation, 23 are safety and security and 21 are communications. As shown in the tables above, 66 critical facilities are located in Moderate fire threat zones, 26 of which are transportation and 21 are communication. Critical facilities most at risk of damage in the event of a wildfire are communication facilities (e.g., FM Tower, Cellular towers, Paging towers) and transportation facilities, such as the State Route (SR) 1 at Ytias Creek Bridge and SR-154 at Alamo Pintado Creek bridge. All transportation critical facilities that occur in High and Very High fire threat zones are bridges, the majority of which are located in unincorporated areas, including South Coast, Santa Ynez Valley, Santa Maria Valley, Lompoc Valley, and Cuyama Valley.

Figure 6-6 depicts the location of the county's critical facilities relative to Fire Hazard Severity Zones. Figure 6-7 depicts critical facilities and WUI Zones within the county. Figure 6-8 depicts the location of critical facilities relative to wildfire threat zones. Figure 6-9 depicts the location of critical facilities relative to emergency evacuation routes.

As depicted in Figures 6-6 and 6-8, the majority of Santa Barbara County is located within Very High or High Fire Hazard Severity Zones and Very High and High fire threat zones, meaning that in addition to critical facilities described above, homes and residential structures across the county are vulnerable to wildfire threat, especially those in Santa Ynez Valley, Cuyama Valley, and the South Coast, which are identified as high or severe vulnerabilities (Santa Barbara County 2021).

Further, as indicated by Figure 6-9, emergency access and evacuation can be constrained in hillside neighborhoods and rural communities where limited ingress and egress can slow and prevent the efficient movement of people and vehicles. This is particularly true in denser communities with larger populations served by narrow local roads such as the Riviera in the City of Santa Barbara, the Goleta foothills, and areas of the Santa Ynez Valley and Orcutt. This vulnerability may be exacerbated in the future under changing housing laws in California that incentivize additional density within existing neighborhoods, including allowances for accessory dwelling units (ADUs), as well as urban lot splits and duplexes under Senate Bill 9, which increase the service population. During an evacuation, additional residents would depend on the existing roadway network to flee and emergency responders would have additional residents to protect and serve. Further, in most cases, the same roads used for civilian evacuation to leave an area are also used by emergency responders to access the incident area.

County jurisdictions have established various communication pathways to inform the public of emergencies and recommended protective actions, such as evacuations and sheltering in place (see also, Chapter 4.0, *Community Profile and Capability Assessment*). These pathways are frequently used concurrently to amplify emergency information throughout the community and reach vulnerable individuals who may need additional information and resources to take action, including people with disabilities, access and functional needs, and commuters and visitors. Emergency notifications are primarily disseminated using Everbridge, a web-based mass notification platform that supports alerting through phone calls, text messages, email, TTY/TTD (for the deaf and hearing-impaired), Wireless Emergency Alerts (WEAs), and Emergency Alert System (EAS) messages.[2] Notifications may also be delivered directly to residents via door knocks and/or evacuation sirens on law enforcement vehicles. Incident information can also be posted on the County's emergency preparedness website www.ReadySBC.org, shared on social media platforms (e.g., Twitter,

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[2] In acute or extreme hazard scenarios, notification using the FCC's Wireless Emergency Alerts (WEA) system is possible. WEA is a public safety system that allows customers who own compatible mobile devices to receive geographically targeted, text-like messages alerting them of imminent threats to safety in their area such as dangerous weather, missing children, and other critical situations. The EAS is a national public warning system commonly used by state and local authorities to deliver important emergency information, such as weather and AMBER alerts, to affected communities.

Figure 6-6. Critical Facilities in Fire Hazard Severity Zone

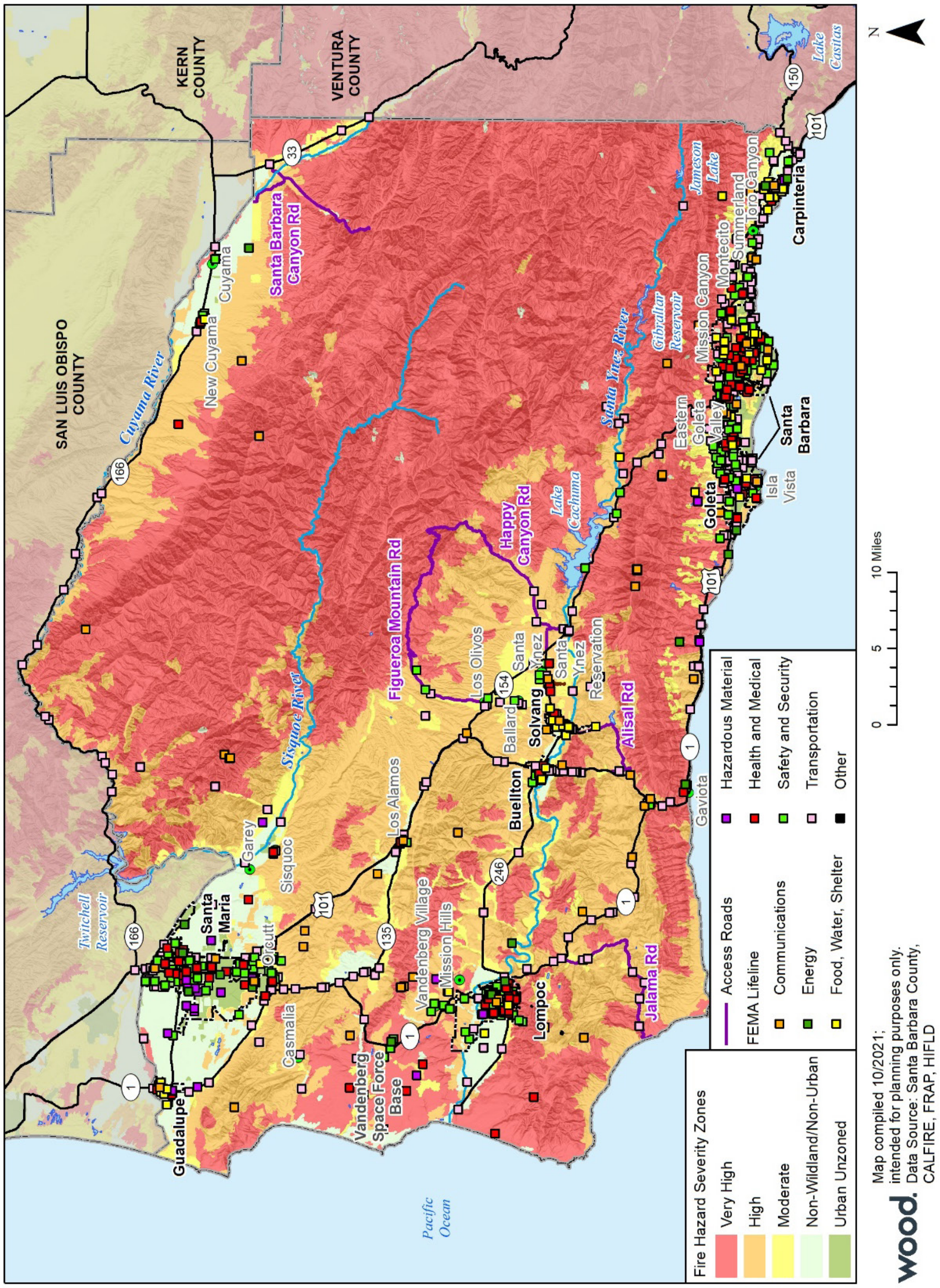


Figure 6-7. Critical Facilities in Wildland Urban Interface (WUI)

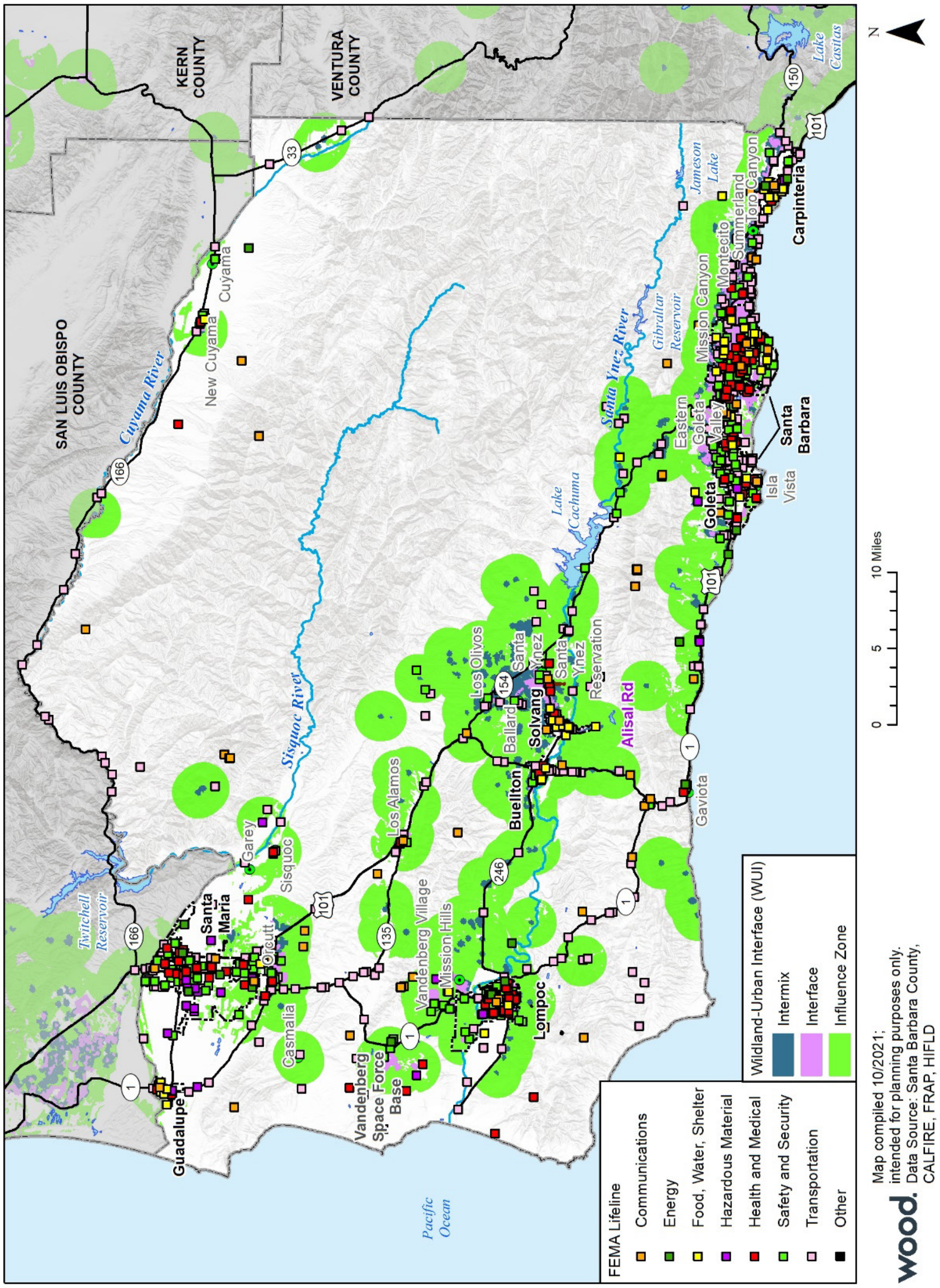


Figure 6-8. Critical Facilities in Fire Threat Zones

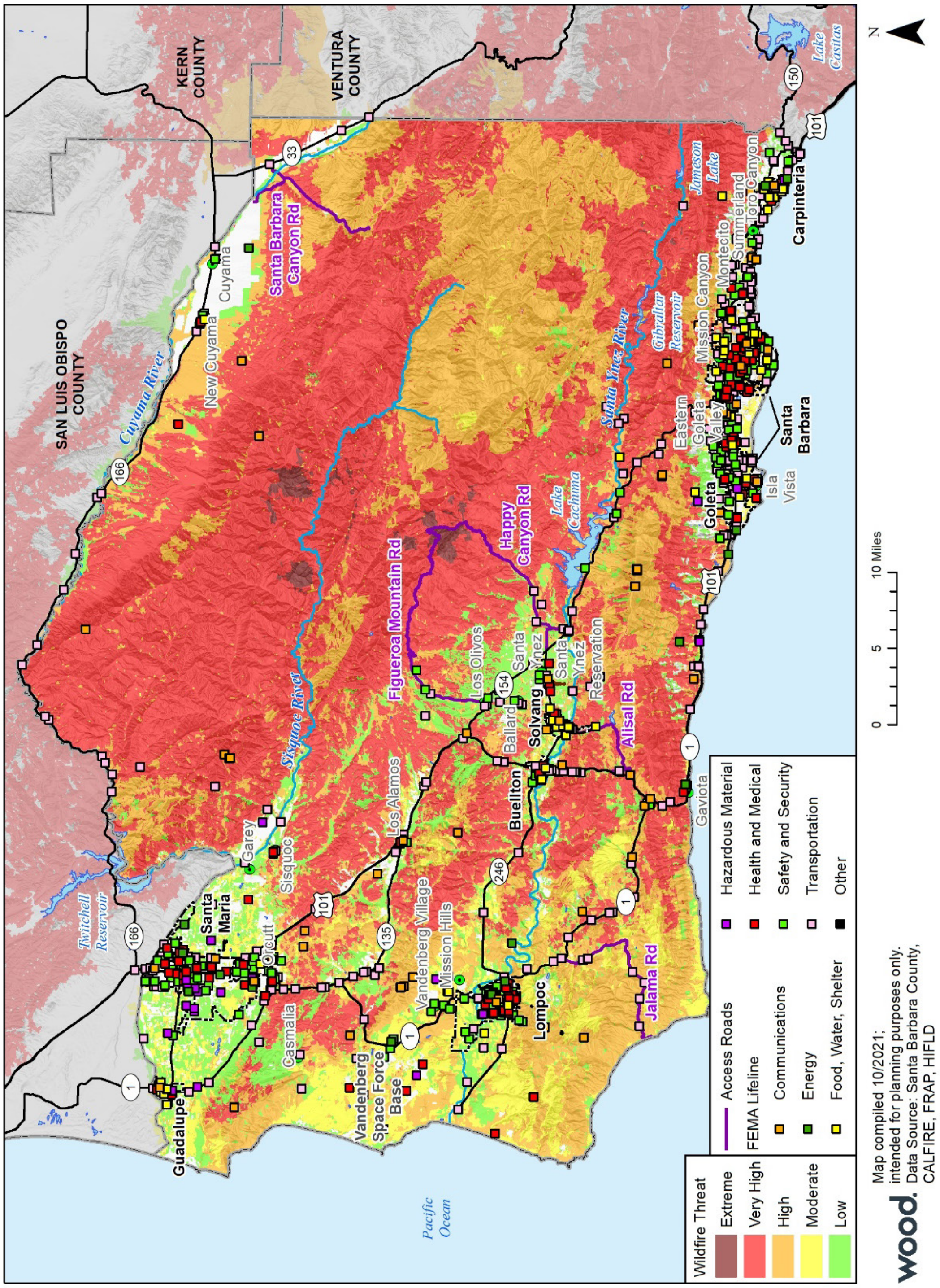
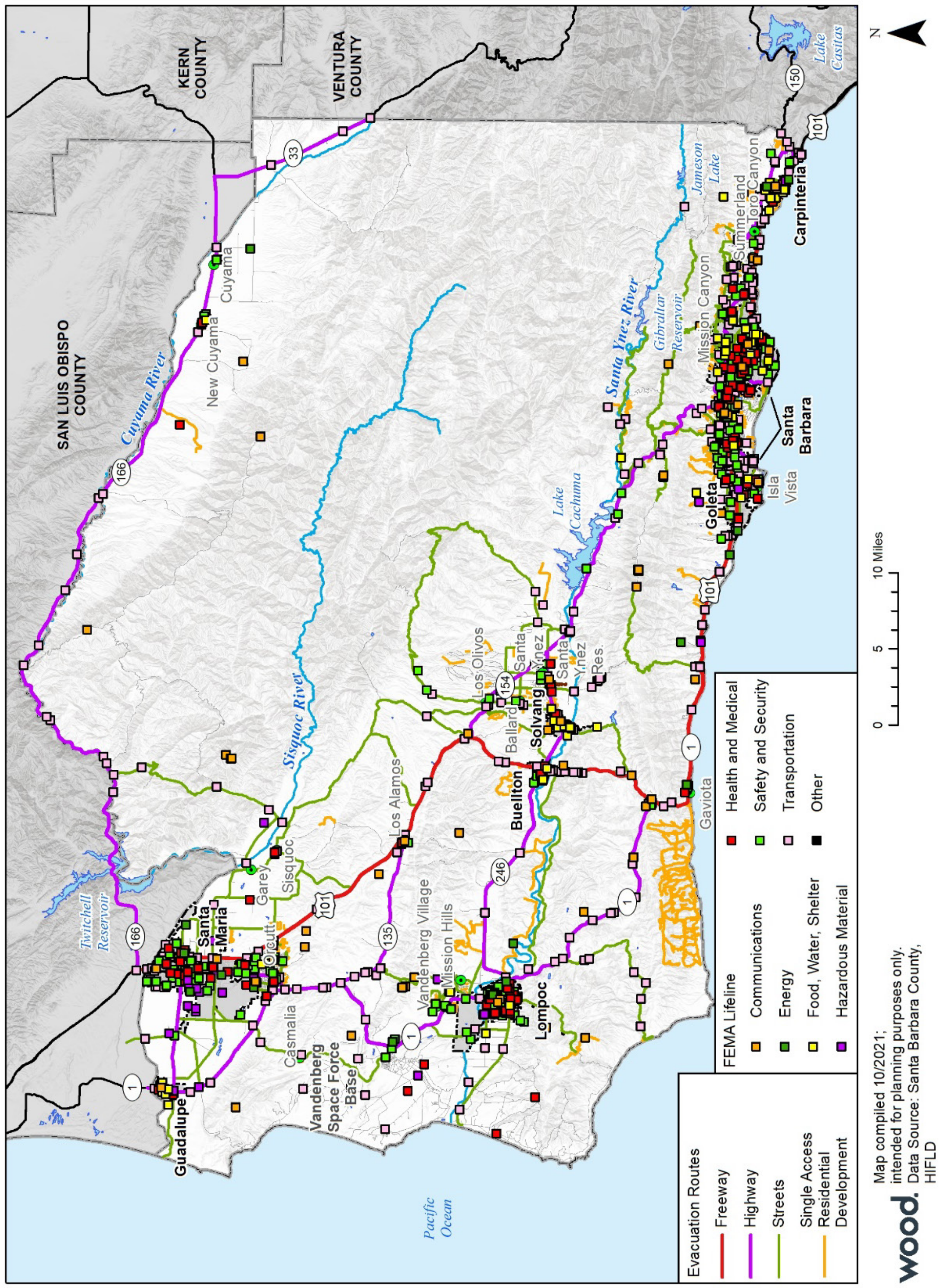


Figure 6-9. Evacuation Routes, Residential Areas with Single Access, and Critical Facilities



Facebook), through print, radio, and TV media, and accessed through 2-1-1 and Call Center hotlines. Most of these concepts rely on the availability of communications infrastructures, such as the internet, cell phones, landlines, and broadcast media; all of which can be impacted by natural hazards, such as wildfires. Additionally, populations with limited resources, existing social or economic disparities, language and communication barriers, may not have access to all the methods utilized for notifications, or may not trust messages from government programs, staff and officials, putting these populations at greater risk.

6.3.2 Drought & Water Shortage

As described in Section 5.3.2, *Drought and Water Shortage*, drought occurs cyclically in Santa Barbara County and is expected to become more frequent and severe under changing climate conditions. Recently, the historically severe 2012-2017 statewide drought was followed by limited wet years and several very dry years. According to the U.S. Drought Monitor, an estimate 423,895 people reside in drought areas in Santa Barbara County, including 297,824 residents in Extreme Drought areas (D3), 125,765 residents in Severe Drought areas (D2), and 304 residents in Moderate Drought areas (D1) as of September 2022.

The effects of drought affect both local surface water supplies and deliveries from the State Water Project. While such effects on surface water supplies are most visible in Santa Barbara County when looking at the current capacity and maximum storage of the water supply reservoirs, droughts can severely reduce or even halt deliveries from the State Water Project. Locally, drought can impact water reservoirs along the Santa Ynez River, particularly Lake Cachuma, the largest reservoir in the County. As of November 9, 2021, Cachuma Reservoir, a key water supply for the entire South Coast, was reported to be at 48.1 percent capacity, the Gibraltar Reservoir that supplies the City of Santa Barbara at a capacity of 4.3 percent, and the Jameson Reservoir that supplies the community of Montecito at a capacity of 58.6 percent (refer to Table 5-6). Information on Twitchell Reservoir capacity, which does not provide long-term storage but plays a key role in recharging the Santa Maria Groundwater Basin, is unavailable currently (Santa Barbara County Flood Control and Water Conservation District [County Flood Control District] 2021).

During droughts, groundwater basin overdraft (when groundwater recharge cannot keep up with groundwater extraction) can occur in the county. While sustained groundwater overdraft is related to long-term trends in the balance between groundwater withdrawals and recharge, droughts increase demand on groundwater basins while decreasing or even eliminating recharges and replenishment, sometimes for multiple years. Such droughts can delay the recovery of groundwater basins even during wet years and cause problems such as declines in water quality, drying of surface creeks and wetlands, etc. As described in Section 5.3.2, *Drought & Water Shortage*, the California Department of Water Resources (DWR) has identified five groundwater basins in the county as High or Medium priority basins subject to critical conditions of overdraft (refer to Table 5-6; DWR 2017):

- Carpinteria Groundwater Basin
- Montecito Groundwater Basin
- Santa Ynez River Valley Groundwater Basin
- San Antonio Creek Valley Groundwater Basin

- Cuyama Valley Groundwater Basin

All regions of the county are relatively dependent on groundwater supplies with groundwater providing a significant component of supply for the cities of Lompoc and Santa Maria and important to all other urban areas and particularly for agriculture. Further, the Cuyama Valley, the communities of Los Alamos, Mission Hills, Vandenberg Village, and the City of Lompoc rely solely on groundwater (Santa Barbara County IRWM Cooperating Partners 2019). If groundwater levels experience sustained declines during a prolonged drought, these communities have few alternative sources of water. Therefore, the county is particularly vulnerable to the impacts of drought and water shortage, given the heavy reliance of many communities and the agricultural industry on groundwater.

Prolonged droughts can deplete County surface water storage and decrease groundwater recharge, affecting two primary water sources for the County. Drought and water shortages can occur countywide and have significant impacts on communities and the economy. Drought impacts are felt first by those most dependent on or affected by annual rainfall (e.g., fire departments, ranchers engaged in dryland grazing or dry farming, rural residents relying on wells in low-yield rock formations, or other small water systems lacking a reliable water source). For example, residents in remote areas or locations with limited roadway access may have limited water and energy supplies that can be damaged by hazardous events, or a lack of backup supplies, leaving people without water for hours or days (Santa Barbara County Planning and Development Department 2021). Income-constrained communities may struggle to pay for increased water utility bills that may occur during drought or a continuing climate crisis (Santa Barbara County Planning and Development Department 2021). Significant economic impacts on the county's agriculture industry can occur as a result of short- and long-term drought conditions; these include hardships to farmers, farmworkers, packers, and shippers of agricultural products. Droughts can stress crops and livestock, reducing productivity and resulting in losses to Santa Barbara's agricultural economy (Santa Barbara County Planning and Development Department 2021).

Climate change has the potential to make drought events more common in California, including Santa Barbara County (DWR 2021). Extreme heat creates conditions more conducive for the evaporation of moisture from the ground, increasing the possibility of drought. As described in Section 5.3.2, *Drought & Water Shortages*, the County's CCVA identified changing precipitation patterns in impacts on local water supplies and loss of snowpack which impact the State Water Project as factors exacerbated by climate change that can contribute to drought severity experienced within the county. Changing precipitation patterns are anticipated to increase the severity of episodic severe storms; however, droughts would likely last longer and happen more frequently because of more variability in precipitation extremes (Santa Barbara County Planning and Development Department 2021). Changing precipitation distribution, timing, and intensity have the potential to impact both the County's local surface water supplies and groundwater recharge. Projections for increased variability in rainfall may increase the potential for more frequent and more severe periods of drought, interspersed with periods of intensive rainfall.

Drought can also have many secondary impacts. For example, drought is a major contributor to increased wildfire hazards, in that it creates a greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation, along with reduced water supply for firefighting purposes. Please refer to Section 6.3.1, *Wildfire*, above for greater detail on county vulnerability to wildfire risk. Drought conditions can also lead to groundwater overdraft conditions, with effects on water quality, well yields, and some surface water resources such as streams and wetlands This phenomenon often leads to subsidence, which is the lowering of the land-surface elevation (see Section 6.3.8, *Geologic Hazards*). Overdraft conditions can lead to higher concentrations of contaminants in the water when increased pumping during drought draws shallow, contaminated groundwater to depths commonly tapped by public drinking-water wells (Levy et al. 2021). Drought can also compound the spread of invasive species (see Section 6.5.3, *Invasive Species*). Invasive species that were previously limited by cold winters can survive warmer weather conditions with rising global temperatures. Stress events such as extreme drought can reduce native species and ecosystem resilience, increasing susceptibility to pests and secondary pathogens (Brown-Lima 2021; IUNC 2021). Many invasive species can more easily adapt to and take advantage of warmer temperatures and higher CO_2 levels than their native counterparts, thus becoming champions in the competition for resources. Drought can also prevent dams and wastewater infrastructure from functioning properly. Drought may lower groundwater levels so that well pumps operate inefficiently and suffer mechanical damage (World Bank 2020). When flows decline, sedimentation of solids and wastewater stagnation begin to occur in wastewater infrastructure. Stagnation results in anaerobic conditions and generates acids that corrode pipes and gases such as hydrogen sulfide that cause odors and pose health and safety hazards (World Bank 2020). Without rainfall and river flow during periods of drought, beach sediments are not replenished, making beaches smaller and more vulnerable to coastal hazards related to sea level rise (see Section 6.3.6, *Coastal Hazards*) (USGS 2017).

To address potential water shortages in the future, in 2015 the City of Santa Barbara reactivated its desalination plant, which provides the City of Santa Barbara with three million gallons of drinking water per day. This is equivalent to 3,125 acre-feet of water annually or about 30 percent of the City's demand (refer to Section 5.3.2*, Drought & Water Shortage*). Further, Santa Barbara County's Integrated Regional Water Management Program (IRWM) is intended to promote integrated regional water management strategies such as landscape water conservation to ensure sustainable water uses and attempts to address the issues and differing perspectives of all entities involved through mutually beneficial solutions. The Disadvantaged Community Involvement Program is designed to ensure the involvement of disadvantaged communities (DACs), economically distressed areas (EDAs), or underrepresented communities (collectively referred to as DACs) in IRWM planning efforts. The IRWM identifies Guadalupe, Garey, Casmalia, Lompoc, Cuyama, and Isla Vista communities as DACs in Santa Barbara County (IRWM 2018). Additionally, in 2012, a 200,000-gallon reservoir was constructed at Lake Cachuma and designs were completed to add fire hydrants throughout the Cachuma Recreation Area. This project increased the county's water storage capabilities to address potential future water shortages and increase fire suppression for future wildfires. The U.S. Bureau of Reclamation has determined that at least two major facilities at Lake Cachuma, including the water treatment plant and lift station no. 2, need to be relocated to higher ground to allow for a higher surcharge in the system. As of 2022, the design for the water treatment plant is complete but funds are needed for implementation.

6.3.3 Liquefaction (Earthquake)

Earthquake-related vulnerabilities within the county were quantified using Hazus and analyzed in Section 6.2.1, *Earthquake (Ground shaking)* above. Vulnerabilities within the county associated with liquefaction, which is often caused by earthquake ground shaking, are discussed below.

When liquefaction of the soil does occur, buildings and other objects on the ground surface may tilt or sink, and lightweight buried structures (such as pipelines) may float toward the ground surface. Liquefied soil may be unable to support its weight or that of structures, which could result in loss of foundation bearing or differential settlement. Liquefaction may also result in the development of cracks in the ground surface followed by the emergence of a sand/water mixture, typically referred to as a sand-boil. In areas underlain by thick deposits of saturated, loose granular sediment (such as alluvial valleys or beaches), subsidence as much as several feet may result.

As shown in Figure 6-10, there are areas in the City of Guadalupe, City of Lompoc, City of Buellton, City of Solvang, City of Goleta, the City of Santa Barbara, City of Carpinteria, and Cuyama and New Cuyama that have a high liquefaction severity class. In particular, low-lying areas of the cities of Carpinteria and Santa Barbara that were constructed over historic salt marsh and wetland areas are vulnerable, such as the Beach Neighborhood in Carpinteria and a portion of the waterfront and funk zone in Santa Barbara. The City of Santa Maria and its surrounding areas have a moderate liquefaction severity class. There are also limited areas in the west part of the county that have a moderate liquefaction severity class. Moreover, some areas between the City of Santa Barbara and the City of Carpinteria also have a moderate liquefaction severity class. The majority of the county’s other parts have a low liquefaction severity class.

As described in Section 5.3.3, *Earthquake and Liquefaction*, the rating of high, moderate, and low hazard is based on the probable depth to groundwater with consideration given to probable soil characteristics. The exposure of the critical facilities to liquefaction zones is summarized in Tables 6-36 through 6-38 and depicted in Figure 6-10. Based on the GIS analysis, the Santa Barbara County planning area has 26,035 improved parcels valued at over $16 billion and home to 67,404 residents in the High Liquefaction Hazard area. An additional 46,590 improved parcels and $25 billion in value with 139,511 residents fall within the Moderate Liquefaction Hazard area. In the Low Liquefaction Hazard area, 40,559 improved parcels valued at over $39 billion and home to 100,988 residents are vulnerable. As a result, total structural exposure is approximately $81 billion. This information is summarized in Table 6-36 (High Liquefaction), Table 6-37 (Moderate Liquefaction), and Table 6-38 (Low Liquefaction).

Figure 6-10. Groundwater Liquefaction Severity Zones

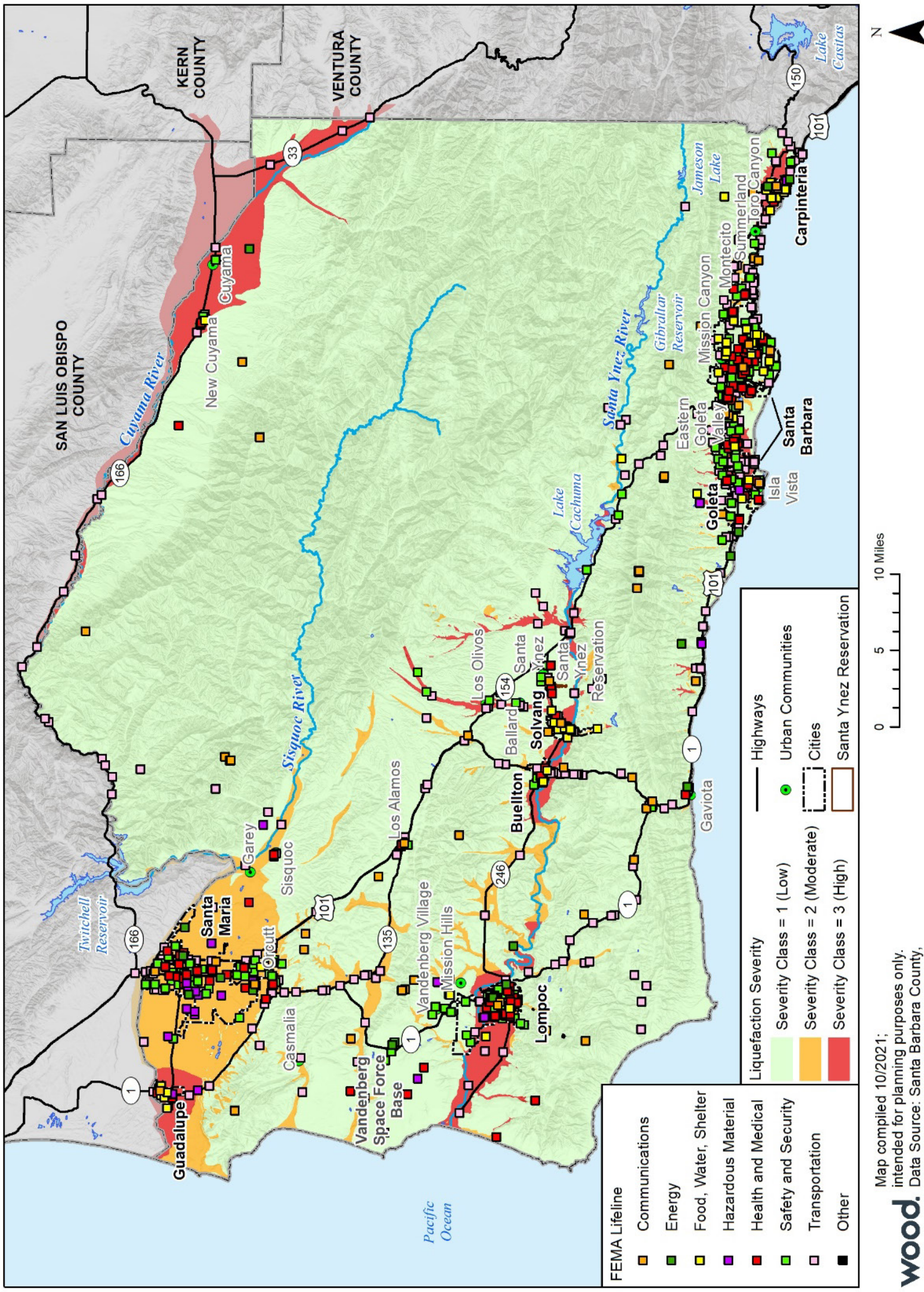


Table 6-36. High Liquefaction Hazard Vulnerabilities by Jurisdiction

Summary of Risk by Property Type and Jurisdiction

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Buellton	1,576	$537,392,741	$346,552,073	$883,944,814	3,974
Carpinteria	3,026	$962,998,103	$556,377,344	$1,519,375,447	7,760
Goleta	4,433	$2,135,394,107	$1,684,597,985	$3,819,992,092	10,797
Guadalupe	1,957	$328,225,990	$193,781,187	$522,007,177	7,243
Lompoc	5,882	$1,494,895,596	$946,321,525	$2,441,217,121	16,247
Santa Barbara	2,924	$2,006,063,440	$1,404,480,717	$3,410,544,157	5,525
Santa Maria	-	-	-	-	-
Solvang	352	$127,053,931	$87,613,698	$214,667,629	705
Unincorporated	5,885	$2,267,747,481	$1,356,590,921	$3,624,338,402	15,155
Total	**26,035**	**$9,859,771,389**	**$6,576,315,449**	**$16,436,086,838**	**67,404**

Summary of Risk to Critical Facilities by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Other	Total Count	Total Value
Buellton	-	-	3	-	3	7	6	-	19	$3,502,993
Carpinteria	2	1	14	-	7	14	11	-	49	$154,237,262
Goleta	-	-	1	1	9	17	22	-	50	$22,940,801
Guadalupe	1	-	5	2	5	4	-	-	17	$42,500,000
Lompoc	2	2	2	2	20	19	9	2	58	$6,993,328
Santa Barbara	1	-	7	-	3	22	42	-	75	$2,034,893
Santa Maria	-	-	-	-	-	-	-	-	0	$0
Solvang	-	-	14	-	2	-	2	-	18	$5,265,614
Unincorporated	1	3	5	1	16	33	67	-	126	$119,269,665
Total	**7**	**6**	**51**	**6**	**65**	**116**	**159**	**2**	**412**	**$356,744,556**

As shown in Figure 6-6, critical facilities are densely located in the county's major cities. Since these cities are in the high liquefaction severity zone, these facilities are also therefore susceptible to liquefaction hazards.

Table 6-37. Moderate Liquefaction Hazard Vulnerabilities by Jurisdiction

Summary of Risk by Property Type and Jurisdiction

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Buellton	54	$63,123,666	$76,437,258	$139,560,924	47
Carpinteria	-	-	-	-	-
Goleta	340	$104,228,754	$69,782,730	$174,011,484	887
Guadalupe	-	-	-	-	-
Lompoc	3,109	$536,209,852	$320,518,390	$856,728,242	8,165
Santa Barbara	6,497	$2,579,423,813	$1,651,535,640	$4,230,959,453	14,448
Santa Maria	21,993	$6,605,150,068	$4,818,372,926	$11,423,522,994	75,756
Solvang	111	$54,204,482	$27,599,796	$81,804,278	253
Unincorporated	14,486	$5,542,925,361	$3,031,501,742	$8,574,427,103	39,954
Total	**46,590**	**$15,485,265,996**	**$9,995,748,480**	**$25,481,014,476**	**139,511**

Summary of Risk to Critical Facilities by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Other	Total Count	Total Value
Buellton	-	-	-	-	-	-	-	-	0	$0
Carpinteria	-	-	-	-	-	-	-	-	0	$0
Goleta	-	1	-	1	-	-	1	-	3	$0
Guadalupe	-	-	-	-	-	-	-	-	0	$0
Lompoc	-	-	-	-	10	13	-	1	24	$9,872,835
Santa Barbara	-	-	1	-	13	16	31	-	61	$0
Santa Maria	3	5	1	9	25	53	22	-	118	$94,509,416
Solvang	-	-	2	-	-	-	-	-	2	$1,874,683
Unincorporated	1	1	2	4	10	30	77	-	125	$7,624,721
Total	**4**	**7**	**6**	**14**	**58**	**112**	**131**	**1**	**333**	**$113,881,655**

Table 6-38. Low Liquefaction Hazard by Jurisdiction

Summary of Risk by Property Type and Jurisdiction

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Buellton	59	$19,935,180	$9,986,728	$29,921,908	160
Carpinteria	890	$355,903,976	$313,681,489	$669,585,465	2,255
Goleta	4,352	$2,009,141,365	$1,279,718,676	$3,288,860,041	11,619
Guadalupe	-	-	-	-	-
Lompoc	632	$149,366,821	$76,144,750	$225,511,571	1,819
Santa Barbara	14,363	$8,426,186,505	$5,362,147,411	$13,788,333,916	32,877
Santa Maria	94	$26,072,996	$16,532,415	$42,605,411	332
Solvang	1,575	$655,692,915	$385,374,624	$1,041,067,539	3,353
Unincorporated	18,594	$12,820,879,952	$7,444,959,539	$20,265,839,491	48,574
Total	**40,559**	**$24,463,179,710**	**$14,888,545,630**	**$39,351,725,340**	**100,988**

Summary of Risk to Critical Facilities by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Other	Total Count	Total Value
Buellton	-	-	-	-	-	-	-	-	0	$0
Carpinteria	1	-	-	1	-	3	3	-	8	$4,548,554
Goleta	-	-	1	-	2	4	10	-	17	$7,986
Guadalupe	-	-	-	-	-	-	-	-	0	$0
Lompoc	-	-	-	-	-	5	-	-	5	$0
Santa Barbara	2	-	10	-	24	46	15	-	97	$115,268,243
Santa Maria	-	-	-	-	-	-	-	-	0	$0
Solvang	1	-	2	-	6	5	-	-	14	$8,313,388
Unincorporated	89	5	11	7	23	76	124	-	335	$64,558,350
Total	**93**	**5**	**24**	**8**	**55**	**139**	**152**	**0**	**476**	**$192,696,521**

6.3.4 Flood

The geographical location, climate, and topography of Santa Barbara County make some areas of the county prone to flooding. While there are some benefits associated with flooding, such as maintaining natural riparian processes along creeks, and replenishment of beach sand and nutrients to agricultural lands, it presents a hazard to development in floodplains. According to the County's CCVA, flooding is one of two hazards (the other being wildfire) that presents severe vulnerabilities in the county. Climate change is expected to increase the frequency and intensity of heavy rainstorms that cause riverine flooding. Floods can cause many cascading effects. Emergency responses can be interrupted by damaged roads and infrastructure. Fire can break out as a result of dysfunctional electrical equipment. Hazardous materials can also get into floodways, causing health concerns and polluted water supplies. During a flood, the drinking water supply can be contaminated. Santa Barbara County has several hydrologic basins that have different types of flooding problems, including over bank riverine flooding, flash floods, tidal flooding/tsunamis, and dam failure (see Section 6.3.8, *Coastal Hazards* for discussion of tidal flooding; Section 6.3.9, *Tsunami* for a summary of tsunami vulnerabilities, and; Section 6.5.3, *Dam Failure* for further discussion of vulnerabilities related to a failure of one of the county's 14 dams).

The most common flooding in Santa Barbara is due to riverine flooding and flash flood events. Large areas of Santa Barbara County are at risk of being inundated by a 100-year flood event. The tables below show the total acreage anticipated to be flooded under various flood scenarios, broken down by planning region. This also gives a percentage of the total planning area that would be inundated in each scenario. As shown in Table 6-39 and Table 6-40, as much as 2.16 percent of the county or 15,975 acres could be inundated in a DWR Awareness 100-year flood, and as much as 5.98 percent or 48,818 acres could be inundated in a FEMA recognized 100 year or 1-percent annual chance flood. The Santa Ynez Valley planning region contains the largest area of FEMA 1-percent annual chance flood zone areas in the county, particularly along the lower Santa Ynez River.

Table 6-39. DWR Awareness 100-Year Flood Acreage Inundated by Planning Region

Planning Region	Flood Zone Acres	Total Planning Region Acres	Percent
Cuyama Valley	289	112,783	0.26%
Lompoc Valley	3,444	195,287	1.76%
Santa Maria Valley	5,383	178,146	3.02%
Santa Ynez Valley	6,859	252,907	2.71%
Total	**15,975**	**739,123**	**2.16%**

Table 6-40. FEMA Riverine 100-Year (1% Annual Chance) Flood Acreage Inundation by Planning Region

Planning Region	Flood Zone Acres	Total Planning Region Acres	Percent
Cuyama Valley	9,782	112,783	8.67%
Lompoc Valley	10,102	195,287	5.17%
Santa Maria Valley	10,427	178,146	5.85%
Santa Ynez Valley	13,641	252,907	5.39%
South Coast	4,865	77,020	6.32%
Total	**48,818**	**816,143**	**5.98%**

Based on the GIS analysis, the Santa Barbara County planning area has 4,358 improved parcels valued at over $2.4 billion in the 1-percent annual chance floodplain. An additional 8,755 improved parcels and $2.75 billion in value fall within the 0.2-percent annual chance floodplain. As a result, total structural exposure is approximately $5.2 billion. When factoring the content values within these areas in addition to the structures the total combined value of exposure is approximately $8.8 billion. The jurisdiction with the highest estimated loss is the City of Santa Barbara, with nearly $480.5 million estimated loss (Table 6-41). Development in the 0.2-percent annual chance floodplain is typically not regulated, thus a large flood event could be extremely damaging in Santa Barbara County. This information is summarized in Table 6-41 and Table 6-42.

Table 6-41. Riverine 100-Year (1% Annual Chance) Floodplain Exposure and Loss by Jurisdiction

Jurisdiction	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Estimated Loss
Buellton	Agricultural	1	$15,824	$15,824	$31,648	$7,912
	Commercial	13	$5,678,196	$5,678,196	$11,356,392	$2,839,098
	Exempt	2	$432,840	$432,840	$865,680	$216,420
	Industrial	19	$31,696,505	$47,544,758	$79,241,263	$19,810,316
	Residential	13	$25,424,348	$12,712,174	$38,136,522	$9,534,131
	Total	**48**	**$63,247,713**	**$66,383,792**	**$129,631,505**	**$32,407,876**
Carpinteria	Commercial	13	$14,174,037	$14,174,037	$28,348,074	$7,087,019
	Exempt	4	$154,452	$154,452	$308,904	$77,226
	Industrial	5	$7,398,889	$11,098,334	$18,497,223	$4,624,306
	Mixed Use	3	$2,166,129	$2,166,129	$4,332,258	$1,083,065
	Residential	526	$167,128,857	$83,564,429	$250,693,286	$62,673,321
	Total	**551**	**$191,022,364**	**$111,157,380**	**$302,179,744**	**$75,544,936**
Goleta	Agricultural	2	$253,504	$253,504	$507,008	$126,752
	Commercial	129	$117,258,070	$117,258,070	$234,516,140	$58,629,035
	Exempt	3	$2,808,441	$2,808,441	$5,616,882	$1,404,221
	Industrial	50	$90,697,475	$136,046,213	$226,743,688	$56,685,922
	Mixed Use	3	$2,100,244	$2,100,244	$4,200,488	$1,050,122
	Residential	534	$159,439,479	$79,719,740	$239,159,219	$59,789,805
	Total	**721**	**$372,557,213**	**$338,186,211**	**$710,743,424**	**$177,685,856**
Lompoc	Exempt	1	$0	$0	$0	$0
	Industrial	1	$3,428,579	$5,142,869	$8,571,448	$2,142,862
	Residential	15	$13,647,851	$6,823,926	$20,471,777	$5,117,944
	Total	**17**	**$17,076,430**	**$11,966,794**	**$29,043,224**	**$7,260,806**
Santa Barbara	Commercial	238	$251,669,229	$251,669,229	$503,338,458	$125,834,615
	Exempt	20	$30,448,403	$30,448,403	$60,896,806	$15,224,202
	Improved Vacant	5	$1,484,383	$1,484,383	$2,968,766	$742,192
	Industrial	166	$96,871,668	$145,307,502	$242,179,170	$60,544,793
	Mixed Use	23	$40,608,953	$40,608,953	$81,217,906	$20,304,477
	Residential	1,340	$687,581,751	$343,790,876	$1,031,372,627	$257,843,157
	Total	**1,792**	**$1,108,664,387**	**$813,309,346**	**$1,921,973,733**	**$480,493,433**

Table 6-41. Riverine 100-Year (1% Annual Chance) Floodplain Exposure and Loss by Jurisdiction (Continued)

Jurisdiction	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Estimated Loss
Santa Maria	Commercial	6	$8,258,723	$8,258,723	$16,517,446	$4,129,362
	Industrial	1	$683,266	$1,024,899	$1,708,165	$427,041
	Residential	59	$21,744,379	$10,872,190	$32,616,569	$8,154,142
	Total	**66**	**$30,686,368**	**$20,155,812**	**$50,842,180**	**$12,710,545**
Solvang	Commercial	8	$3,761,546	$3,761,546	$7,523,092	$1,880,773
	Residential	27	$7,712,587	$3,856,294	$11,568,881	$2,892,220
	Total	**35**	**$11,474,133**	**$7,617,840**	**$19,091,973**	**$4,772,993**
Unincorporated	Agricultural	137	$71,915,703	$71,915,703	$143,831,406	$35,957,852
	Commercial	40	$27,120,431	$27,120,431	$54,240,862	$13,560,216
	Exempt	18	$2,415,899	$2,415,899	$4,831,798	$1,207,950
	Improved Vacant	11	$12,153,178	$12,153,178	$24,306,356	$6,076,589
	Industrial	3	$994,993	$1,492,490	$2,487,483	$621,871
	Mixed Use	1	$353,626	$353,626	$707,252	$176,813
	Residential	918	$569,900,696	$284,950,348	$854,851,044	$213,712,761
	Total	**1,128**	**$684,854,526**	**$400,401,675**	**$1,085,256,201**	**$271,314,050**
	Grand Total	**4,358**	**$2,479,583,134**	**$1,769,178,848**	**$4,248,761,982**	**$1,062,190,495**

Table 6-42. Riverine 500-Year (0.2% Annual Chance) Floodplain Exposure and Loss by Jurisdiction

Jurisdiction	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Estimated Loss
Buellton	Agricultural	2	$438,249	$438,249	$876,498	$219,125
	Commercial	15	$13,580,849	$13,580,849	$27,161,698	$6,790,425
	Industrial	6	$8,202,899	$12,304,349	$20,507,248	$5,126,812
	Residential	79	$27,343,985	$13,671,993	$41,015,978	$10,253,994
	Total	**102**	**$49,565,982**	**$39,995,439**	**$89,561,421**	**$22,390,355**
Carpinteria	Commercial	8	$1,131,349	$1,131,349	$2,262,698	$565,675
	Exempt	1	$0	$0	$0	$0
	Residential	410	$105,601,207	$52,800,604	$158,401,811	$39,600,453
	Total	**419**	**$106,732,556**	**$53,931,953**	**$160,664,509**	**$40,166,127**
Goleta	Commercial	19	$29,729,120	$29,729,120	$59,458,240	$14,864,560
	Exempt	2	$68,270	$68,270	$136,540	$34,135
	Industrial	43	$69,653,400	$104,480,100	$174,133,500	$43,533,375
	Residential	422	$190,974,351	$95,487,176	$286,461,527	$71,615,382
	Total	**486**	**$290,425,141**	**$229,764,666**	**$520,189,807**	**$130,047,452**

Table 6-42. Riverine 500-Year (0.2% Annual Chance) Floodplain Exposure and Loss by Jurisdiction (Continued)

Jurisdiction	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Estimated Loss
Lompoc	Agricultural	2	$127,641	$127,641	$255,282	$63,821
	Commercial	264	$213,278,513	$213,278,513	$426,557,026	$106,639,257
	Exempt	41	$33,728,653	$33,728,653	$67,457,306	$16,864,327
	Industrial	103	$71,347,724	$107,021,586	$178,369,310	$44,592,328
	Mixed Use	3	$432,101	$432,101	$864,202	$216,051
	Residential	4,353	$950,854,870	$475,427,435	$1,426,282,305	$356,570,576
	Improved Vacant	3	$424,721	$424,721	$849,442	$212,361
	Total	**4,769**	**$1,270,194,223**	**$830,440,650**	**$2,100,634,873**	**$525,158,718**
Santa Barbara	Commercial	73	$73,920,419	$73,920,419	$147,840,838	$36,960,210
	Exempt	5	$13,895,325	$13,895,325	$27,790,650	$6,947,663
	Industrial	3	$32,301,506	$48,452,259	$80,753,765	$20,188,441
	Mixed Use	5	$15,239,672	$15,239,672	$30,479,344	$7,619,836
	Residential	429	$184,966,430	$92,483,215	$277,449,645	$69,362,411
	Total	**515**	**$320,323,352**	**$243,990,890**	**$564,314,242**	**$141,078,561**
Santa Maria	Commercial	192	$84,162,146	$84,162,146	$168,324,292	$42,081,073
	Exempt	17	$8,025,887	$8,025,887	$16,051,774	$4,012,944
	Industrial	26	$19,741,862	$29,612,793	$49,354,655	$12,338,664
	Residential	1,556	$347,554,198	$173,777,099	$521,331,297	$130,332,824
	Improved Vacant	1	$4,848	$4,848	$9,696	$2,424
	Total	1,792	$459,488,941	$295,582,773	$755,071,714	$188,767,929
Solvang	Commercial	5	$13,347,623	$13,347,623	$26,695,246	$6,673,812
	Residential	102	$29,987,919	$14,993,960	$44,981,879	$11,245,470
	Total	**107**	**$43,335,542**	**$28,341,583**	**$71,677,125**	**$17,919,281**
Unincorporated	Agricultural	4	$403,946	$403,946	$807,892	$201,973
	Commercial	47	$39,843,344	$39,843,344	$79,686,688	$19,921,672
	Exempt	12	$11,597,821	$11,597,821	$23,195,642	$5,798,911
	Industrial	3	$1,579,343	$2,369,015	$3,948,358	$987,089
	Mixed Use	1	$870,953	$870,953	$1,741,906	$435,477
	Residential	494	$131,022,309	$65,511,155	$196,533,464	$49,133,366
	Improved Vacant	4	$18,895	$18,895	$37,790	$9,448
	Total	**565**	**$185,336,611**	**$120,615,128**	**$305,951,739**	**$76,487,935**
	Grand Total	**8,755**	**$2,725,402,348**	**$1,842,663,081**	**$4,568,065,429**	**$1,142,016,357**

Additionally, a GIS vulnerability assessment was conducted delineating the areas exposed to the coastal 1-percent annual chance flood hazard in Santa Barbara County. Utilizing this data for an exposure analysis, the Santa Barbara County planning area has 121 improved parcels valued at over $100 million located within the 1-percent annual chance coastal floodplain. This vulnerability exists primarily on the South Coast. Detailed results of this analysis by jurisdiction are summarized below.

Table 6-43. Coastal 100-Year (1% Annual Chance) Floodplain Exposure and Loss by Jurisdiction

Jurisdiction	Property Type	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Estimated Loss
Carpinteria	Residential	37	$12,122,876	$6,061,438	$18,184,314	$4,546,079
Unincorporated	Commercial	1	$30,784	$30,784	$61,568	$15,392
	Residential	83	$88,823,161	$44,411,581	$133,234,742	$33,308,685
	Grand Total	**121**	**$100,976,821**	**$50,503,803**	**$151,480,624**	**$37,870,156**

The total number of residential properties in each floodplain was multiplied by the average household size of 2.88 persons for the county (ACS 2019 estimates; the Average Household Size for each jurisdiction was used following the same methodology for residential properties exposed by each city) to estimate resident population within mapped flood hazard areas. Based on this analysis, which accounts for residents only and not workers, 9,190 residents are living in the 1-percent annual chance floodplain throughout the county. Of all study areas, the City of Santa Barbara has the most residents living in the 1-percent annual chance flood area, followed by the unincorporated county. Table 6-44 below details population estimates by flood hazard zone.

Table 6-44. Santa Barbara County Population Living in the Flood Hazard Zones

Flood Zone	Population
Riverine 100-Year (1% Annual Chance)	9,190
Riverine 500-Year (0.2% Annual Chance)	23,681
Coastal 100-Year (1% Annual Chance)	340
Total	**33,212**

The same GIS overlay analysis described in Section 6.1.3 was used to examine the vulnerability of critical facilities. The exposure of the critical facilities to the various flood zones is summarized in Table 6-45 through Table 6-51 and depicted in Figure 6-11 and Figure 6-12.

Table 6-45. Critical Facilities within 100-Year (1% Annual Chance) Flood Hazard by Planning Region and FEMA Lifeline

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Cuyama Valley	-	-	1	-	2	1	4	8	$600,687
Lompoc Valley	-	-	1	-	-	-	12	13	$0
Santa Maria Valley	-	-	-	-	-	-	15	15	$0
Santa Ynez Valley	-	-	2	1	-	3	29	35	$1,472,878
South Coast	-	-	7	-	7	21	109	144	$54,546,559
Unincorporated	-	-	-	-	-	-	6	6	$0
Total	**0**	**0**	**11**	**1**	**9**	**25**	**175**	**221**	**$56,620,124**

Table 6-46. Critical Facilities within 100-Year (1% Annual Chance) Flood Hazard by Jurisdiction and FEMA Lifeline

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Buellton	-	-	2	-	-	-	6	8	$1,288,047
Carpinteria	-	-	2	-	1	3	8	14	$37,504,526
Goleta	-	-	-	-	-	4	11	15	$15,007,140
Lompoc	-	-	-	-	-	-	6	6	$0
Santa Barbara	-	-	5	-	4	12	52	73	$2,034,893
Santa Maria	-	-	-	-	-	-	4	4	$0
Solvang	-	-	-	-	-	-	2	2	$0
Unincorporated	-	-	2	-	5	6	86	99	$785,518
Total	**0**	**0**	**11**	**0**	**10**	**25**	**175**	**221**	**$56,620,124**

Table 6-47. Critical Facilities within Coastal 100-Year (1% Annual Chance) Flood Hazard by Planning Region and FEMA Lifeline

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Unincorporated	-	-	-	-	-	-	1	1	$6,070,044
Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**$6,070,044**

Table 6-48. Critical Facilities within Coastal 100-Year (1% Annual Chance) Flood Hazard by Jurisdiction and FEMA Lifeline

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Unincorporated	-	-	-	-	-	-	1	1	$6,070,044
Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**$6,070,044**

Table 6-49. Critical Facilities within 500-Year (0.2% Annual Chance) Flood Hazard by Planning Region and FEMA Lifeline

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Other	Total Count	Total Value
Cuyama Valley	-	-	-	-	-	4	1	-	5	$71,075
Lompoc Valley	2	1	2	2	19	17	3	2	48	$6,912,480
Santa Maria Valley	-	-	-	-	1	11	2	-	14	$17,122,046
Santa Ynez Valley	-	-	1	-	-	-	1	-	2	$0
South Coast	-	-	3	-	3	-	7	-	13	$63,500,000
Total	**2**	**1**	**6**	**2**	**23**	**32**	**14**	**2**	**82**	**$87,605,601**

Table 6-50. Critical Facilities within 500-Year (0.2% Annual Chance) Flood Hazard by Jurisdiction and FEMA Lifeline

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Other	Total Count	Total Value
Carpinteria	-	-	3	-	1	-	-	-	4	$63,500,000
Goleta	-	-	-	-	-	-	3	-	3	$0
Lompoc	2	1	2	2	19	17	3	2	48	$6,912,480
Santa Barbara	-	-	-	-	2	-	4	-	6	$0
Santa Maria	-	-	-	-	1	11	2	-	14	$17,122,046
Solvang	-	-	1	-	-	-	-	-	1	$0
Unincorporated	-	-	-	-	-	4	2	-	6	$71,075
Total	**2**	**1**	**6**	**2**	**23**	**32**	**14**	**2**	**82**	**$87,605,601**

Table 6-51. Critical Facilities within DWR Awareness 100-Year Flood Hazard by Planning Area and FEMA Lifeline

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Lompoc Valley	-	-	-	-	-	1	17	18	$0
Santa Maria Valley	-	-	-	-	-	-	3	3	$0
Santa Ynez Valley	1	-	-	-	-	-	12	13	$0
Unincorporated	-	-	-	-	-	-	11	11	$0
Total	**1**	**0**	**0**	**0**	**0**	**1**	**43**	**45**	**$0**

*Some Critical Facilities are located in both a 100-year and 500-year Flood Zone.

The majority of transportation critical facilities located within a flood zone are bridges but other vulnerable facilities include the portions of Lompoc City Bus Yard, Lompoc City Airport, and Santa Barbara Airport. Safety and Security facilities located within flood zones include fire stations (e.g., Lompoc Station Nos. 1 and 2, Santa Barbara Airport Station), schools (e.g., Cuyama Valley High, El Camino School in Carpinteria), police, sheriff, and highway patrol (e.g., Santa Maria Police Department and California Highway Patrol), historic sites (e.g., Los Banos pool in Santa Barbara), community centers (e.g., the Lompoc Library), among others. The majority of health and medical facilities located within flood zones are clinics but also include senior centers and nursing homes, emergency medical services (EMS) stations, and Veteran services. Facilities with hazardous materials include the Lompoc Water Treatment Plant and a hazardous waste collection facility in Lompoc.

Based on this analysis, in the event of a major flood, damage to wastewater treatment plants such as the Lompoc Water Treatment Plant or septic systems can cause the systems to backup and leak effluent into the surrounding soil and water, as well as drain back into residences and businesses. Transportation facilities, such as bridges along SR-166, may be damaged or destroyed in a flood, compromising evacuation routes and delaying emergency response services. Residents and clientele of clinics and nursing homes may need to be relocated or evacuated during a flood event; however, difficulties may arise due to flood damage to transportation facilities and mobility constraints of affected residents. The locations of critical facilities within the county relative to the FEMA 100-year (1-percent annual chance) and 500-year (0.2-percent annual chance) flood and DWR flood awareness zones are shown in Figure 6-11.

Repetitive Loss (RL) Properties

A repetitive loss property is defined by FEMA as “a property for which two or more NFIP losses of at least $1,000 each have been paid within any 10 years since 1978”. A repetitive loss property may or may not be currently insured by the NFIP. Repetitive loss properties may change over time depending on local conditions and loss records.

The RL properties in the South Coast Flood Zone are built on a narrow coastal strip that fronts the Pacific Ocean. The seven-mile-long strip extends from Olive Mill Road in Montecito, east to Sandyland Cove Road near Carpinteria.

Most of the land within this narrow coastal strip is designated Zone VE (i.e., areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action) per FEMA’s most recent 2018 coastal map update. There are areas designated as AE-Zones at the locations where six coastal creeks and the Carpinteria Slough empty into the ocean. This portion of the coast is periodically subject to high-velocity wave action as are Goleta Beach County Park and Haskell’s Beach at the Bacara Resort. The Base Flood Elevation (BFE) in these AE-Zones ranges from 8 to 31 feet along the coastal strip (FEMA 2021). Since 1988, the County has been requiring the lowest horizontal structural member to be elevated to 13.6 feet, per the North American Vertical Datum of 1988. The County now compares current BFEs to the 13.6 and takes the higher of the two. The September 18, 2018 FIRM updates dramatically increased the BFEs, so mostly it is the FIRM, not the Repetitive Loss area resolution that governs. Currently, the BFE of the coastal strip RL area in the vicinity of BFE Carpinteria Slough reaches up to 24 feet (Figure 6-12; FEMA 2021).

Figure 6-11. Critical Facilities in FEMA and DWR Flood Hazard Zones

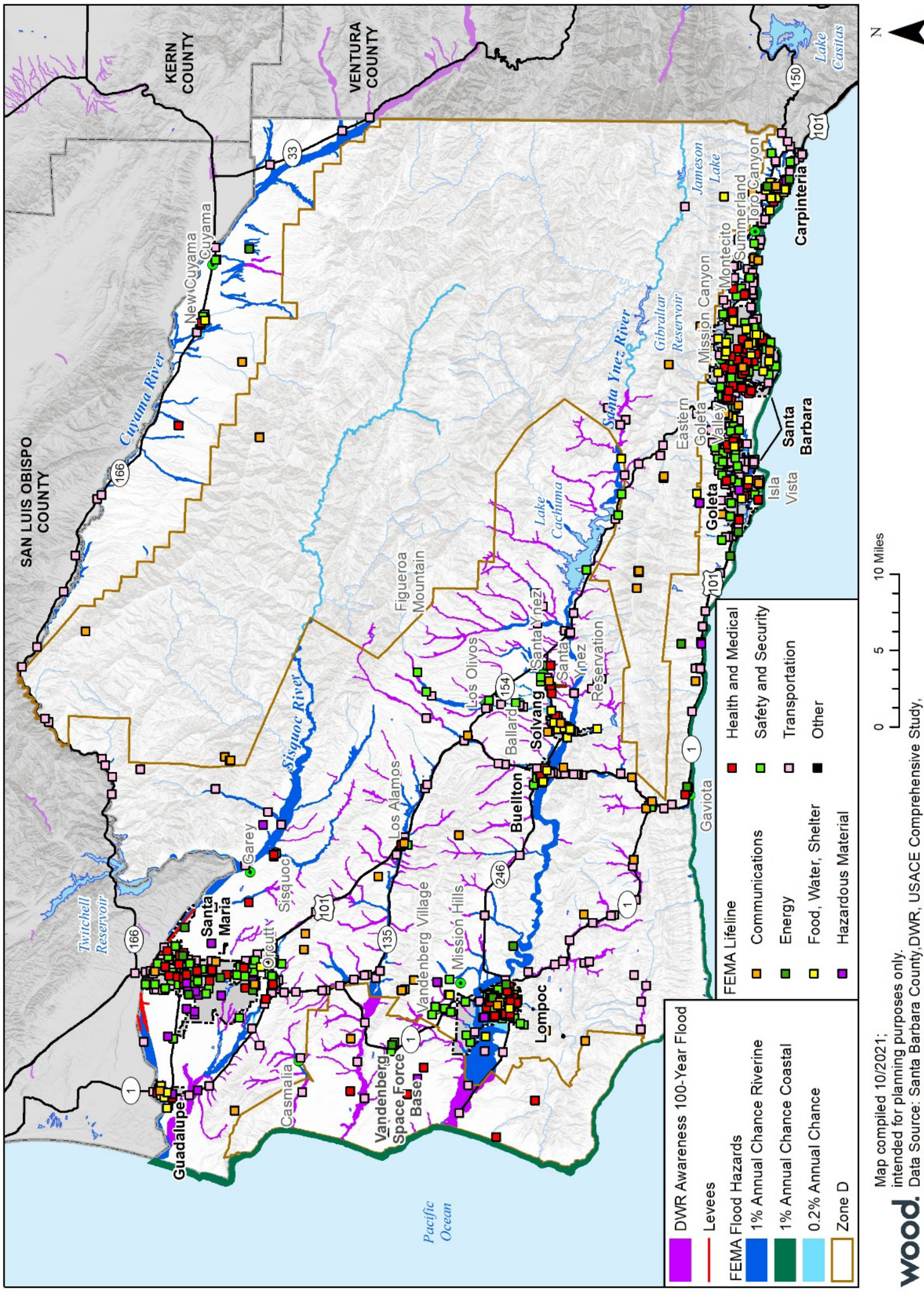
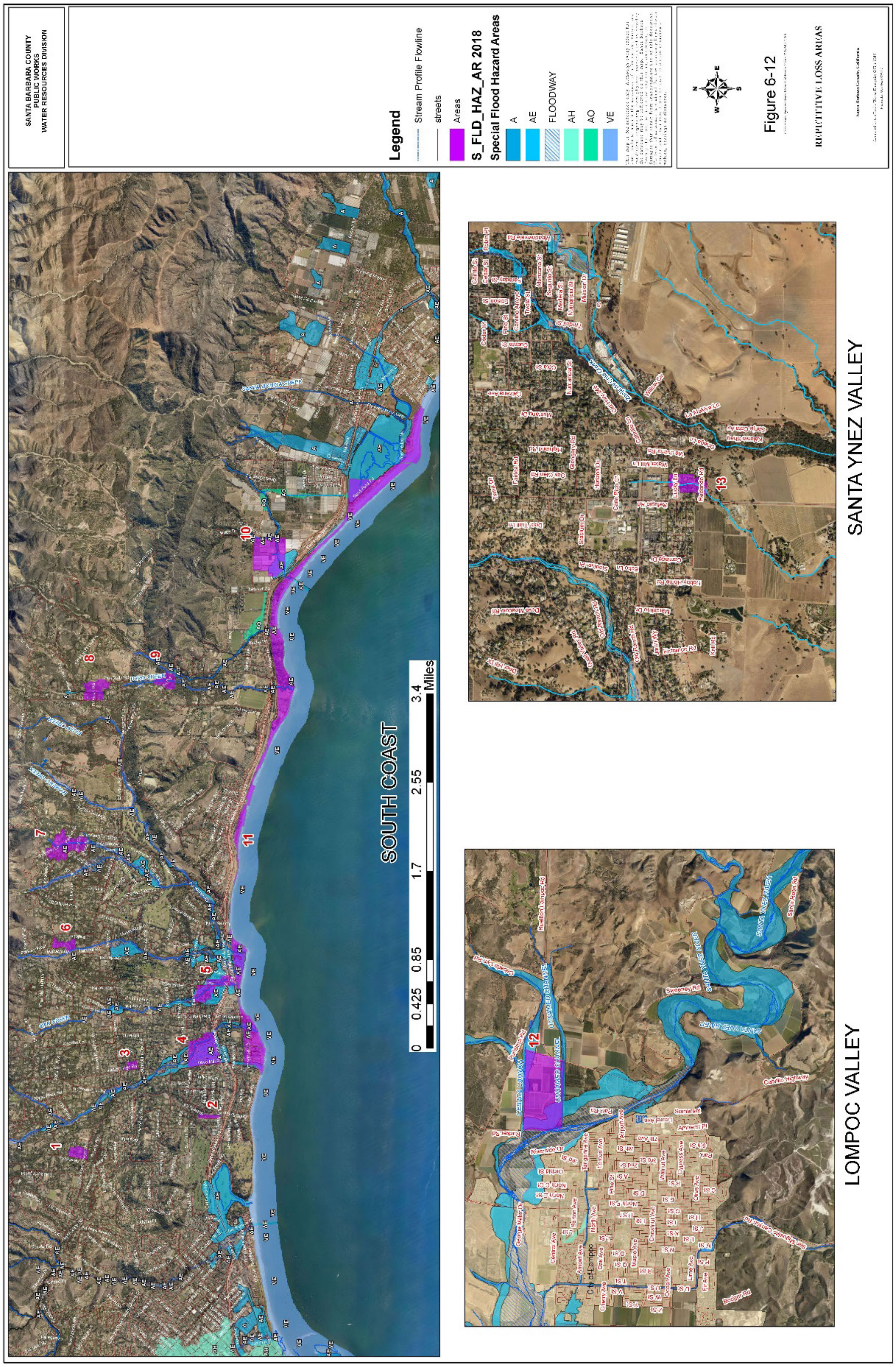


Figure 6-12. Repetitive Loss Areas of Santa Barbara County



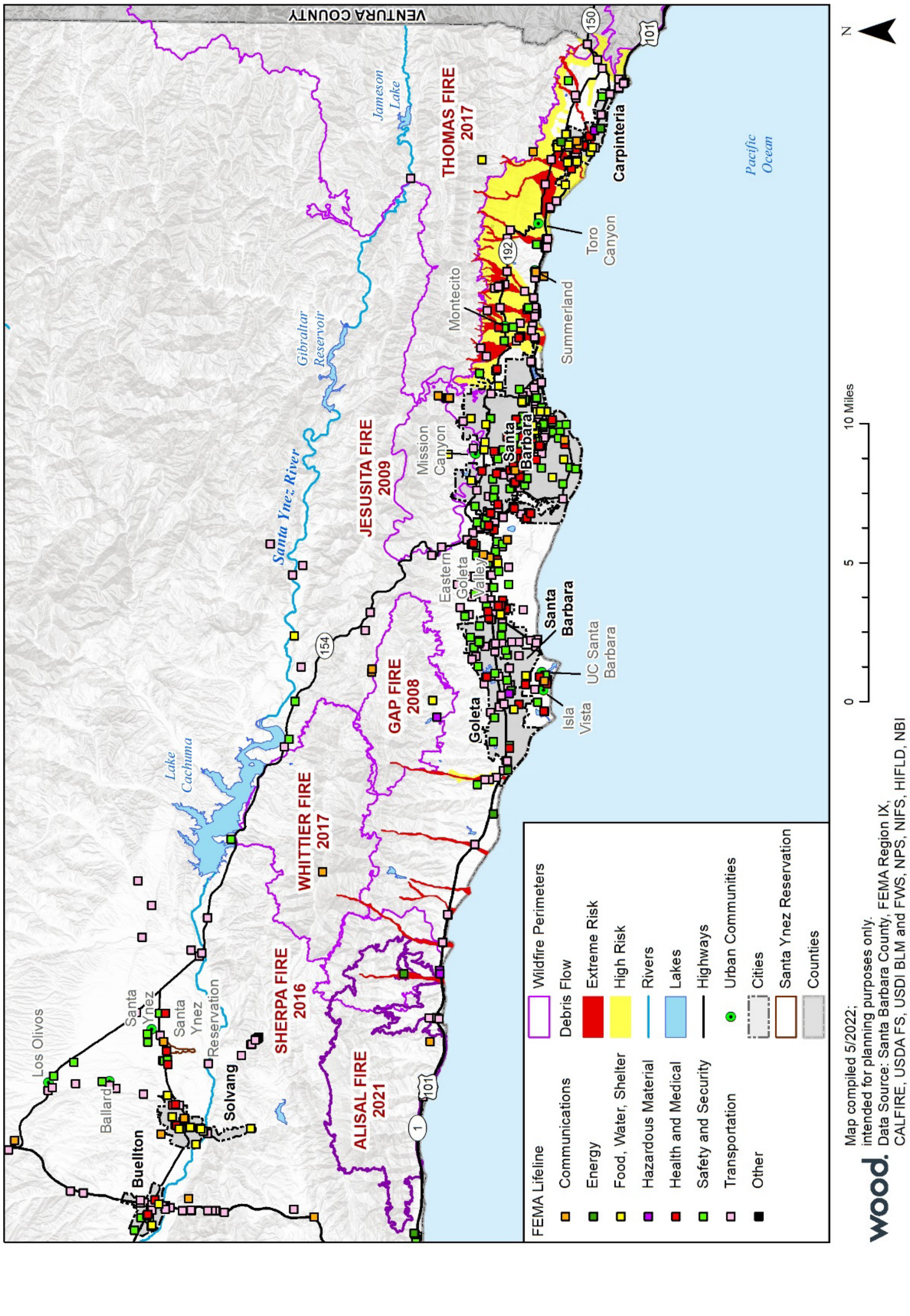
Except for homes that have been substantially improved or razed and rebuilt, most of the homes exposed to these flood hazards were built before the county participated in the community rating system. Due to the very high value of homes in this area, it is infrequent that the substantial improvement threshold is met, requiring pre-FIRM structures to be brought into compliance with NFIP standards. Although there is little new development on the strip since the area is essentially built out, substantial remodeling and expansions of older homes are ongoing, exposing these higher value homes to repeated damage. Because the parcels are small and the land amongst the most valuable in California there is a trend to maximize space per zoning regulations by additions, remodeling, and occasionally tearing structures down and rebuilding.

The largest losses to the NFIP in Santa Barbara County are the multiple RL structures in the South County Coastal Basin. Options for dealing with riverine flood hazards or those associated with coastal wave attack and inundation to properties structurally are limited and have historically included the installation of hard protection such as revetments and sea walls, and historically use of groins to retain sand along beaches. However, local agencies and California Coastal Commission regulations strongly discourage the use of armoring along creeks or use of rock revetments or seawalls for protection from coastal flood hazards. Although the County used FEMA funds to acquire some parcels in Montecito after the 2018 Montecito debris flows and floods, acquisition and demolition of such properties would likely be cost prohibitive, as these are among the most expensive properties in California, and condemnation would likely be politically infeasible. Long-range local agency adaptation plans sometimes recommend elevation of structures or limiting extensive remodels or expansions in high hazard zones as alternatives. However, there are viewshed restrictions and providing grant assistance to this type of property is unlikely due to political and environmental implications. For these reasons, the County has developed annual multiple outreach and education strategies to encourage self-responsible actions in these areas and other flood-prone areas in general. The County targets education and outreach programs to a variety of audiences to not only encourage retrofit and flood loss reduction activities but to encourage flood-resistant future development (see also, Chapter 4.0, *Community Profile and Capability Assessment*). Further, local agencies are pursuing soft or green options to address such hazards as beach nourishment, construction of living shorelines of restored dunes, and sand retention as options to reduce such vulnerabilities. Inland, there are two repetitive loss areas: Lompoc Valley and Santa Ynez Valley

6.3.5 Mudflow & Debris Flow

As described in Section 5.3.5, *Mudflow & Debris Flow*, in Santa Barbara County, hillsides and communities at the base of steep mountain slopes or within flood plains are especially at risk of debris flows and mudflows following wildfires. High-intensity wildfires can strip areas of vegetation and make soils hydrophobic, preventing water from percolating into the soil during a high-intensity precipitation event. Chaparral land, typically located on steep mountain slopes, is especially susceptible to debris flow after a fire. Heavy rains could trigger debris flows or mudflows along any hillside or steep slope within the county, particularly along the foothills of the South Coast, but also in areas of the Santa Ynez Valley at the base of mountain slopes and within the Solomon Hills south of Orcutt. Communities and neighborhoods located within past debris-flow deposits at the base of the Santa Ynez mountains, which most recently occurred along the South Coast from Montecito to Carpinteria, are especially vulnerable.

Figure 6-13. Debris Flow Storm Impact Consideration



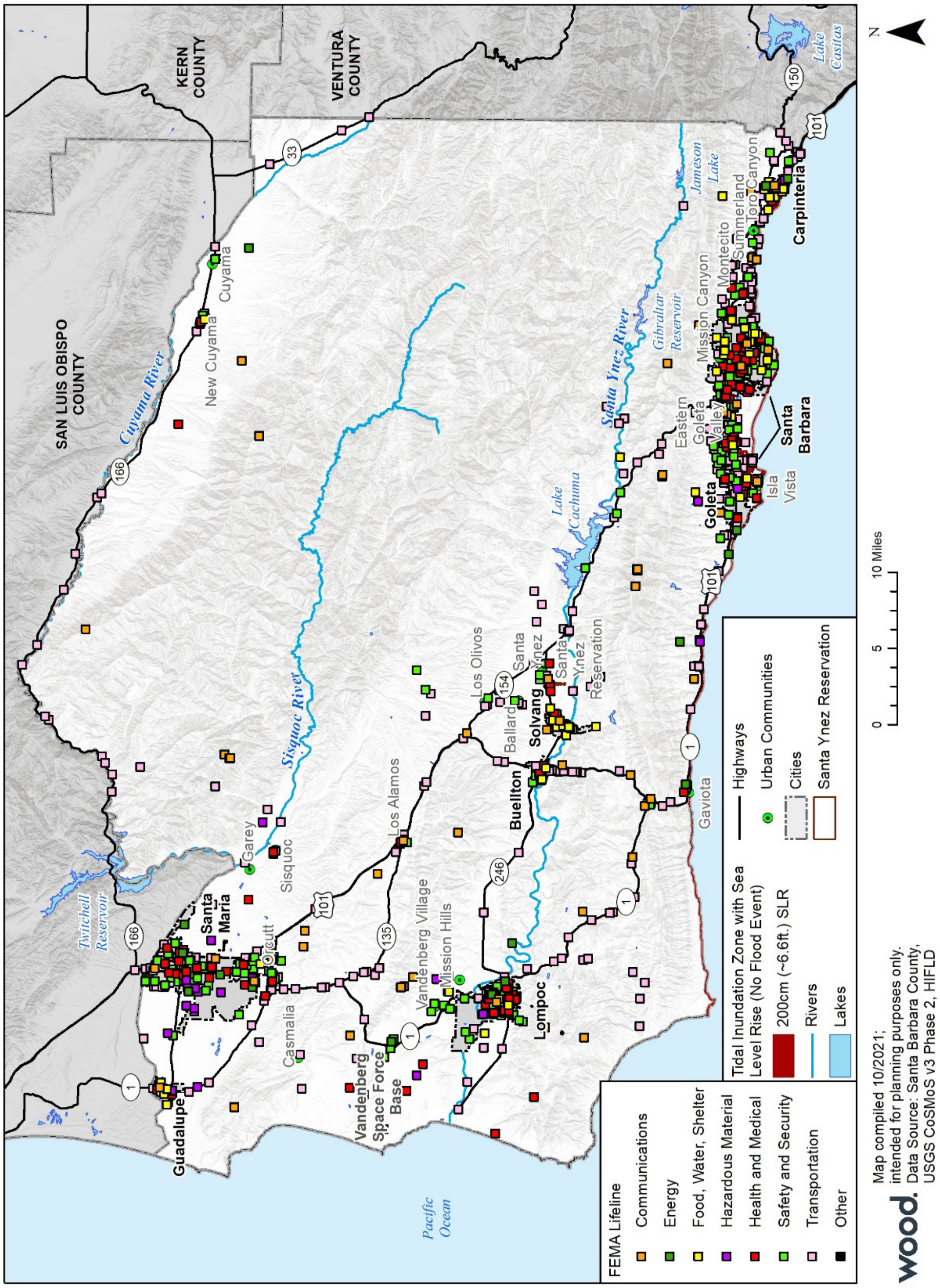
As shown in Figure 6-14, critical facilities located along Arroyo Paredon Creek and the eight creeks that extend from the foothills towards the coast (i.e., Montecito, San Ysidro, Romero, Toro Canyon, Santa Monica Arroyo, Carpinteria, Gobernador, Rincon creeks) have been most recently at risk for debris or mudflow. Additionally, Gaviota coastal drainages have similar conditions and have been mapped to specific extents that are vulnerable to debris flow, particularly in post-fire conditions. In total, the mapped extent for extreme debris flow hazards covers 3,814 acres (5.0 percent) of the South Coast area, including 3 acres in the City of Carpinteria, 8 acres in the City of Goleta, and 20 acres in the City of Santa Barbara. As mapped, high debris flow hazard areas cover 7,268 acres (9.4 percent) of the South Coast area, including 309 acres in the City of Carpinteria and 115 acres in the City of Santa Barbara.

However, debris flow hazard mapping is confined to these creeks associated with recent debris flows following wildfires, including the Thomas Fire, Cave Fire, and Alisal Fire. Given similar topography and conditions on the South Coast, areas within the City of Santa Barbara along Sycamore Canyon, Mission, and Arroyo Burro Creeks, in the Goleta Valley along its multiple creeks such as Maria Ygnacia, San Jose, and Tecolotito may also be vulnerable, but have not yet been subject to detailed debris flow hazard mapping. In addition, while most Santa Ynez Valley communities may lie outside such hazard zones, ranches, and camps, located along the base of the Santa Ynez Mountains could also be vulnerable. Given the lack of detailed mapping for debris flow and mudflow risk, GIS-based quantitative data for the whole county is not available for this hazard.

Under extreme circumstances, transportation infrastructure is vulnerable to debris flow hazards, where bridges, culverts, and roadways may be washed out or blocked by debris and mud. Highway 101 and SR 192 extend east to west and pass-through areas that are susceptible to debris flow due to intersections with multiple drainages from the Santa Ynez Mountains. This was demonstrated by severe damage sustained during the 2018 Montecito debris flows, triggered by a severe storm following the Thomas Fire. Further, UPRR runs parallel to Highway 101 through the South Coast and is similarly vulnerable to physical damage, which would substantially disrupt the transportation of goods and people with related economic ramifications. SR-154 navigates steep areas of the Santa Ynez Mountains and multiple drainages along the mountain's north slopes. Flooding of the Cuyama River and associated mudflows can wash out Highway 166. As such, in the event of a mudslide or debris flow, these highways can be vulnerable to damage or destruction.

The Montecito debris flows in January 2018 demonstrate this vulnerability within the county. A month following the Thomas Fire, 0.54 inches of rain fell in five minutes in a rain cell burst over the burn scar. This extreme rain triggered debris flows downslope of the Santa Ynez Mountains along five creeks predominantly in Montecito but also within the Carpinteria Valley. The debris flow caused widespread damage or destruction of 408 homes and killed 23 people (Jean Yamamur 2021). Following the Montecito debris flows, a 30-mile section of Highway 101 was closed for 13 days (Robert D Niehaus, Inc 2018). Multiple bridges along SR 192 and Highway 101 were damaged. UPRR was closed as well, contributing to the isolation of South County communities such as Carpinteria from the region. Highway 154 is similarly vulnerable to mudslides and debris flows and was closed for three weeks following post-Whittier Fire heavy rains and debris flows.

Figure 6-14. Critical Facilities and Sea Level Rise Projections Tidal Inundations: No Flood Event



As discussed in Section 6.3.1, *Wildfire*, in the event of an emergency the county will utilize existing communication pathways to inform the public of emergencies and recommended protective actions, such as evacuations and sheltering in place. However, most rely on the availability of communications infrastructures, such as the internet, cell phones, landlines, and broadcast media; all of which can be impacted by natural hazards such as mudflows and debris flows. Additionally, populations with limited resources, existing social or economic disparities, language and communication barriers, may not have access to all the methods utilized for notifications, or may not trust messages from government programs, staff and officials, putting these populations at greater risk. Communities vulnerable to mudflow and debris flow risk with an above-average social vulnerability (as represented in Figure 4-3) include communities in old town Goleta, Eastern Goleta Valley, east Santa Barbara, and Carpinteria on the South Coast where the potential for debris flow within developed communities is greatest. Emergency notification and evacuation efforts may be hindered in these communities.

6.3.6 Coastal Hazards

As described in Section 5.3.6, *Coastal Hazards*, coastal hazards on the county's coastline are concentrated along the South Coast due to extensive existing shoreline development, whereas in the north county, cities and urban development are located away from the coast and related hazards. Under current sea levels, shoreline areas of the South Coast communities of Santa Barbara County are vulnerable to bluff and beach erosion, wave impacts, and flooding of low-lying areas (Santa Barbara County 2021). Beaches buffer the shoreline from erosion, wave attack, and flooding, with beach widths governed primarily by sediment input from coastal streams and storm wave erosion, with beach width varying significantly over time based on these factors. However, outside of areas with historic wetland and dune complexes at Ellwood/Devereux in Goleta, the Santa Barbara Waterfront, and Carpinteria Beach, South Coast beaches generally consist of a thin layer of sand overlying rocky marine terrace.[3]

In areas of the county's shoreline backed by coastal bluffs, particularly at the west end of the littoral cell, such as Isla Vista and the Gaviota Coast, accretion of sand along the beaches is typically governed by limited annual sediment input from smaller coastal watersheds, exposing these bluffs to erosive processes that slowly eat away at the foundations of the bluffs. However, other bluff-backed beaches along the central and eastern segments of the South Coast, such as More Mesa, Hope Ranch Beach, Summerland Beach, and Rincon Beach have historically been wider, perhaps due to greater sources of sediment input from larger streams. Development atop the coastal bluffs along the Gaviota Coast and Isla Vista are particularly vulnerable to erosion, with past undermining of the UPRR near Gaviota and a limited segment of the El Capitan to Refugio coastal bike trail and ongoing vulnerability of blufftop development in Isla Vista. In 2020, the County Planning & Development Department created its Isla Vista Bluffs policies to address erosion effects on blufftop properties (see Section 5.3.6, *Coastal Hazards* and Section 4.2.3, *County Regulatory Mitigation*

[3] Wildfires and floods can have significant benefits to beach width due potential large volumes of sand from areas creeks reaching the shoreline. For example, historically wide beaches experienced during over a decade the late 1970s and early 1980s along much of the South Coast are thought to have originated from the 1955 Refugio Fire and subsequent heavy rains which left beaches such as Goleta Beach over 400 feet in width (Noble Engineers, 2018). These wide beaches were heavily eroded during the historically severe 1983 El Niño.

Capabilities). Even along typically wider beaches at Hope Ranch and the Mesa in Santa Barbara, blufftop homes have been exposed to damage or destruction from bluff failure.

Storm surge is the rise in water produced by a storm over and above expected tides. The potency of the storm surge depends on the intensity and speed of a wave as well as the particular features of the coastline. For example, the steeper the slopes are on the beach, the higher the upward motion of waves as they break onto the beach or cliff (wave run-up). Intense storms, such as the El Niños of 1983 and 2015/2016, can further exacerbate the wave run-up to enhance the detrimental erosive forces along the county's coastlines (County of Santa Barbara 2017). For example, the El Niño of 1983 caused widespread damage to shoreline development at Miramar Beach and along Pardaro Lane in Montecito, and at Sandyland Cove in Carpinteria, resulting in the installation of extensive rock revetments to protect homes. The El Nino in 2015/2016 resulted in serious beach erosion throughout California and major property damage at Goleta Beach County Park and Haskell's Beach in Goleta. Damage from storm-induced wave run-up also includes flooding.

Rising sea levels would amplify the damaging effects of coastal hazards. The increased flooding that is associated with sea level rise would affect communities on low-lying plains across the South Coast of Santa Barbara County, in particular the cities of Goleta, Santa Barbara, and Carpinteria and the communities of Isla Vista and Eastern Goleta Valley (County of Santa Barbara 2017). As sea level continues to rise, areas that would have previously only been temporarily flooded or submerged during very high tides or strong storm conditions would begin to be more consistently submerged or inundated by routine high tide inundation.

Sea level rise is projected to increase shoreline and coastal vulnerabilities through higher sea levels, increased wave attacks, flooding, and accelerated bluff erosion. Some beaches fronting coastal bluffs may disappear over time due to limited sediment input and are not able to migrate inland due to coastal bluffs, leaving the bluffs exposed to wave attack, erosion, and potential failure. Although projections of increased bluff erosion would be affected by the degree of wave exposure, the presence of coastal armoring, sand accretion, and underlying geologic formations, general programmatic long-term modeling, and analysis project an average of 623 feet of dune erosion and 177 feet of bluff erosion by 2100 (Santa Barbara County 2021). While it must be emphasized that such projections are extremely programmatic, this potential accelerated erosion could expose shoreline development and natural ecosystems to increased hazards and even destruction. However, while these projections are the best available information for initial general hazard planning purposes, many factors can affect such projections. For example, the potential positive effects of increased frequency and intensity of wildfires combined with episodic strong precipitation events and active beach nourishment programs have not been accounted for in these projections and it is unclear to what extent if any these would slow or offset such sea level rise induced accelerated erosion. Additional analysis and more detailed studies may help refine such projections.

The rate of sea level rise is expected to increase over time due to the effects of climate change and global warming, resulting in increased flooding and erosion hazards along the county's coastal shoreline, especially along the county's South Coast and the low-lying shoreline of the Lompoc Valley. The County of Santa Barbara and the cities of Goleta, Santa Barbara, and Carpinteria have all completed sea level rise studies with sometimes varying approaches to modeling and associated assumptions. While each of these models is useful for general initial hazard planning purposes and represents the best available tools, all have limitations. As discussed further below, while the best available tools, these limitations may cause the models in some instances potentially to overstate the degree of sea level rise hazard. According to Coastal Storm Modeling System (CoSMoS), a regional model employed in the County's 2017 sea level rise study, by 2030, a 10.2-inch sea level rise and 100-year flood (see also, Section 6.3.4, *Flood*) is projected to inundate 894 acres (0.46 percent) of Lompoc Valley and 2,754 acres (3.58 percent) of the South Coast. This 10.2-inch sea level rise and 100-year flood projections are also expected to inundate 86 acres in Carpinteria, particularly within the City's Beach Neighborhood, accounting for 5.26 percent of the city, 100 acres (1.98 percent) in the Goleta Valley primarily around the airport, and 1,219 acres (9.66 percent) in Santa Barbara. By 2060, sea level rise is projected to increase to 27.2 inches, inundating 1,014 acres (0.52 percent) of the Lompoc Valley and 3,374 acres (4.38 percent) of the South Coast. These 27.2 inches are projected to inundate 136 acres (8.3 percent) of Carpinteria, 145 acres (2.87 percent) of Goleta, and 1,457 acres (11.55 percent) of Santa Barbara, particularly along the waterfront and harbor. Projected sea level rise by 2030 is summarized in Table 6-52 by planning region and Table 6-53 by jurisdiction. Projected sea level rise by 2060 is summarized in Table 6-54 by planning region and Table 6-55 by jurisdiction.

Table 6-52. Sea Level Rise (2030) by Planning Region

Planning Region	Sea Level Rise Acres	Total Planning Region Acres	Percent
Lompoc Valley	894	195,287	0.46%
South Coast	2,754	77,020	3.58%
Total	**3,648**	**272,307**	**1.34%**

Table 6-53. Sea Level Rise (2030) by Jurisdiction

Jurisdiction	Sea Level Rise Acres	Total Jurisdiction Acres	Percent
Carpinteria	86	1,643	5.26%
Goleta	100	5,049	1.98%
Santa Barbara	1,219	12,614	9.66%
Total	**1,405**	**19,306**	**7.28%**

Table 6-54. Sea Level Rise (2060) by Planning Region

Planning Region	Sea Level Rise Acres	Total Planning Region Acres	Percent
Lompoc Valley	1,014	195,287	0.52%
South Coast	3,374	77,020	4.38%
Total	**4,389**	**272,307**	**1.61%**

Table 6-55. Sea Level Rise (2060) by Jurisdiction

Jurisdiction	Sea Level Rise Acres	Total Jurisdiction Acres	Percent
Carpinteria	136	1,643	8.30%
Goleta	145	5,049	2.87%
Santa Barbara	1,457	12,614	11.55%
Total	**1,739**	**19,306**	**9.01%**

Location and estimated value of parcels within these jurisdictions are provided in Table 6-56 for 2030 projected sea level rise and Table 6-57 for 2060 projected sea level rise. Approximately 952 improved parcels valued at over $1 billion and a population of approximately 2,030 may be at risk for damage under the projected 2030 sea level rise. Under projected 2060 sea level rise conditions, 1,401 improved parcels valued at over $2 billion and a population of 3,044 may also be at risk of coastal hazards from sea level rise. Damages could be particularly severe at the Santa Barbara Airport, the City of Santa Barbara's waterfront, and within the Beach Neighborhood of Carpinteria. Key coastal campgrounds at Jalama Beach County Park and Gaviota, Refugio, El Capitan, and Carpinteria State Beaches may also all be vulnerable to increased damage, as well as natural and recreational resources at Surf Beach and Ocean Beach in the Lompoc Valley and Guadalupe Dunes County Park in the Santa Maria Valley.

Table 6-56. Santa Barbara County at Risk to the 2030 Sea Level Rise Hazard by Jurisdiction

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Buellton	-	-	-	-	-
Carpinteria	131	$53,154,005	$26,577,003	$79,731,008	359
Goleta	18	$1,813,002	$1,675,178	$3,488,180	25
Guadalupe	-	-	-	-	-
Lompoc	-	-	-	-	-
Santa Barbara	422	$388,797,649	$304,011,171	$692,808,820	578
Santa Maria	-	-	-	-	-
Solvang	-	-	-	-	-
Unincorporated	381	$560,156,017	$285,914,965	$846,070,982	1,068
Total	**952**	**$1,003,920,673**	**$618,178,316**	**$1,622,098,989**	**2,030**

Table 6-57. Santa Barbara County at Risk to the 2060 Sea Level Rise Hazard by Jurisdiction

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Buellton	-	-	-	-	-
Carpinteria	342	$100,168,735	$50,923,702	$151,092,437	918
Goleta	19	$1,823,861	$1,691,466	$3,515,327	25
Guadalupe	-	-	-	-	-
Lompoc	-	-	-	-	-
Santa Barbara	592	$538,448,834	$426,178,789	$964,627,623	858
Santa Maria	-	-	-	-	-
Solvang	-	-	-	-	-
Unincorporated	448	$667,674,425	$340,321,806	$1,007,996,231	1,244
Total	**1,401**	**$1,308,115,855**	**$819,115,762**	**$2,127,231,617**	**3,044**

Tables 6-58 through 6-61 summarize the potential projected impact on critical facilities from sea level rise and Figures 6-14 and 6-15 illustrate the possible vulnerability of the county's critical facilities to sea level rise by 2030 and 2060. The County's model shows that 17 critical facilities are at risk of becoming periodically or more frequently inundated and exposed to repeated damage by sea level rise by 2030, with damage increasing by 2060. These include nine bridges, Goleta Beach County Park, a complex of buildings along low-lying Mesa Road at the University of California Santa Barbara (UC Santa Barbara), including County Fire Department Station 17, various UC Santa Barbara public works and support facilities, and the Santa Barbara Airport. In addition to these facilities, the American Medical Response Station 1, Goleta West Water District, Charles E. Myer Desalination Plant, Santa Barbara Waterfront Harbor Patrol, and several other bridges (25 total critical facilities) are projected to be at risk of becoming periodically inundated or damaged by sea level rise by 2060. Damage to these facilities may cost the county and other local agencies millions in repairs, replacements, or other mitigation, and additional assessment of such vulnerabilities will be key to guiding sea level rise physical adaption and mitigation planning.

Table 6-58. Critical Facilities in 2030 Sea Level Rise Zones by Planning Region

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
South Coast	-	-	1	-	1	4	11	17	$6,070,044
Total	**0**	**0**	**1**	**0**	**1**	**4**	**11**	**17**	**$6,070,044**

Figure 6-15. Critical Facilities and Sea Level Rise Projections Tidal Inundations: No Flood Event Zoom

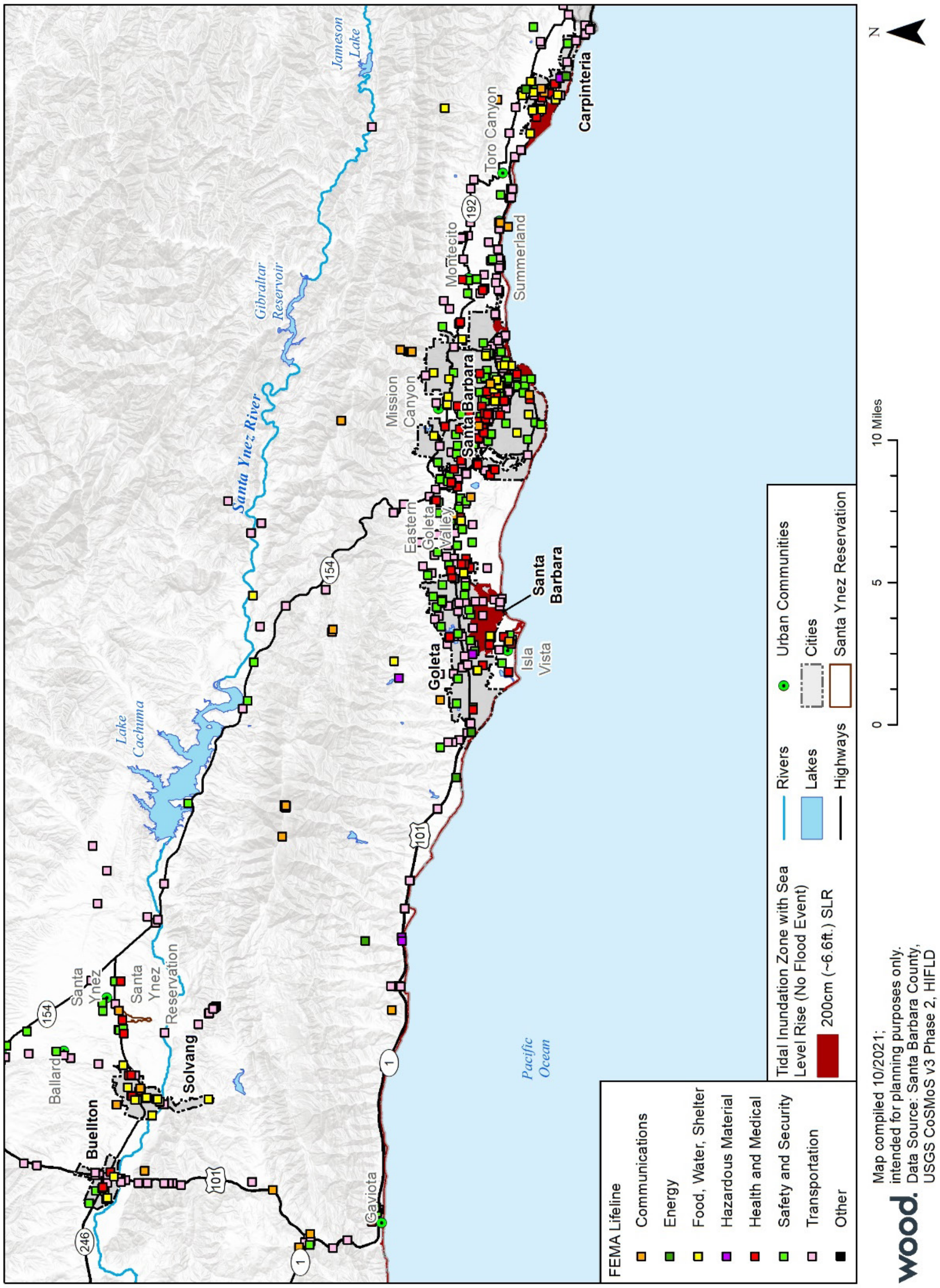


Figure 6-16. Critical Facilities and Sea Level Rise Projections Tidal Inundations: 100-Year Flood Event

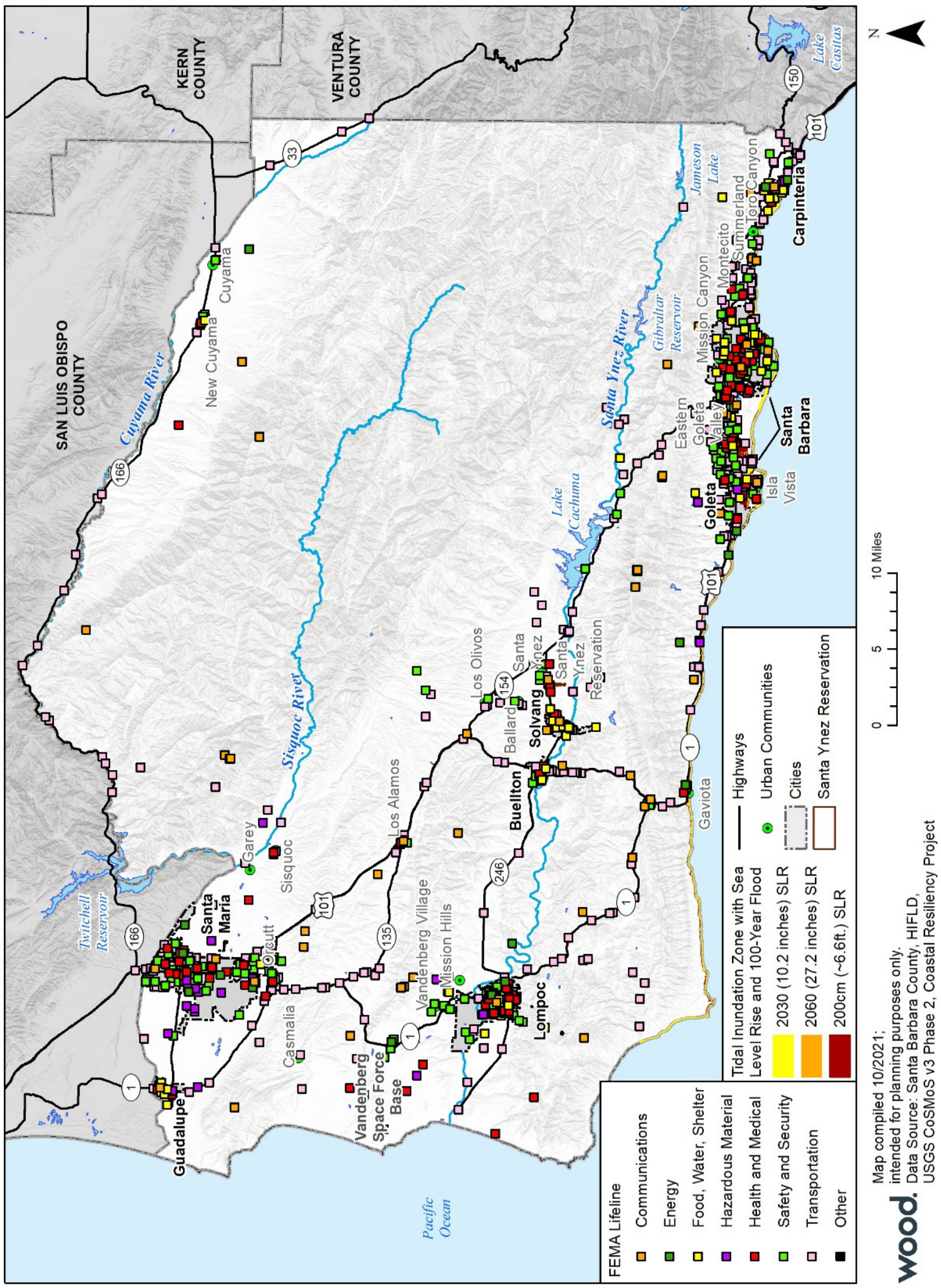


Figure 6-17. Critical Facilities and Sea Level Rise Projections Tidal Inundations: 100-Year Flood Event Zoom

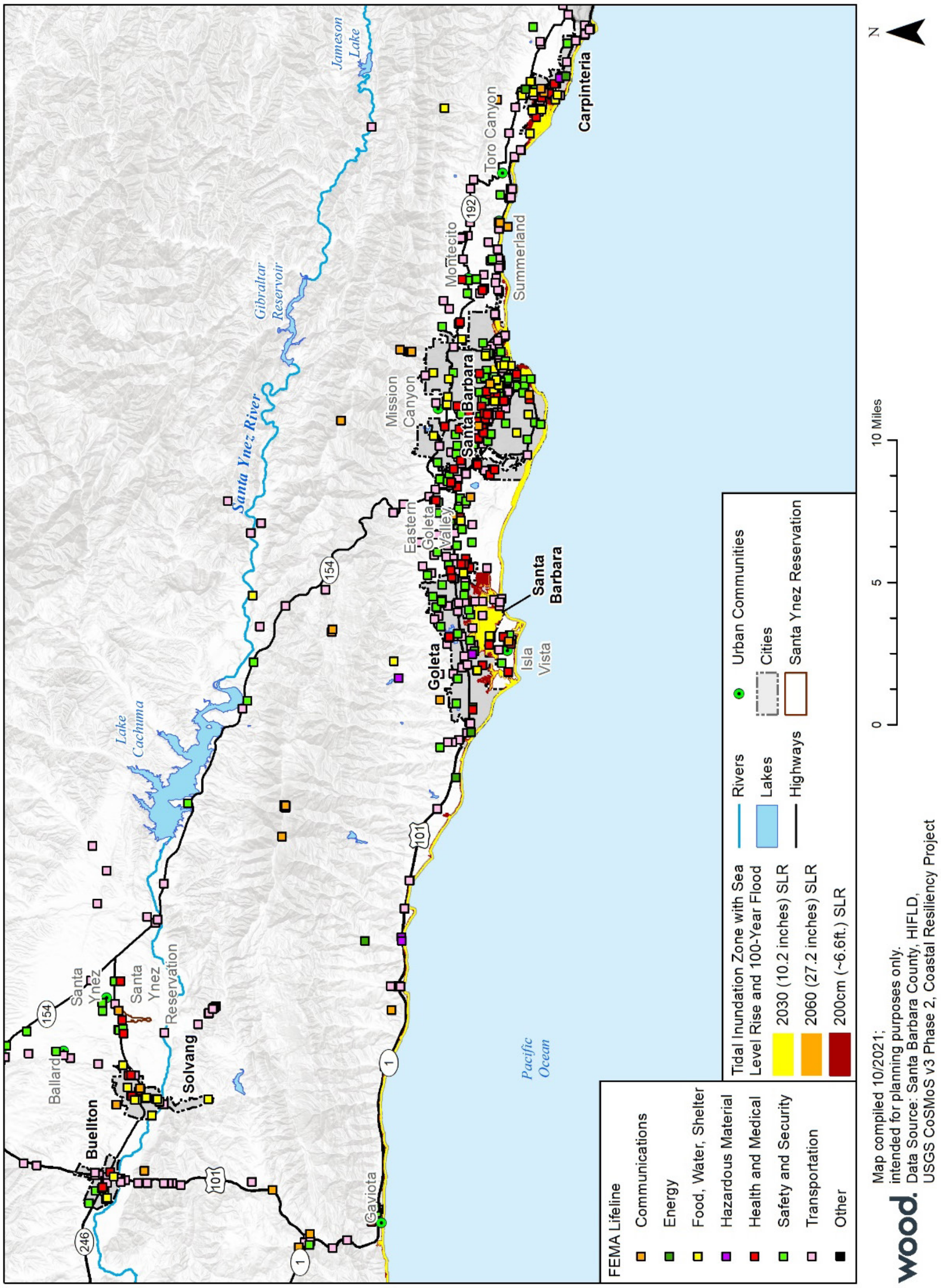


Table 6-59. Critical Facilities in 2030 Sea Level Rise Zones by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Santa Barbara	-	-	1	-	-	4	9	14	$0
Unincorporated	-	-	-	-	1	-	2	3	$6,070,044
Total	**0**	**0**	**1**	**0**	**1**	**4**	**11**	**17**	**$6,070,044**

Table 6-60. Critical Facilities in 2060 Sea Level Rise Zones by Planning Region

Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
South Coast	-	-	4	-	2	4	15	25	$6,070,044
Total	**0**	**0**	**4**	**0**	**2**	**4**	**15**	**25**	**$6,070,044**

Table 6-61. Critical Facilities in 2060 Sea Level Rise Zones by Jurisdiction

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Carpinteria	-	-	-	-	1	-	-	1	$0
Santa Barbara	-	-	4	-	-	4	11	19	$0
Unincorporated	-	-	-	-	1	-	4	5	$6,070,044
Total	**0**	**0**	**4**	**0**	**2**	**4**	**15**	**25**	**$6,070,044**

However, this vulnerability assessment is based on long-term regional models that cannot reflect the mitigating effects of local conditions such as revetments, sand elevations, beach profiles, the distance of structures from the shoreline, and the construction of structures that may be able to better withstand coastal hazards. Damage from sea level rise can be substantially affected by location and elevation, the presence of hard structures or revetments, and intervening structures between the facility and the shoreline. For example, the County's 2017 modeling projects that flooding would reach deep into the Goleta Slough, yet the model does not account for the presence of Goleta Beach County Park, associated rock revetments, and State Route 217 which constrict the passage of seawater into the

Slough to a single channel under the SR 217 bridge. This local condition may limit or reduce the extent and elevation of projected flooding. Detailed site-specific modeling at Goleta Beach County Park conducted in 2019 and 2020 revealed that the Park would not be regularly inundated, but that the severity of damage to the Park from wave overtopping and periodic inundation would increase (depending on mitigation actions), particularly between 2050 and 2070 (Noble Consultants 2018; 2020). Similarly, while the City of Carpinteria's 2019 Sea Level Rise Vulnerability Assessment and Adaptation Plan (SLRVAAP) projects substantial flooding inland through the Carpinteria Salt Marsh, the model employed could not account for the presence of 16-foot-high rock revetments fronting most of the Marsh which constrict tidal influx and projected inland tidal flooding passage to the 100-foot-wide Santa Monica Creek ocean outlet. Similar modeling limitations may apply to the projected extent and depth of flooding of Carpinteria's Beach Neighborhood or perhaps the Santa Barbara Waterfront (City of Carpinteria 2019).

While the existing sea level rise vulnerability models used in this assessment are the best available tools to inform hazard mitigation planning for sea level rise, additional more refined study is needed to assess actual vulnerability and guide specific and often extremely expensive physical adaption measures.

6.3.7 Landslide

As described in Section 5.3.7, *Landslides*, landslides are most common on steep slopes made of loose soil and other material such as those found in North County and the South Coast, but they can also happen on shallower slopes. Cuyama Valley is also susceptible to landslides. Landside susceptibility areas and the location of critical facilities are depicted in Figure 6-18.

To assess vulnerability to landslides, data was collected from the California Geologic Survey that represents landslide incidence and susceptibility. The geographies impacted are categorized into seven classes: 0, III, V, VI, VII, VIII, IX, and X, with 0 being at the lowest risk and X being the highest (see Figure 6-19). Table 6-62 summarizes the total exposure of properties in areas of the county at risk for landslide hazards. All facilities not shown fall into the low-risk category. As shown therein, the county has 28,669 improved parcels valued at over $26 billion and a population of approximately 72,887 at risk of landslide hazards. The majority of these properties are located in the City of Santa Barbara or unincorporated county territory. This is expected because not only is the City of Santa Barbara nestled between the Pacific Ocean and Santa Ynez Mountains, but it also includes residential development spread across the hillsides of Alta Mesa. Similarly, the unincorporated community of Campanil (located on the hillside along Las Positas Road in Santa Barbara) consists of extensive residential development among the hillsides. Other unincorporated communities such as Casmalia, Gaviota, and Montecito are located adjacent to foothills at risk of landslide. Tables 6-63 and 6-64 summarize the number and type of critical facilities within each landslide hazard class by planning region and by jurisdiction, respectively.

Figure 6-18. Critical Facilities and Landslide Incidence

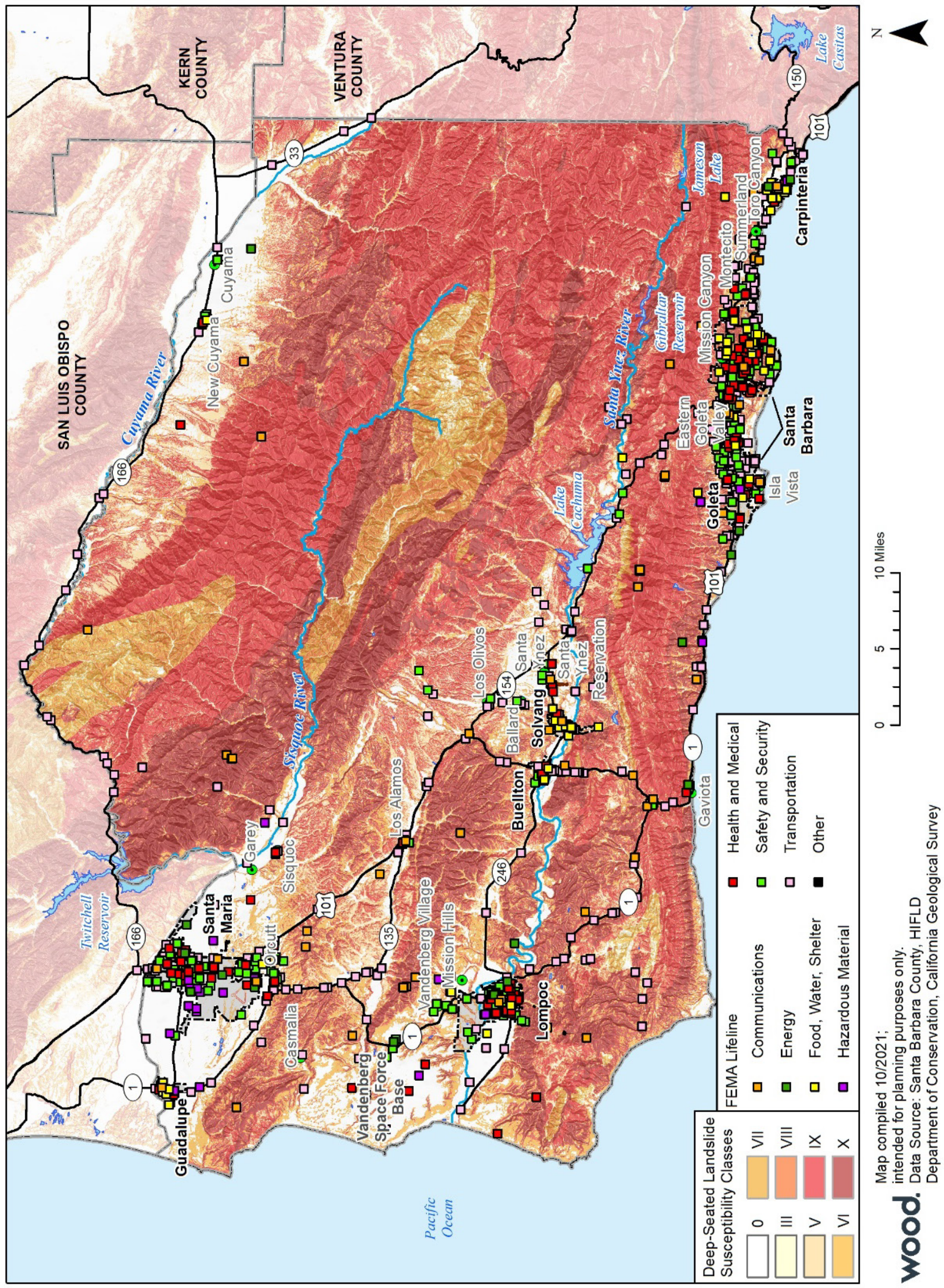


Table 6-62. Sand Barbara County Improved Properties at Risk to Landslide Summary

Jurisdiction	Class III Parcel Count	Class V Parcel Count	Class VI Parcel Count	Class VII Parcel Count	Class VIII Parcel Count	Class IX Parcel Count	Class X Parcel Count	Total Improved Parcel Count
Buellton	0	0	0	192	0	26	18	236
Carpinteria	0	0	0	130	0	2	0	132
Goleta	0	0	0	1,152	0	81	24	1,257
Guadalupe	0	0	0	25	0	2	0	27
Lompoc	0	0	0	758	0	57	16	831
Santa Barbara	0	10	0	6,961	16	1,551	1,387	9,925
Santa Maria	0	0	0	438	0	23	2	463
Solvang	0	13	0	697	0	95	43	848
Unincorporated	1	639	3	9,934	413	2,518	1,442	14,950
Total	**1**	**662**	**3**	**20,287**	**429**	**4,355**	**2,932**	**28,669**

Jurisdiction	Improved Value	Estimated Content Value	Total Value	Population
Buellton	$85,536,165	$55,668,264	$141,204,429	611
Carpinteria	$65,234,630	$63,592,900	$128,827,530	318
Goleta	$579,385,209	$341,778,333	$921,163,542	3,355
Guadalupe	$2,858,084	$1,534,160	$4,392,244	102
Lompoc	$165,647,504	$85,966,217	$251,613,721	2,395
Santa Barbara	$4,966,368,305	$2,686,366,237	$7,652,734,542	23,758
Santa Maria	$127,782,805	$100,932,864	$228,715,669	1,682
Solvang	$327,881,166	$183,465,534	$511,346,700	1,907
Unincorporated	$10,376,127,824	$5,966,124,673	$16,342,252,497	38,759
Total	**$16,696,821,692**	**$9,485,429,179**	**$26,182,250,871**	**72,887**

Table 6-63. Critical Facilities in Landslide Zones by Planning Region

Risk Level	Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Class X	Cuyama Valley	-	-	-	-	-	-	-	0	$0
	Lompoc Valley	4	-	-	-	-	1	1	6	$0
	Santa Maria Valley	1	-	-	-	-	-	1	2	$0
	Santa Ynez Valley	-	-	-	-	-	1	-	1	$0
	South Coast	1	1	1	-	-	2	5	10	$1,208,931
	Unincorporated	6	-	-	-	-	-	2	8	$0
	Total	**12**	**1**	**1**	**0**	**0**	**4**	**9**	**27**	**$1,208,931**
Class IX	Cuyama Valley	-	-	-	-	-	-	-	0	$0
	Lompoc Valley	4	-	-	-	-	-	2	6	$0
	Santa Maria Valley	3	-	-	-	-	-	1	4	$0
	Santa Ynez Valley	3	-	1	-	-	-	1	5	$1,339,060
	South Coast	1	-	-	2	-	6	14	23	$40,731,333
	Unincorporated	13	-	3	-	-	-	3	19	$500,000
	Total	**24**	**0**	**4**	**2**	**0**	**6**	**21**	**57**	**$42,570,393**
Class VIII	Cuyama Valley	-	-	-	-	-	-	-	0	$0
	Lompoc Valley	1	-	-	-	-	-	2	3	$0
	Santa Maria Valley	-	-	-	-	-	-	-	0	$0
	Santa Ynez Valley	-	-	5	-	-	5	-	10	$6,359,103
	South Coast	-	-	-	-	-	-	1	1	$0
	Unincorporated	9	-	-	-	-	1	3	13	$0
	Total	**10**	**0**	**5**	**0**	**0**	**6**	**6**	**27**	**$6,359,103**
Class VII	Cuyama Valley	-	-	-	-	-	-	1	1	$0
	Lompoc Valley	5	-	-	2	3	4	13	27	$5,521,837
	Santa Maria Valley	2	-	-	1	-	6	12	21	$1,904,164
	Santa Ynez Valley	4	-	3	-	4	2	20	33	$1,103,171
	South Coast	2	1	5	2	17	39	45	111	$44,107,483
	Unincorporated	1	-	-	1	2	-	6	10	$0
	Total	**14**	**1**	**8**	**6**	**26**	**51**	**97**	**203**	**$52,636,655**

Table 6-63. Critical Facilities in Landslide Zones by Planning Region (Continued)

Risk Level	Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Class VI	Cuyama Valley	-	-	-	-	-	-	-	0	$0
	Lompoc Valley	-	-	-	-	-	-	2	2	$0
	Santa Maria Valley	-	-	-	-	-	-	-	0	$0
	Santa Ynez Valley	-	-	-	-	-	-	-	0	$0
	South Coast	-	-	-	-	-	-	-	0	$0
	Unincorporated	1	-	-	-	-	-	-	1	$0
	Total	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**$0**
Class V	Cuyama Valley	1	-	-	-	1	1	-	3	$309,420
	Lompoc Valley	1	-	-	-	-	1	1	3	$0
	Santa Maria Valley	-	-	-	-	-	-	1	1	$0
	Santa Ynez Valley	-	-	-	-	-	1	4	5	$0
	South Coast	-	-	-	-	-	-	1	1	$0
	Unincorporated	18	-	-	-	-	-	5	23	$0
	Total	**20**	**0**	**0**	**0**	**1**	**3**	**12**	**36**	**$309,420**
Class III	Cuyama Valley	-	-	-	-	-	-	-	0	$0
	Lompoc Valley	-	-	-	-	-	-	1	1	$0
	Santa Maria Valley	-	-	-	-	-	-	-	0	$0
	Santa Ynez Valley	-	-	-	-	-	-	-	0	$0
	South Coast	-	-	-	-	-	-	-	0	$0
	Unincorporated	-	-	-	-	-	-	-	0	$0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**$0**

Table 6-64. Critical Facilities in Landslide Zones by Jurisdiction

Risk Level	Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Class X	Buellton	-	-	-	-	-	-	-	0	$0
	Carpinteria	-	-	-	-	-	-	-	0	$0
	Goleta	-	-	-	-	-	-	-	0	$0
	Guadalupe	-	-	-	-	-	-	-	0	$0
	Lompoc	-	-	-	-	-	1	-	1	$0
	Santa Barbara	-	-	-	-	-	-	-	0	$0
	Santa Maria	-	-	-	-	-	-	-	0	$0
	Solvang	-	-	-	-	-	-	-	0	$0
	Unincorporated	12	1	1	-	-	3	9	26	$1,208,931
	Total	**12**	**1**	**1**	**0**	**0**	**4**	**9**	**27**	**$1,208,931**
Class IX	Buellton	-	-	-	-	-	-	-	0	$0
	Carpinteria	-	-	-	-	-	-	-	0	$0
	Goleta	-	-	-	-	-	-	1	1	$0
	Guadalupe	-	-	-	-	-	-	-	0	$0
	Lompoc	-	-	-	-	-	-	-	0	$0
	Santa Barbara	-	-	-	-	1	-	4	5	$0
	Santa Maria	-	-	-	-	-	-	-	0	$0
	Solvang	-	-	1	-	-	-	-	1	$1,339,060
	Unincorporated	24	-	3	-	1	6	16	50	$41,231,333
	Total	**24**	**0**	**4**	**0**	**2**	**6**	**21**	**57**	**$42,570,393**
Class VIII	Buellton	-	-	-	-	-	-	-	0	$0
	Carpinteria	-	-	-	-	-	-	-	0	$0
	Goleta	-	-	-	-	-	-	-	0	$0
	Guadalupe	-	-	-	-	-	-	-	0	$0
	Lompoc	-	-	-	-	-	-	-	0	$0
	Santa Barbara	-	-	-	-	-	-	-	0	$0
	Santa Maria	-	-	-	-	-	-	-	0	$0
	Solvang	-	-	-	-	-	-	-	0	$0
	Unincorporated	10	-	5	-	-	6	6	27	$6,359,103
	Total	**10**	**0**	**5**	**0**	**0**	**6**	**6**	**27**	**$6,359,103**
Class VII	Buellton	-	-	1	-	-	-	1	2	$0
	Carpinteria	-	-	1	-	-	-	1	2	$0
	Goleta	-	-	-	1	-	1	8	10	$0
	Guadalupe	-	-	-	-	-	-	-	0	$0
	Lompoc	-	-	-	1	3	2	4	10	$2,683,634
	Santa Barbara	-	-	4	-	11	12	8	35	$0
	Santa Maria	-	-	-	-	-	-	-	0	$0
	Solvang	-	-	2	-	3	-	-	5	$366,688
	Unincorporated	14	1	2	4	9	34	75	139	$49,375,613
	Total	**14**	**1**	**10**	**6**	**26**	**49**	**97**	**203**	**$52,425,935**

Table 6-64. Critical Facilities in Landslide Zones by Jurisdiction (Continued)

Risk Level	Planning Region	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Class VI	Buellton	-	-	-	-	-	-	-	0	$0
	Carpinteria	-	-	-	-	-	-	-	0	$0
	Goleta	-	-	-	-	-	-	-	0	$0
	Guadalupe	-	-	-	-	-	-	-	0	$0
	Lompoc	-	-	-	-	-	-	-	0	$0
	Santa Barbara	-	-	-	-	-	-	-	0	$0
	Santa Maria	-	-	-	-	-	-	-	0	$0
	Solvang	-	-	-	-	-	-	-	0	$0
	Unincorporated	1	-	-	-	-	-	2	3	$0
	Total	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**$0**
Class V	Buellton	-	-	-	-	-	-	-	0	$0
	Carpinteria	-	-	-	-	-	-	-	0	$0
	Goleta	-	-	-	-	-	-	-	0	$0
	Guadalupe	-	-	-	-	-	-	-	0	$0
	Lompoc	-	-	-	-	-	-	-	0	$0
	Santa Barbara	-	-	-	-	-	-	-	0	$0
	Santa Maria	-	-	-	-	-	-	-	0	$0
	Solvang	-	-	-	-	-	-	1	1	$0
	Unincorporated	20	-	-	-	1	3	11	35	$309,420
	Total	**20**	**0**	**0**	**0**	**1**	**3**	**12**	**36**	**$309,420**
Class III	Buellton	-	-	-	-	-	-	-	0	$0
	Carpinteria	-	-	-	-	-	-	-	0	$0
	Goleta	-	-	-	-	-	-	-	0	$0
	Guadalupe	-	-	-	-	-	-	-	0	$0
	Lompoc	-	-	-	-	-	-	-	0	$0
	Santa Barbara	-	-	-	-	-	-	-	0	$0
	Santa Maria	-	-	-	-	-	-	-	0	$0
	Solvang	-	-	-	-	-	-	-	0	$0
	Unincorporated	-	-	-	-	-	-	1	1	$0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**$0**

As shown therein, the most common types of critical facilities located within landslide hazard areas are transportation, safety and security, and communications facilities. Most transportation facilities located within landslide hazard zones are bridges, including bridges of major thoroughfares such as Highway 101 and SR-166., as well as UPRR tracks and bridges Examples include the bridges over Mission Creek on SR 192/Foothill Road and Highway 101 at El Capitan State Beach. Evacuation of residents, emergency response services, and other transportation services could be delayed if roadways become blocked off by landslides. Due to its remote location and reliance on SR-166, residents of Cuyama Valley are especially vulnerable to becoming isolated in the event of landslides.

Safety and security facilities located within landslide hazard areas include fire stations, police, and sheriff facilities, schools, jails (e.g., the County jail in Eastern Goleta Valley), and other government facilities. The most vulnerable facilities include Summerland Elementary and Fire Station No. 11 in the South Coast, Midland School in Santa Ynez Valley, and a solid waste yard in the City of Lompoc. If these facilities were damaged in a landslide, in addition to potential loss of life and property, community emergency response could be negatively affected. For example, several fire stations on the South Coast, Lompoc Valley, and Vandenberg Space Force Base (SFB) are located within high-risk areas for landslide hazards. If these buildings are damaged by landslides, fire and emergency medical response may be severely delayed. Additionally, landslide damage to jail facilities, such as the Santa Barbara County Main Jail, which is located in a Class VII landslide risk zone, could facilitate jailbreaks in the county. This could result in subsequent civil disturbance hazards.

Communication facilities include cellular, paging, and FM towers, which are often located on mountain ranges and susceptible to damage in the event of a landslide. Damage to communication facilities could affect emergency alerts and notifications and put residents at higher risk of landslide hazards by severing lines of communication.

6.3.8 Geologic Hazards

Geologic hazards in the county include land subsidence, inland erosion, and expansive soils. As described in Section 5.3.8, *Geologic Hazards*, erosion has not been mapped or rated at the county level and instances of erosion within the county are primarily limited to coastal erosion along the dunes and sea cliffs of the western and southern coastlines (County of Santa Barbara 2015). Vulnerabilities to coastal erosion are described in Section 6.3.6, *Coastal Hazards*. Vulnerabilities to earthquake hazards are discussed in Section 6.2.1, *Earthquake (Ground shaking),* and earthquake-induced liquefaction vulnerabilities are discussed in Section 6.3.3, *Earthquake (Liquefaction)*. Therefore, the discussion below is limited to vulnerabilities from land subsidence and expansive soils. While these hazards often result in severe property damage, they typically do not present risks to human life.

Land subsidence within the county is reported as most severe in the Cuyama Valley Groundwater Basin (DWR 2021b). However, a comparison of changes in land-surface elevation determined from continuous GPS stations and Synthetic Aperture Radar (SAR) satellites with groundwater levels measured in observation wells indicated that the Cuyama Valley aquifer system experiences seasonal elastic land deformation and expansion that results in small amounts of recoverable subsidence. The lack of detailed data on land subsidence in Santa Barbara County makes it difficult to quantify potential losses. Most subsidence instances result in relatively minor damage and settling of buildings. Linear infrastructure (e.g., roads, buried pipelines) tends to have the most risk of land subsidence. Statewide, subsidence has caused damage to dams and levees, canals, roads and bridges, water and sewer lines, pipelines, well casings, and aircraft runways, in addition to a variety of buildings and other structures. Severe land subsidence can also disrupt and alter the flow of surface or underground water, as well as reduce the future capacity of aquifers.

Typically, there is little impact on the natural environment from land subsidence. However, subsidence events can disrupt and alter the flow of surface or underground water, an impact that may not be noticed until long after the fact. However, land subsidence within the county as measured by GPS and SAR satellites is not currently a present danger. While land subsidence in the Cuyama

Valley, the area with the highest levels of land subsidence in the county, is at 0.88 inches, areas in the San Joaquin Valley (e.g., Tulare Lake) are reported to have up to -3 feet of vertical displacement (DWR 2021b).

Land subsidence has a direct correlation with water supply. For example, land subsidence is caused by loss of support underground, which can result from an overdraft of groundwater supplies (NOAA 2021b). Furthermore, soil compaction resulting from subsidence can permanently reduce aquafer capacity, impacting water supplies long into the future. Therefore, increased water pumping resulting from new development or increased agricultural production has the potential to increase the frequency and severity of subsidence. This is especially important in Cuyama Valley, given that the primary land use in this region is agriculture and groundwater is the sole source of water supply (Santa Barbara County IRWM Cooperating Partners 2019). Increased efforts to monitor and manage groundwater pumping, increased accuracy of mapping, and emphasis on appropriate grading and ground compaction during development would help alleviate vulnerability for future development in unknown areas of risk. Further discussion of water storage loss can be found in Section 6.3.2, *Drought & Water Shortage*.

6.3.9 Tsunami

As described in Section 5.3.9, *Tsunami*, the University of Southern California (USC) Tsunami Research Group has modeled areas in Santa Barbara County that could potentially be inundated in the event of a tsunami. This model is based on potential earthquake sources and hypothetical extreme undersea, near-shore landslide sources were mapped and used to profile maximum potential exposure. The data was mapped by the California Geological Survey and Cal OES for Tsunami Evacuation Planning (Figures 6-19 and 6-20). As shown in these figures, much of the county's coastline is considered within tsunami hazard areas, including coastal bluffs and beaches in Carpinteria, Montecito, Santa Barbara, Isla Vista, Goleta Point, Devereux Slough, Ocean Beach Park west of Lompoc, and Guadalupe-Nipomo Dunes Preserve. However, the areas where the tsunami hazard threatens critical facilities and infrastructure is limited to the South Coast planning region of the county (Figure 6-20).

Critical facilities were compared against the extreme tsunami inundation zone overlay to see whether they fall within the geographic extent of the hazard. Based on the GIS mapping, 46 critical facilities fall within the tsunami risk area, of which 28 facilities are bridges located in Carpinteria, Santa Barbara, and unincorporated county land in the South Coast planning region (Table 6-65. Other facilities within the tsunami hazard zone include critical infrastructures, such as the Charles E. Myer Main Desalination Plant, El Estero Water Resources Center, sewage pump stations, and the Laguna pump station, which was installed to provide flood control along Laguna Creek. Public services, including the American Medical Response Station 1, Santa Barbara Fire Station 2 and fire training center, County Fire Department Station 17, and the Santa Barbara Waterfront Harbor Patrol are at risk of inundation from a tsunami. Given its location near the coastline, the Santa Barbara Airport is also at risk from tsunami hazards, which presents an added constraint to evacuations and transport in the case of a tsunami event. In addition, Aliso Elementary School and a few historic sites are at risk for tsunami inundation. The Goleta Pier, which is also within the tsunami hazard area, has an estimated structure value of approximately $6.4 million. Figures 6-19 and 6-20 depict the location of the critical facilities relative to the extreme tsunami inundation zone.

Figure 6-19. Critical Facilities and Tsunami Inundation Areas

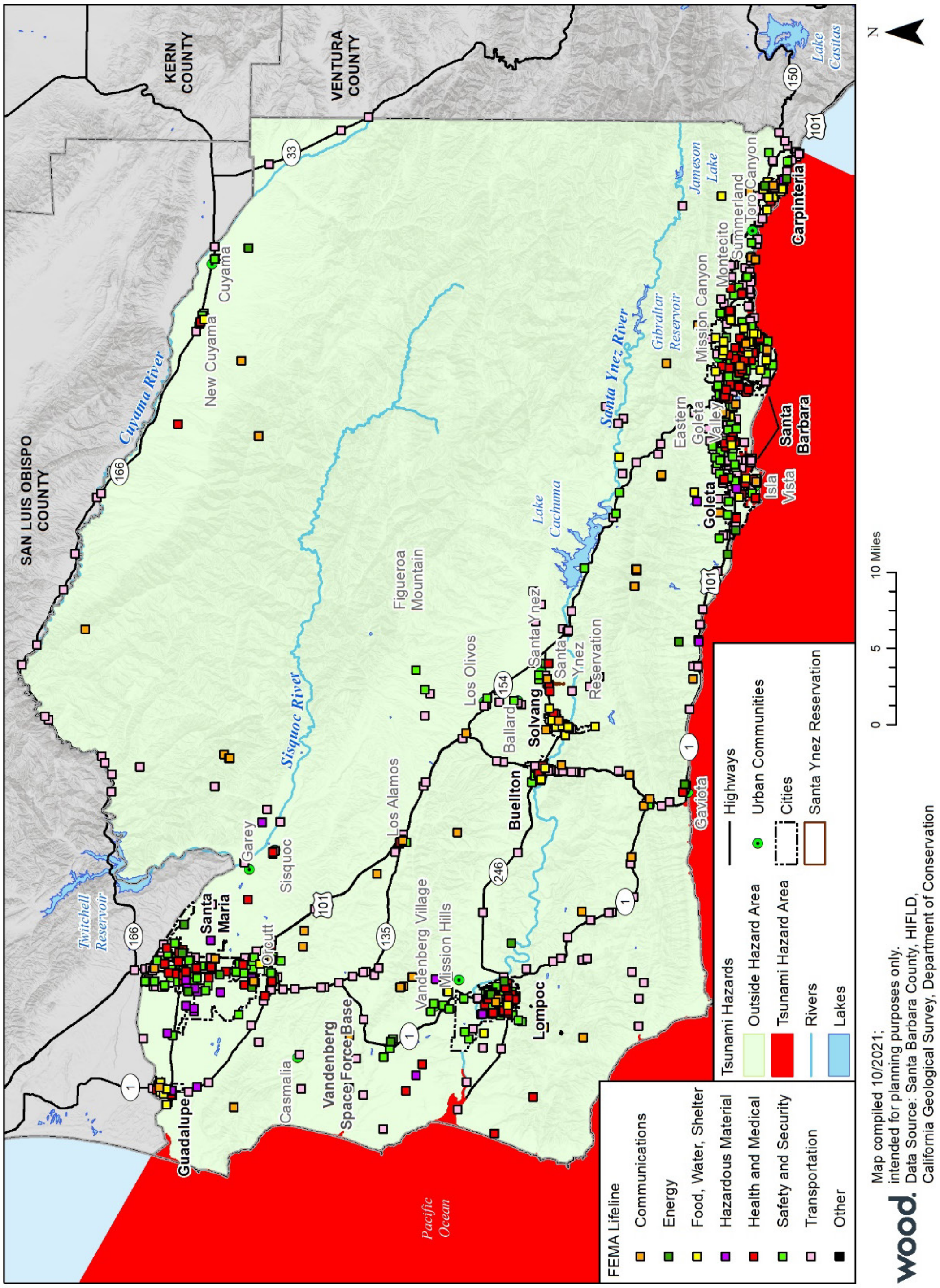
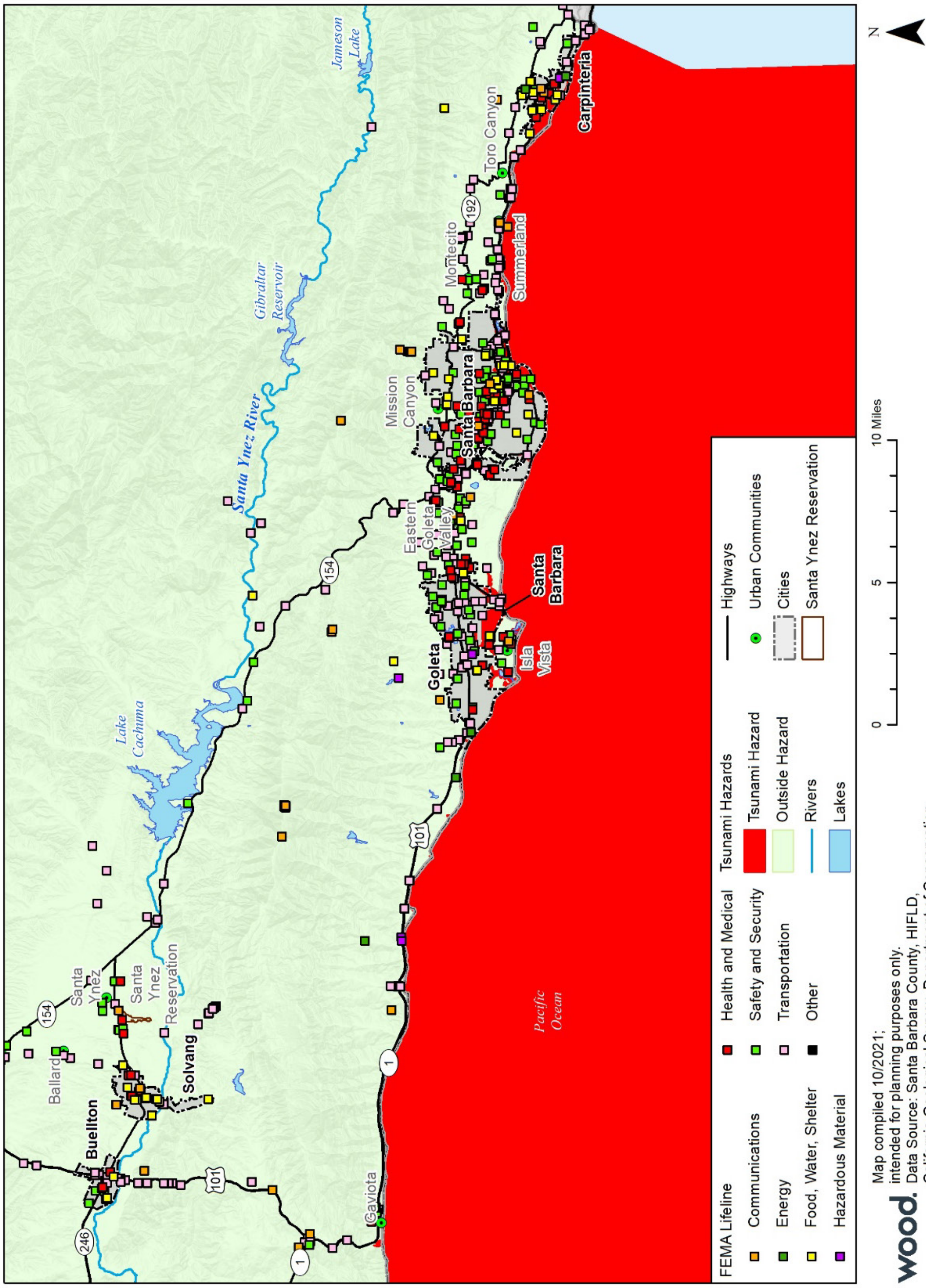


Figure 6-20. Critical Facilities and Tsunami Inundation Areas Zoom



The exposure of the critical facilities to tsunami hazard zones is summarized in Tables 6-65 and depicted in Figure 6-19 and Figure 6-20. Based on the GIS analysis, the Santa Barbara County planning area has 2,234 improved parcels valued at over $2.6 billion and home to 5,139 residents in the Tsunami Hazard area. This information is summarized in Table 6-65.

Table 6-65. Tsunami Hazard Vulnerabilities by Jurisdiction

Summary of Tsunami Risk by Property Type and Jurisdiction

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Buellton	-	-	-	-	-
Carpinteria	892	$261,905,728	$143,458,752	$405,364,480	2,332
Goleta	1	$93,253	$93,253	$186,506	3
Guadalupe	-	-	-	-	-
Lompoc	-	-	-	-	-
Santa Barbara	890	$834,121,159	$554,212,789	$1,388,333,948	1,580
Santa Maria	-	-	-	-	-
Solvang	-	-	-	-	-
Unincorporated	451	$593,829,456	$306,957,019	$900,786,475	1,224
Total	**2,234**	**$1,689,949,596**	**$1,004,721,813**	**$2,694,671,409**	**5,139**

Critical Facilities by Category in Extreme Tsunami Inundation Zone

Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Total Count	Total Value
Carpinteria	-	-	2	-	1	1	6	10	$9,957,908
Santa Barbara	-	-	4	-	1	5	13	23	$2,034,893
Unincorporated	1	-	-	-	1	-	11	13	$6,070,044
Total	1	0	6	0	3	6	30	46	$18,062,845

6.4 SEVERE WEATHER AND STORM EVENTS

6.4.1 Extreme Heat/Freeze

As described in Section 5.4.1, *Extreme Heat/Freeze*, the county has different extreme heat temperatures in different regions. Coastal communities on average have lower temperatures compared to communities in the inland areas of the county and could be less at risk of extreme temperatures Although temperatures are lower in coastal areas, it is still dangerous when temperatures are higher than usual because people are potentially less acclimatized to high temperatures if they occur and may not have the resources to cope with extreme temperatures (Santa Barbara County Planning and Development Department 2021). For example, people may be less aware of the behaviors that can reduce exposure (e.g., reducing activity level or going to an air-conditioned location) or reduce physiologic stress (e.g., appropriate hydration), and the built environment may not be designed for extreme heat or freeze conditions (e.g., homes, workplaces, and institutions are less often equipped with air conditioning or it is inadequate for extreme or prolonged heat events). Even in areas equipped with air conditioning, the increased use of air conditioners during heat waves can lead to power outages, which makes the events even more risky and even deadly.

The risks of extreme heat and freeze are often profiled as parts of larger hazards, such as drought, wildfire, or severe winter storms. However, as temperature variances may occur outside of larger hazards or outside of the expected seasons but still incur large costs, it is important to examine them as stand-alone hazards. Extreme heat may overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure and presents health concerns to individuals outside in the temperatures.

While extreme heat rarely damages buildings, both extreme heat and freeze can cause infrastructure damage to roads from “thermal expansion.” Extreme cold may also lead to higher electricity and natural gas demands to maintain appropriate indoor heating levels combined with damages caused to the delivery infrastructure such as frozen lines and pipes. Cold temperatures may also impact transportation infrastructure and road conditions through increased wear and stress on asphalt roads and bridges. Exposed populations may be at risk while waiting for public transportation, particularly when combined with wind-chill, and some vehicles may not start, which impacts the commute of the workforce and, in worst-case scenarios, the movement of emergency services personnel.

Both extreme heat and freeze can have significant impacts on populations, lifeline infrastructure, and the economy. While everyone is vulnerable to extreme temperature incidents, some populations are more vulnerable than others. Traditionally, the very young and very old are considered at higher risk of the effects of extreme temperatures; however, recent research indicates that the impact of extreme heat, particularly on socially vulnerable and disadvantaged populations, has been historically under-represented (Campbell et al. 2018).

Extreme heat poses the greatest danger for Santa Barbara County’s thousands of outdoor laborers who support the county’s agriculture economy. Exertional heat illness occurs across a wide age range and in numerous industries and occupations, including the following: agriculture, construction, firefighting, warehousing, delivery, and service work. Outdoor laborers are exposed to extreme temperatures and at higher risk of heat-related illnesses than other populations of the county. Although a significant number of California workers have experienced severe heat-related illness and death during heat waves in recent years, exertional work-related heat-illness is believed to be under-reported and not well captured by existing data systems (CDPH 2013).

The elderly, children, people with certain medical conditions, and the houseless are also vulnerable to exposure. However, any populations working or recreating outdoors during periods of extreme cold or heat are exposed, including otherwise young and healthy adults and houseless populations. Adults and young people are commonly out in temperatures of extreme heat and cold, whether due to commuting for work or school, conducting property maintenance such as lawn care, or for recreational reasons.

Urban populations, such as in the cities of Goleta, Santa Barbara, and Santa Maria, are also at higher risk due to the urban heat island effect. Temperatures in most urban areas are significantly higher than in the surrounding, less urbanized areas because pavement and building materials absorb sunlight and heat. Daytime temperatures in urban areas are on average six °F higher than in rural areas, while nighttime temperatures can be as much as 22 °F higher as the heat is gradually released from buildings and pavement (California Department of Public Health 2013).

Water infrastructure is at risk from freezing during extreme cold events, including line breaks and frozen valve gates affecting the water distribution system. The county and municipal governments wrap pipes before freezing temperature events to help prevent damage. Both extreme heat and freeze can affect road infrastructure, damaging and buckling road surfaces, which could result in secondary effects related to emergency service operations and other transportation. Direct impacts on critical infrastructure also include power line sagging and power surges. Critical infrastructure such as water pumping stations that rely on public utility systems could also be overloaded and may result in impacts during extreme heat events.

During extreme heat conditions, peak energy demand exceeding the local utility's capacity for supply can overwhelm electricity facilities, which can reduce efficiency, cause system failures (blackout or brownout conditions), or Public Safety Power Shutoffs (PSPS). The loss of utilities or power outages during extreme heat events could also result in adverse secondary impacts on sensitive populations. Electrical power outages may impact response capabilities or care capabilities for hospitals and clinics in the county.

Although infrequent in the county, prolonged freezing temperatures can damage or destroy crops, affecting the economy and agricultural jobs in Santa Barbara County. Freezing temperatures occurring during the winter and spring growing seasons can cause extensive crop damage. According to the U.S. Department of Agriculture (USDA) Risk Management Agency (RMA) Crop Indemnity Reports, between $639,274.95 and $5,525,759.20 of crops have been lost annually to heat or freeze conditions in the county (see Table 6-66; USDA RMA 2021). Secondary impacts of freeze disasters can include major economic impacts on farmers, farmworkers, packers, and shippers of agricultural products. Freezes can also cause significant increases in food prices to the consumer due to shortages. Freezing spells are likely to become less frequent as climate temperatures increase. While fewer freezing spells would decrease cold-related health effects, too few freezes could lead to increased incidence of disease as vectors and pathogens do not die off.

Table 6-66. Crop Loss Due to Extreme Heat/Freeze, USDA RMA Crop Indemnity Reports, 2007-2020

Year	Crop	Cause of Loss	Net Determined Acres	Indemnity Amount
2017	Avocados	Heat	520.6	$467,991.35
	Grapes	Heat	249.5	$327,659.00
		Frost/Freeze	50.2	$61,771.00
	Pistachios	Heat		$260,226.00
	Total			**$1,117,647.35**
2018	Avocados	Heat	444.5	$127,128.15
		Frost/Freeze	120.3	$990,40.80
	Grapes	Heat	187.9	$895,65.90
		Frost/Freeze	475.4	$333,695.80
	All Other Crops	Frost/Freeze	9.0	$178,451.00
	Total			**$639,274.95**
2019	Avocados	Heat	1836.285	$2,416,221.05
		Frost/Freeze	46.805	$39,859.45
	Blueberries	Heat	15.2	$180,183.2
		Frost/Freeze	121	$2,714,231.8
	Grapes	Heat	9.385	$12,955.7
		Frost/Freeze/Cold/Wet Winter	15.956	$11,025
	Pistachios	Frost/Freeze	132	$151,283
	Total			**$5,525,759.20**
2020	Blueberries	Heat	29.5	$907,378.2
		Frost/Freeze	115.5	$3,431,189.8
	Grapes	Heat	370.3	$695,803
	Total			**$5,034,371.00**

Source: USDA RMA 2021.

6.4.2 Windstorm

As described in Section 5.4.2, *Windstorm*, sundowner winds are particularly damaging winds unique to Santa Barbara County, which flow down from the southern slopes of the Santa Ynez Mountains from Gaviota to Carpinteria. These winds can reach over 120 °F and speeds of 60 mph in some areas (Santa Barbara County Planning and Development Department 2021). Sundowner winds are most prevalent in the spring and summer months; however, they can strike at any time of the year (Live Science 2012). Santa Ana winds tend to blow most frequently from October to April. They flow from the inland deserts to the coastal areas of Southern California at an average wind speed of 40 mph. Both types of wind events are hot, gusty winds with low humidity that can raise the temperature in the region by 20 °F or more and can exacerbate other hazards occurring simultaneously in the county (Santa Barbara County Planning and Development Department 2021).

Windstorms, especially sundowner winds, could have a considerable impact on the population, built environment, lifeline infrastructure, and the economy. Severe winds can directly impact the county by damaging or destroying buildings, knocking over trees, and damaging power lines and electrical equipment (Santa Barbara County Planning and Development Department 2021). Secondary impacts of damage caused by wind events often result from damage to communication, transportation, or medical infrastructure. High winds can lead to PSPS, which can impact the county's economic drivers and key services. During severe wind events, electricity transmission lines can be damaged or turned off by Pacific Gas and Electric Company (PG&E) or Southern California Edison (SCE), causing widespread power outages and hardships for County residents. Severe winds, particularly on steep slopes, can also damage communication facilities (Santa Barbara County Planning and Development Department 2021). Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a wind event put tremendous strain on a community. In the immediate aftermath, the focus is on emergency services. Severe wind is also a major hazard for aviation operations. In the event of a windstorm, any of the county's five airports could be affected by grounded planes and canceled flights.

High winds can also cause severe indirect impacts by sparking wildfires and spreading them quickly over the terrain (Santa Barbara County Planning and Development Department 2021). The effects of wildfire on population, built environment, lifeline infrastructure, and the economy throughout the county are further discussed in Section 6.3.1, *Wildfire*.

Windstorms can damage or destroy crops, affecting the economy and agricultural jobs in Santa Barbara County. While windstorms in the county have caused less crop loss between 2017 and 2020 than extreme heat and freeze, excessive winds have resulted in $99,653.85 of crop loss, specifically to avocado crops (Table 6-67; USDA RMA 2021). Crop loss from high winds results in secondary effects on the local economy and unemployment in the county.

Table 6-67. Crop Loss Due to Excessive Winds, USDA RMA Crop Indemnity Reports, 2007-2020

Year	Crop	Net Determined Acres	Indemnity Amount
2017	Avocados	48.7	$76,099.3
2018		4.1	$2,917.8
2019		10.42	$2,880.4
2020		29.4	$17,756.35
	Total		$99,653.85

Source: USDA RMA 2021.

The availability of sheltered locations, such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. However, as windstorms are not common in southern California, it is uncommon for buildings to include basements or storm shelters.

Vulnerable groups of the community are especially exposed to the indirect impacts of high winds, particularly the loss of electrical power. These populations include the elderly or disabled, especially those with medical needs and treatments dependent on electricity. Nursing homes, community-based residential facilities, and other special needs housing facilities are also vulnerable if electrical outages are prolonged since backup power generally operates only minimal functions for a short period.

6.4.3 Hailstorm

As described in Section 5.4.3, *Hailstorms*, hailstorms are rare in the county. In the past four decades, only seven significant hailstorms have been recorded. While these hailstorms resulted in a few vehicle accidents, vehicle damage, and one injury, none were documented as causing severe impacts to life or property. As such, hailstorms represent a relatively low risk for the county. By comparison, other areas of the country, including the Midwest and the southern U.S., regularly experience seasonal hailstorms where direct damage from large and/or persistent hail is severe, and lives and millions of dollars are lost annually due to this hazard.

Large-scale hailstorm events in Santa Barbara County are rare and short-lived, causing little if any life-threatening situations and only occasional significant damage to property. Hailstorms are infrequent and relatively mild when they occur, both in size and duration, including how long the hailstones remain before melting. However, hailstorms can present acute hazardous conditions. For example, in March 2021, a hailstorm in Montecito and Santa Barbara led to an eight-vehicle crash on Highway 154 (Bolton 2021b). The crash resulted from icy conditions and two inches of hail on the Cold Spring Bridge and left three people with minor injuries (Bolton 2021a). This incident indicates that during a hailstorm county residents must travel with caution on local roads.

Further, the likelihood of hailstorms occurring, the frequency in which they occur, and the severity of the storm are expected to increase as a result of climate temperatures increasing (Raupach et al. 2021). Due to climate change, the county may experience more frequent hailstorms in the future with more hazardous conditions that would require emergency response in the event of accident or injury as a result of those conditions.

According to the USDA RMA Crop Indemnity Reports, only one hail event in Santa Barbara County has resulted in impacts on agriculture. In 2019, a hail event resulted in $46,200 of loss to grape fields (USDA RMA 2021). As described for extreme heat and freeze and windstorms above, any crop loss due to severe weather events, such as hailstorms, has a secondary effect on the local economy of the county.

6.4.4 Tornado

As described in Section 5.4.4, *Tornado*, tornado events are unlikely in the county, as compared to areas in the Midwest and the southern U.S. where risk exposure is severe and many lives and millions of dollars are lost annually due to this hazard., a total of five tornados/funnel cloud events have occurred in the county between 1950 and 2021 (NOAA National Centers for Environmental Information [NCEI] 2021a). However, in the unlikelihood of a significant tornado event, it is expected to have a considerable impact on the population, built environment, lifeline infrastructure, and the economy.

General damages are both direct (what the tornado event physically destroys) and indirect, which focuses on additional costs, damages, and losses attributed to secondary hazards spawned by the event, or due to the damages caused by the tornado event. Depending on the magnitude of the event as well as the size of the tornado and its path, a tornado is capable of damaging or destroying almost any structure or infrastructure in the county. The damage from tornadoes comes from the strong winds they contain and the flying debris they create. It is generally believed that tornadic wind speeds can be as high as 300 mph in the most violent tornadoes. Wind speeds that high can cause automobiles to become airborne, rip ordinary homes to shreds, and turn broken glass and other debris into lethal missiles. The biggest threat to living creatures (including humans) from tornadoes is from flying debris and from being tossed about in the wind. Construction practices and building codes can help maximize the resistance of the structures to damage (NOAA National Severe Storms Laboratory [NSSL] 2021).

Like high winds, tornadoes may impact exposed critical infrastructure such as power lines; depending on the impact and the function, this could cause a short-term economic disruption. The most common problems associated with tornadoes are the loss of utilities. Downed power lines can cause power outages, leaving large parts of the county isolated, and without electricity, water, and communication. Damage may also limit timely emergency response and the number of evacuation routes for both remote and urban areas of the county. Downed electrical lines following a storm can also increase the potential for lethal electrical shock. Damaging winds from tornados can also spark and spread wildfires (refer to Section 6.3.1, *Wildfire* for more information on the county's vulnerability to wildfires).

6.4.5 Hurricane

As described in Section 5.4.5, *Hurricane*, Santa Barbara County is at very low risk of hurricanes, although one can threaten the Southern California coast. No hurricanes have hit California in recorded history because tropical storm winds generally blow from east to west (NOAA NCEI 2021c). California is affected by heavy rain resulting from tropical winds that blow north from Mexico and become colder by the time they hit California. In the future, monitoring is needed to determine whether present patterns of movement of such storms continue or are modified by the warming of waters off the Pacific Coast due to climate change. In the unlikelihood of a significant event, hurricanes would have a considerable impact on the population, built environment, lifeline infrastructure, and the economy.

6.5 URBAN AND HUMAN-CAUSED HAZARDS

6.5.1 Pandemic/Public Health Emergency

As described in Section 5.5.1, *Pandemic/Public Health Emergency*, Santa Barbara County, as well as the state, nation, and the entire world, is vulnerable to outbreaks, epidemics, and pandemics caused by either newly emerging or existing diseases spread person to person, through a vector such as a mosquito, or both. A significant public health emergency can have a considerable impact on the population, the economy, and essential public services (e.g., fire and police protection, medical services, etc.).

Populations identified by the county as especially vulnerable to human health hazards include undocumented persons, senior citizens, senior citizens living alone, persons with existing chronic health conditions, persons experiencing houselessness, overcrowded households and neighborhoods, low-resourced ethnic minorities people of color, households in poverty, communities with a high-pollution burden, and those without health insurance (Santa Barbara County Planning and Development Department 2021). Undocumented or non-English speaking individuals may be less able to understand such pandemic-related instructions or receptive to responding to government outreach, while lower-income households may lack the means to comply with the direction. Trends of the COVID-19 pandemic further revealed vulnerable groups within Santa Barbara County population and how such public health emergencies have the potential to affect the local economy. For example, COVID-19 disproportionately impacted the county's Hispanic/Latino population. While Hispanics/Latinos accounted for 48 percent of Santa Barbara County's population they represented 59 percent of COVID-19 cases and 63 percent of hospitalizations (Santa Barbara County Public Health Department 2021a). In contrast, Whites represented 17 percent of cases while accounting for 43 percent of the population (Santa Barbara County Public Health Department 2021a). While Whites made up 43 percent of deaths, many of these deaths occurred at skilled nursing homes and other congregate care settings, which have been highly impacted by the pandemic. The City of Santa Maria had the highest overall COVID-19 case count with 11,217 confirmed cases and has been disproportionately impacted by the pandemic (Santa Barbara County Public Health Department 2021b). The City of Santa Barbara followed in rank with 6,240 cases, and then Lompoc with 3,538 cases (Santa Barbara County Public Health Department 2021a). To improve outreach to affected groups such as non-English or Spanish speaking Mixtec populations in the Santa Maria Valley, the County worked through UC Santa Barbara to interface with local organizations more trusted by such communities to enhance acceptance and implementation of vaccines and pandemic adaptation measures such as masking and social distancing.

The data found that working-age adults (18 to 49 years) had the highest proportion of cases, with people in their 20s being the 10-year age group with the most common cases (Santa Barbara County Public Health Department 2021a). Many of these younger adults likely make up a large proportion of students and workers in frontline occupations and highly exposed industries, putting them at greater risk of contracting the virus. The age group with the lowest number of cases was 70+; however, it is important to note that 70+ year-olds also make up a very small relative proportion of the county's population. Additionally, it should be noted that while older age groups had the lowest number of cases in the county, the 50-69 and 70+ year-olds age groups made up a greater proportion of hospitalizations (33 percent and 30 percent, respectively) despite their relatively low make-up of the population (22 percent and 11 percent, respectively) (Santa Barbara County Public Health Department 2021a). While the elderly had lower numbers of cases, this is likely because they are retired and carefully following stay-at-home orders. However, throughout the pandemic, 219 outbreaks were associated with congregate care facilities in which many elderly populations reside (Santa Barbara County Public Health Department 2021a). Congregate care settings include skilled nursing facilities, residential care facilities, adult residential facilities, independent living facilities, and intermediate care facilities were at risk. Other congregate care facilities that posed a special risk for virus transmission and contraction included Santa Barbara County Jail, and Lompoc Federal Correctional Complex, among others.

The arrival of the COVID-19 pandemic led to unprecedented nationwide economic restrictions and shutdowns. In Santa Barbara County, the Leisure & Hospitality, and Retail industries have suffered greatly due to the pandemic increased expenses including some lockdowns and restrictions on operations staff overtime costs needed for the pandemic response and prevention. Higher-paying industry clusters in Santa Barbara County such as Information and Communication Technologies and Finance, Insurance, and Real Estate saw a decline in employment between one and two percent – roughly what is expected in a minor recession. Lower paying industries, like Tourism, Hospitality, Recreation, and Other Services (which include services such as hair salons, spas, and dry cleaners), experienced a drop in employment between 15 and 40 percent (Santa Barbara County Workforce Development Board and Santa Barbara Foundation 2020). High levels of unemployment, disruption due to childcare needs, health concerns, bolstered unemployment insurance, and a nationwide reexamination of what work looks like have contributed to a tumultuous labor market. Approximately $20.9 million of COVID-19-related expenses went towards direct and support functions of the county during the 2019-2020 fiscal year (County of Santa Barbara 2020). It should also be noted that the COVID-19 pandemic has also resulted in unmeasurable opportunity costs where the county has had to address the pandemic rather than other planned County projects and programs.

The COVID-19 pandemic also presented a major strain on the Santa Barbara County healthcare system. In December 2020, intensive care unit (ICU) capacity for adults dropped to its lowest rate ever recorded at 6.7 percent of total beds available, well below the state's threshold of 15 percent capacity. While the reduced rate of ICU capacity was partially the result of increasing COVID-19 hospitalizations, a drop in the overall number of staffed beds in the county also severely decreased capacity. According to County Public Health spokeswoman Jackie Ruiz, a reevaluation of ICU beds by Cottage Hospital in Santa Barbara determined that only 45 of the hospital's 65 registered ICU beds were staffed and prepared to receive patients in December 2020 (Santa Maria Times 2021).

The County's pandemic influenza disease response plan, developed in 2007 through the coordination efforts of County departments and partner agencies, established a solid foundation for improved coordination and intervention by all participants. Implementation of this plan for an influenza pandemic or other public health emergency enables County departments to fulfill their roles and responsibilities through a coordinated strategy aimed at protecting the public's health and minimizing the impact on the economy and essential public services.

6.5.2 Cyber Threat

As described in Section 5.5.2, *Cyber Threat*, County government agencies have IT departments that thwart hundreds of cyber threats per year, according to members of the MAC and County OEM. The County enterprise gets hundreds to thousands of "scans" weekly in attempts to find weaknesses in the County's cyber environment, including attempts to breach the County's firewalls. The County's IT departments attempt to filter hundreds of daily malicious URLs (i.e., internet sites) both inbound and outbound. The County's IT logs indicate hundreds of daily infiltration attempts. Most jurisdictions have several levels of security in place, dependent upon the security levels of individuals and the geographical locations (onsite or remote).

Due to the existing level of cyber threat attempts in the county and as a society and government functions become ever more technologically dependent, this hazard is of increasing concern. In the event of a significant cyber-attack event, there could be a considerable impact on the population, built environment, lifeline infrastructure, environment, and the economy. A cyber threat can infiltrate many institutions including banking, medical, education, government, military, and communication and infrastructure systems. The majority of effective malicious cyber-activity has become web-based. The duration of a cyber-attack is dependent on the complexity of the attack, how widespread it is, how quickly the attack is detected, and the resources available to aid in restoring the system. A cyber-attack could be geared toward one organization, one type of infrastructure, and/or a specific geographical area. The affected area could range from small to large scale.

Cyber-attacks generated toward large corporations can negatively affect the economy. Globally, the cost of cyber-attack is anticipated to be $6 trillion by 2021 (County of Santa Barbara 2020). Attacks geared toward critical infrastructure and hospitals can result in the loss of life and the loss of basic needs, such as power and water, to the general public. Cyber-attacks can lead to the loss of operational capacity. For example, up to 147,000 patients of Scripps Health may have had personal information compromised in a cyber-attack that took place on May 1, 2021 (NBC 2021).

The County should also provide a central monitoring and response capability. The county provides the public with online guidance to avoid cyber risks and cyber-attacks on personal information, such as keeping software applications and operating systems up to date and limiting the personal information you share online (Ready 2021). Humans are the weakest link in a chain of cyber security; it remains difficult to continuously monitor and manage human/operator vulnerability. However, to address this weakness it is suggested that all jurisdictions in Santa Barbara County continue or develop a security training program that all employees are required to complete or renew annually.

6.5.3 Invasive Species

Historically, the county's terrestrial habitats were extremely vulnerable to invasive species, which spread widely from areas such as Europe (e.g., annual grasses), Africa (ice plants in dune habitats), and Australia (eucalyptus trees). These historic invasive species now dominate many terrestrial habitats. Today, the county's terrestrial and aquatic ecosystems and farmlands remain vulnerable to invasive species which can cause significant and enduring economic, human health, and environmental impacts. Impacted habitats include both terrestrial upland areas (e.g., grasslands and oak woodlands) and coastal marine, estuarine, and lake waters. However, it is unclear to what extent new terrestrial invasive species may be introduced, or if the threat is more related to the continued gradual spread of already present invasives (e.g., into disturbed habitats) or northward migration of such species due to climate change.

All of Santa Barbara County, including wildlands, are vulnerable to invasive plant species. The County supports dozens of non-native species, with different potential to increase the vulnerability of native ecosystems, farmland, and even urban environments. Invasive weeds can increase maintenance costs for agriculture, homes, and roads. The County's natural environment is vulnerable to the uncontrolled spread of invasive weeds, which could reduce biodiversity, increase fire risk, and result in crop loss. For example, eucalyptus trees are non-native to California yet widespread throughout Santa Barbara County. Eucalyptus trees have occupied many crucial habitats along streams such as at the Ellwood Mesa, More Mesa, more than 200 acres of historic native dunes and wetland habitats at the Santa Maria Airport, stretches of Orcutt Creek, and the Solomon Hills, and many areas throughout the north county. However, these trees are highly flammable and can worsen the spread and severity of wildfire events.

In partnership with Santa Barbara County Weed Management Area, the Cachuma Resource Conservation District provides weed-related services to the agricultural community to help identify invasive weeds such as eucalyptus trees and develop solutions to control them (County of Santa Barbara 2018). Some of these weeds are widespread, some are rare, some are limited to riparian areas, and most are limited to some ecological niche or habitat type (County of Santa Barbara

Agricultural Commissioner's Office 2011). For example, invasive wild oats (*Avena fatua*) occur in many of the County's moist lowland grasslands, drier upland grasslands, and open woodlands.

Although not currently an issue, the County's marine environments may become vulnerable to, invasive species due to commercial shipping causing the introduction of non-indigenous species to the Santa Barbara Channel. The transfer of ballast water from "source" to "destination" ports may make the County vulnerable to the movement of many organisms from one region to the next. Biofouling (i.e., the colonization of submerged surfaces by microorganisms) can affect the county's waterbodies along submerged or wetted hard surfaces, such as the Santa Barbara Harbor, Sterns Wharf, and Goleta Pier. Inland water bodies, including Lake Cachuma, are also vulnerable to the colonization of quagga and zebra mussels, and other aquatic invasive species. If introduced to Lake Cachuma and other freshwater bodies, invasive aquatic species, such as the quagga and zebra mussels, could impact recreational boating opportunities, agriculture, water conveyance, commercial and recreational fishing, marine transportation, and tourism, among other industries, all of which are essential to the county's economy. For example, when quagga and zebra mussels invade local waters, they clog public water intakes and pipes, increasing maintenance costs. They colonize pipes constricting flow and reducing the intake in heat exchangers, condensers, firefighting equipment, and air conditioning and cooling systems. Navigational and recreational boating in the county's lakes can also be affected by increased drag due to attached mussels. Small mussels can get into engine cooling systems causing overheating and damage. Navigational buoys have sunk because of the weight of attached mussels. Deterioration of dock pilings increases if encrusted with these mussels as well as corrosion of steel and concrete affecting structural integrity (U.S. Fish and Wildlife Service [USFWS] 2014). Prolific breeders, these mussels can overrun a lake causing hundreds of thousands of dollars' worth of damage annually. Rapid reproduction can negatively disrupt an ecosystem in a short amount of time. Once these mussels are introduced into a waterway, there is no way to fully eradicate the species.

To date, there are no indications that Santa Barbara County's waters, including Cachuma Lake, have been exposed to quagga or zebra mussels, and early detection monitoring has detected no mussels. Close monitoring of marine and lake vessels is performed in the county to prevent the colonization of marine invasive species in the county's water bodies. Due to the discovery of quagga mussels in Southern California in 2008, the County of Santa Barbara Parks Division staff enacted a protocol at Lake Cachuma to stop the spread of these highly destructive invasive species. For motorized boats to get onto Lake Cachuma the watercraft would be visually inspected, making sure the boat is clean, drained, and dry. After the boat passes the inspection, the vessel must enter a quarantine period of 30 days (County of Santa Barbara 2018a).

The Channel Islands National Marine Sanctuary is near a major metropolitan area, adjacent to commercial shipping lanes, and is frequented by commercial and recreational boaters; as such, the water body is vulnerable to introduced marine invasive species. The Channel Islands National Marine Sanctuary has identified several algal species that have proliferated the Chanel Islands and Santa Barbara harbors and could outcompete native species if they become widespread (NOAA 2007).

6.5.4 Civil Disturbance

As described in Section 5.5.4, *Civil Disturbance*, the county has been historically vulnerable to some degree of civil disturbance unrest, particularly within the densely populated college community of Isla Vista and within larger cities, causing a potential impact on the population, built environment, lifeline infrastructure, economy, and the environment. Recently, the county has seen a rise in protests and demonstrations for social change (e.g., anti-racism), indicating that this type of civil disturbance may occur in the future. For example, during a Black Lives Matter march in 2020 and an anti-COVID-19 vaccine demonstration in 2021, attendees marched from De la Guerra Plaza to Stearns Wharf. Similarly, Santa Maria City Hall has served as a gathering site for marches, as seen during the 2020 Black Lives Matter and 2021 Women's March before proceeding to Broadway and Main Street. While these protests themselves are peaceful, they can be followed by sporadic post-demonstration vandalism (e.g., spray-painting buildings) (The Independent 2020b).

As with the above-referenced events, such disturbances can be triggered by national or international events, or potentially local events that cause high levels of community concern. Based on historical occurrences, the county's vulnerability to the potential for such civil disturbances may be the highest in communities such as Isla Vista and the county's larger cities, and new events or unanticipated pollical developments could potentially trigger such civil disturbances.

While there are no reports of police brutality or excessive force in the county, clashes between protesters, rioters, and police have occurred in the past and are likely to occur again in the future. More than a dozen after-action evaluations looking at how police departments responded to the 2020 anti-racism demonstrations across the U.S. found that more often officers behaved aggressively, wearing riot gear and spraying tear gas or "less-lethal" projectiles in indiscriminate ways, appearing to target peaceful demonstrators and displaying little effort to de-escalate tensions. In places like Indianapolis and Philadelphia, reviewers found, the actions of the officers seemed to make things worse. These evaluations also offered a range of recommendations to improve outcomes in the future:

- Departments need to better work with community organizers, including enlisting activists to participate in training or consulting with civil rights attorneys on protest-management policies.
- Leaders need to develop more restrictive guidelines and better supervision of crowd control munitions, such as tear gas.
- Officers need more training to manage their emotions and aggressions as part of de-escalation strategies.

For decades, criminal justice experts have warned that warrior-like police tactics escalate conflict at protests instead of defusing it. Between 1967 and 1976, three federal commissions investigated protests and riots. All found that police wearing so-called "riot gear" or deploying military-style weapons and tear gas led to the same kind of violence police were supposed to prevent.

Future social or political unrest could ignite civil disturbances in the county. While civil disturbance is challenging to predict and can occur throughout the county, civil disorder in the county is primarily limited to urban centers and areas of higher population, such as the City of Santa Barbara, Isla Vista, and the City of Santa Maria. Historically, De la Guerra Plaza and the County Courthouse in downtown Santa Barbara have been gathering sites before or after peaceful protests and marches. Similarly, Santa Maria City Hall has served as a gathering site for marches.

Climate change may also result in increased civil disturbance over competition for natural resources. In this county, climate change-induced water shortages may increase competition for water between urban and agricultural users or between farming and natural resources preservation interests, although civil disturbances for such competition have not historically occurred. Climate change-induced migration may also indirectly affect the county as desperate people fleeing their homelands seek refuge in the United States, although it is unclear if such migration presents real potential for civil disturbances. While increases in large-scale wildfires, floods, and natural disasters such as the 2018 Montecito debris flows can displace thousands from the homes for extended periods with some potential for civil disturbance, this has not historically occurred after such events, and the potential for such disturbance may be related to the resiliency of the communities impacted and the duration of such displacement.

6.5.5 Agricultural Pests

Agricultural losses occur on an annual basis and are usually associated with severe weather events, including heavy rains, floods, hail, freeze (refer to Section 6.4, *Severe Weather and Storm Events*), and drought (refer to 6.3.2, *Drought & Water Shortage*). The State of California Multi-Hazard Mitigation Plan attributes most of the agricultural disasters statewide to drought, freeze, and insect infestations. Other agricultural hazards include fires, crop and livestock disease, noxious weeds, and contamination of animal food and water supplies.

The County of Santa Barbara's Pest Exclusion Program acts as the first line of defense to prevent pests and diseases that are potentially devastating to crops and livestock from becoming established in the state. Incoming plant material is inspected at mail carriers, nurseries, retailers, and homes for pests. In 2020, 217 pests were intercepted through this program, the most commonly intercepted species being the Lesser Snow Scale (*Pinnaspis strachani*) (County of Santa Barbara 2020).

In 2020, the California Department of Food and Agriculture confirmed the presence of Asian citrus psyllids (*Diaphorina citri),* Kuwayama, a harmful exotic insect pest, and a vector of Huanglongbing (HLB) disease, in Santa Barbara County. These pests present a significant and imminent threat to the natural environment, agriculture, and economy of California. Unabated, the establishment of HLB in California would harm the natural environment as commercial and residential citrus growers would be forced to increase pesticide use. Also, the establishment of HLB could lead to the enforcement of quarantine restrictions jeopardizing California's citrus exports, which are valued at over $800 million per year (California Department of Food and Agriculture 2020). In response to this infestation, the county ordered insecticide treatments within a 400-meter radius around the Asian citrus psyllids detection site.

Infestation of agriculture pests could impact crop yields, potentially destroying whole fields. Between 2017 and 2020, the only crop indemnity data related to agricultural pests and disease within the county was for 2019. In 2019, the RMA paid approximately $8,550 indemnities due to damage from insects and $9,663 indemnities due to damage from crop disease in Santa Barbara County (USDA RMA 2021).

A widespread infestation of livestock and crops could severely impact the economic base of the county and its communities employed by the agriculture industry. According to the USDA 2017 Census of Agriculture, Santa Barbara County has 1, 467 farms and 715,067 acres of farmland, which indicate a -8 percent change and +2 percent change, respectively, from the previous Census in 2012. The market value of products sold from Santa Barbara County farms in 2017 was approximately $1.52 billion, a 29 percent increase from 2012 to 2017 (USDA NASS 2017). In 2020, the county's fields, orchards, vineyards, and pastures produced over $1.8 billion of products (CDC/ATSDR 2021). While agricultural production in the county can enhance the economy and improve human health and ensure stable food prices in California and the U.S., certain habitats established for irrigation and agricultural output can also threaten human health by increasing the risk of vector-borne diseases (e.g., mosquitos, etc.). Rural communities, residing closest to these agricultural operations may also be most vulnerable to these diseases, as livestock pathogens are capable of infecting host species, which may include wildlife and human. Jobs could be negatively impacted during an agriculture emergency; jobs tangentially tied to the agriculture industry could also be affected.

According to *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*, rising temperatures and drought conditions due to climate change could also lead to increases in the occurrence and transport of pathogens in agricultural environments, which would increase the risk of food contamination and direct human exposure to pathogens and toxins (U.S. Global Change Research Program 2016). In turn, this would increase health risks and require greater vigilance in food safety practices and regulations. Disease can also exacerbate the impacts of other natural hazards, such as adverse weather. For example, dead branches can be broken by high winds, falling and causing harm to people.

Based on the SoVI data discussed in Section 4.1.3, *Environmental Justice and Social Vulnerability*, the areas with the highest level of social vulnerability in the county are located in the cities of Santa Maria and Guadalupe (and surrounding communities) and the Cuyama Valley. These communities as well as those working in the agricultural sector would likely be impacted by the effects of agricultural hazards.

Critical facilities in the county would not be directly impacted by agricultural pests or diseases; however, the food and agriculture industries are considered critical infrastructure in Santa Barbara County and California. Impacts to this infrastructure, such as farms, dairy operations, and processing facilities would have debilitating effects on food security, the economy, and public health and safety. Santa Barbara County farms and ranches, and the associated food processing facilities would be directly impacted economically by long-term disruptions in the food supply associated with crop losses due to agricultural pests and disease.

Pesticides, herbicides, and antibiotics can help crops resist pests and diseases and new cultivars of crops that are heat and drought-resistant can be planted. However, this may be expensive for farm and ranch owners and there may be hesitancy from the community even if these options were available. Agricultural operations may recover from decimated crops or livestock over time; however, if climate change hazards happen year after year, they may not be able to recover as well (Santa Barbara County Planning and Development Department 2021).

6.5.6 Terrorism

In the unlikelihood of a significant terrorism event, there could be a considerable impact on the population, built environment, lifeline infrastructure, environment, and the economy. Terrorism can occur throughout the entire county but due to its intended purpose would most likely happen in more populous urban areas where more devastation and panic would ensue, such as the City of Santa Barbara, Isla Vista, or the City of Santa Maria. Military operations at Vandenberg SFB could be a target for terrorism, though unlikely given the location of the SFB in a remote coastal location over 100 miles north of the Los Angeles metropolitan area. While terrorism events can occur anywhere within the county, certain professions, including but not limited to elected officials, police officers, teachers, and first responders may have an increased likelihood of being targeted.

6.5.7 Well Stimulation & Hydraulic Fracturing

As described in Section *5.5.7*, *Well Stimulation & Hydraulic Fracturing*, no fracking currently takes place in Santa Barbara County since oil-bearing formations in the county cannot be economically fracked. Therefore, the oil and gas industry in the county does not use the same level of hazardous chemicals for oil extraction. However, cyclic steaming, which is the oil extraction technique used in inland areas in the county, is associated with hazards such as impacts on air quality, water quality, and seismic safety. The primary hazard due to cyclic steaming is from seeps of oil and water (surface expressions), which can damage water quality and habitat. The development of these oil and gas facilities itself results in impacts on the natural landscape of undeveloped lands within the county. The more wells that are drilled, the higher the likelihood of some environmental damage, although the amount of damage is unknown (Cal OES 2018). For example, as described in Section *5.5.7*, oil seeps have historically occurred throughout the Orcutt Hill oilfield site, increasing in frequency since the beginning of Pacific Coast Energy Company (PCEC) steaming activities in 2007 as the result of over-injection of steam (water). Over 100 documented seeps were recorded at this property where oil from the Careaga formation came to the surface due to an imbalance of steam injection and oil extraction (Personal Comm. Errin Briggs, County Planning and Development 2021). While installation of seep cans limits the direct impacts of oil on the environment, installation of the cans and associated access roads have been documented to result in the removal of native vegetation and impacts on sensitive species. To date, the existing 99 seep can installations have resulted in the direct removal of 6.09 acres of sensitive habitat and approximately 360 individual Lompoc yerba santa (*Eriodictyon capitatum*), a federally listed endangered plant species (Santa Barbara County Planning Commission 2016).

Therefore, areas surrounding the Cat Canyon oilfield in the Santa Maria Valley and Orcutt Hill oilfield are at the highest risk in the county for exposure to water quality hazards and habitat degradation from cyclic steaming activities. Based on SoVI data, the areas at the highest risk of hazards from cycling steaming are also some of the most socially vulnerable areas in the county.

6.6 INFRASTRUCTURE FAILURES

6.6.1 Energy Shortage & Resiliency

Energy disruptions are considered a form of lifeline system failure. Electricity service is also highly vulnerable because it is highly dependent on electrical transmission lines and substations functioning properly. Disruptions can be the consequence of another hazard or can be a primary hazard, absent of an outside trigger. Much of the county's electrical lines are located in areas at risk for hazards (e.g., in high fire risk and flood hazard areas). For example, most of the electrical transmission lines that serve the South Coast planning region run through the Santa Ynez Mountains, making them susceptible to service disruption in the event of a wildfire or landslide (Santa Barbara County Planning and Development Department 2021).

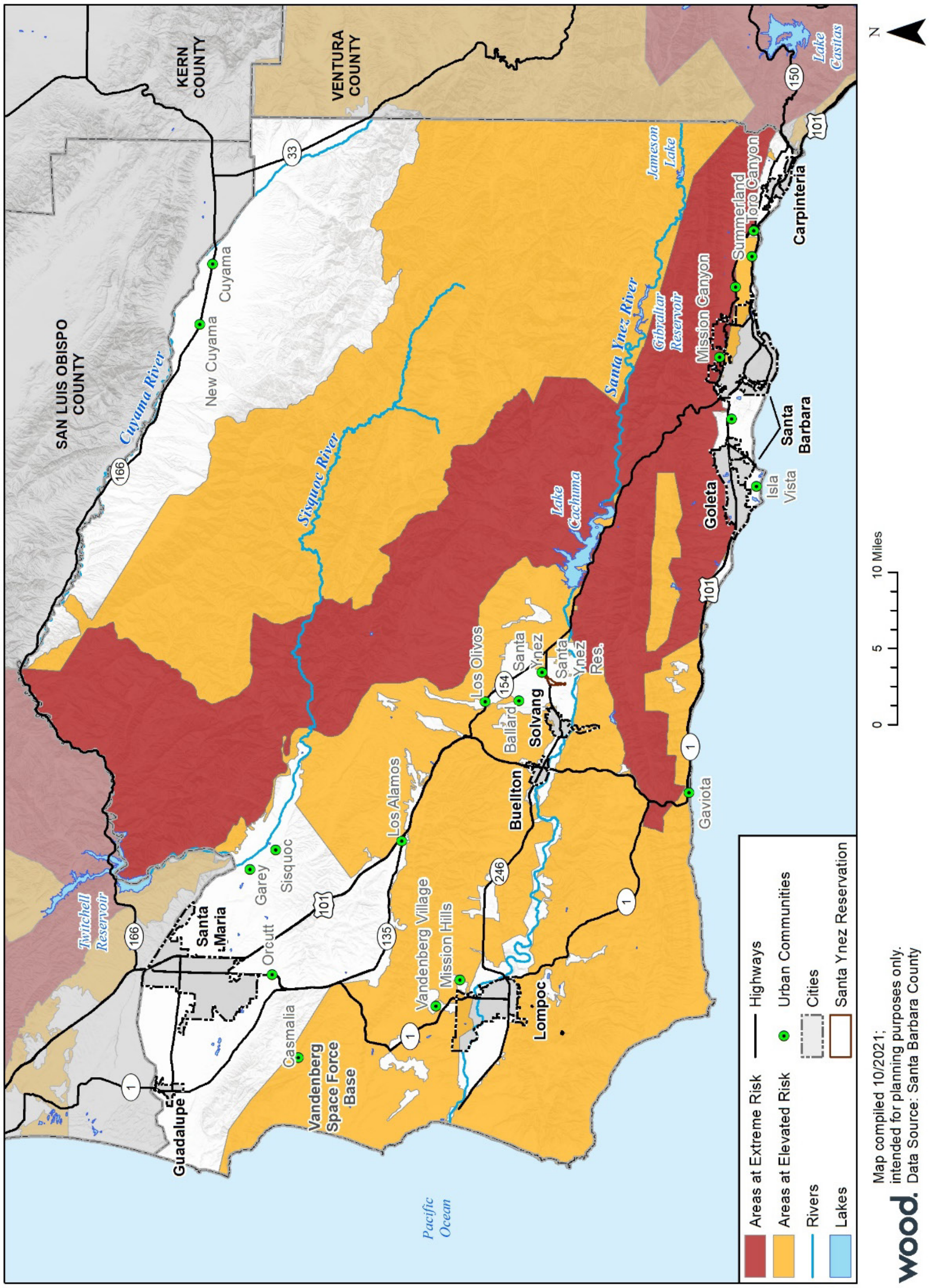
As described in Section 5.6.1, *Energy Shortage & Resiliency*, since the county lies on the border of the separate electric distribution system for Pacific Gas & Electric (PG&E) and Southern California Edison (SCE), a major interruption of service in the South Coast planning region would result in all service within the South Coast would be likely denied. Likewise, if there is a major interruption of service coming from the north, power north of Gaviota from the outage may be affected. As a result, disruptions to the few key transmission wires carrying this electricity are more impactful than in other locations and create low grid reliability.

Further, the existing transmission lines serving southern Santa Barbara County deliver electricity through a single set of transmission lines located on the north end of a mountain range and are vulnerable to severe weather or wildfire events. If this existing transmission network were to be disrupted, metered customers in southern Santa Barbara County would face extended blackouts, preventing the use of critical services such as electric medical devices, traffic lights, retail businesses, grocery stores, gas stations, ATMs, and banks.

Additionally, Santa Barbara County is vulnerable to power outages during PSPS, which would occur when investor-owned electric utilities, including PG&E and SCE, shut off the electric power to protect public safety during extreme weather conditions (refer to Section 6.3.1, *Wildfire*, Section 6.4.1, *Extreme Heat/Freeze,* and Section 6.4.2, *Windstorm*). In extreme heat conditions, increases in air conditioning use can stress and overload the grid, causing power outages and potential damage to electricity transmission lines and substations. During severe wind events, electricity transmission lines can be damaged or turned off by PG&E or SCE, causing widespread power outages and hardships for County residents. During a PSPS, all customers serviced by an affected circuit would have their power shut off, and such power outages could last multiple days depending on the severity of the weather and other factors (e.g., wildfire risk).

Power outages and communication system failures can directly harm the economy, government operations, and public safety, and hinder recovery efforts. As climate change increases the frequency and intensity of related wildfire and weather hazards, energy disruptions are likely to occur more frequently and last longer. The county continues to experience both population growth and weather cycles that contribute to a heavy demand for power. Predicted increases in heatwaves, as well as increasingly severe winter storms, would put greater strain on PG&E and SCE energy facilities in Santa Barbara County.

Figure 6-21. Areas at Risk of Public Safety Power Shutoff



Transportation may also be disrupted during a power outage for Amtrak as well as populations that use electric vehicles and therefore rely on electric vehicle charging stations.

6.6.2 Hazardous Materials Release

As described in Section 5.6.2, *Hazardous Materials Release*, the release of hazardous materials into the environment can cause a multitude of problems for the population, built environment, lifeline infrastructure, environment, and the economy. The impact of a fixed hazardous facility, such as a chemical processing facility is typically localized to the property where the incident occurs. The impact of a small spill (i.e., liquid spill) may also be limited to the extent of the spill and remediated if needed. Although these incidents can happen almost anywhere, certain areas of the county are at higher risk. Higher risk areas include transportation-related infrastructure, such as roadways and railways, as well as areas within a half-mile in either direction of designated hazardous materials routes. People and property in the vicinity of industrial facilities that use, store, and/or dispose of hazardous materials and/or waste are also at increased risk of impact. The locations and identity of facilities that store hazardous materials are reported to local and federal governments. Security measures at these facilities can be heightened. Incidences can occur during the production, storage, transportation, use, and/or disposal of hazardous materials and waste. Many facilities have their own hazardous materials guides and response plans, including transportation companies that transport hazardous materials.

Some of the most notable hazardous material sites in the county include various industrial sites within the cities of Lompoc, Goleta, Santa Barbara, Santa Maria, Vandenberg SFB, and oil processing facilities along the South Coast. In addition, the Casmalia Hazardous Waste Management Facility (also known as the "Casmalia Resources Superfund Site") is a contaminated hazardous waste dumping site. The dumping site is located in the North County near the small, unincorporated community of Casmalia and is a 252-acre inactive commercial hazardous waste treatment, storage, and disposal facility whose operations caused contaminated soil, soil vapor, surface water, sediment, and groundwater with hazardous chemicals (EPA 2021b).

Impacts of hazardous material incidents on critical facilities are most often limited to the area or facility where they occurred, such as at a transit station, airport, fire station, hospital, or railroad. However, they can cause long-term traffic delays and road closures resulting in major delays in the movement of goods and services. These incidents would be more severe if they result in traffic delays on road closures on any of the designated truck routes or hazardous materials routes in the county, including UPRR. These impacts can spread beyond the county to affect neighboring counties, or vice-versa. The primary economic impact of hazardous material incidents results in lost business, delayed deliveries, property damage, and potential contamination. Large and publicized hazardous material-related events can deter tourists and recreationists too. If incidents occur along major transportation corridors in the county, such as Highway 101, they can temporarily close routes and result in traffic delays affecting a significant portion of the county. Additionally, as described for vulnerabilities related to wildfire and flood, if a hazardous material incident occurs along and results in the closure of Highway 166, the Cuyama planning region would be virtually cut off from the rest of the county. Therefore, the effects of major transportation corridor closures could be significant.

While hazardous material incidents could take place anywhere across the county and could be unpredictable, those living near hazardous waste treatment, storage, and disposal facilities or along designated hazardous materials routes have the highest risk of exposure to hazardous materials. The clusters of EnviroStor and GeoTracker sites are shown in Figure 5-24. Based on a combination of the SoVI data presented and discussed in Section 4.1.3 and the presence of EnviroStor and GeoTracker facilities, the most vulnerable populations include the cities of Santa Barbara, Goleta, Lompoc, and Santa Maria, as well as around the community of Casmalia. In addition, agricultural farm workers are most vulnerable to pesticide exposure and other hazardous material incidents associated with the agricultural operation.

Communities can be at risk if certain chemicals or radioactive substances are used unsafely or released in harmful amounts into the environment. Hazardous materials incidents can cause injuries, hospitalizations, and even fatalities to people nearby. People living near hazardous facilities and along transportation routes may be at a higher risk of exposure, particularly those living or working downstream and downwind from such facilities. For example, a toxic spill or a release of an airborne chemical near a populated area can lead to significant evacuations and have a high potential for loss of life.

6.6.3 Dam Failure

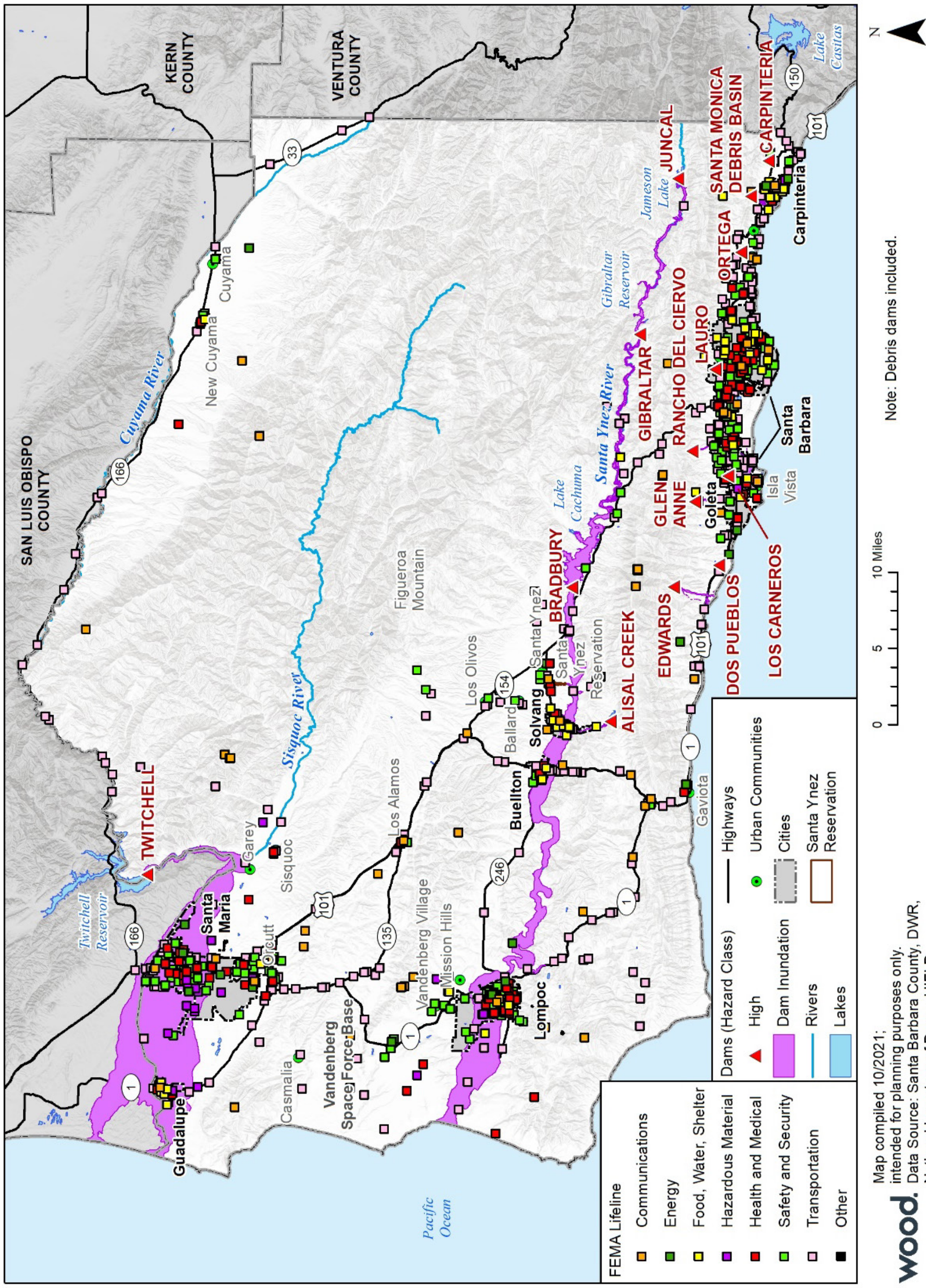
As seen during the failure of Sheffield Dam in 1925, dam failure has the potential to cause significant loss of life and property or environmental damage. Dam inundation may be caused by dam failure or overtopping (due to severe rains or snowmelt) or a levee failure that releases a large amount of water in a limited drainage basin. Dams may also fail as a result of structural damage caused by seismic events, erosion, structural design flaws, rapidly rising floodwater, landslides flowing into a reservoir, or malicious actions (Santa Barbara County Planning and Development Department 2015). A dam incident can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to dam failures is confined to the areas and populations subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the dam itself and associated revenues that accompany those functions.

As described in Section 5.6.3, *Dam Failure*, there are 14 dams in the county: Alisal Creek, Bradbury, Carpinteria, Dos Pueblos, Edwards Reservoir, Gibraltar, Glen Anne, Juncal, Lake Los Carneros, Lauro, Ortega, Rancho Del Ciervo, Santa Monica Debris Basin, and Twitchell (refer to Figure 5-25). All 14 dams in the county are identified by the DWR DSOD as high-hazard dams (Figure 5-25). Based on dam inundation data from the county, DWR, and National Inventory of Dams, Figure 6-22 displays the dam inundation areas by dam in the county overlayed with the county's critical facilities. The results of this analysis describe which critical facilities are located in the high hazard dam inundation area, as summarized in Table 6-68.

Table 6-68. Critical Facilities by Category in Dam Inundation Zones

	Critical Facility Category								
Dam Name	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Other	Total
Alisal Creek	--	--	1	--	--	--	--	--	1
Bradbury	2	2	17	2	17	20	27	3	90
Carpinteria	--	--	--	--	--	--	--	--	0
Dos Pueblos	--	--	--	--	--	--	--	--	0
Edwards Reservoir	--	--	--	--	--	--	--	--	0
Gibraltar	--	--	--	--	--	--	1	--	1
Glenn Annie	--	--	--	--	--	--	9	--	9
Juncal	--	--	--	--	--	--	1	--	1
Lake Los Carneros	--	--	--	--	--	--	--	--	0
Lauro	--	--	--	--	2	2	16	--	20
Ortega	--	--	--	--	--	--	--	--	0
Rancho Del Ciervo	--	--	--	--	--	--	--	--	0
Santa Monica Debris Basin	--	--	5	--	1	1	3	--	10
Twitchell	2	3	5	11	25	42	27	--	115
Total	**4**	**5**	**28**	**13**	**45**	**65**	**84**	**3**	**247**

Figure 6-22. Critical Facilities and Dam Failure Inundation Areas



There are 247 critical facilities within the dam inundation zones, worth over $88 million in building value. A majority of these critical facilities fall within the inundation extent of only two dams: Twitchell and Bradbury. Twitchell Dam has the most critical facilities within its inundation zone (115 facilities), and failure of this dam would inundate portions of the cities of Santa Maria and Guadalupe as well as Highway 1 with relatively little evacuation time. However, the failure of Bradbury Dam would also expose a large portion of the county's at-risk critical facilities (90 facilities) and populations in the communities of Cachuma Village, Solvang, Buellton, Lompoc, Lompoc Valley, and south Vandenberg SFB. Floodwaters from Bradbury Dam would affect areas across nearly the entire east to west perimeters of the county, along the Santa Ynez River Valley. It should also be noted that Juncal Dam and Gibraltar Dam are located upstream of Bradbury dam and therefore, failure of either dam may have cascading effects on the integrity of Bradbury Dam. For example, if Juncal Dam fails, the area downstream would be inundated with flood flows, which could affect the capacity of Gibraltar Dam. If this were to cause the failure of Gibraltar Dam, flood flows from Juncal and Gibraltar dams would inundate the Bradbury Dam, which may affect the ability of Bradbury Dam to hold its maximum capacity.

Although there are many dams within the densely populated South Coast planning region (i.e., Edwards, Dos Pueblos, Glen Anne, Los Carneros, Rancho Del Ciervo, Lauro, Ortega, Santa Monica Debris Basin, and Carpinteria) closer to larger clusters of critical facilities and residents, these dams are smaller, and inundation is expected to affect much fewer critical facilities than Twitchell and Bradbury dams. For example, the total number of critical facilities that would be inundated by these 9 South Coast dams is 39 facilities (Table 6-68). The failure of any of these dams would cause downstream flooding and would likely result in loss of life and property. The potential magnitude of a dam failure depends on the time of year and the base flow of the river when the failure occurs. During the winter months, when the river flows are higher, the impact on the area would be much greater and evacuation times even shorter.

Any critical asset located under the dam in an inundation area would be susceptible to the impacts of a dam failure. Of particular risk would be roads and bridges that could be vulnerable to washouts, further complicating response and recovery opportunities by cutting off impacted areas. For example, the failure of Bradbury Dam could inundate Highway 154, Highway 101, and SR 1, effectively cutting off the north and south county regions from each other. Thus, a dam failure event could be extremely damaging to inundated critical infrastructure and associated services. As shown in Table 6-68, 84 (34 percent) of the 247 total critical facilities located in dam inundation areas are transportation facilities, primarily consisting of bridges, as well as the Lompoc Airport.

In general, communities located below a high-hazard dam and along a waterway are potentially exposed to the impacts of a dam failure, with both lives and property at risk. Inundation maps that identify anticipated flooded areas (which may not coincide with known floodplains) are produced for all high hazard dams and are contained in the Emergency Action Plan (EAP) required for each dam. Parcel analysis was carried out with the latest datasets from the county as well as the assessor's office improvement values, to overlay each dam inundation layer with the parcels to arrive at total parcels exposed, loss estimates, and populations at risk. Table 6-69 summarizes the estimated losses calculated from tallying up the parcels' improved and content values. The Santa Barbara County Planning area has 28,825 improved parcels valued at over $13 billion and a population of 91,349 located within a dam inundation zone.

Table 6-69. Santa Barbara County at Risk to Dam Inundation Hazard by Jurisdiction Summary

Jurisdiction	Improved Parcel Count	Improved Value	Estimated Content Value	Total Value	Population
Buellton	837	$305,699,902	$224,679,113	$530,379,015	2,032
Carpinteria	358	$103,183,093	$53,454,864	$156,637,957	3
Goleta	31	$53,470,171	$53,888,240	$107,358,411	55
Guadalupe	1,957	$328,225,990	$193,781,187	$522,007,177	7,243
Lompoc	6,253	$1,520,738,811	$959,045,584	$2,479,784,395	17,163
Santa Barbara	1,224	$507,071,142	$301,565,481	$808,636,623	2,754
Santa Maria	17,620	$4,750,019,259	$3,215,214,404	$7,965,233,663	61,303
Solvang	159	$59,078,679	$32,996,045	$92,074,724	356
Unincorporated	386	$204,838,839	$177,304,373	$382,143,212	441
Total	**28,825**	**$7,832,325,886**	**$5,211,929,289**	**$13,044,255,175**	**91,349**

Persons located underneath or downstream of a dam are at risk of a dam failure, though the level of risk can be tempered by topography (specifically where populations are located within the inundation path of a dam), amount of water in the reservoir, and time of day of the breach. Injuries and fatalities can occur from debris, bodily injury, and drowning. Once a dam has breached, standing water presents all the same hazards to people as floodwater from other sources (refer to Section 6.3.4, *Flood*). People in the inundation area may need to be evacuated, cared for, and possibly permanently relocated. Impacts could include thousands of evacuations and likely hundreds of casualties, depending on the dam involved. Specific population impacts are noted in Table 6-69. An incident at the Twitchell Dam would likely put the most people at risk, followed by the Bradbury Dam. The inundation path of the Twitchell Dam would not only put the most people at risk but would also impact the cities of Santa Maria and Guadalupe. Both communities are among the areas with the highest ranking of overall social vulnerability in the county based on the SoVI data presented and discussed in Section 4.1.3. Public outreach and education on dam incidents as well as ensuring alert and warning systems are working properly should be focused on these areas.

6.6.4 Natural Gas Pipeline Rupture & Storage Facility Incident

As described in Section 5.6.4, no history of major natural gas pipeline or storage facility incidents has occurred in the county, though the Montecito debris flows of 2018 caused a gas rupture and explosion. No comprehensive statewide seismic hazard vulnerability inventory for pipeline networks exists in California. However, it can be assumed that any facility near a natural gas transmission pipeline is at risk. This risk is heightened if the facility is also located in an area of high seismicity, where multiple gas line failures and resulting fires can be expected (Cal OES 2018).

Compounding the potential risk is the age and gradual deterioration of the gas transmission system due to natural causes. Significant failure, including pipe breaks and explosions, can result in loss of life, injury, property damage, and environmental impacts. Causes of and contributors to pipeline failures include construction errors, material defects, internal and external corrosion, operational errors, control system malfunctions, outside force damage, subsidence, and seismicity. Growth in population, urbanization, and land development near transmission pipelines, together with the addition of new facilities to meet new demands, may increase the likelihood of pipeline damage due to human activity and the exposure of people and property to pipeline failures (Cal OES 2018).

In preparation for the CCVA, the Santa Barbara County Planning and Development Department met with SoCal Gas staff in July 2021 to discuss vulnerabilities in the county related to natural gas pipeline rupture and storage facility incidents. Additional infrastructure currently being updated and installed includes advanced meters that are read wirelessly and automated valves that can be turned on or off remotely during a hazardous event. SoCal Gas staff worked with the County Fire Department to shut down the natural gas system during the Montecito Debris Flow event and brought in hundreds of service staff to re-ignite stoves, water heaters, pool heaters, and other appliances during the recovery effort. SoCal Gas staff mentioned how the transmission and distribution lines are air- and watertight, usually underground, and therefore resilient to flooding and wildfire. The climate change hazards of most concern to SoCal Gas staff are those associated with ground movements, such as landslides and debris flows. However, at the time of discussion, SoCal Gas was in the process of installing a fiber optic monitoring system to detect earth and water movement for advanced notice to turn the pressure down or to shut off pipes in an emergency (Santa Barbara County Planning and Development Department 2021).

The Santa Barbara County Planning and Development Department, Petroleum Unit regulates onshore oil and gas activities within Santa Barbara County by performing annual inspections of onshore wells, facilities, pipelines, and other pertinent equipment throughout oil production leases. The Unit regulates onshore petroleum facilities and operations, including but not limited to, exploration (drilling), production, storage, processing, disposal, well plugging, and well abandonment to protect the health, safety, public welfare, physical environment, and natural resources of the county.

6.6.5 Train Accident

As described in Section 5.6.5, trains running through the county, and near Highway 101 in some areas, carry commuters as well as commodities, including hazardous materials, fuel (including oil), agriculture, meats, and non-consumables. Train accidents are generally localized, and the incidents result in limited impacts at the community level. However, a hazardous material incident on rails or roadways has the potential to damage and destroy habitat and built structures, harm people and wildlife, and shut down both rail and highway transportation routes where the rail line and Highway 101 are nearby. For example, in July 1991, a Southern Pacific freight train carrying hazardous chemicals derailed in the Ventura County coastal community of Seacliff. Hundreds of people--residents, surfers, and oil-facility workers--were evacuated near the tracks about eight miles north of Ventura because of concerns about toxic fumes (Pummer and Daunt 1991).

The risk of train accidents in the county is limited to areas immediately surrounding the two Amtrak routes that serve the county: the Pacific Surfliner and Coast Starlight. Within the county, the Pacific Surfliner hugs the Pacific Coastline from the southern border of the county through Vandenberg SFB, before turning east towards Casmalia and north through Guadalupe. The Coast Starlight follows the same route as the Pacific Surfliner within the boundary of Santa Barbara County (Amtrak 2021). Secondary impacts related to train accidents may include the shutdown of rail transportation and associated effects on commuting, transportation of goods, and the regional economy.

6.6.6 Aircraft Crash

As described in Section 5.6.6, here are five public airports in the county: Lompoc Airport, Santa Barbara Municipal Airport, Santa Maria Public Airport, Santa Ynez Airport, and New Cuyama Airport, which is closed indefinitely due to unsafe potholes and overgrown vegetation along the runway. The U.S. Air Force (USAF) operates military aircraft at Vandenberg SFB, which supports west coast launch activities for the USAF, Department of Defense (DoD), National Aeronautics and Space Administration (NASA), and other natural programs. Vandenberg SFB supports the processing and launch of a variety of aircraft vehicles including but not limited to ballistic missiles and planes (USAF 2021). Each airport maintains emergency response plans that are tested at regular intervals with local government response agencies under Federal Aviation Administration (FAA) regulations.

Areas near the ends of airport runways are characterized not only by extreme noise but also by a higher risk of airplane crashes and therefore are not suitable for urban land uses (Cal OES 2018). A major air accident that occurs in a heavily populated residential area can result in considerable loss of life and property. Therefore, aircraft accidents that may occur at Santa Barbara Airport or Santa Maria Airport would result in the highest exposure of people and structures to death, injury, or property damage. For reference, a 1986 airplane crash in the City of Cerritos, Los Angeles County resulted in 13 fatalities and 67 injuries as well as over $407.5 million in damages (Cal OES 2018).

Damage assessment and disaster relief efforts associated with an air accident would require support from other local governments, private organizations, and in certain instances, from the State and Federal governments. However, the county has defined Airport Approach Overlay Districts to regulate land uses within airport clear and approach zones, and each airport is required to maintain and update, as needed, an airport master plan consistent with the FAA, such as the Santa Barbara Airport Master Plan. While the potential for a crash is present, no major or unique risks to the environment or public are present or anticipated to occur from aircraft crashes in the county.

6.6.7 Oil Spill

As described in Section 5.6.7, oil spills can be caused by people making mistakes or being careless, equipment breaking down, natural disasters, and deliberate acts of terrorism, vandals, or illegal dumpers (Cal OES 2018). Vulnerabilities to oil spills vary for marine oil development and terrestrial oil development. Although oil development and production are heavily regulated in the County, past onshore and offshore spills demonstrate that even in a highly regulated environment, areas of the County with large-scale oil production remain potentially vulnerable to oil spills.

Oil spills originating from offshore oil platforms can create devastating and significant impacts on the economy and natural environment of Santa Barbara County. During an oil spill, the oil floats on saltwater and often floats on freshwater. Depending on the type of oil, oil can sink in freshwater but usually, oil spreads out across a large area and is called an oil slick. As the oil slick spreads and covers a larger area, it becomes thinner and is called an oil sheen (Cal OES 2018). Onshore oil spills result in similar impacts to surface waters, habitats, and wildlife. The environmental impacts from oil spills contribute to short- and long-term impacts on economic activities in areas affected by oil spills. Moratoriums may be temporarily imposed on fisheries, and tourism may decline in beach communities, resulting in economic hardship for individuals that are dependent on those industries for their livelihood and on the economic health of the community as exemplified by the 2015 Refugio Beach oil spill when over 100,000 gallons of crude oil were spilled, originating from an underground pipeline. The spill affected hundreds of fish, birds, marine mammals, and invertebrates. The spill also shut down fisheries, closed multiple beaches, and impacted recreational uses such as camping, non-commercial fishing, and beach visits (Cal OES 2018).

Wetlands and marshes of the county coastline are especially at risk for long-term significant impacts of oil spills. Marshes and wetlands provide critical habitat to a diverse range of species, including migratory birds and endangered plants and animals. Once oil enters a marsh below sediment levels it becomes near impossible to remove and has longstanding impacts on wildlife and ecosystems.

The County maintains a Petroleum Code to protect the health, safety, public welfare, physical environment, and natural resources of the county by the reasonable regulation of onshore petroleum facilities and operations, including but not limited to exploration; production; storage; processing; transportation; disposal; plugging and abandonment of wells; and operations and equipment accessory and incidental thereto (Santa Barbara County Planning and Development Department 2018a). The County has also established three mitigation funding programs to help mitigate significant impacts of offshore oil and gas development.

- The **Coastal Resource Enhancement Fund**, established in 1987, is a permit condition for major oil and gas projects offshore Santa Barbara County to help fund enhancements of coastal aesthetics, coastal recreation, coastal tourism, and environmentally sensitive coastal resources (Santa Barbara County Planning and Development Department 2018b).
- The County established the **Fisheries Enhancement Fund** in 1987 to help mitigate the significant impacts of offshore oil and gas development on commercial fisheries and the local commercial fishing industry. Such impacts include:
  - Preclusion from historic fishing grounds due to the presence of facilities or designated navigational lanes.
  - Altering the distribution and abundance of fisheries through oil spills, drilling mud discharges, noise and vibration.
  - Competition for onshore resources, such as harbors and piers.
  - Interference with certain fishing operations due to the marine vessel traffic associated with offshore oil and gas development.
    - Santa Barbara County has funded 24 programs or projects through the Fisheries Enhancement Fund (Santa Barbara County Planning and Development Department 2018c).
- The **Local Contingency Fund** has been designed to establish a quick and effective mechanism to aid commercial fishermen who have incurred gear loss or damage as a result of obstructions related to oil and gas development or production activities in both federal and state waters. There are two main functions of the fund:

- To act as a loan program to provide speedy equipment repair and/or replacement to fishermen while they wait for payment on Federal Contingency Fund claims for damage and/or loss that occurs as a result of Federal OCS development or production activities; and
- To reimburse fishermen for damage or loss of gear, not covered under the Federal Fund, which occurs in State waters due to Federal or State oil and gas development or production activities (Santa Barbara County Planning and Development Department 2018d).

Depending on the origin, size, and duration of the release, an oil spill can have serious impacts on air and water quality, public health, plant and animal habitat, and biological resources. Spill clean-up and remediation activities may cost millions of dollars and impacts can last for years (Cal OES 2018). In June 2021, natural resources trustee agencies consisting of the U.S. Department of Commerce represented by the NOAA; the U.S. Department of the Interior represented by the USFWS, National Park Service and Bureau of Land Management; the CDFW Office of Spill Prevention and Response; the California Department of Parks and Recreation; the California State Lands Commission; and the Regents of the University of California finalized a $22 million settlement toward resolving natural resource damage claims, restoring habitats and wildlife injured by oil, and compensating the public for lost recreational opportunities (NOAA 2021). The CDFW Office of Spill Prevention and Response (Oiled Wildlife Division) treats countless thousands of oiled birds and other wildlife annually. Oil slicks and spills (as well as naturally occurring oil plumes) have a devastating impact on wildlife (Cal OES 2018).

6.6.8 Levee Failure

As described in Section 5.6.8, the stability of levees is a function of several variables: water level change, ground shaking, and static loading. Water level changes can be due to peak flood levels or rapid draw-down; both are known to adversely affect the stability of levees. Ground shaking is a function of earthquakes in and around the levees but can occur up to 100 kilometers or more away and still affect levee performance [(see also, Section 6.2.1, *Earthquake (Ground shaking*)]. Static loading represents the nominal loading conditions that regularly exist, but documented levee failures have occurred with no adverse conditions other than static loading.

If the Santa Maria Valley Levee failed, the City of Santa Maria, including residential areas, business districts, and arable lands may be vulnerable to inundation with large volumes of water. If failure of this levee occurred during or following rain and heavy flow in the Santa Maria River, the incident could result in millions of dollars of property damage and crop damage, as well as fatalities and injuries of people working and living in the area. However, considering the Santa Maria Valley has undergone extensive recent engineering improvements by the U.S. Army Corps of Engineers (USACE) to reduce and avoid historical flooding events from a failure of the Santa Maria River Levee, there is a low probability of major levee failure. Although river flows as low as 8,000 cubic feet per second (cfs) (5-year flow) have caused significant damage to the levee in 1966,1969,1978, 1980, 1983, 1995, 1998, and 2001, levee improvement upgrades in 2009 and 2013 strengthened portions of the levee to reduce overall vulnerability to the City of Santa Maria and Santa Maria Valley from a failure of the Santa Maria River Levee (USACE 2009; 2013).

6.6.9 Radiological Accident

Minor radiological accidents are possible at several facilities in the county that utilize some form of uranium, including the UC Santa Barbara and regional hospitals. Therefore, areas surrounding these facilities as well as the major transportation routes used to transport the uranium (e.g., Highway 101) are at a greater risk of exposure to radioactive materials.

Additionally, as described in Section 5.6.9, when any nuclear facility is operated, a nuclear accident is possible. California's only operating nuclear power plant, the Diablo Canyon Nuclear Power Plant (NPP), is located in San Luis Obispo County adjacent to the north of Santa Barbara County. Jurisdictions located in the Emergency Planning Zones (1-12) for the plant include Avila Beach, the City of San Luis Obispo, Los Osos, Arroyo Grande, Grover Beach, Oceano, Pismo Beach, Shell Beach, Morro Bay, and Cayucos all within San Luis Obispo County (refer to Figure 5-34; San Luis Obispo County Office of Emergency Services 2021).

A significant radiological incident would have significant impacts on the population, built environment, lifeline infrastructure, environment, and the economy of the county. Determining the health effects of overexposure to radiation is complicated by the fact that there is a large range of variation in individual responses. The extent and severity of the radiation effect on body cells depend upon the number of radioactivity, the type of radiation, the exposure rate and time, and how close it is to the body. In general, the closer the source of ration is to the cells, the greater the possibility of injury (San Luis Obispo County Office of Emergency Services 2014). As such, communities in the northwest portion of the county, such as the cities of Guadalupe and Santa Maria, which are closer to the Diablo Canyon NPP, are at greater risk of radiological effects than communities in the eastern portion of the county (e.g., Cuyama) and South Coast planning region.

For the general public, the two basic protective actions which may be taken immediately to prevent or reduce exposure to a gaseous plume are evacuation and shelter in place. The actual radiation release or projected arrival of the radioactive plume would be key in the selection of the most effective protective response. If this lead time is relatively short and the release is not of long duration, the most effective protection may be afforded by a shelter in place with doors and windows tightly closed. Under such circumstances evacuation may not be effectively completed before the passage of the radioactive plume, resulting in less protection than that afforded by sheltering. Further details on the Emergency Planning Zones, as well as other information on hazards and vulnerabilities of the Diablo Canyon NPP, can be found in the *San Luis Obispo County/Cities Nuclear Power Plant Emergency Response Plan* (San Luis Obispo County Office of Emergency Services 2014).

The principal deterrent to an accident is prevention through correct design, construction, and operation, which assures the integrity of the reactor system is maintained. Protective systems are installed and are automatically activated to counteract the effects when any part of the reactor system fails. These protective systems cannot provide absolute certainty that a failure would not occur, nor if it does occur, that it would be effectively counteracted. However, the probability of a radiological emergency at an NPP is extremely low (San Luis Obispo County Office of Emergency Services 2014).

The Diablo Canyon NPP is scheduled to begin decommissioning in November 2024 and August 2025, and the process would take approximately 10 years; however, the site would remain a hazardous materials site for decades (PG&E 2021). Decommissioning must comply with the U.S. Nuclear Regulatory Committee's emergency and planning requirements to reduce the risk of a radiological accident. If, in the unanticipated event that the Diablo Canyon NPP's life extends beyond 2025, such risk of radiological accident may persist.

7.0 MITIGATION PLAN

This chapter describes the mitigation strategy process and mitigation action plan for the 2022 County of Santa Barbara (County) Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). It describes how the County and participating agencies set goals and objectives, considered a range of mitigation activities, and prepared a mitigation action implementation plan. The mitigation strategy reflects the results of the collaborative work of the Mitigation Advisory Committee (MAC) and Local Planning Teams (LPT). Section 7.5, *Mitigation Implementation Plan* is based on the updated planning process for the 2022 MJHMP, including the capability assessment (Chapter 4.0), hazard assessment (Chapter 5.0), vulnerability assessment (Chapter 6.0), and the mitigation goal setting and identification of mitigation actions conducted for this chapter. Taking all of these into consideration, the MAC developed the following overall mitigation strategy:

- **Communicate** the hazard information collected and analyzed through this planning process and recent experience with hazard mitigation so that the community better understands what can happen where and what they can do to be better prepared.
- **Use** existing rules, regulations, policies, and procedures.
- **Implement** the mitigation actions of this plan.
- **Monitor** multi-objective management opportunities so that funding opportunities may be shared and packaged and broader constituent support may be garnered.

7.1 MITIGATION GOALS AND OBJECTIVES

Over a series of meetings during the 2022 MJHMP update, the MAC and LPT reviewed the results of the hazard identification, vulnerability assessment, and capability assessment update. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the MAC to update planning goals and objectives and the ultimate mitigation strategy for Santa Barbara County. The MAC meetings involved collaborative discussions and exercises designed to achieve a collaborative mitigation strategy to address vulnerabilities in the county. As presented in Chapters 4.0 through 6.0, the MAC has evaluated resources, documented mitigation capabilities, and assessed hazards and vulnerabilities within Santa Barbara County. Further, the MAC has considered community input about the concerns, objectives, and needs for hazard mitigation, as described in Chapter 3.0.

As a result of this process, the MAC developed goals, objectives, and mitigation actions as described further herein. The goals are broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of the community, public and private;
- Are non-specific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Goals are stated without regard to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

As a key part of the 2022 MJHMP update, MAC members reviewed the goals and objectives from the 2017 plan and made the following adjustments to better reflect current conditions, community inputs, and agency concerns.

- Goal 1, focusing on development, was edited to remove specific plans from the language of the goal to encompass a broader variety of plans and codes to address both mandated components and issues of significant local concern (e.g., drought).
- Goal 2, focusing on critical facilities, was edited to be clearer and more concise. An objective was also added to specifically address updating technology and providing tools for community resiliency, which were not addressed in the 2017 goal.
- Goal 3, focusing on outreach, was updated to prioritize community outreach, add details on collaboration with other agencies and organizations, and specifically address outreach to vulnerable and disadvantaged communities.
- Goal 4 is new for the 2022 MJHMP to address urban and human-made hazards that were not addressed by the other goals.
- Goal 5 is new for the 2022 MJHMP to address climate change and resiliency based on feedback from the MAC, direction from 2022 – 2026 FEMA Strategic Plan, and public input indicating issues of significant local concern such as increased severity of drought and wildfires due to changing climate.

The updated goals and objectives of this plan are:

Goal 1: Ensure future development is resilient to known hazards.

Objective 1.A: Ensure development in known hazardous areas is limited or incorporates hazard-resistant design based on applicable plans, development standards, regulations, and programs.

Objective 1.B: Educate developers and decision-makers on design and construction techniques to minimize damage from hazards.

Goal 2: Protect people and community assets from hazards, including critical facilities, infrastructure, water, and public facilities.

Objective 2.A: Enhance the ability of community assets, particularly critical facilities, to withstand hazards.

Objective 2.B: Use the best available science and technology to better protect life and property.

Objective 2.C: Upgrade and replace aging critical facilities and infrastructure.

Objective 2.D: Ensure mitigation actions encompass vulnerable and disadvantaged communities to promote social equity.

Goal 3: Actively promote understanding, support, and funding for hazard mitigation by participating agencies and the public.

Objective 3.A: Engage, inform, and educate the public on tools and resources to improve community resilience to hazards, reduce vulnerability, and increase awareness and support of hazard mitigation activities.

Objective 3.B: Ensure effective outreach and communications to vulnerable and disadvantaged communities.

Objective 3.C: Increase awareness and encourage incorporation of hazard mitigation principles and practice among public, private, and nonprofit sectors, including all participating agencies.

Objective 3.D: Ensure interagency coordination and joint partnerships with the County, cities, state, tribal, and federal governments.

Objective 3.E: Continuously improve the County's capability and efficiency at administering pre- and post-disaster mitigation programs, including providing technical support to cities and special districts and providing support for implementing local mitigation plans.

Objective 3.F: Monitor and publicize the effectiveness of mitigation actions implemented countywide.

Objective 3.G: Position the County and participating agencies to apply for and receive grant funding from FEMA and other sources.

Goal 4: Minimize the risks to life and property associated with urban and human-caused hazards.

Objective 4.A: Minimize risks from biological hazards, including disease, invasive species, and agricultural pests.

Objective 4.B: Be prepared and respond to urban hazards, including terrorism, cyber threats, and civil disturbance.

Objective 4.C: Minimize risks from energy production, including hazardous oil and gas activities.

Goal 5: Prepare for, adapt to, and recover from, the impacts of climate change and ensure regional resiliency.

Objective 5.A: Use the best available climate science to implement hazard mitigation strategies in response to climate change.

Objective 5.B: Identify, assess, and prepare for the impacts of climate change.

Objective 5.C: Coordinate with the public, private, and nonprofit sectors to implement strategies to address regional hazards exacerbated by climate change.

Objective 5.D: Ensure climate change hazard mitigation addresses vulnerable and disadvantaged communities.

7.2 STATUS REVIEW & ASSESSMENT OF PREVIOUS MITIGATION ACTIONS

As part of the process of developing the mitigation actions included in this section, the MAC and LPT reviewed and considered a range of mitigation options, building from the 2017 MJHMP. During the 2022 MJHMP update, the County planning team reviewed the mitigation actions identified in the 2017 MJHMP, which include several strategies brought forward from the 2011 MJHMP, to determine the status of each mitigation action. The section below provides an overview and the status of each of these previous mitigation actions.

The actions from the 2017 MJHMP were revisited, re-evaluated, re-prioritized and in some cases discarded for inclusion in the 2022 MJHMP. All incomplete projects were reassessed by the 2022 MJHMP planning team and, if deemed necessary, are included in the Mitigation Implementation Plan (Section 7.5). During this process, several actions were noted as being deferred or canceled by the MAC and LPT. In many cases, alternative mitigation actions were developed by the MAC and LPT to replace outdated or inappropriate mitigation actions. See Table 7-1 for a description of mitigation alternatives considered and actions continued in the 2022 MJHMP. The exercise of considering the range of mitigation alternatives, canceling and replacing those measures that are no longer appropriate, and including priority measures to address the current vulnerability assessment in the county ensures that the Mitigation Plan is timely, relevant, and effective.

Many of the participating agencies have also successfully implemented previously identified actions from their respective hazard mitigation plans. Information on each jurisdiction's progress of previous mitigation actions, where applicable, and new actions developed can be found in each jurisdictional annex.

Table 7-1 provides a summary report for each mitigation action included in the former 2017 MJHMP, including the current status (e.g., completed, ongoing, not started, under construction, canceled) and whether the action has been included in the 2022 implementation plan provided in Section 7.5.

Table 7-1. Status of Previous Mitigation Actions

Project Number	Project Title	Project Description	Status	In 2022 Plan?
Previous Actions Included in the 2017 MJHMP				
2016-1	Establish Climate Change Task Force	**Phase I:** Establish a multi-jurisdictional Climate Change Task Force. **Phase II:** Maintain Task Force to 1) Assess vulnerability to climate change 2) Monitor climate change conditions 3) Forecast short-term and long-term impacts 4) Develop related mitigation projects and programs.	Phase I Completed, Phase II Not Started	X
2016-2	Guadalupe Levee Project	Study the feasibility and the benefits of building a Levee system adjacent to the city of Guadalupe to prevent chronic flooding.	Not Started	X

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
2016-3	HWY 166 Drainage Project	Improve drainage along both sides of Hwy 166 in the City of Guadalupe to mitigate chronic flooding of the roadway.	Under Construction	
2016-4	Ongoing Wildfire Education Campaign	The "Ready! Set! Go!" Campaign was launched in May of 2009. This campaign is a new approach to educating Southern California residents about the year-round threat of wildfire. This public education program seeks to gain active public involvement in reducing life and property loss caused by wildfires. The program was developed by agencies in California Regional Mutual Aid Regions 1 and 6 to convey a unified message. The program is designed to be used by any agency and can be modified to meet a specific jurisdiction's needs. This mitigation action is ongoing to continually update education materials and provide educational programs to the public on an annual basis.	Ongoing	X
2016-5	Enhance Fire Weather Forecasting Program	The current fire weather program is based on the U.S. Forest Service system, which includes only 4 remote automated weather stations throughout the county. The stations are in areas that are not representative of the micro-climates that exist within the county. A larger and better network would allow the county to focus fire prevention efforts from year to year in the most accurate and threatened locations. • Acquire 7 permanent and 4 portable automated fire weather stations. The County Fire Department purchased and installed 3 permanent Remote Automatic Weather Stations (RAWS) in 2014/2015. They are located at San Marcos Pass, Refugio Pass, and Tepusquet. Four additional units are proposed for Carpinteria Foothills, Gaviota, Santa Ynez Valley, and Cuyama. The County Fire Department has two portable RAWS that need to be replaced due to age and legacy technology. • Site the stations at optimum locations throughout the County, with the flexibility of moving the portables on an annual basis. Cost is anticipated to be approximately $110,000 for 4 new permanent stations and two portables, and a budget of approximately $4,000 per year for maintenance will be needed. With more accurate forecasting, limited resources could be applied to more targeted locations for prevention and operational activities resulting in significant cost savings and likely losses avoided due to prevention activities.	Completed; County Fire Department intends to continue implementing this program through 2022 MJHMP	X
2016-6	Fire Emergency Communications Center (ECC) Facility	Build second Fire ECC in Battalion 2. This would provide redundancy in the event that the existing South Coast combined Sherriff/Fire ECC is compromised by a natural disaster. The existing South Coast ECC is located in a High Fire Hazard area and was evacuated during the 1990 Paint Fire. Adding a dedicated Fire ECC in the north or central county would allow	Canceled. In October 2019, the County Board of Supervisors voted	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		redundancy in the event of a disaster that compromised one facility. Personnel could be crossed trained to handle both Fire and Law duties as needed.	instead to expand emergency communications at the existing EOC on the South Coast. This expansion is underway in 2022.	
2016-7	South Coast Foothill Fuel Break	Plan and implement the completion of a community defensible space fuel break along the foothills of the Santa Ynez Mountains from the Ventura County line to Tecolote Canyon west of Goleta City.	Underway. Approximately 75% complete as of 1/1/2022	X
2016-8	East Side Storm Drain Outlet reconstruction, Santa Barbara City	Reconstruction of the existing box culvert at the Ocean, installation of a new Tidal Gate. This project was completed by the City of Santa Barbara in 2020 (County Flood Control and Water Conservation District [Flood Control District]).	Completed	
2016-9	Romero Creek Capacity Improvements, Montecito	Improve the capacity of the existing facilities. The project consists of widening the channel from 30 feet and 18 feet currently, to 74 feet.	Not Started	X
2016-10	Oak Creek Capacity Improvements, Montecito	Improve the capacity of the existing facilities. This project will replace a 14-foot-wide concrete-lined channel from the Ocean to the UPRR; by the acquisition of two parcels. This would also necessitate the replacement of a private bridge.	Not Started	X
2016-11	San Ysidro Creek Capacity Improvements, Montecito	Improve the capacity of the existing facilities. That will include the construction of a 70-foot-wide channel in the lower section and a 48-foot-wide channel in the upper section of the creek; acquisition of one lot and easements on the other lots.	Not Started	X
2016-12	Montecito Creek Channel Improvements, Montecito	Improve the capacity of the existing facilities. That will include the construction of a 70-foot-wide channel in the lower section and a 48-foot-wide channel in the upper section of the creek; acquisition of one lot and easements on the other lots. The study report for this project was completed in the 2018 calendar year.	Study Report Completed, Construction Not Started	X
2016-13	North Ave Storm Drain Improvements, East Side Lompoc	This project is the future second phase and will construct a 30" and 24" storm drain with 4 catch basins; replace the concrete sidewalk, curb, and gutter. The project is located at the intersection of "H" Street and North Ave. This project was completed in the summer of 2019.	Completed	
2016-14	Cebada Canyon Channel Improvements, Lompoc Valley	This project is located in the vicinity of McLaughlin Road. The project will reconstruct a portion of the existing concrete-lined rectangular channel.	Not Started	X

Table 7-1. Status of Previous Mitigation Measures (Continued)

<table>
<tr><th>Project Number</th><th>Project Title</th><th>Project Description</th><th>Status</th><th>In 2022 Plan?</th></tr>
<tr><td>2016-15</td><td>Sycamore Canyon Master Drainage Plan, Santa Barbara</td><td>This project is located along Sycamore Creek from the Pacific Ocean to the Five Points roundabout. The Master Drainage Plan will identify a project that will widen the channel to improve conveyance capacity. The study report for this project was completed in 2018.</td><td>Study Report Completed, Construction Not Started</td><td>X</td></tr>
<tr><td>2016-16</td><td>Mission Canyon Master Drainage Plan, Santa Barbara</td><td>This project will develop a Master Drainage Plan for the Mission Canyon area.</td><td>Completed. The study report was completed in 2018. No future projects were identified from this study</td><td></td></tr>
<tr><td>2016-17</td><td>San Pedro Creek Fish Passage, Goleta</td><td>This project will modify the existing concrete-lined channel to accommodate fish passage in the Reach between Avenida Gorrion and Calle Real.</td><td>Not Started</td><td>X</td></tr>
<tr><td>2016-18</td><td>Blosser Basin, Santa Maria</td><td>This project consists of either constructing a pipeline or installing a pipe to drain the runoff from the basin.</td><td>Not Started</td><td>X</td></tr>
<tr><td>2016-19</td><td>Bradley Channel Relining, Santa Maria</td><td rowspan="2">2016-19 and 2016-20 were combined into one project and will be constructed in phases.
Phase I: Phase I consists of improving sections of the Bradley Flood Control Channel in the City of Santa Maria. One section is approximately 1,750 linear feet of an earthen channel located between Highway 101 and State Route 135 that will be lined with a concrete trapezoidal channel. The second section is approximately 960 linear feet of an earthen channel located between East Donovan Road and Magellan Drive which will also be lined with a concrete trapezoidal channel. Each year, maintenance staff removes debris and sediment deposits from the channel bottom and obstructive vegetation along the banks of the unlined channels to maintain channel capacity and reduce flood hazards. Completion of this project will minimize the flood hazard to adjacent properties. This project will be funded by the Santa Maria Flood Zone. Since this project is an improvement to an existing facility, no additional impacts are anticipated.
Phase II: Phase II of this project will reconstruct the existing concrete-lined Bradley Channel between Jones St., and Main St. in the City of Santa Maria. The existing channel is in poor condition and has undergone numerous point repairs by County Flood Control District staff. Damage to the channel is likely the result of its age. This project will reconstruct the channel to an updated engineering standard which will reduce the risk of future structural failure. Since this portion of the project is an improvement to an existing facility, no additional impacts are anticipated.</td><td rowspan="2">Not Started</td><td rowspan="2">X</td></tr>
<tr><td>2016-20</td><td>Bradley Channel Improvements, Santa Maria</td></tr>
</table>

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
2016-21	Maria Ygnacio East Debris Basin Modification, Goleta	This project will modify the existing basin: will include the removal of two berms currently blocking the old creek, re-grading of creek banks, and native plants restoration.	Complete. The construction phase was completed in 2019. The environmental monitoring work is still ongoing	
2016-22	Maria Ygnacio Main Debris Basin Modification, Goleta	This project will modify the existing basin: will include the removal of two berms currently blocking the old creek, re-grading of creek banks, and native plants restoration.	Complete. The construction phase was completed in 2019. The environmental monitoring work is still ongoing.	
2016-23	San Ysidro Debris Basin Modification, Montecito area	This project will modify the San Ysidro Creek Debris Basin. This basin is located in Montecito. The project will modify the earthen-filled-grouted rock rip-rap dam embankment with an engineered outlet control structure to capture large-scale debris and facilitate Southern California steelhead passage.	Not started	X
2016-24	Cold Springs Debris Basin Modification, Montecito area	The project will modify the earthen-filled grouted rock rip-rap dam embankment with an engineered outlet control structure to capture large-scale debris and facilitate Southern California steelhead passage.	Ongoing. Phase I: The "Cold Springs Basin Expansion" was completed in September of 2020. Phase II: The "Cold Springs Basin Modification" is anticipated for construction in 2023	X
2016-25	Rattlesnake Debris Basin Modification, Upper Santa Barbara	This project will either remove or modify the existing basin, to improve the fish passage; will include grading and native plants restoration.	Not started	X
2016-26	Faraday Storm Drain, Santa Ynez	This project consists of acquiring easements and constructing ~1920 feet of storm drain, west of Faraday St., between Olive St. and Pine St. in Santa	Completed. This project was	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		Ynez. This future project will reduce the flooding during rain events.	completed in May of 2018.	
2016-27	Unit II Channel Improvements, Santa Maria	This project is intended to increase the hydraulic capacity of the existing channel by realigning and removing a sharp S-curve, widening approximately 5,000 linear feet of the channel. The project will require real property acquisition. The improvements will provide additional flood protection to the adjacent farmland.	Completed. This project was completed in August of 2018.	
2016-28	Airport Ditch Lining, Orcutt	This project will replace a portion of the existing earthen-lined ditch with concrete lining or a combination of storm drain/open channel. The project is located along Skyway Drive, in Santa Maria. The project will reduce erosion and deposition in downstream reaches that subsequently require cleaning	Completed. This project was completed in December of 2017.	
2016-29	Stockpile Area-South Coast	This project consists of obtaining land on the South Coast for use as a stockpile by Flood Control Maintenance. This area will be used to temporarily stockpile materials cleared out of channels and basins during yearly or emergency maintenance. The materials will then be disposed of by contractors when they need fill material for construction projects.	Ongoing	X
2016-30	Implementation of County Energy and Climate Action Plan	Implement County Energy and Climate Action Plan (ECAP) by 1) Conducting annual monitoring and reporting of progress toward ECAP goals; 2) Updating baseline data for emissions, etc.; 3) Continuing to develop partnerships with community groups that support ECAP implementation.	Completed. In May 2015, the County adopted an ECAP to reduce GHG emissions to 15 percent below baseline levels (2007) by 2020. The ECAP sunset in 2020 and the County Community Services Department, Sustainability Division will be providing a final report to the Board of Supervisors in early 2022.	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
2016-31	Critical Infrastructure Threat Assessment ID Project	Currently, there is not a countywide agreed-upon list of Critical or Essential Facilities. While there are several lists of Critical and Essential Facilities, the criteria are not standardized. Additionally, the list of Critical and Essential Facilities lacks the necessary meta data (i.e., construction type, elevation level, replacement value, content cost) that would be beneficial to assess the risk of threats and hazards. Because there is not a comprehensive list of Critical or Essential Facilities, the HMP utilized the Hazus default data. While the Hazus default data provided better insight into the earthquake and flood risk, the assumptions (i.e., structural characteristics of building) do not adequately reflect the true vulnerabilities of the facilities and/or the community. To remedy this, Santa Barbara County is proposing to create a comprehensive Critical or Essential Facilities List and utilize it in Hazus and upload the information into the secure IP Gateway portal.	Canceled. This action is still needed and has been revised and included in Section 7.5, *Mitigation Implementation Plan*	X
2016-32	Establish Drought Task Force	Establish and maintain a multi-jurisdictional Drought Task Force to 1) Assess vulnerability to drought risk; 2) Monitor drought conditions; 3) Monitor water supply; 4) Plan for drought; 5) Develop related mitigation projects and programs.	Ongoing	X
2016-33	Retrofit Water Supply System	Improve water supply and delivery systems to save water through actions such as 1) Design water delivery systems to accommodate drought events; 2) Develop new or upgrade existing water delivery systems into and out of Lake Cachuma.	Ongoing	X
2016-34	Assess and Mitigate Structure Ignition Vulnerabilities	Identify the most vulnerable homes and communities, based on structural characteristics that make them vulnerable to ignition during wildfires. Educate the public about the need to assess and mitigate their vulnerabilities to home loss, including the potential for grant funding to carry out mitigation activities.	Ongoing. Will be incorporated into the Regional Wildfire Mitigation Program (RWMP)	X
Previous Actions from the 2011 Mitigation Plan included in the 2017 MJHMP				
2011-1	Tecolote Tunnel Rebuild (Otherwise known as the Modified Upper Reach Reliability Project [MURRP])	This project provides a redundant pipeline from the South Portal of the Tecolote Tunnel to the Corona Del Mar Water Treatment Plant to increase the operational flexibility, reliability, and capacity of the South Coast Conduit. The project provides 80 percent of the potable water to the south coast. **Phase I** of the MURRP was completed in 2012, including a 48-inch diameter pipeline from the South Portal of the Tecolote Tunnel to the Phase I endpoint. **Phase II** would finish the project by installing approximately 10,000 additional linear feet from the Phase I endpoint to the Corona Del Mar Water Treatment Plant. As stated, the project would increase the operational flexibility, reliability, and capacity of	Phase I Completed, Phase II Canceled	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		the South Coast Conduit in the upper reach. Phase II is yet to be completed.		
2011-2	Seismic Retrofit of 14 County Courthouse Facilities	Phase I and Phase II Seismic Analysis was completed. Buildings with a rating of 4 or higher were seismically retrofit for a total of 3 out of the 14 courthouse buildings. Hazard Mitigation Grant Program funding from FEMA and matching funds from the Courts were used.	Completed	
2011-3	Inventory of Un-reinforced Masonry Structures	Deferred from 2004 MJHMP. P&D's County Building Official worked on this project. General Services has supplied a list of County-owned unreinforced masonry structures that are in the unincorporated area of the County.	Completed	
2011-4	Bradley Channel Improvements,	Refer to 2016-20.	Not Started, 3 projects combined into 1	X
2011-5	'A' Street Basin	Located in the southwest portion of Santa Maria just west of Betteravia Street the 'A' Street Basin gathers debris from residents and business/s in the surrounding area. After the December 2010 flood, much of the concrete-lined spillway is cracked (not because of the 2010 flood but normal wear and tear, the floods added extra materials that made the situation of replacement necessary. Additionally, the current capacity needs to be increased as development in the area has added additional run-off into the basin. The basin measures approximately 15 feet deep X 40 feet across X 10 feet high, the size would be doubled.	Completed	
2011-6	Unit II Ditch Improvements	Located in North Santa Maria alongside the Levee Unit 11 "Tailwater" Ditch is washing out due to the extensive rains and needs to be re-hydro seeded and with new plants and seeding with the hillside re- compacted approximately 15,000 feet long X 30 feet down to 10 feet down in various locations. Basically, reshaping the ditch and seeding along with netting the hillside. Costs approximately $50,000 (this project would be grouped with another like project concerning cost to make $100,000). If the Ditch is not regularly maintained, then the Levee would be in jeopardy and flooding would occur damaging 200 to 400 residents in N. Santa Maria along with freeway stoppage due to mud and debris.	Completed	
2011-7	Laguna County Sanitation District Earthquake Retrofit Project 1	The Laguna County Sanitation District is a county sanitation district formed in 1958 under the county sanitation district act (Section 4700 et seq of the California Health & Safety Code). The District is a dependent special district with the County Board of Supervisors acting as its ex-officio board of directors. The District's reclamation plant treats wastewater collected from the unincorporated community of Orcutt and unincorporated portions of Santa Maria, which is	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		primarily domestic with small commercial contributions. The plant is located in proximity to known earthquake faults. The proximity to Orcutt (Solomon) Creek also contributes to high ground water conditions. Recent data indicates that the closest active fault is the Casmalia-Orcutt fault 2 miles away with a maximum credible event of 7.5. For reference, the San Simeon Earthquake on December 22, 2003, caused minor damage to the plant, was approximately 65 miles away, and was a magnitude of 6.5. Earthquake impacts could include damage to structures, piping, and equipment. Center baffles are fiberglass and not compatible with the lateral movement of water during earthquakes. • Replace existing baffles with stainless steel or other products made to sustain greater lateral forces due to ground and water movement. • Upgrade connections to match the new baffle material. • Upgrade existing secondary clarifier center baffles.		
2011-8	Laguna County Sanitation District Earthquake Retrofit/Analysis Project 2	The secondary digester (original primary digester) was constructed in 1959 and the primary digester was constructed in 1974. Today, revised seismic standards exist, and the impact and proximity of earthquake faults have provided new information on seismic threats. It is unknown how stable these facilities are under lateral loadings associated with an earthquake. Tasks include: • Commission a structural analysis of the digesters; • Implement mitigation measures.	Canceled	
2011-9	Seismic Safety and Mitigation Outreach and Education	Develop comprehensive earthquake awareness and outreach programs concentrating on the following areas: • Understanding of Risk • Understanding of Retrofit Actions, Mitigation, and Construction Techniques • Overview of grant funding programs available to assist Target training to the following audiences: • Owners of un-reinforced masonry buildings • Contractors • The Business Community • County and City employees with mitigation, construction, and development related job duties	Canceled	
2011-10	Laguna County Sanitation District Flood	The Laguna County Sanitation District is a county sanitation district formed in 1958 under the county sanitation district act (Section 4700 et seq of the California Health & Safety Code). The District is a	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
	Analysis and Protection	dependent special district with the County Board of Supervisors acting as its ex-officio board of directors. The District's reclamation plant treats wastewater collected from the unincorporated community of Orcutt and unincorporated portions of Santa Maria, which is primarily domestic with small commercial contributions. The plant is located in the proximity of known earthquake faults. The proximity to Orcutt (Solomon) Creek also contributes to high ground water conditions. The plant is located adjacent to the Orcutt Creek flood plain. FEMA maps show the plant to be located in Zone-A, areas subject to a 100-year flood. However, further reports indicate the plant site to be just out of most 100-year flood reaches. Actual flood waters have breached the adjacent creek and washed around the plant site causing damage to the access road to the plant. Therefore, flood damage is possible. The plant, as with most wastewater plants, was constructed downstream of its collection systems as a way to economically transport wastewater to the plant by gravity. This generally results in the placement of trunk collector lines and wastewater plants near major water courses since water courses follow lower-lying areas. At the time the plant was constructed, regulations for development within potential floodways did not exist, as FEMA maps and flood impacts from development were not available until 1979. However, to date, a comprehensive flood study has not been conducted. Potential damage includes sediment deposition, flooding, and washouts of all below-grade facilities. • Commission flood studies and implement recommended corrective measures such as levee construction and drainage improvements. • Implement recommendations of the study. The project was completed in September 2020.		
2011-11	Evaluate Expansion of Flood Warning System	The County will evaluate expanding the flood warning system. The ALERT system is located throughout the County, but most areas that experience flash flooding events are difficult to predict. The County will evaluate ways to disseminate warning information to the public (i.e., Reverse 911). • Explore a linking the flood warning system, critical facility, and Repetitive Loss audit information to instruct homeowners on what proper actions to take to protect their property will be examined. • Create a short report detailing alternatives, feasibility, and costs for achieving this strategy • Commission flood studies and implement recommended corrective measures such as levee construction and drainage improvements. • Implement recommendations of the study.	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
2011-12	GIS Multi-Hazard Disaster Management Information System	The County is developing a GIS system for managing information related to hazards. Goleta would like to expand its GIS capability and capacity to feed data related to vulnerability analysis and mapping, future disaster damage, and mitigation projects into the County's system. By enhancing GIS capabilities, Goleta will also be better positioned to use applications such as FEMA's Hazus software during updates to this plan. The system envisioned would be the basis for monitoring progress, updating, and continuously improving the quality of this document. The following activities will be conducted to develop, implement and maintain the system: • Procure the appropriate hardware and software needed to design and implement the system • Identify dedicated staff and associated funding • Establish an inter-departmental committee to design the scope of the system • Coordinate with the county to identify ways to develop parallel systems in a way that Goleta's system could eventually feed the county system for a centralized disaster data clearinghouse • Design a web-based interface application that would be made available to county and city users. • Develop a brief data stewardship plan • Identify potential integration (multi-beneficial uses) between the system and Hazus and DFRIM production for map modernization	Not Started. This action has been revised and included in Section 7.5, *Mitigation Implementation Plan*	X
2011-13	Old San Marcos Road Geotechnical Survey of Slope Stability	Old San Marcos Road is a well-used local access road that serves residential and commercial needs, as well as is used as an alternative and important transportation route between State Highway 154 and Cathedral Oaks Road and State Route 192. This road is an important route for emergency service vehicles and State Department of Transportation vehicles to maintain and clear (slide) debris from State Highway 154. During the declared Storm Disaster of 1998, this road was the primary access route for maintenance and construction vehicles accessing a large landslide problem. San Marcos Road is also a key fire suppression and maintenance accessway and is located in a very high fire-threat area. This is an area of reoccurring slope instability, with long stretches of road actively subject to movement. To better evaluate the problem, the County will undertake a Geotechnical Survey of Slope Stability of Old San Marcos Road to determine the extent of instability, and appropriate long-term solutions. Phase II of this project would implement analysis and findings into a design plan for a permanent fix and enable the construction phase.	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
2011-14	South County Geotechnical Survey of Slope Stability	There are numerous locations throughout the County where slope stability problems are reoccurring, causing disaster damage to roadways, public safety access issues, and potential economic losses from disruption of commerce. To better evaluate the problem, the County will undertake a Geotechnical Survey of the Slope Stability of Existing Roadways to determine appropriate long-term solutions. Explore strategies to determine cost-effective solutions to recognized geologic erosion hazards affecting County-maintained roadways and structures in the southern half of the County. Particular emphasis will be placed on areas of reoccurring landslides. Due to the unique topography and climate in the County, numerous portions of the County-maintained roadway system are within areas that are prone to landslide damage.	Ongoing	X
2011-15	North County Geotechnical Survey of Slope Stability	There are numerous locations throughout the County where slope stability problems are reoccurring, causing disaster damage to roadways, public safety access issues, and potential economic losses from disruption of commerce. To better evaluate the problem, the County will undertake a Geotechnical Survey of the Slope Stability of Existing Roadways to determine appropriate long-term solutions. Explore strategies to determine cost-effective solutions to recognized geologic erosion hazards affecting County-maintained roadways and structures in the southern half of the County. Particular emphasis will be placed on areas of reoccurring landslides. Due to the unique topography and climate here in the County, numerous portions of the County-maintained roadway system are within areas that are prone to landslide damage.	Ongoing	X
2011-16	Ongoing Wildfire Education Campaign	Refer to 2016-4.	Ongoing	X
2011-17	Staffing of Operations Division of Fire Department	County Fire is lacking in its ability to actually complete projects that result in mitigation benefits. For example, if fuel breaks are needed, the projects to cut them are typically grant-funded. It is very difficult to fund positions with variable grant funds. The County needs fire hand crews in the Operations Division.	Ongoing. This action has been revised and included in Section 7.5, *Mitigation Implementation Plan*	X
2011-18	Incorporate Dam inundation Area "Information Only" Layer in FEMA DFIRM Map	As noted in Action FLD-2, the County will increase participation in FEMA's floodplain re-mapping initiative. The basis for a sound floodplain management program is the quality of the risk information upon which development decisions are made. The FEMA FIRMs are the best available depiction of overall flooding risk in the County and the primary tool that citizens and businesses use to make development decisions in flood-	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
	Modernization Initiative	prone areas. FEMA's flood map modernization initiative is focused on producing seamless digital flood maps on a countywide basis nationwide. The digital maps will provide a platform from which updated flood data (hydrologic, topographic, and hydraulic analysis and coastal storm surge modeling) can be added at a fraction of the cost and time previously required. FEMA Region IX has begun a process of scoping mapping needs in Santa Barbara County. The County will seek an increased role in the remapping process via a Cooperating Technical Partnership (CTP) agreement with FEMA to ensure the accuracy and quality of new countywide mapping. As part of that role, the County will encourage the inclusion of Dam Failure inundation mapping as an "information only" layer on the new DFIRMs. • Establish a meeting with FEMA Region IX and Cal EMA • Obtain conceptual support from FEMA and Cal EMA for including informational Dam Inundation Layer • Work with FEMA contractor to incorporate inundation layer through CTP agreement with FEMA		
2011-19	Construct Storm Drainage Improvements at Toro Canyon Park	Large canyon drains to an undersized culvert under Toro Canyon Park Road resulting in silt and debris over the road and erosion of the road embankment on the outlet side of the pipe. Public Assistance money has been paid in previous disasters to make the road passable. The County will replace the culvert with one of adequate size to pass the 100-year event. • Identify funding • Hire an engineering firm to perform watershed analysis, design, and permit the project • Replace Culvert	Deferred	X
2011-20	Tucker's Grove Park Interior Access Road Creek Crossing Improvements	Existing "Arizona Crossing" and associated low flow culverts silt in storm events and cause erosion of the road embankment on the upstream and downstream sides of the crossing and dangerous flooding conditions on the roadway. The County will remove the crossing and replace it with a bridge for pedestrian and vehicle access. This will avoid repeat damage, facilitate fish passage and improve safety conditions. • Identify Funding • Hire an engineering firm to design and permit protection • Construct bridge	Deferred	X
2011-21	Cachuma Lake Mohawk Trail Bridge and Dock Abutment	During a 2001 flooding event, this pedestrian bridge over Tequepis Creek was undermined, eliminating access to the public fishing area and floating dock. The County will design and repair the bridge to endure	Deferred	X

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
	Rehabilitation and Access Improvements	wave action and move the trail to a safer area and re-establish a land connection to the floating dock. Design is in place, identify funding and construct the project.		
2011-22	Cachuma Lake Mohawk Camping Area Bridge Abutment Protection	Traffic bridge over Tequepis Creek to Mohawk Camping Area experiences scour at its abutments during high creek flows, threatening the integrity of the bridge abutments. The County will reinforce the bridge and protect the abutments with riprap or similar material. • Hire an engineering firm to design and permit protection • Construct improvements	Deferred	X
2011-23	Enhancements to Annual Culvert Inspection Program to Include Mitigation Strategies	The County Public Works Department, Transportation Division currently implements an annual culvert inspection program to monitor the structural condition, debris clogging, and general conveyance. Culverts within the unincorporated county are inventoried with GPS coordinates and mapped as a GIS layer. Attributes currently include the type of culvert, size, diameter, length, inspection date, condition, and replacement recommendations when applicable. The Transportation Division will work with Flood Control to continuously update the inventory and add the flood-carrying capacity of the culverts to the attributes inventoried. This will allow the development of a systematic replacement program that will include consideration of flood loss reduction. As part of the ongoing annual inspection program, the size (length, volume, condition, etc.) has been collected and inventoried in a GIS environment. This survey and data collection program allow for the budgeting of repairs and replacements. To enhance the existing program, the two divisions will work together to implement the following steps: • From the existing size inventory, work with Flood Control to determine the ability of key culverts to pass the 100-year design event. • Capture findings as a GIS attribute associated with the mapped points • Produce a brief implementation plan to ensure that the attribute database will remain updated as part of the overall GIS system in the County.	Ongoing	X
2011-24	University Circle Open Spaces Berkeley Bike/Pedestrian Bridge Removal and Replacement	The pedestrian/bike bridge is not capable of passing significant storm events, resulting in upstream backwater flooding. This could cause the bridge to fail and causes access problems across the creek in that area, which is heavily traveled by County residents. The County will replace the bridge with one capable of passing 100-year flows. • Identify funding	Completed. This project was completed by the County Public Works Department in 2018.	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		• Hire an engineering firm to design and permit protection • Construct bridge		
2011-25	Jalama Beach Park Waterline Protection	Well and primary water supply line to the park crosses private properties. Erosion of ranch roads during storms, (e.g., 1998) has undermined and exposed the water line, threatening service and potentially costly repairs. The County will mitigate repeat damage by installing drainage improvements on the roadways in the areas of the line crossing. • Complete in-house design • Construct improvements	Completed. This project was completed in 2018.	
2011-26	Live Oak Camp Access Road Protection	The access road to camp is adjacent to the bank of the Santa Ynez River. Relocation is not a feasible alternative due to topography. During high stream flows, erosion is occurring in the road embankment. The County will install gabion retaining walls and erosion control systems along a 200-foot reach to protect from erosion. • Complete in-house design and obtain permits • Identify funding • Construct project	Deferred	X
2011-27	Bridge Scour Abatement Program	Explore strategies to determine cost-effective solutions to recognized geologic erosion hazards (especially scour) affecting County-maintained bridge structures. The County has a unique topographic and climatic setting that leads to relatively large amounts of water flow and materials to be transported over a relatively short distance to the ocean. Due to constricting of creek channels, decreased infiltration rates, and increased run-off from cultivated areas as well as urban development, creek channels are incised and continue to degrade. This increases the local and long-term scour at several bridges throughout the County. The County will conduct initial investigations to determine appropriate long-term solutions to prevent substantial scour damage and eventual structural failure. Phase II of the project would be to seek funding to design and construct scour mitigation projects.	Ongoing	X
2011-28	Investigation of Low-Capacity Bridges to Determine Appropriate Long-Term Solutions	A few bridges throughout the County do not have the capacity to pass storms of very low recurrence intervals (less than 25-year) causing backwater flooding and potential damage to the structures, commerce, transportation, and agricultural lands. Explore strategies to determine cost-effective solutions to mitigate flooding from low-capacity bridges. The initial strategy will be for feasibility studies to determine the most beneficial course of action to remedy the observed lack of capacity to handle very low recurrence events and increase the capacity of these bridges to pass a 100-year storm event. Phase II	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		will be to seek funding through a grant application to design and construct permanent solutions.		
2011-29	Goleta Beach Park Embankment Protection for Park Maintenance Facilities	High flows are eroding creek banks and threaten facilities adjacent to the Goleta Slough. The current top of the bank is within three feet of facilities. Facilities are used for ranger residences and park maintenance storage facilities. Evaluate alternative means to protect the facilities either through hard structures or other means and proceed to construction. • Identify funding • Hire an engineering firm to design and permit protection • Construct protection along approximately 300 linear feet.	Deferred	X
2011-30	Wallace Avenue Bluff Re-Vegetation and Stabilization	The bluff is eroding during coastal storms and heavy rain events, threatening the public beach access parking lot on the top of the bluff. Portions of the parking lot have already been lost to previous storm events. The County would like to stabilize the bluff by re-vegetation and relocation inland of the parking lot away from the bluff. The preliminary design has been completed. Identify funding, construct a retaining wall, relocate the parking lot, and re-vegetate the bluff.	Deferred	X
2011-31	Mountainous Road Rockfall Hazard Geotechnical Surveys	Several mountainous roads within the unincorporated area are frequently used local access roads that serve residential and commercial needs, as well as providing important routes for emergency service vehicles for fire access and other hazard mitigation/response uses. Due to the highly fractured nature of the geologic materials, and the near-vertical slope face, these are areas of reoccurring slope instability, with long stretches of road actively subject to movement. In particular, Gibraltar Road, Stagecoach Road, and Painted Cave Road have been identified as highly hazardous areas. There is a history of occasional damage to public property and endangerment of the traveling public. To better evaluate the problem, the County will undertake a Geotechnical Survey of Slope Stability of pre-defined roadway segments to determine the extent of instability, and appropriate long-term solutions. Phase II of this project would implement analysis and findings into a design plan for a permanent fix and enable the construction phase.	Completed	
2011-32	Parks - Guadalupe Dunes Park Entrance Road	This road was washed out due to the March 2011 Storm and has been approved as a “disaster location” by Gov. Brown’s Emergency Declaration to FEMA. As of June 14, 2011, DHS/FEMA has not approved any of California as a disaster area. Floodwaters washed out over 3,250 linear feet X 22-foot-wide roadway that was alongside the Santa Maria River that went to the Guadalupe Dunes Parking area. The County would request approximately $450,000 for the roadway to	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		be restored using Type A Asphalt (approximately 1,265 tons) after the SunGard (approximately 91,500 square feet including shoulders) was repaired and after the installation of 6 inches of class 2 Base rock (approximately 2,558 tons) was added for the Class A asphalt. Additionally, install base rock shoulder backing at 3 inches wide.		
2011-33	Santa Barbara Bowl - Service Road Improvements (N. End Drive-Service Road off of Newton Rd) Entrance	This project will take place at the Newton Road extension (Santa Barbara County Bowl, “Bowl”) located in the northern section of the Bowl. Flooding, rains, and freezes have nearly destroyed this roadway facility and the local drainage attached to the road. Scope of Work will be R&R approximately 763 linear feet of AC, clean up and haul broken AC debris, but hill along the narrow point of the road to create a 16’ width, (currently at 8 feet to 10 feet in width) scarily, grade and compact subgrade with sheep foot roller and install 6-inch class II road base, grade and compact (16-foot wide) Install 3-inch new hot asphalt 16-foot wide, compact and roll finish smooth and install 260 linear feet and asphalt berm for drainage. The current roadway is not suitable for emergency vehicles that would get stuck in a fire emergency or evacuation. Currently, the only suitable fire access is at 1122 N. Milpas Street.	Canceled	
2011-34	Toro Canyon Park Gazebo Access Road Drainage	Dirt road lacks adequate drainage and is severely eroded in flooding events. The County will construct drainage facilities including water bars and drainage culverts to prevent future erosion and continuous repair. Identify funding, conduct in-house design, and construct drainage projects.	Deferred	X
2011-35	Obtain National Weather Service “Storm Ready” Designation	Arrange a meeting of FMPC and National Weather Service to review criteria for designation against the programs and actions outlined in this plan.	Completed	
2011-36	Jalama Road Geotechnical Survey of Slope Stability	Several sections of roadway along this road are showing evidence of continuing failure. This road is the only access point for the Jalama Beach County Park, several residences, and nearby farming and ranching operations. This area was severely damaged in the 1995 and 1998 declared disaster storm events. During the summer of 2004, this area experienced significant wildfire activity, demonstrating its need for continued access to fire suppression vehicles. Several areas need stabilization to prevent a larger failure during an intense storm event. Such an event could cause a lengthy road closure, adversely impact public health and safety, and have negative impacts on the local commerce and economy. To better evaluate the problem, the County will undertake a Geotechnical Survey of Slope Stability of pre-defined roadway segments to determine the extent of instability, and appropriate long-term solutions. Phase II of this project would implement	Completed	

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		analysis and findings into a design plan for a permanent fix and enable the construction phase.		
2011-37	Relocate the Hearts Adaptive Riding Center	The closed Foothill Landfill is a receiver site for Flood Control maintenance activities in the Goleta Slough and debris basins located in the South coast foothills. In the case of an emergency, the site may also become a receiver site for soil debris from other Flood Control or road maintenance activities (e.g., landslide debris). The Hearts Adaptive Riding Center has been relocated, which gives additional capacity for receipt of this material.	Completed	
2011-38	Geotechnical Engineered Solution of Slope Failure on Glen Annie Road (South County)	Increased erosion of the creek slope has eroded the shoulder and support as well as a portion of the roadway for Glen Annie Road. Road width has been diminished, as to only allow one travel lane, with alternating traffic. This road is the only access point for the Goleta Water District water treatment plant at the north end of Glen Annie Road. This sole access way is used to transport water treatment chemicals necessary to the continuous operations of the treatment plant, which serves over 80,000 people in the Goleta and Santa Barbara City and County Area. Based on developed Engineering Design Plans and Specifications, the County will seek to construct a permanent solution to this ever-increasing problem (most likely a mid-slope retaining wall as identified as a feasible alternative in the design plans).	Completed	
2011-39	Cachuma Lake Recreational Area Public Access Ramp Protection	With increased water surface elevations (3 feet) associated with flood retention, combined with storm waves, access to the boat mooring area is inundated, precluding public access during the period of inundation. The period of inundation could be up to five months. The County will install a construction retaining wall to relocate the accessway to a higher area. • Hire an engineering firm to design and permit protection • Identify funding • Construct project	Deferred	X
2011-40	Cachuma Lake Water Treatment Plant Relocation	In addition to water supply, Lake Cachuma is used for flood retention. Lake surcharges will be increased by 3 feet to allow spring release for steelhead salmon spawning season. The County will relocate the existing water treatment plant and two sewer lift stations to address increased flooding levels, which when combined with storm waves on the lake will threaten existing facilities with erosion, inundation, loss of water services, and potential sewerage spills into the lake. Relocation will be to an area outside of the inundation zone.	Deferred	X

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
		Water treatment plant relocation has been designed and preliminary designs for the lift station #2 facility are in place • Complete final design • Identify funding ($8M) • Construct		
2011-41	Develop a Debris Management Plan for Public Works Infrastructure generated debris	All of the hazards identified throughout this plan could pose a serious need for the processing of debris in a post-disaster environment. The County is lacking a comprehensive all hazards debris management plan. • Form a small working group to evaluate existing solid waste capacity and post-disaster debris management actions • Model anticipated debris from different event scenarios • Write and seek public approval for a comprehensive all-hazard debris management plan Potential disasters identified in this plan pose a serious need for the processing of debris in a post-disaster environment. The report shows the County is lacking debris management infrastructure, especially locations to process and store material in the aftermath of a disaster. Additional work has been completed to identify additional privately owned sites as locations for storage and processing of debris. The finished plan included the following components: 1) Formed a small working group to evaluate existing solid waste capacity and post-disaster debris management actions; 2) Modeled anticipated debris from different event scenarios; 3) Sought public approval for a comprehensive all-hazard debris management plan.	Completed	
2011-42	Goleta Beach Park Pier Abutment Protection	Where the pier connects to land, high storm waves erode the sandy beach area exposing abutments and threatening failure. The County will place revetment around threatened piers. The design will be completed in-house. Design project in-house, identify funding, seek permits, and construct the project.	Completed. Revetment at base of pier installed under emergency permits; coastal development permitting is underway.	
2011-43	Enhance Fire Weather Forecasting and Predictive Services Program	Refer to 2016-5.	Completed	
2011-44	Firewise Community Planning and	Outside of the County Fire Department, there is more of an emphasis on fire suppression than on activities individual property owners can undertake to prevent	Ongoing	X

Table 7-1. Status of Previous Mitigation Measures (Continued)

Project Number	Project Title	Project Description	Status	In 2022 Plan?
	Prevention Techniques Training	fires from destroying their buildings. The NFPA Firewise Communities program provides training to local government officials (including planners outside of fire agencies) on fire mitigation at the site-specific level. While most of the training includes action on the behalf of property owners that are already required or recommended, those actions may not be familiar to many owners and local government officials. • Contact the National Fire Protection Association about opportunities to participate in its Firewise Communities training program. • Identify funding to train not only Fire Department staff and Forrest Managers, but planning and environmental staff as well, including the 8 Cities • Distribute invitations to citizens living in Extremely High threat areas • Rotate training around the county. The Santa Barbara County Fire Safe Council was awarded a National Fish and Wildlife Foundation grant in 2020 to develop a Firewise Program for Santa Barbara County.		

7.3 ADDITIONAL MITIGATIONS IMPLEMENTED SINCE 2017

In addition to previous mitigation actions identified in the 2017 MJHMP and summarized above in Section 7.2, the County has implemented several hazard-related mitigation projects independent of the MJHMP (see Table 7-2 for a summary of other hazard-related County projects and more detailed descriptions below). These projects were identified and pursued independently from the 2017 MJHMP to address new or changed conditions in the county. In some cases, projects were completed under emergency conditions, including the Goleta Beach and Pier Park and Shoreline Protection projects, which were pursued in response to intense winter storms that caused beach and shoreline erosion that threatened the park and pier. In other cases, projects were completed as repairs or improvements to avoid hazards and maintain facilities in a safe condition such as the construction of the Buena Vista Creek Debris Basin or Montecito Debris Nets following the 2018 Montecito debris flows to help protect properties by keeping large material in the basin while allowing water to flow downstream. These measures are included here to document mitigating actions the County has implemented for hazards addressed by the 2022 MJHMP, including flooding, debris flows, geologic hazards, landslides, and earthquakes.

Table 7-2. Additional Mitigation Actions Implemented by County (2017 – 2021)

Project	Description	Status
County Flood Control District		
Buena Vista Creek Debris Basin	The total cost for the construction of the Buena Vista Creek Debris Basin project is expected to be about $4 million, with 75% of the funding coming from FEMA Hazard Mitigation Grant Program funding.	2023 Construction
Operational Improvements Santa Monica Debris Basin	This project, the Santa Monica Debris Basin Improvement Project, includes improvements to the existing basin that will allow more efficient basin clean-out and will reduce basin repair and maintenance costs. The project includes increasing the height and intake capacities of the three existing Intake Towers; improving heavy equipment access pads, replacing the existing farmer access bridge over the emergency spillway with one of sufficient capacity to support fully loaded haul trucks and heavy equipment; placing asphalt concrete along the dam embankment road and the east and west side access roads to accommodate heavy truck traffic loads; installing 72-inch manhole over the Intake Tower low-flow pipe to facilitate debris removal and maintenance access, installing a new plunge pool by-pass pipe (to used for intermittent maintenance of the plunge pool), and construction of a new spillway channel bridge to provide access to the low-flow pipe and outfall.	2022 Construction
Randall Road Debris Basin	Santa Barbara County received a grant from FEMA for the construction of the Randall Road Debris Basin for $13.5 million, which covers about 75% of the total cost.	Under Construction
Montecito Debris Nets and Flood Control Improvements	Installation of 6 nets to prevent or slow rocks and debris that may come down the canyons in Montecito.	Completed 2019
Cold Springs Basin Expansion	Expanded capacity of the Cold Springs Basin by about 30 percent.	Completed 2020
Community Services Department, Parks Division		
Toro Canyon Park Road	This project includes the repair and reconstruction of approximately 1.2 miles of asphalt roadway from Toro Canyon Road to the entrance of Toro Canyon Park.	Completed 2021
Point Sal access road (Brown Road) and culvert(s) drainage	This project consisted of road repair, culvert and drain repair, and replacement to reduce future erosion of the road.	Completed 2019
Montecito Trails	This project consists of target trails repair for several recreational trails, including Cold Springs, Hot Springs, Buena Vista, Ennisbrook, and East Valley Road trails, in Montecito that were damaged or destroyed during the Montecito debris flows following the Thomas Fire.	Ongoing Hot Springs and Buena Vista Trail completed in 2019; Cold Springs Trail completed in 2020
Goleta Beach and Pier Emergency Permits for Shoreline/Park Protection	The emergency project repaired damage to Goleta Beach County Park and Pier following winter storm damage, including the installation of approximately 900 linear feet of rock revetment	Completed 2015/2016
Cachuma Lake Fire Suppression	This project increases the water distribution line size and adds fire hydrants throughout the park.	The design has been completed. Construction of the

Table 7-2. Additional Mitigation Actions Implemented by County (2017 – 2021) (Continued)

Project	Description	Status
		main distribution line has been completed. Three water distribution loops remain to be completed. Funding needed (3M)
Cachuma Reservoir	This project constructs a new enclosed 200,000-gallon reservoir and installs a roof on the existing 180,000-gallon in-ground reservoir for increased water storage and accommodation of fire suppression mechanisms.	Completed in 2014
Goleta Bay Kelp Forest Restoration	This project rebuilds the Goleta Bay Kelp Forest that was decimated in the 1980/1990 El Nino storm events. The benefits of the project are carbon sequestration for a reduction in climate temperature, and the protection of beaches on the Goleta coast, including Goleta Beach County Park. The project is to be implemented in phases to test the kelp base mechanism's ability to be weighted/secured to the sandy seabed and maintain ecological existence with kelp crabs. The project is being, and the initial test phase is funded, by a non-profit group, Friends of Goleta Beach.	Initial investigation completed. Funding is needed for the restoration project design and implementation.
Public Works Department, Transportation Division		
East Mountain Drive Low Water Crossing Replacement	The project plans to replace the previous low water crossing on East Mountain Drive with a bridge. The bridge will re-establish the Cold Spring Creek crossing on East Mountain Drive with a concrete bridge that meets current structural standards.	2022 Construction
Bella Vista Drive Low Water Crossing Replacement	The project consisted of replacing the previous low water crossing on Bella Vista Drive with a bottomless concrete box culvert.	Completed 2021
Refugio Road Rock Scaling	The project consisted of hand crews supported on anchored ropes, working from the top of the slope down to Refugio Roadway elevation. Dislodged boulders are chased down the slope and removed by heavy excavation equipment at roadway elevation.	Completed 2021
East Mountain Drive Rockfall Attenuator System	The project consisted of the installation of 4,608 Square feet of cable netting and 160 linear feet of concrete railing with a 10-foot-high fence to prevent rock from entering East Mountain Drive.	Completed 2019
Agricultural Commissioner's Office		
Invasive Shot Hole Borer Management	With the help of a California Department of Forestry and Fire (CAL FIRE) grant, the County Agricultural Commissioner Weights and Measures Department is removing diseased and dying trees that are heavily infested with the Invasive Shot Hole Borer (ISHB) (*Euwallacea spp*). ISHB carries a type of deadly Fusarium fungus that disrupts the flow of water and nutrients to the tree. The first group of five diseased sycamore trees was removed at the Lower Manning Park picnic area and the Montecito YMCA parking area in January 2021. The trees met the standard for heavily infested trees according to Unified Cooperative Extension (UCCE) guidelines and presented a safety hazard to the public. Staff collaborated with the California Department of	Ongoing This effort is funded with a CalFire Grant that started in 2020 and ends in March 2024.

Table 7-2. Additional Mitigation Actions Implemented by County (2017 – 2021) (Continued)

Project	Description	Status
	Food and Agriculture (CDFA), County Parks Department, County Public Works Department, County Planning and Development Department, and the Montecito YMCA to successfully remove the trees. Under the grant, suspect trees are sampled by trained staff and if found positive for the Fusarium, they are removed by licensed tree removal companies. Fusarium samples are taken from the diseased tree and analyzed by a CDFA lab. Once confirmed, the infested tree is carefully removed, the wood is chipped to less than a one-inch diameter, and the infested green waste is covered and transported to a certified composting facility (County Agricultural Commissioner's Office 2021).	

7.4 PRIORITIZATION PROCESS

The 2022 MJHMP used a STAPLEE methodology developed by FEMA to allow emergency managers to apply consistent analysis to the range of mitigation options available. Once the available mitigation actions were identified by the MAC, each was evaluated against the STAPLEE criteria to assist in prioritizing each measure. The STAPLEE criteria include the following:

- **Social:** Will the measure be accepted by the community? Does the measure adversely affect or inequitably benefit any segment of the population? (e.g., disadvantaged communities, vulnerable populations, different groups or areas)?
- **Technical:** How effective will the action be at protecting lives and preventing injuries? How significant will the action be in eliminating or reducing damage to structures and infrastructure? Would the action solve the root problem rather than a symptom?
- **Administrative:** Does the county have the personnel and administrative capabilities to implement and manage the project (i.e., adequate staffing and operational capabilities to implement the project)?
- **Political:** Will the measure have political and/or public support? Does the measure have a local champion to lead its development and implementation?
- **Legal:** Does the jurisdiction have the legal authority to implement the action? Is it legal? Is there potential for a legal challenge?
- **Economic:** Are the costs to implement the action commensurate with the benefits achieved? Is there funding available? Will the action contribute to the local economy?
- **Environmental:** Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

The MAC used STAPLEE criteria to evaluate and prioritize the mitigation actions identified in the 2022 MJHMP update. Each mitigation action was assigned a numeric rank (-1, 0, or 1) for each of the evaluation criteria, as follows

1 = Highly effective or feasible

0 = Neutral or not applicable

-1 = Ineffective or not feasible

Based on the evaluation score of each STAPLEE Criterion, mitigation actions received a cumulative score. The cumulative score indicates the priority of mitigation actions as:

"Low" = 1 – 5

"Medium" 6 – 10

"High." 10+

Per the Disaster Mitigation Act (DMA) requirements, an emphasis was placed on the importance of benefit-cost analysis in determining action priority. Other criteria used to assist in evaluating the benefit-cost of a mitigation action included:

- Does the action address hazards or areas with the highest risk?
- Does the action protect lives?
- Does the action protect infrastructure, community assets, or critical facilities?
- Does the action meet multiple objectives (Multiple Objective Management)?
- What will the action cost?
- What is the timing of available funding?

The process of identification and analysis of mitigation options allowed the MAC to come to a consensus and collectively prioritize recommended mitigation actions. During the MAC planning process, emphasis was placed on the importance of a benefit-cost review in determining project priority; however, this was not a quantitative analysis.

Benefit-cost was considered in the development of the Mitigation Implementation Plan detailed below in Section 7.5. Each action developed for this plan contains a description of the proposed project, expected project benefits, the entity or entities with primary responsibility for implementation, a cost estimate (if available), potential funding sources (if known or available), and a conceptual implementation schedule. Development of these project details relative to the STAPLEE Criteria for each action led to the determination of priority for each action. Cost-effectiveness will be further considered in greater detail through formal benefit-cost analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

The intent of prioritizing mitigation actions is to help the County focus and concentrate its efforts; however, it should be noted that when and if specialized grants and/or funds are made available that could finance a mitigation action, the County may adjust the ranking to enable them to implement the mitigation action.

This plan also carries forward some mitigation actions developed during the 2017 and 2011 planning processes (refer to Section 7.2, *Status of Previous Mitigation Actions*). MAC and LPT members were asked to review their existing mitigation actions and report on the progress made toward implementation and decide whether any incomplete actions should be carried forward for continued or future implementation or be deleted. In some cases, mitigation actions were adjusted to reflect new situations or priorities. These measures were previously prioritized using the STAPLEE approach in 2017; however, to account for changes to goals and objectives and changes to hazard priorities for this plan, the MAC re-evaluated the priority of all measures included in Section 7.5.

Table 7-3 presents the prioritized list of mitigation actions that will be considered and implemented. See Appendix C for the complete STAPLEE scoring matrix that informed this plan update.

Table 7-3. 2022 Mitigation Actions and Prioritization

ID No.	Action Title	Total Score	Priority
2022-72	Regional Priority Plan (RPP)	16	High
2022-73	Regional Wildfire Mitigation Program (RWMP)	16	High
2022-88	Oil and Gas Pipeline Safety	15	High
2022-104	Plan Alignment	15	High
2022-50	Countywide LiDAR Imagery	14	High
2022-52	Wildfire Hazard Mapping	14	High
2022-70	Ongoing Interagency Coordination to Implement MJHMP	14	High
2022-71	Hazard and Safety Plan Alignment	14	High
2022-103	Extreme Heat Planning	14	High
2022-5	Wildfire Resilient Design Information	13	High
2022-48	GIS Multi-Hazard Disaster Management Information System	13	High
2022-57	Portable Radio Upgrades and Replacements	13	High
2022-59	Hydrant Upgrade and Expansion Program	13	High
2022-98	Isla Vista Coastal Resilience	13	High
2022-2	Development in Fire-Prone Areas	12	High
2022-6	Scaling Public Services	12	High
2022-7	Collaborative Wildfire Risk Reduction Program	12	High
2022-47	Develop an Energy Assurance Plan	12	High
2022-51	Maintain Fire Weather Forecasting Program	12	High
2022-68	Emergency Notification in Hard-to-Reach Areas	12	High
2022-69	Ongoing Wildfire Education Programs	12	High
2022-77	Santa Barbara Fire Crew Camp	12	High
2022-78	Sediment Management Program	12	High
2022-81	County Funding Pursual	12	High
2022-83	Pandemic Preparedness	12	High
2022-96	Sea Level Rise Planning	12	High
2022-97	Goleta Bay Kelp Forest Restoration	12	High
2022-102	Drought and Water Supply Planning	12	High
2022-1	Annual Review of Zoning Code for Development in Hazard Prone Areas	11	High
2022-3	Resilient Development on the Coast	11	High
2022-8	South Coast Foothill Fuel Break	11	High
2022-49	Critical Facilities Database Maintenance	11	High
2022-58	County Fire Station Repair and Replacements	11	High
2022-61	Increasing Services to the Houseless Community	11	High

Table 7-3. 2022 Mitigation Actions and Prioritization (Continued)

ID No.	Action Title	Total Score	Priority
2022-65	Mitigate Structure Ignition Vulnerabilities	11	High
2022-66	Air Quality Awareness – Wildfires	11	High
2022-67	Disadvantaged Community Outreach Initiative	11	High
2022-84	Weed Management Area	11	High
2022-85	Citrus Greening Prevention	11	High
2022-87	Response to Cyber Threat	11	High
2022-89	Air Quality Awareness – Hazardous Materials and Natural Gas Release	11	High
2022-90	Air Quality Awareness – Oil Spills	11	High
2022-91	Air Quality Awareness – Radiological Emergency	11	High
2022-92	Implement the 2030 Climate Action Plan	11	High
2022-93	Energy Resiliency and Reduction of Fossil Fuel Consumption	11	High
2022-39	Goleta Pier Coastal Development Permits	10	Medium
2022-40	Goleta Beach County Park Adaptive Management & Beach Nourishment Program	10	Medium
2022-53	Geotechnical Survey of Slope Stability	10	Medium
2022-62	Energy Resilience for Vulnerable Communities	10	Medium
2022-63	County Community Resilience Program	10	Medium
2022-64	County Hazard Awareness and Preparedness Public Outreach Program	10	Medium
2022-75	Preparing for Future Hazards	10	Medium
2022-80	Monitoring and Publicizing Hazard Mitigation Actions	10	Medium
2022-82	Grant Funding for Coastal Utilities Relocation	10	Medium
2022-9	Groundwater Basin Management	9	Medium
2022-38	Goleta Beach Park Embankment Protection for Park Maintenance Facilities	9	Medium
2022-46	Implement Energy Assurance Assessment Services Program	9	Medium
2022-60	Retrofit Water Supply Systems	9	Medium
2022-76	Staffing of Operations Division of Fire Department	9	Medium
2022-86	Civil Disturbances and Community Relations	9	Medium
2022-94	Santa Barbara County Climate Action Campaign	9	Medium
2022-12	Buena Vista Creek Debris Basin	8	Medium
2022-13	Romero Creek Capacity Improvements, Montecito	8	Medium
2022-14	Romero Creek Debris Basin Improvement Project	8	Medium
2022-15	Oak Creek Capacity Improvements, Montecito	8	Medium
2022-16	San Ysidro Creek Capacity Improvements, Montecito	8	Medium
2022-17	San Ysidro Debris Basin Modification, Montecito area	8	Medium
2022-18	Montecito Creek Channel Improvement, Montecito	8	Medium
2022-19	Cebada Canyon Channel Improvements, Lompoc Valley	8	Medium
2022-20	Sycamore Canyon Master Drainage Plan, Santa Barbara	8	Medium
2022-21	San Pedro Creek Fish Passage, Goleta	8	Medium
2022-23	Bradley Channel Relining and Improvements, Santa Maria	8	Medium

Table 7-3. 2022 Mitigation Actions and Prioritization (Continued)

ID No.	Action Title	Total Score	Priority
2022-24	Cold Springs Debris Basin Modification, Montecito area	8	Medium
2022-25	Stockpile Area – South Coast	8	Medium
2022-26	Rattlesnake Debris Basin Modification, upper area of Santa Barbara	8	Medium
2022-27	Lower Mission Creek Flood Control Project	8	Medium
2022-28	San Antonio Creek Debris Basin Modification	8	Medium
2022-29	San Roque Debris Basin Modification	8	Medium
2022-30	Mission Creek Debris Basin Modification	8	Medium
2022-31	Arroyo Paredon Debris Basin Modification	8	Medium
2022-41	Goleta Valley Wastewater Outfall Inspection Vault Relocation	8	Medium
2022-44	Cachuma Lake Recreational Area Public Access Ramp Protection	8	Medium
2022-45	Cachuma Lake Water Treatment Plant Relocation	8	Medium
2022-54	Enhancements to Annual Culvert Inspection Program to Include Mitigation Strategies	8	Medium
2022-55	Lake Los Carneros Dam Information	8	Medium
2022-56	Infrastructure Upgrade Plan	8	Medium
2022-99	Establish Climate Change Task Force	8	Medium
2022-100	Establish Drought Task Force	8	Medium
2022-101	Coordinate with the Santa Barbara County Regional Climate Collaborative	8	Medium
2022-4	Community Energy Resilience	7	Medium
2022-10	North Lompoc Flood Risk Attenuation Project	7	Medium
2022-11	Guadalupe Levee Project	7	Medium
2022-22	Blosser Basin, Santa Maria	7	Medium
2022-32	Construct Storm Drainage Improvements at Toro Canyon Park	7	Medium
2022-33	Tucker's Grove Park Interior Access Road Creek Crossing Improvements	7	Medium
2022-34	Cachuma Lake Mohawk Trail Bridge and Dock Abutment Rehabilitation and Access Improvements	7	Medium
2022-35	Cachuma Lake Mohawk Camping Area Bridge Abutment Protection	7	Medium
2022-36	Live Oak Camp Access Road Protection	7	Medium
2022-37	Bridge Scour Abatement Program	7	Medium
2022-42	Wallace Avenue Bluff Re-Vegetation and Stabilization	7	Medium
2022-43	Toro Canyon Park Gazebo Access Road Drainage	7	Medium
2022-79	County Staff Training and Accountability	7	Medium
2022-95	Establish Resilience Hubs	6	Medium
2022-74	Emergency Work	5	Low

7.5 MITIGATION IMPLEMENTATION PLAN

This Mitigation Implementation Plan was developed to present the recommendations developed by the MAC for how the County can reduce the vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Over time, the implementation of these projects will be tracked as a measure of demonstrated progress in meeting the plan's goals.

Once it was determined which hazards warranted the development of specific mitigation actions, the MAC and LPT analyzed viable mitigation options that supported the goals and objectives identified in Section 7.1. Mitigation alternatives identified for implementation by the MAC and LPT were evaluated and prioritized using the criteria discussed in Section 7.4 of this plan. General mitigation categories were considered as part of the mitigation planning process:

- **Preventive and Regulatory Measures**: Preventative measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include building codes, zoning ordinances, general plans, and floodplain regulations.
- **Property Protection Measures**: Property protection measures are used to modify buildings or property subject to damage. Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency. Property protection measures fall under three approaches:
    - Modify the site to keep the hazard from reaching the building;
    - Modify the building (retrofit) so it can withstand the impacts of the hazard; and
    - Insure the property to provide financial relief after the damage occurs.
- **Natural Resource Protection**: Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas and watersheds. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Resource protection programs and standards can help mitigate the impact of natural hazards, while they improve the overall environment, including wetland protection, erosion and sedimentation control, stream/creek restoration, best management practices, and open space/agricultural land protection.
- **Structural Projects:** Levees, reservoirs, basins, diversions, and dredging are examples of projects that can mitigation flood hazards. These types of mitigations are usually highly effective, can be managed long-term by a government agency, and can incorporate other benefits such as water quality/supply and recreation. However, they require regular maintenance and can be disruptive to natural water courses and habitat.
- **Emergency Services**: Emergency services measures protect people during and after a disaster. An emergency management program addresses all hazards, and it involves all local government departments. Services range from hazard tracking, recognition, and warning to emergency response and evacuation/shelter to post-disaster recovery and mitigation.
- **Public Information and Outreach**: Outreach projects orient property owners to the hazards they face and to the concept of property and life protection. They are designed to encourage people to seek out more information to take steps to protect themselves and their properties.

Public information programs tell people what they can do about the hazard. Thus, projects include information on safety, health and property protection measures. Outreach projects should be locally designed and tailored to meet local conditions.

The Mitigation Implementation Plan summarizes who is responsible for implementing each of the prioritized actions, as well as when and how the actions will be implemented. Each action summary also considers the benefit-cost of the action to meet the regulatory requirements of the DMA. The estimated cost, potential funding sources, and action details are provided for planning and feasibility purposes to guide future actions by the County and participating agencies. The Mitigation Implementation Plan identifies the updated mitigation actions for the County of Santa Barbara. Actions specific to other participating agencies are detailed in the jurisdictional annexes.

It is important to note that the County and the participating jurisdictions have numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as general plan elements, community wildfire protection plans, and capital improvement budgets and reports. These actions are considered to be part of this plan, and the details, to avoid duplication, should be referenced in their source document (see also, Chapter 4.0, *Community Profile and Capabilities Assessment*). The County also realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this plan.

The actions are grouped by the corresponding goals of this plan. The jurisdictional annexes contain the detailed action item descriptions respective to each jurisdiction. The Mitigation Implementation Plan can be used for reference during future MAC meetings to track progress moving forward.

GOAL 1. ENSURE FUTURE DEVELOPMENT IS RESILIENT TO KNOWN HAZARDS.

Objective 1.A. Ensure development in known hazardous areas is limited or incorporates hazard-resistant design based on applicable plans, development standards, regulations, and programs.

2022-1. Annual Review of Zoning Code for Development in Hazard Prone Areas

The County shall annually review its zoning code to ensure development is appropriately limited in hazard prone areas, including high fire hazard severity zones, frequent flooding zones, and Alquist-Priolo (earthquake) zones, consistent with state standards and best practices. If adjustments are needed, this action can include planning and ordinances that address the following:

1. Limit development of essential services buildings, residential uses, and other highly sensitive uses in areas subject to severe safety hazards and/or require measures to reduce fire hazards (e.g., fuel management to create defensible space) or improvements to reduce flood hazards (e.g., raising finish floor levels or other flood protection measures). Highly sensitive uses are defined as those that meet one or more of the following criteria:

   a. Land uses whose onsite population cannot be readily evacuated or otherwise adequately protected from serious harm from wildfires through methods such as sheltering-in-place and fuel management that reduces hazards while respecting natural resources (e.g., environmentally sensitive habitat areas, sensitive species, visual resources, etc.). This includes, but is not limited to, homes, schools, hospitals, clinics, nursing homes, multiple-family housing exclusively for the elderly or disabled, high-density residential, stadiums/large event venues, and other uses with large public-assembly facilities.
   b. Land uses that serve critical "lifeline" functions, such as water supplies, fire response, and police response, if exposed to a significant risk that will curtail their "lifeline" functions for a critical period.
2. Prioritize development projects in known high hazard areas that include passive open space uses over sensitive structural development, such as residential development.
3. Review zoning maps and consider if selective re-zoning within the most high-hazard-prone areas is needed to prevent future residential and infrastructure development in known high hazard zones.
4. Review and update permitting requirements where needed (e.g., fuel management for defensible space) in response to new or expanded hazard areas within the County to create clear hazard reduction development standards and ensure standards are incorporated into project design through appropriate planning and decision-maker review.
5. Require Accessory Dwelling Units (ADUs) within the Wildland-Urban Interface (WUI) and in very high fire hazard zones to be setback from wildland vegetation (e.g., on the road side of primary homes) if feasible.
6. Support modifications to state legislation that permits ADUs and increased residential density by right to prohibit or limit such development within designated WUIs and within Very High Wildfire Hazard Zones.
7. Pursue acquisition of properties in very high fire hazard severity zones, prioritizing the acquisition of properties that are planned for a rebuild after a disaster.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Flood, Debris Flows, Coastal hazards, Earthquake
Estimated Timeline	Annually
Estimated Cost/Funding Source	$15,000 annually/General fund for staff salaries
Responsible Agency/Department	County Planning and Development Department
Comments	Sourced from MAC input, public survey results, and participating agency safety elements

2022-2. Development in Fire-Prone Areas

The County shall implement measures to ensure that new development in high fire severity zones is resistant to wildfire. This action can include planning and ordinances that address the following:

1. Adopt and enforce WUI Building Code standards, consistent with or more stringent than CAL FIRE's WUI Fire Area Building Standards, that emphasize ignition-resistant construction.

Applications for new development that require fuel modification shall include a Fuel Modification Plan for the project. This plan shall be prepared by a landscape architect or resource specialist and shall be designed to improve defensible space and include measures to minimize removal of native vegetation, minimize disturbance to environmentally sensitive habitat areas, and incorporate fire-retardant vegetation in new plantings, using fire-resistant native vegetation (e.g., oak trees) adjacent to or within wildland areas where feasible. Such plans shall be reviewed and approved by the Santa Barbara County Fire Department and County Planning and Development Department.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	2027
Estimated Cost/Funding Source	$20,000/General fund for staff salaries
Responsible Agency/Department	County Planning and Development Department and County Fire Department
Comments	Sourced from MAC input, public survey results, participating agency safety elements, and other local HMPs (San Luis Obispo County)

2022-3. Resilient Development on the Coast

The County shall continue to require that all new construction or reconstruction, including ADUs, increased residential densities allowed under state law, additions, and major renovations, on coastal or blufftop properties avoid coastal hazards, including erosion and wave runup. This action can include planning and ordinances that address the following:

1. A coastal hazard study shall be prepared and submitted to the County as a part of the project application to determine the necessary construction design and technique to protect the structure and prevent impacts to adjacent property from wave runup, coastal flooding, and coastal erosion with consideration of sea level rise.
2. New construction, including reconstruction where more than 50 percent of the exterior walls are removed, shall be located outside of setbacks required to protect the structure from erosion and/or wave attack for 75 years, including the effects of sea level rise, and/or required to be located landward of existing the existing primary residence.
3. New developments must not contribute to increases in bluff erosion, by either directing all runoff away from the bluff face or using appropriate conveyance to channel runoff to the beach at the base of the bluff.
4. Erosion control elements must be included in all shoreline development or redevelopment, including the use of drought-tolerant, preferably native coastal bluff scrub vegetation landscaping to help stabilize the blufftop and bluff face.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Flood, Coastal Hazards (Sea Level Rise)

Mitigation Priority and Performance	
Estimated Timeline	2027
Estimated Cost/Funding Source	$20,000 annually/General fund for staff salaries
Responsible Agency/Department	County Planning and Development Department
Comments	Sourced from MAC input, County Community Plans, and participating agency safety elements

2022-4. Community Energy Resilience

The County shall develop a program to increase community energy resiliency in new development and redevelopment. The program can include planning and ordinances that address the following:

1. Ensure infrastructure and new development are equipped to add generators and air conditioning (AC) units.
2. Increase the ease of installing generators, including incentives for clean energy options, by reducing permitting requirements for installing generators.
3. Pursue funding for providing generators that would support existing infrastructure.
4. Prioritize low- or no-emission generators and energy-efficient (e.g., EnergyStar rated) generators.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Energy Shortage & Resiliency, Extreme Heat/Freeze
Estimated Timeline	2027
Estimated Cost/Funding Source	$100,000/General fund for staff salaries, FEMA Hazard Mitigation Grant, FEMA Building Resilient Infrastructure and Communities Grant, PG&E Resilience Hugs Grant Program
Responsible Agency/Department	County Community Services Department and Planning and Development Department
Comments	Sourced from County departmental recommendations

Objective 1.B. Educate developers and decision-makers on design and construction techniques to minimize damage from hazards.

2022-5. Wildfire Resilient Design Information

The County shall prepare public information providing clear and succinct information about developing wildfire resilient properties with a focus on WUI areas. Topics could include vegetation/fuel management, defensible space, emergency access, and building techniques (e.g., sealed vents. This document may be digital and print and distributed through a variety of media outlets to ensure wide-reaching dissemination, including by the Planning and Development Department to potential project developers. A multilingual presentation should be provided.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	2023
Estimated Cost/Funding Source	$35,000/ FEMA Building Resilient Infrastructure and Communities Grant, CalFire Fire Prevention Grant, Coastal Conservancy Wildfire Resilience Grant
Responsible Agency/Department	County Office of Emergency Management, County Fire Department, and Planning and Development Department
Comments	Sourced from MAC member recommendations

2022-6. Scaling Public Services

New and emerging state legislation addresses the statewide housing crisis by promoting the generation of housing units in local agencies, including allowing by-right density increases within existing communities such as ADUs and multi-family housing (e.g., duplexes, triplexes). As a result, existing neighborhoods within the County may experience an increase in service population over time. The County Planning and Development Department, in collaboration with local jurisdictions, shall plan for potential increased demand for public services, such as emergency response (e.g., fire and police stations) and public utilities (e.g., electricity, water) in areas with denser populations and rapid growth. The County shall compare current planned population growth rates (i.e., General Plan growth) to actual growth on an annual basis and work with service providers to ensure proper levels of public services to new populations. The County shall present updates to decision-makers, including any recommendations for adjustments to existing capital planning needs in response to changing service demands. The County shall continue to ensure developers pay fair-share fees to cover the cost of capital improvements and are informed about any adjustments to fee programs in response to changing service demands.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$250,000/General fund for staff salaries, California Department of Housing and Community Development Grants
Responsible Agency/Department	County Executive Office
Comments	Sourced from MAC member recommendations

GOAL 2. PROTECT PEOPLE AND COMMUNITY ASSETS FROM HAZARDS, INCLUDING CRITICAL FACILITIES, INFRASTRUCTURE, WATER, AND PUBLIC FACILITIES.

Objective 2.A. Enhance the ability of community assets, particularly critical facilities, to withstand hazards.

2022-7. Collaborative Wildfire Risk Reduction Program

The County shall work with the cities, state, and local organizations to develop a Collaborative Wildfire Risk Reduction Program. The program shall prioritize the following actions:

1. Develop a plan to conduct controlled burns, prescribed grazing, fire breaks, and fuels reduction (e.g., vegetation clearing or culling, roadside mowing, hand crew clearance) in fire-prone areas. Efforts should target the WUI and foothill areas, and other high fire severity zones while respecting environmentally sensitive habitat areas and aesthetic considerations. The plan shall address location, extent, timing, and monitoring/maintenance requirements for each fuel reduction effort.
2. Develop a plan to remove eucalyptus trees and other highly flammable vegetation from high fire areas proximate to the WUI.
3. Perform an outreach campaign that would discourage residents from conducting backyard burning and instead encourage or incentivize mulching. Outreach would be conducted on an annual basis.
4. Initiate preparation of Community Wildfire Protection Plans (CWPP) for communities that are vulnerable to wildfire such as Lompoc Valley.
5. Coordinate with existing wildfire mitigation efforts Coordinate with existing wildfire mitigation efforts (see also, *2022-66. Regional Wildfire Mitigation Program [RWMP]*).

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$225,000/General fund for staff salaries, CalFire Fire Prevention Grant, Coastal Conservancy Wildfire Resilience Grant, FEMA Hazard Mitigation Grant, FEMA Building Resilient Infrastructure and Communities Grant
Responsible Agency/Department	County Fire Department
Comments	The action may involve multiple agencies depending on the location and extent of fuel reduction. County Fire Department will serve as the interdepartmental and interagency coordinator of this effort. Sourced from public survey results and other local HMPs (San Luis Obispo County)

2022-8. South Coast Foothill Fuel Break

The County shall continue to implement the community defensible space fuel break along the foothills of the Santa Ynez Mountains from the Ventura County line to Tecolote Canyon west of the City of Goleta.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	2022
Estimated Cost/Funding Source	$800,000/Acquire Fire Safe Council Grant, Fire Prevention Grant
Responsible Agency/Department	County Fire Department
Comments	This project, which was adapted from 2016-7, is approximately 75 percent complete.

2022-9. Groundwater Basin Management

The County shall pursue the following measures to minimize the adverse effects of drought through improvements in water management as follows:

1. Work with water management agencies to enhance groundwater recharge such as creating a plan for pumping floodwaters, such as during flooding in the Santa Ynez River, into groundwater recharge basins or injection into groundwater basins.
2. Continue to coordinate with groundwater sustainability agencies in the county to develop and implement groundwater sustainability plans (GSPs) for basin recharge, quality, and reliability.
3. Develop projects and/or agreements with state and other localities to replenish water reserves such as groundwater recharge and infiltration, including the following efforts:
    a. The County and City of Goleta will continue to work with the Goleta Water District on the implementation of its Stormwater Resources Plan to create infiltration basins at locations in the Goleta Valley.
    b. The County will continue to work with the City of Santa Maria to identify and develop groundwater recharge and infiltration sites in the City and surrounding areas affected by Santa Maria River flooding.
4. Develop a plan to address and prevent saltwater intrusion of groundwater basins, including studying the potential impacts of sea level rise on basins.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Drought, Coastal Hazards (Sea Level Rise)
Estimated Timeline	2027
Estimated Cost/Funding Source	$750,000/General fund for staff salaries and materials, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant

Mitigation Priority and Performance	
Responsible Agency/Department	County Public Works Department, County Flood Control, County Community Services Department, City of Goleta, City of Santa Maria
Comments	Sourced from MAC input, public survey results, and participating agency safety elements

2022-10. North Lompoc Flood Risk Attenuation Project

The County shall work with the City of Lompoc and other local, state, or federal stakeholders to reduce or eliminate existing flood risks in the northern portions of the City and surrounding unincorporated areas, including potential attenuation devices such as a river levee.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$80,000/General fund for staff salaries and materials, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	U.S. Army Corps of Engineers, City of Lompoc, with support from County Flood Control District,
Comments	Sourced from MAC member input

2022-11. Guadalupe Levee Project

Study the feasibility and the benefits of building a levee system adjacent to the City of Guadalupe to prevent chronic flooding.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood, Levee Failure
Estimated Timeline	2026
Estimated Cost/Funding Source	$100 million/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	U.S. Army Corps of Engineers, City of Guadalupe
Comments	This project was adapted from 2016-2 included as part of the 2017 MJHMP

2022-12. Buena Vista Creek Debris Basin

This project, the Buena Vista Creek Debris Basin project includes the construction of a basin and outlet control structure designed to trap boulders and large debris at Buena Vista Creek. The Buena Vista Creek Debris Basin will be located along the west fork of Buena Vista Creek, and upstream of Park Lane. This project includes the construction of an outlet control structure. The structure will withstand the forces of large debris loads and facilitate sediment recovery downstream.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2023
Estimated Cost/Funding Source	$4,086,000/South Coast Flood zone; FEMA HMGP Grant
Responsible Agency/Department	County Flood Control District
Comments	This project is underway. The debris basin project is expected to be about $4 million, with 75% of the funding coming from FEMA Hazard Mitigation Grant Program funding.

2022-13. Romero Creek Capacity Improvements

This project is located on Romero Creek in Montecito downstream of Highway 101 to the ocean. The conveyance capacity of the existing facilities is limited and a preliminary engineering study will be done to develop drainage improvement alternatives. Currently, the lower reach of Romero Creek from the Pacific Ocean to the Fernald Point Lane Bridge consists of approximately 650 feet of a 30-foot-wide rectangular channel. Upstream of Fernald Lane bridge, the approximately 300-foot reach of the cobbled channel narrows to 18 feet at the UPRR bridge. The ultimate condition that is analyzed by Moffatt & Nichol in 2014 consists of widening the channel to 74 feet and other improvements. There will be no impact on the operating budget.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$29,598/ South Coast Flood Zone Fund; CA Department Fish and Wildlife Grant, FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was adapted from 2016-9 included as part of the 2017 MJHMP and is for future consideration as funding becomes available. This project is currently in the planning stage.

2022-14. Romero Creek Debris Basin Improvement Project

This project will modify the Romero Creek Debris Basin. The basin is located in Montecito. The project will modify the earthen-filled grouted rock rip-rap dam embankment with an engineered outlet control structure to capture large-scale debris and to facilitate Southern California Steelhead passage.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2023

Mitigation Priority and Performance	
Estimated Cost/Funding Source	$2,579,000/ South Coast Flood Zone Fund; CA Department Fish and Wildlife Grant
Responsible Agency/Department	County Flood Control District
Comments	MAC member recommendations

2022-15. Oak Creek Capacity Improvements, Montecito

The County shall improve the capacity of the existing Oak Creek facilities. This project will replace a 14-foot-wide concrete-lined channel from the Pacific Ocean to the UPRR, including the acquisition of two parcels. This would also necessitate the replacement of a private bridge.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$28,362,000 /FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project, which was deferred and adapted from 2016-10, is for future consideration as funding becomes available.

2022-16. San Ysidro Creek Capacity Improvements, Montecito

This project is located on San Ysidro Creek in Montecito downstream of Highway 101 to the ocean. The conveyance capacity of the existing facilities is limited and a preliminary engineering study was done by Penfield and Smith in 2009. The study recommends a 100-year level of protection. Recommended improvements include the construction of a 70-foot wide channel in the lower section and a 48-foot wide channel in the upper section of the creek. This project will require the acquisition of one lot and significant easements on other lots. There will be no impact on the operating budget

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2023
Estimated Cost/Funding Source	$42,726,000/ South Coast Flood Zone; CA Department Wildlife Grant/Ocean Protection Council/Some Grants already received: BEACON; Urban Stream Restoration-Proposition 84; California Department of Fish and Wildlife.
Responsible Agency/Department	County Flood Control District
Comments	This project was deferred and adapted from 2016-11

2022-17. San Ysidro Debris Basin Modification, Montecito area

This project will modify the San Ysidro Creek Debris Basin. This basin is located in Montecito. The project will modify the earthen-filled-grouted rock rip-rap dam embankment with an engineered outlet control structure to capture large-scale debris and facilitate Southern California steelhead passage.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2023
Estimated Cost/Funding Source	$2,537,000/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was adapted from 2016-23 included as part of the 2017 MJHMP.

2022-18. Montecito Creek Channel Improvement, Montecito

This project is located along Montecito Creek from the Montecito Creek Debris Basin located on the Casa Dorinda property, upstream of Hot Springs Road. The Montecito Creek Channel Improvements Project will widen the channel to improve conveyance capacity. Completion of this project will reduce flooding and property damage adjacent to Montecito Creek during large storm events. There will be no impact on the operating budget.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$9,473,000/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was adapted from 2016-12. The study report for this project was completed in the 2018 calendar year. Construction will commence in the future as funding allows.

2022-19. Cebada Canyon Channel Improvements, Lompoc Valley

This project consists of reconstructing a portion of the concrete-lined rectangular channel. The project is located in the vicinity of McLaughlin Rd., Lompoc Valley. The Cebada Canyon Channel was built by the Soil Conservation Service in 1949 and owned by the Flood Control District. Due to the old age of the structure, some portions have failed. The proposed project will include the re-construction of the damaged portions.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2026
Estimated Cost/Funding Source	$312,000/Lompoc Valley Flood Zone, FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was adapted from 2016-14. The study report for this project was completed in the 2018 calendar year. Construction will commence in the future as funding allows.

2022-20. Sycamore Canyon Master Drainage Plan, Santa Barbara

This project is located along Sycamore Creek from the Pacific Ocean to the Five Points roundabout. The Master Drainage Plan will identify a project that will widen the channel to improve conveyance capacity.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$6,875,000 to design & construct/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was adapted from 2016-15. The study report for this project was completed in the 2018 calendar year. Construction will commence in the future as funding allows.

2022-21. San Pedro Creek Fish Passage, Goleta

This project will modify the existing concrete-lined channel to accommodate fish passage in the Reach between Avenida Gorrion and Calle Real.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$5,762,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project, which was deferred and adapted from 2016-17, is for future consideration as funding becomes.

2022-22. Blosser Basin, Santa Maria

This project consists of either constructing a pipeline or installing a pump to drain the runoff from the basin.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2023
Estimated Cost/Funding Source	$586,000/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project, which was deferred and adapted from 2016-18, is for future consideration as funding becomes available.

2022-23. Bradley Channel Relining and Improvements, Santa Maria

This project consists of improving sections of the Bradley Flood Control Channel in the City of Santa Maria. One section is approximately 1,750 linear feet of an earthen channel located between Highway 101 and State Route 135 that will be lined with a concrete trapezoidal channel. The second section is approximately 960 linear feet of an earthen channel located between East Donovan Road and Magellan Drive which will also be lined with a concrete trapezoidal channel. Each year, maintenance staff removes debris and sediment deposits from the channel bottom and obstructive vegetation along the banks of the unlined channels to maintain channel capacity and reduce flood hazards. Completion of this project will minimize the flood hazard to adjacent properties. This project will be funded by the Santa Maria Flood Zone. Since this project is an improvement to an existing facility, no additional impacts are anticipated. The other portion of this project will reconstruct the existing concrete-lined Bradley Channel between Jones Street, and Main Street in the City of Santa Maria. The existing channel is in poor condition and has undergone numerous point repairs by County Flood Control District staff. Damage to the channel is likely the result of its age. This project will reconstruct the channel to an updated engineering standard which will reduce the risk of future structural failure. Since this portion of the project is an improvement to an existing facility, no additional impacts are anticipated.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2025
Estimated Cost/Funding Source	$8,972,000 /Santa Maria Flood Zone, FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	2016-19 and 2016-20 from the 2017 MJHMP were combined into one project and will be constructed in phases as funding becomes available.

2022-24. Cold Springs Debris Basin Modification, Montecito area

The "Cold Springs Basin Expansion" (Phase I) was completed in September of 2020. The "Cold Springs Basin Modification" (Phase II) is anticipated for construction in the summer of 2023. The project will modify the earthen-filled grouted rock rip-rap dam embankment with an engineered outlet control structure to capture large-scale debris and facilitate Southern California steelhead passage.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2023
Estimated Cost/Funding Source	$2,753,000/South Coast Flood Zone; California Department Fish and Wildlife Grant, FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was adapted from 2016-24 included as part of the 2017 MJHMP.

2022-25. Stockpile Area – South Coast

This project consists of obtaining land on the South Coast for use as a stockpile by Flood Control Maintenance. This area will be used to temporarily stockpile materials cleared out of channels and basins during yearly or emergency maintenance. The materials will then be disposed of by contractors when they need fill material for construction projects. Currently, the best location for this stockpile area is being researched.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$1,929,000/South Coast Flood Zone, FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was deferred and adapted from 2016-29 included as part of the 2017 MJHMP.

2022-26. Rattlesnake Debris Basin Modification, upper area of Santa Barbara

This project will either remove or modify the existing basin to improve the fish passage and will include grading and native plants restoration.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood

Mitigation Priority and Performance	
Estimated Timeline	2027
Estimated Cost/Funding Source	$196,000/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	This project was deferred and adapted from 2016-25 included as part of the 2017 MJHMP.

2022-27. Lower Mission Creek Flood Control Project

This project is located along Mission Creek from Canon Perdido St. to State St. in the City of Santa Barbara. The Lower Mission Creek project will widen the channel to improve capacity. This project is being coordinated with several bridge reconstructions being undertaken by the City of Santa Barbara. A natural open space environment is incorporated into the design. Completion of this project will reduce flooding and property damage adjacent to lower Mission Creek during large storm events. The Lower Mission Creek Flood Control Project is a federal US Army Corps of Engineers project that has been under study and development since the 1960s. The City of Santa Barbara and the County Flood Control District worked with the community in the 1990s to develop the current project that addresses flood control concerns and environmental issues. The Corps completed the Feasibility Study over 15 years ago and has invested approximately $4 million in preliminary and design work. The project consists of constructing many Reaches.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$86,072,000 (for all Reaches)/South Coast Flood Zone; Proposition 50 Grant
Responsible Agency/Department	County Flood Control District
Comments	MAC member recommendations

2022-28. San Antonio Creek Debris Basin Modification

This project consists of modifying the existing San Antonio Creek Debris Basin. The basin is located on San Antonio Creek, Santa Barbara. The modification will notch the spillway and construct an outlet structure that accommodates fish passage. The basin will continue to trap large debris and provide flood protection. The modification will decrease routine annual maintenance costs.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	Preliminary design in 2022; construction 2027
Estimated Cost/Funding Source	$1,655,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant

Mitigation Priority and Performance	
Responsible Agency/Department	County Flood Control District
Comments	MAC member recommendations

2022-29. San Roque Debris Basin Modification

This project consists of modifying the existing San Roque Creek Debris Basin. The basin is located in Santa Barbara. The project will modify the rock rip-rap spillway and construct an outlet that will continue to trap large debris while restoring sediment transport and the Southern California Steelhead passage. This project will decrease routine annual maintenance costs.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	Preliminary design in 2023; construction 2027
Estimated Cost/Funding Source	$1,655,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	MAC member recommendations

2022-30. Mission Creek Debris Basin Modification

This project consists of modifying the existing Mission Creek Debris Basin. The basin is located upstream of the Botanical Gardens on Mission Creek, Santa Barbara. The project will potentially modify the rock rip-rap spillway and construct an outlet that will continue to trap large debris while restoring sediment transport and the Southern California Steelhead passage. This project will decrease routine annual maintenance costs.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	Preliminary design in 2023; construction 2027
Estimated Cost/Funding Source	$1,655,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	MAC member recommendations

2022-31. Arroyo Paredon Debris Basin Modification

This project consists of modifying the existing Arroyo Paredon Creek Debris Basin. The basin is located easterly of Montecito. The project will modify the rock rip-rap spillway and construct an outlet that will continue to trap large debris while restoring sediment transport and the Southern California Steelhead passage. This project will decrease routine annual maintenance costs.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	Preliminary design in 2023; construction 2027
Estimated Cost/Funding Source	$1,655,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Flood Control District
Comments	MAC member recommendations

2022-32. Construct Storm Drainage Improvements at Toro Canyon Park

Large volumes of canyon runoff drain to an undersized culvert under Toro Canyon Park Road resulting in silt and debris over the road and erosion of the road embankment on the outlet side of the pipe. Public Assistance money has been paid in previous disasters to make the road passable. The County will replace the culvert with one of adequate size to pass the 100-year event.

- Identify funding;
- Hire an engineering firm to perform watershed analysis, design, and permit the project; and
- Replace culvert.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$100,000/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project, which was deferred and adapted from 2011-19, is for future consideration as funding becomes available.

2022-33. Tucker’s Grove Park Interior Access Road Creek Crossing Improvements

Existing “Arizona Crossing” and associated low flow culverts silt in storm events and cause erosion of the road embankment on the upstream and downstream sides of the crossing and dangerous flooding conditions on the roadway. The County will remove the crossing and replace it with a bridge for pedestrian and vehicle access. This will avoid repeat damage, facilitate fish passage, and improve safety conditions.

- Identify Funding
- Hire an engineering firm to design and permit protection
- Construct bridge

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$300,000/FEMA Hazard/Pre-Disaster Mitigation Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project was deferred and adapted from 2011-20 included as part of the 2011 MJHMP.

2022-34. Cachuma Lake Mohawk Trail Bridge and Dock Abutment Rehabilitation and Access Improvements

During a 2001 flooding event, this pedestrian bridge over Tequepis Creek was undermined, eliminating access to the public fishing area and floating dock. The County will design and repair the bridge to endure wave action and move the trail to a safer area and re-establish a land connection to the floating dock. The design has been completed. The County shall identify funding to construct the project.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$100,000/FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project, which was deferred and adapted from 2011-21, is for future consideration as funding becomes available.

2022-35. Cachuma Lake Mohawk Camping Area Bridge Abutment Protection

Traffic bridge over Tequepis Creek to Mohawk Camping Area experiences scour at its abutments during high creek flows, threatening the integrity of the bridge abutments. The County will reinforce the bridge and protect the abutments with riprap or similar material.

- Hire an engineering firm to design and permit protection
- Construct improvements

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$200,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project, which was deferred and adapted from 2011-22, is for future consideration as funding becomes available.

2022-36. Live Oak Camp Access Road Protection

The access road to Live Oak Camp is adjacent to the bank of the Santa Ynez River. Relocation of the access road is not a feasible alternative due to topography. During high stream flows, erosion occurs in the road embankment. The County will install gabion retaining walls and erosion control systems along a 200-foot reach to protect from erosion.

- Complete in-house design and obtain permits;
- Identify funding; and
- Construct the project.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$300,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project, which was deferred and adapted from 2011-26, is for future consideration as funding becomes available.

2022-37. Bridge Scour Abatement Program

The County shall explore strategies to determine cost-effective solutions to recognized geologic erosion hazards (especially scour) affecting County-maintained bridge structures. The county has a unique topographic and climatic setting that leads to relatively large amounts of water flow and materials to be transported over a relatively short distance to the ocean. Due to constricting of creek channels, decreased infiltration rates, and increased run-off from cultivated areas as well as urban development, creek channels are incised and continue to degrade. This increases the local and long-term scour at several bridges throughout the county. The County will conduct initial investigations to determine appropriate long-term solutions to prevent substantial scour damage and eventual structural failure. Phase II of the project would be to seek funding to design and construct scour mitigation projects.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$300,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Caltrans Grant
Responsible Agency/Department	County Public Works Department - Transportation
Comments	This project was deferred and adapted from 2011-27 included as part of the 2011 MJHMP.

2022-38. Goleta Beach Park Embankment Protection for Park Maintenance Facilities

High flows are eroding creek banks and threaten facilities adjacent to the Goleta Slough. The County shall evaluate alternative means to protect park facilities either through hard structures or other means, hire an engineering firm to design and permit protection, identify funding, and construct protection along approximately 300 linear feet of the Goleta Beach Park Embankment.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Geologic Hazards
Estimated Timeline	2027
Estimated Cost/Funding Source	$300,000/FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant, Caltrans Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project, which was deferred and adapted from 2011-29, is for future consideration as funding becomes available.

2022-39. Goleta Pier Coastal Development Permits

The County Parks Division shall continue to seek Coastal Development Permits for emergency repairs to Goleta Pier abutments and the 800-foot-long emergency rock revetment installed in 2018 in response to damage caused by the 2015-2016 El Nino and severe 2017 storms that were declared federal disasters.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Coastal Hazards
Estimated Timeline	2027
Estimated Cost/Funding Source	$100,000/Goleta Beach revenues
Responsible Agency/Department	County Community Services Department – Parks Division, County Planning Department, California Coastal Commission
Comments	This project is ongoing with a CDP application pending before the California Coastal Commission.

2022-40. Goleta Beach County Park Adaptive Management & Beach Nourishment Program

The County Community Services Department - Parks Division shall implement the Goleta Beach Adaptive Management Plan and continue to seek grant funding for large scale (e.g., 200,000 cubic yards of sand, if feasible) beach nourishment program at Goleta Beach County Park, including seeking permits for sand retention, consistent with the Goleta Beach County Park Adaptive Management Plan. The County could pursue funding from the State Division of Boating and Waterways and possibly the California Coastal Conservancy and U.S. Army Corps of Engineers, with federal funds potentially requiring authorizing legislation. The County should coordinate with the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) and seek support from state and federal legislative representatives.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Coastal Hazards
Estimated Timeline	2022 - 2025
Estimated Cost/Funding Source	$7,000,000 - $8,000,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant, Caltrans Grant
Responsible Agency/Department	County Community Services Department – Parks Division, County Planning Department, California Coastal Commission
Comments	This project would require several years to implement due to rigorous state and federal permit requirements and a minimum of 1 year to construct; to be effective over a longer duration, some form of sand retention would be required as well as periodic smaller maintenance renourishment events.

2022-41. Goleta Valley Wastewater Outfall Inspection Vault Relocation

The County Community Services Department - Parks Division shall coordinate with the Goleta Sanitary District to relocate the Goleta Valley wastewater outfall inspection vault landward out of the coastal hazard zone at Goleta Beach County Park.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Coastal Hazards
Estimated Timeline	2022 - 2025
Estimated Cost/Funding Source	$3,500,000/ General Services Department budget, FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant, Caltrans Grant
Responsible Agency/Department	County Community Services Department – Parks Division, County Planning Department, California Coastal Commission
Comments	This project would require several years to implement due to the complexity of coordinating with multiple regulatory agencies and engineering challenges associated with redesigning the wastewater outfall line for 80,000 residents of the Goleta Valley.

2022-42. Wallace Avenue Bluff Re-Vegetation and Stabilization

The Wallace Avenue bluff is eroding during coastal storms and heavy rain events and may become unstable during earthquakes, threatening the public beach access parking lot on the top of the bluff. Portions of the parking lot have already been lost to previous storm events. The County would like to stabilize the bluff by re-vegetation and relocation inland of the parking lot away from the bluff. The preliminary design has been completed. The County shall identify funding, construct a retaining wall, relocate the parking lot, and re-vegetate the bluff.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Geologic Hazards, Earthquake
Estimated Timeline	2027

Mitigation Priority and Performance	
Estimated Cost/Funding Source	$650,000/FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant, Caltrans Grant
Responsible Agency/Department	County Community Services Department – Parks Division, County Planning Department, California Coastal Commission
Comments	This project, which was deferred and adapted from 2011-30, is for future consideration as funding becomes available. The bluff may be in the road right-of-way.

2022-43. Toro Canyon Park Gazebo Access Road Drainage

The dirt Gazebo Access Road lacks adequate drainage and is severely eroded due to repetitive flooding events. The County will construct drainage facilities including water bars and drainage culverts to prevent future erosion and continuous repair. The County shall identify funding, conduct in-house design, and construct the drainage project.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$300,000/FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant, Caltrans Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project, which was deferred and adapted from 2011-34, is for future consideration as funding becomes available.

2022-44. Cachuma Lake Recreational Area Public Access Ramp Protection

With increased water surface elevations (3 feet) associated with flood retention, combined with storm waves, access to the boat mooring area is inundated, precluding public access during the period of inundation. The period of inundation could be up to five months. The County will install a construction retaining wall to relocate the accessway to a higher area.

- Hire an engineering firm to design and permit protection;
- Identify funding; and
- Construct the project.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$300,000/FEMA Hazard/Pre-Disaster Mitigation Grant, Department of Parks and Recreation Grant
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project, which was deferred and adapted from 2011-39, is for future consideration as funding becomes available.

2022-45. Cachuma Lake Water Treatment Plant Relocation

In addition to water supply, Lake Cachuma is used for flood retention. Lake surcharges will be increased by 3 feet to allow spring release for steelhead salmon spawning season. The County will relocate the existing water treatment plant and two sewer lift stations to address increased flooding levels, which when combined with storm waves on the lake will threaten existing facilities with erosion, inundation, loss of water services, and potential sewerage spills into the lake. Relocation will be to an area outside of the inundation zone.

- Water treatment plant relocation has been designed and preliminary designs for the lift station #2 facility are in place
- Complete final design
- Identify funding

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$8,000,000/U.S. Bureau of Reclamation grants
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	This project was deferred and adapted from 2011-40 included as part of the 2011 MJHMP. The final design process is being completed in 2021.

2022-46. Implement Energy Assurance Assessment Services Program

The Energy Assurance Assessment Services (EAAS) program focuses on conducting surveys and audits of critical facilities to improve energy efficiency, demand responsiveness, implementing distributed energy resources (DERs) such as solar and energy storage and ultimately improving energy resilience within the County. The program has launched – critical facilities have been identified and outreach and marketing have begun to building owners. Building audits started in November 2021. The program provides technical services to building owners to help them understand the costs and benefits of energy efficiency, demand response, and DERs, as well as the resiliency benefits this offers. The work of the EAAS can help identify sites that could operate as resiliency centers in the case of a natural disaster or Public Safety Power Shut Off (PSPS) and will feed into the development of a broader Energy Assurance Plan.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Energy Shortage, Climate Change
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	Current funding of approximately $800,000 from the California Energy Commission. Additional funds need to be obtained to expand the scope and provide incentives.
Responsible Agency/Department	County Community Services Department, General Services Department, Office of Emergency Management

Mitigation Priority and Performance	
Comments	Sourced from MAC members and County departmental recommendations. Additional funding needs to be identified to increase the number of facilities that can be audited and to provide incentives for project implementation.

2022-47. Develop an Energy Assurance Plan

The goal of an Energy Assurance Plan (EAP) is to assist local governments in planning for and responding to natural and human-caused disasters and emergencies that often result in a decrease or total outage of energy, which is needed to sustain critical functions and essential services. Objectives of an EAP include:

1. Identify key public and private contacts
2. Formulate roles and responsibilities
3. Understand legal parameters
4. Determine actions to reduce adverse impacts
5. Mitigate disruptions to the energy supply system
6. Elevate awareness of energy security and assurance
7. Become better informed about EA resources
8. Improve all-hazards emergency preparedness and response
9. Learn about critical infrastructure, key assets, and essential services

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Energy Shortage, Climate Change
Estimated Timeline	2023
Estimated Cost/Funding Source	The County Board of Supervisors has allocated approximately $250,000 to develop an EAP.
Responsible Agency/Department	County Community Services Department, General Services Department, Office of Emergency Management
Comments	Sourced from MAC members and County departmental recommendations. This project will require coordination with external partners such as investor-owned utilities, community choice energy providers, etc.

Objective 2.B. Use the best available science and technology to better protect life and property.

2022-48. GIS Multi-Hazard Disaster Management Information System

The County shall continue to improve GIS mapping and tracking efforts by gathering and maintaining relevant GIS data layers and imagery and utilizing the best available mapping applications and software on an annual basis. Each year, the County should review its current hazards geodatabase and compile from other government, academic, and private organizations new data related to vulnerability analysis and mapping, future disaster damage, and mitigation projects that can be used for emergency preparedness and response. This data would be organized into the County's existing GIS for managing information related to hazards. The system envisioned would be the basis of monitoring progress, updating, and continuously improving the quality of hazard mitigation planning as a centralized disaster data clearinghouse. By enhancing GIS capabilities, the County will also be better positioned to use applications such as FEMA's Hazus software during updates to this plan. The GIS should be publicly available in a web-based, user-friendly format to allow residents to investigate the latest map-based hazard information available. The following activities will be conducted to develop, implement, and maintain the system:

- Identify dedicated staff and associated funding;
- If needed, procure the appropriate hardware and software to design and implement the system;
- Establish an inter-departmental committee to review datasets and retrieve and process new data;
- Integrate new and adjusted hazard zone data from the County's updated Safety Element and Climate Change Vulnerability Assessment, including wildfire risk, evacuation routes, and debris flow risk.
- Pursue depth grid data for flood hazards to allow for more accurate analysis of flood vulnerabilities using FEMA's Hazus software;
- Pursue acquisition of countywide, cross-jurisdictional LIDAR data to provide finer grain data on building footprints, infrastructure, vegetation types, ecological aspects, and other factors that are important for understanding and addressing fire risk
- Design a web-based interface application that would be made available to county and city users;
- Develop a brief data stewardship plan; and
- Identify potential integration (multi-beneficial uses) between the system and Hazus and DFRIM production for map modernization.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	Total start-up costs are estimated at $20,000 for hardware, software, and training of existing staff. Annual maintenance costs of approximately $5,000 are expected/ County General Fund
Responsible Agency/Department	Office of Emergency Management, County Planning and Development Department, County Community Services Department, General Services Department, County Public Works Department
Comments	This project was adapted from 2011-12 and updated to include input from the MAC.

2022-49. Critical Facilities Database Maintenance

The County and participating agencies shall collect and maintain accurate and detailed critical facility information to ensure the next MJHMP update can include a more accurate risk assessment. Data that should be collected for critical facilities should include structural system, the number of stories, year of construction, seismic code used for design, building square footage, construction materials, building replacement value, and content replacement value. This should also be done for schools. The Hazus-MH default database represents each school campus with a single building record of an assumed construction type. In reality, most public schools are multi-building campuses, built over several years (i.e., buildings on one campus may be designed to different seismic codes). To improve the risk assessment for public schools, information on each building should need to be collected to inform the next round of MJHMP updates. A review of each participating agency's critical facilities list shall occur annually and be confirmed by emergency management staff.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Earthquake and Liquefaction, Wildfire, Flood, Debris Flow
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$10,000 annually/County General Fund, FEMA Hazard/Pre-Disaster Mitigation Grant
Responsible Agency/Department	General Services Department, in coordination with County Public Works Department, Office of Emergency Management, and CalOES
Comments	Sourced from MAC member recommendations and FEMA guidance

2022-50. Countywide LiDAR Imagery

The County shall seek funding for aerial LiDAR imagery. The mission serves to collect valuable topographic data allowing scientists, mapping professionals, and local agencies to examine both natural and manmade environments with accuracy, precision, and flexibility. Partners can use this laser imagery to assist in emergency response; determine areas at risk of fire, flood, and other hazards; and planning of maintenance and mitigation projects.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$435,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant, USGS
Responsible Agency/Department	County Fire Department, County Planning and Development, General Services, Public Works Department, USFS, UCSH
Comments	Sourced from MAC member recommendations and public survey results

2022-51. Maintain Fire Weather Forecasting Program

The County Fire Department has 9 permanent Remote Automatic Weather Stations (RAWS) units installed and operational and two portable RAWS units. This program requires annual maintenance.

With more accurate forecasting, limited resources could be applied to more targeted locations for prevention and operational activities resulting in significant cost savings and likely losses avoided due to prevention activities.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Climate-Related, Severe Weather
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$10,000 annually/County General Fund, FEMA Hazard/Pre-Disaster Mitigation Grant
Responsible Agency/Department	County Fire Department
Comments	This project was adapted from 2011-43 and 2016-5 and updated to include input from the MAC.

2022-52. Wildfire Hazard Mapping

The County shall update local Fire Hazard maps in collaboration with current efforts to update the State Fire Hazard Severity Zones and shall map potential debris flow areas countywide.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$10,000 annually/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Grant, CalOES Grant
Responsible Agency/Department	County Fire Department, Office of Emergency Management, Planning and Development Department
Comments	Sourced from MAC member recommendations and FEMA guidance

2022-53. Geotechnical Survey of Slope Stability

There are numerous locations throughout the County where slope stability problems are reoccurring, causing disaster damage to roadways, public safety access issues, and potential economic losses from disruption of commerce. To better evaluate the problem, the County will undertake a Geotechnical Survey of the Slope Stability of Existing Roadways to determine appropriate long-term solutions. Explore strategies to determine cost-effective solutions to recognized geologic erosion hazards affecting County-maintained roadways and structures in the county. Particular emphasis will be placed on areas of reoccurring landslides. Due to the unique topography and climate in the county, numerous portions of the County-maintained roadway system are within areas that are prone to landslide damage.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Earthquake & Liquefaction, Landslide, Geologic Hazards, Coastal Hazards
Estimated Timeline	2027

Mitigation Priority and Performance	
Estimated Cost/Funding Source	$150,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, CalEMA, County Measure D Revenues
Responsible Agency/Department	County Public Works Department - Transportation
Comments	This mitigation action was adapted from 2011-14 and 2011-15, which were ongoing mitigation actions included as part of the 2011 MJHMP.

2022-54. Enhancements to Annual Culvert Inspection Program to Include Mitigation Strategies

The County Public Works Department, Transportation Division currently implements an annual culvert inspection program to monitor the structural condition, debris clogging, and general conveyance. Culverts within the unincorporated county are inventoried with GPS coordinates and mapped as a GIS layer. Attributes currently include the type of culvert, size, diameter, length, inspection date, condition, and replacement recommendations when applicable. The Transportation Division will work with Flood Control to continuously update the inventory and add the flood-carrying capacity of the culverts to the attributes inventoried. This will allow the development of a systematic replacement program that will include consideration of flood loss reduction. As part of the ongoing annual inspection program, the size (length, volume, condition, etc.) has been collected and inventoried in a GIS environment. This survey and data collection program allow for the budgeting of repairs and replacements. To enhance the existing program, the two divisions will work together to implement the following steps:

1. From the existing size inventory, work with Flood Control to determine the ability of key culverts to pass the 100-year design event.
2. Capture findings as a GIS attribute associated with the mapped points
3. Produce a brief implementation plan to ensure that the attribute database will remain updated as part of the overall GIS system in the County

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood, Mudflow & Debris Flow
Estimated Timeline	2027
Estimated Cost/Funding Source	$120,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant
Responsible Agency/Department	County Public Works Department – Transportation, County Flood Control District
Comments	This project was deferred and adapted from 2011-23 included as part of the 2011 MJHMP.

2022-55. Lake Los Carneros Dam Information

The County shall work with the City of Goleta to provide historic information to assist the City's effort to assess and potentially improve the dam at Lake Los Carneros. The dam was constructed and maintained by the County before the City of Goleta's incorporation. As such, historic plans and management information may involve the County, including the County Flood Control District.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Dam/Levee Failure
Estimated Timeline	2023
Estimated Cost/Funding Source	$15,000/General fund for staff salaries and materials, FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant
Responsible Agency/Department	City of Goleta, County Flood Control District
Comments	This project involves the City of Goleta's pending update to the Lake Los Carneros Management Plan

Objective 2.C. Upgrade and replace aging critical facilities and infrastructure.

2022-56. Infrastructure Upgrade Plan

The County shall develop an Infrastructure Upgrade Needs Assessment that addresses the following:

1. Evaluate needs for structure hardening to bring existing critical facilities and infrastructure into compliance with CAL FIRE's WUI Fire Area Building Standards.
2. Evaluate where County roads do not meet existing road standards and identify needed road infrastructure upgrades to bridges, summer crossings, and secondary access roads to withstand flooding and debris flows.
3. Evaluate existing evacuation routes for limitations and hazards (e.g., bottle necks and single access neighborhoods) and identify needed improvements (e.g., emergency access gates and easements).
4. Collate and evaluate dam safety and inspection requirements in coordination with the California Department of Dams (DSOD).
5. Identify water wells that are vulnerable to contamination due to flood hazards and saltwater intrusion areas.
6. Identify critical facilities that require seismic strengthening to reduce the potential for damage to existing structures that do not meet current building code requirements, including a countywide inventory of soft-story critical facilities. These are buildings that were constructed before modern seismic safety building codes that have inadequate seismic support on the ground floor. See also, 2022-49. *Critical Facilities Database Maintenance*.
7. Evaluate needed replacement or upgrades of utility lines (e.g., transmission lines and gas pipelines, sewer and water lines), throughout the county.
8. Evaluate needs and identify funding for new or improved fire hydrant systems in communities that do not have adequate hydrant coverage and are non-compliant with the Fire Code.
9. Evaluate coastal critical facilities for needed upgrades or improvements to improve structural resiliency to coastal flooding, wave runup, and erosion with consideration of projected sea level rise.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Flood, Earthquake, Liquefaction, Coastal Hazards, Wildfire, Water Supply, Energy Shortage
Estimated Timeline	2024
Estimated Cost/Funding Source	$300,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Public Utilities Commission Infrastructure Grant, Infrastructure and Economic Development Bank, State Water Resources Control Board Small Community Drinking Water or Clean Water Funding
Responsible Agency/Department	County Flood Control and Water Conservation District, County Public Works Department, County Community Services Department – Parks Division, and County Planning and Development Department,
Comments	Sourced from MAC member recommendations, public survey results, and participating agency safety elements

2022-57. Portable Radio Upgrades and Replacements

The County shall seek funding to upgrade and replace outdated and non-operable portable radios used by the County Fire Department. Communication is one of the elements of the NIOSH 5, the five key factors of firefighter fatalities. Portable radios are used by firefighters daily and are inherently cost-prohibitive due to the ever-changing technology and required durability. The radios are subjected to extreme environments in structural and wildland firefighting; as well as flood and water-related emergencies. The radios are required to be replaced every ten years. Current radios utilized by County Fire are reaching their end of life, while radios utilized in the wildland fire environment are no longer serviceable. County Fire is currently accessing new technology and products of various manufacturers to replace the aging stock. Grant funding for the replacement of portable radios would enable County Fire to allocate funding to other projects; such as fuel reduction, which are of high priority to the community.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	2027
Estimated Cost/Funding Source	$1,250,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant
Responsible Agency/Department	County Fire Department
Comments	Sourced from MAC member recommendations and public survey results

2022-58. County Fire Station Repair and Replacement

Out of 16 County fire stations, 10 are more than 50 years old and three are more than 60 years old. Older buildings are not compliant with modern building code requirements, including earthquake standards for fire stations. The typical life of a fire station is 40 years. Recent studies conducted by contracted outside agencies have identified the need for County Fire to replace 10 aging fire stations. Older stations are more susceptible to damage from earthquakes. County firefighters have experienced health issues due to aging facilities. In extreme cases, a fire station could be declared uninhabitable, displacing firefighters and fire apparatus. Displacement of firefighters and apparatus and addressing health issues are costly to the County and County Fire. The displacement of firefighters and apparatus also comprises response times and public safety. Santa Barbara County will develop a comprehensive master plan to seismic retrofit or replace fire stations that do not meet current building code requirements, including applicable earthquake standards. The County shall seek funding to repair or replace up to 10 county fire stations countywide to provide adequate fire response services and equipment and equitable access to fire services countywide.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Earthquake
Estimated Timeline	2027 and ongoing
Estimated Cost/Funding Source	$10,000,000 per station/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant
Responsible Agency/Department	County Fire Department
Comments	Sourced from MAC member recommendations and public survey results

2022-59. Hydrant Upgrade and Expansion Program

The County shall seek funding to extend and upgrade its fire hydrant system to reach underserved communities. The County shall coordinate with water service providers to determine unmet needs, evaluate water supply for firefighting, and design hydrant expansion or upgrade projects. In many urban areas of the County, including the Wildland Urban Interface, hydrant infrastructure is lacking and does not meet County Development Standards or Fire Code requirements, including earthquake standards. As these locations are identified, County Fire would work with the local water purveyor to ensure hydrants were installed in these areas to fill in the gaps and meet current building codes. The improved hydrant infrastructure would improve infrastructure resilience and safety for responding firefighters and the public. The resulting hydrant infrastructure would also improve the ability of firefighters to defend homes during wildland fires by increasing the number of readily accessible water sources.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Earthquake
Estimated Timeline	2027 and ongoing
Estimated Cost/Funding Source	$1,500,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant
Responsible Agency/Department	County Fire Department
Comments	Sourced from MAC member recommendations and public survey results

2022-60. Retrofit Water Supply Systems

Improve water supply and delivery systems to save water through actions such as 1) Design water delivery systems to accommodate drought events; 2) Develop new or upgrade existing water delivery systems into and out of Lake Cachuma.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Drought, Agricultural Pests, Invasive Species, Wildfire
Estimated Timeline	2027
Estimated Cost/Funding Source	$200,000/FEMA Hazard/Pre-Disaster Mitigation Grant, Public Utilities Commission Infrastructure Grant, Department of Water Resources Drought Relief Program, Infrastructure and Economic Development Bank, State Water Resources Control Board Small Community Drinking Water or Clean Water Funding
Responsible Agency/Department	Drought Task Force, County Public Works Department, COMB
Comments	This mitigation action has been adapted from 2016-33 included as part of the 2017 MJHMP.

Objective 2.D. Ensure mitigation actions encompass vulnerable and disadvantaged communities to promote social equity.

2022-61. Increasing Services to the Houseless Community

The County shall work to provide services to homeless community members in the following ways:

1. Increase shelter capacity, particularly in urban communities, to prevent homeless community members from living in fire-prone or flood-prone areas.
2. Collaborate with non-governmental organizations on providing additional resources to houseless communities, including housing, food, government documents, healthcare, etc.
3. Pursue additional funding to increase resources and outreach to homeless communities.
4. Increase training and resources for outreach workers.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Flood
Estimated Timeline	2027
Estimated Cost/Funding Source	$500,000/FEMA Emergency Food and Shelter Grant, Department of Housing and Community Development Grant
Responsible Agency/Department	Community Services Department, Public Health Department
Comments	MAC member recommendations, public survey results

2022-62. Energy Resilience for Vulnerable Communities

The County shall pursue funding for providing generators to vulnerable communities such as health care facilities, shelters, and senior and/or assisted living communities for use during power outages, including PSPSs. The County shall prioritize clean energy options over diesel energy generators. See also, 2022-4. *Community Energy Resilience*.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Energy Shortage & Resiliency, Extreme Heat/Freeze
Estimated Timeline	2027
Estimated Cost/Funding Source	$1,000,000/California Energy Commission Grant, FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Building Resilient Infrastructure and Communities Grant, Public Utilities Commission Infrastructure Grant,
Responsible Agency/Department	Community Services Department, Public Health Department
Comments	MAC member recommendations, public survey results

GOAL 3. ACTIVELY PROMOTE UNDERSTANDING, SUPPORT, AND FUNDING FOR HAZARD MITIGATION BY PARTICIPATING AGENCIES AND THE PUBLIC.

Objective 3.A. Engage, inform, and educate the public on tools and resources to improve community resilience to hazards, reduce vulnerability, and increase awareness and support of hazard mitigation activities.

2022-63. County Community Resilience Program

The County shall develop a Community Resilience Program to help communities prepare for hazards. The County shall work closely with the cities and qualified non-governmental organizations to publicize resources and identify contacts. The Program shall include the following measures:

1. Designate and publicize evacuation areas and routes.
2. Advertise local websites that provide hazard information, including OEM, County Fire, County Sheriff, and APCD, and guide how to interpret available information to make decisions about how to protect health and property.
3. Ensure County residents know how to sign up for hazard alerts, including wildfire, earthquake, flooding, air quality, and other hazards.
4. Support the creation of community emergency response teams in local areas.
5. Offer emergency preparedness training (such as CERT) and exercises regularly.
6. Create a list of emergency contacts by neighborhood to help disseminate information
7. Develop the following as part of community resilience planning efforts:
    a. Maps and a database of relief facilities, resources, businesses, and people that can help provide community relief during emergencies; the means for informing the public of resources database; and a process for maintaining and updating database information.

b. An outline and example for the development of neighborhood resiliency plans.

c. An outline of additional community actions or projects for improvement to facilities, equipment, supplies, etc. that would benefit community resiliency.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	All
Estimated Timeline	2027
Estimated Cost/Funding Source	$45,000/ General fund for time and materials, FEMA Building Resilient Infrastructure and Communities Grant
Responsible Agency/Department	County Office of Emergency Management and Community Services Department, partnering with cities and local organizations
Comments	Sourced from MAC member recommendations, participating agency safety elements, and public survey results

2022-64. County Hazard Awareness and Preparedness Public Outreach Program

The County shall develop and implement a wide-reaching public outreach program that includes the following goals:

- Increase public awareness of emergency alert systems and ways to sign up to receive emergency alerts.
- Provide increased multi-lingual outreach, including verbal, in-person, and written communications in multiple languages.
- Work with local community groups, such as Promotores, Mixteco Indigena Community Organizing Project (MICOP), universities, and churches to disseminate information and collect feedback from underrepresented groups.
- Prioritize outreach to people in hazard-prone areas, such as foothill neighborhoods and fire-prone areas, as well as outreach to disadvantaged and frontline communities.
- Conduct in-person outreach to communities with limited access to technology, such as houseless people, the elderly, and disabled people.
- Develop materials for students in K-12 schools that are educational and can be brought back to their families.
- Use a wide range of outreach methods, including pop-up events at community gatherings and popular attractions, in-person and online surveys, amplitude modulation (AM) radio, and electronic communications.
- Implement an incentive program that would encourage homeowners and land managers to replace lawns and high-water plans with drought-tolerant species, replace traditional landscaping systems with recycled water and reuse rainwater, and increase water rates for high users. The County shall consider financial incentives, including grants, to make these changes widely available, prioritizing low-income applicants.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	All
Estimated Timeline	2027
Estimated Cost/Funding Source	$50,000/ FEMA Hazard Mitigation/Building Resilient Infrastructure and Communities Grant, General fund for time and materials
Responsible Agency/Department	County Office of Emergency Management, Community Services Department, County Flood Control District, Planning and Development Department, partnering with cities and local organizations
Comments	Sourced from MAC member recommendations and public survey results

2022-65. Mitigate Structure Ignition Vulnerabilities

The County shall identify the most vulnerable homes and communities, based on structural characteristics that make them vulnerable to ignition during wildfires, then target specific outreach to these communities related to fire hazards. The outreach should educate residents about the need to assess and mitigate their vulnerabilities to home loss, including the potential for assistance to carry out mitigation activities.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	2027
Estimated Cost/Funding Source	$75,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant
Responsible Agency/Department	County Fire Department
Comments	This mitigation action, which was adapted from 2016-34, is ongoing.

2022-66. Air Quality Awareness – Wildfires

The Air Pollution Control District (APCD) shall continue to work with the County Public Health Department to provide information to residents to protect their health during poor air quality conditions. Outreach will include:

- Ensure County residents and stakeholders know how to check local air quality conditions through APCD's website, and how to interpret air quality readings to make decisions about how to protect health.
- Ensure County residents and stakeholders know how to sign up for Air Quality Alerts jointly issued by APCD and County Public Health.
- Ensure County residents and stakeholders know how to create a "clean air room" in their residence using a HEPA air purifier and other tools to minimize indoor air pollution, to ensure healthy indoor air during pollution incidents. Ensure that County residents know safe ways to clean up ash following a wildfire, and resources for dealing with damaged structures where asbestos might be a concern.

- Ensure that this awareness occurs across languages and with additional outreach to underserved areas. An APCD public information officer (PIO) should participate with both the incident joint information center (JIC) team as well as the EOC JIC team. This will ensure that the APCD message is being distributed to the public via news releases, news conferences, and town hall meetings. The APCD PIO should contact the incident management team PIO assigned. APCD uses its website (www.OurAir.org) and various communication tools to inform key constituency groups about air pollution and risks to health. EPA has also developed a "Fire and Smoke Map" at fire.airnow.gov. Information about creating "clean air rooms" at residences can be found on APCD's website: www.OurAir.org/clean-air-rooms. Information about subscribing to Air Quality Alerts can be found on APCD's website: www.OurAir.org/subscribe.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Drought, Windstorm
Estimated Timeline	Ongoing/As needed
Estimated Cost/Funding Source	$10,000/APCD funding
Responsible Agency/Department	Santa Barbara County APCD, in conjunction with County Public Health
Comments	Sourced from MAC member recommendations

Objective 3.B. Ensure effective outreach and communications to vulnerable and disadvantaged communities.

2022-67. Disadvantaged Community Outreach Initiative

The County shall work to increase hazard preparedness among disadvantaged communities by conducting the following measures:

1. The County shall establish a program allowing citizens with life-support equipment or other disabilities to register with the County to prompt attention during emergency conditions. This registration shall include a County Evacuation Assistance list and encourage the participation of Access & Functional Needs (AFN), elderly, and disabled communities. The County shall partner with volunteer organizations to provide care during emergencies to those on the list.
2. Update County and local evacuation plans and other emergency response or contingency plans with provisions addressing the safety of disadvantaged communities and/or people with special needs or disabilities.
3. Assess opportunities to expand broadband internet access across the entire county.
4. Work with local community groups, such as Promotores, MICOP, churches, and community ambassadors, as well as multi-jurisdictional task forces, such as the County Equity Advisory and Outreach Community and groups like the Central Coast Climate Justice Network, to disseminate information and collect feedback from underrepresented groups.
5. Develop a collaborative mutual aid plan with non-governmental organizations and cities.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Earthquake, Flood, Mudflow & Debris Flow, Tsunami, Dam Failure, Levee Failure, Radiological Accident
Estimated Timeline	2027
Estimated Cost/Funding Source	$250,000/CalOES Grant, FEMA Hazard/Pre-Disaster Mitigation Grant
Responsible Agency/Department	County Office of Emergency Management, Community Services Department, County Flood Control District, Public Works Department, Planning and Development, partnering with cities
Comments	Sourced from MAC input, public survey results, participating agency safety elements, and other local HMPs (San Luis Obispo County)

2022-68. Emergency Notification in Hard-to-Reach Areas

The County shall extend emergency notification system coverage to remote, unserved, and/or underserved areas of the county, including non-English speaking and disadvantaged communities. The County has utilized a reverse 911 system in recent years to notify occupants of the need to evacuate. Because of topography, remote location, and clusters of homes in smaller communities; current communications infrastructure does not allow for current notifications systems to access all areas of the County and those residents. This mitigation could include the cost to fund the construction of cellular sites in remote areas which can be utilized by multiple carriers. The resulting projects would improve emergency notifications throughout the County.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	2027
Estimated Cost/Funding Source	$3,000,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant
Responsible Agency/Department	County Fire Department
Comments	Sourced from MAC member recommendations and public survey results

2022-69. Ongoing Wildfire Education Programs

The County shall continue implementation of the "Ready! Set! Go!" Campaign and the NFPA Firewise Community Program to educate residents about the year-round threat of wildfire and gain active public involvement in reducing life and property loss caused by wildfires. The County shall continually update education materials and provide educational programs to the public on an annual basis.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	Ongoing

Mitigation Priority and Performance	
Estimated Cost/Funding Source	$50,000 annually/FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant
Responsible Agency/Department	County Fire Department
Comments	This ongoing mitigation action was adapted and updated from 2016-4 in the 2017 MJHMP.

Objective 3.C. Increase awareness and encourage incorporation of hazard mitigation principles and practice among public, private, and nonprofit sectors, including all participating agencies.

2022-70. Ongoing Interagency Coordination to Implement MJHMP

The County shall continue to facilitate interagency coordination to implement the MJHMP, including annual reviews and progress reports, mandatory periodic updates, meetings, and decision-maker updates.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$15,000 annually/ FEMA Emergency Management Program Grant, General fund for staff salaries and materials
Responsible Agency/Department	County Office of Emergency Management
Comments	Sourced from MAC input and public survey results

2022-71. Hazard and Safety Plan Alignment

The County shall ensure that plans addressing hazards and safety, including the County's Seismic Safety and Safety Element and other elements of the Comprehensive Plan, are aligned with the MJHMP. Annual MJHMP review and maintenance shall include a review of related plans to ensure consistency and integration. The County shall consider adopting the MJHMP by reference in updates for the Seismic Safety and Safety Element.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$75,000/ FEMA Emergency Management Program Grant, General fund for staff salaries and materials
Responsible Agency/Department	County Planning and Development Department
Comments	Sourced from MAC input and public survey results

Objective 3.D. Ensure interagency coordination and joint partnerships with the County, cities, state, tribal, and federal governments.

2022-72. Regional Priority Plan (RPP)

The County shall continue to engage and participate in the Regional Priority Plan (RPP), which is a multi-agency effort to identify an array of actions that community members and leaders across multiple disciplines and sectors can be taken to build community, support ecosystems, build resilience, and reduce wildfire risk. The RPP is a prioritized listing of existing and planned wildfire mitigation projects hosted on a public-facing website. It includes an online map portal.

Anticipated outcomes include:

1. Identification and prioritization of actionable projects that mitigate wildfire risk, build community capacity, and increase wildfire and climate resilience.
2. Development of a centralized database of Santa Barbara County wildfire-related data, the first-ever countywide customizable wildfire risk model, and a spatial decision support system to identify high priority areas for wildfire risk-reduction activities - all available publicly.
3. Deepening relationships, strengthening networks, and building trust among the many community partners and agencies that need to work together to build resilience.
4. Developing a pathway and proposed platform for funding and implementing collaborative projects, identifying new priorities, and building the capacity needed to move projects forward.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Energy Shortage, Extreme Heat, Wildfire, Climate Change
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	The California Coastal Conservancy funded the project via the California Climate Investments Initiative
Responsible Agency/Department	County Fire Department
Comments	The current project team comprises several groups, including the Coastal Conservancy, Cachuma Resource Conservation District, Community Environmental Council, McGinnis Environmental, and the Santa Barbara Fire Safe Council, as well as the County.

2022-73. Regional Wildfire Mitigation Program (RWMP)

The County shall continue to participate in the Regional Wildfire Mitigation Program (RWMP) led by the Santa Barbara County Fire Safe Council. The RWMP is an ongoing wildfire mitigation program involving three domains (Landscape, Built Environment, and Community-Firewise). The program will involve landscape buffering around the WUI using agriculture, traditional fuel breaks, greenbelts, preserved open space, etc. (Landscape Domain), assessment of built-environment vulnerabilities, and a program to facilitate structure hardening (Built Environment Domain) and engaging in the Firewise USA program (Community Domain). Outside of the County Fire

Department, there is more of an emphasis on fire suppression than on activities individual property owners can undertake to prevent fires from destroying their buildings. As part of the RWMP, training is provided to local government officials (including planners outside of fire agencies) on fire mitigation at the site-specific level. While most of the training includes actions on behalf of property owners that are already required or recommended, those actions may not be familiar to many owners and local government officials.

- Contact the National Fire Protection Association about opportunities to participate in its Firewise Communities training program.
- Identify funding to train not only Fire Department staff and Forrest Managers, but planning and environmental staff as well, including the 8 Cities.
- Distribute invitations to citizens living in Extremely High threat areas.
- Rotate training around the county.
- Undertake an education action campaign to ensure community awareness and involvement.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire
Estimated Timeline	Ongoing (funded for 3 years)
Estimated Cost/Funding Source	$1.1 million/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant
Responsible Agency/Department	County Fire Department, Santa Barbara County Fire Safe Council
Comments	This mitigation action was adapted from 2011-44 included as part of the 2011 MJHMP. The Santa Barbara County Fire Safe Council was awarded a National Fish and Wildlife Foundation grant last year to develop a Firewise Program for Santa Barbara County. The Santa Barbara County Fire Safe Council is currently funding its RWMP commitment via grants (1.1 million over three years). Future ongoing funding will be needed once grants are expired to cover the costs of a program manager, website, and support staff.

Objective 3.E. Continuously improve the County's capability and efficiency at administering pre- and post-disaster mitigation programs, including providing technical support to cities and special districts and providing support for implementing local mitigation plans.

2022-74. Emergency Work

Establish a program that will reduce the time and effort required to obtain permits necessary to perform emergency work, including building and infrastructure repairs, emergency water supply installations, debris removal, etc. To the extent that it can be done beforehand, provide County and local jurisdiction staff with sufficient resources to procure permitting assistance. For example, work in riparian corridors and coastal environments may require permits from the U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, and perhaps the U.S. Army Corps of Engineers.

Mitigation Priority and Performance	
STAPLEE Priority	Low
Hazards Mitigated	All
Estimated Timeline	2027
Estimated Cost/Funding Source	$80,000/County General Fund
Responsible Agency/Department	Responsible departments with support from County Planning and Development Department
Comments	Sourced from MAC input and public survey results

2022-75. Preparing for Future Hazards

The County shall prepare for future hazards by exploring the following measures:

1. Designate and develop additional command centers for use during times of emergency. Each of the county's 5 planning areas should have at least one command center that may be activated as needed in response to the range of hazards in the county.
2. Develop a plan for resilience to highway closures, such as Highways 101 and 154, including continuing water and goods transport, shuttle service, and plans for employees that need to commute. This may include ocean ferries where land-based transportation is impeded.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Earthquake, Wildfire, Mud and Debris Flows, Flood, Terrorism, Energy Shortage, Extreme Heat/Freeze
Estimated Timeline	2027
Estimated Cost/Funding Source	$2,000,000/ FEMA Hazard/Pre-Disaster Mitigation and Emergency Management Performance Grant,
Responsible Agency/Department	County Office of Emergency Management, County Community Services Department, partnering with cities
Comments	Sourced from MAC input and public survey results

2022-76. Staffing of Operations Division of Fire Department

County Fire is lacking in its ability to complete projects that result in mitigation benefits. For example, if fuel breaks are needed, the projects to cut them are typically grant-funded. It is very difficult to fund positions with variable grant funds. Ongoing funding will provide staff support for other wildfire mitigation measures. Current needs for permanent funding for some critical prevention positions include Defensible Space Inspectors, Fire Code Inspectors, and Fuels Battalion Chief/Forester. County Fire also needs permanent funding for Operations Division, including two (2) permanent firefighter/medic post positions assigned to Firehawk. Additionally, County Fire will need to staff two new fire stations coming online in the next five years (eight post-positions). See also, 2022-65. *Mitigate Structure Ignition Vulnerabilities*, 2022-52. *Wildfire Hazard Mapping*, and 2022-56. *Infrastructure Upgrade Plan.*

Mitigation Priority and Performance	
STAPLEE Priority	Medium

Mitigation Priority and Performance	
Hazards Mitigated	Wildfire
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$200,000/ Fire District Fund, CSD assessment, FEMA Preparedness Grants, CalFire Grant, County General Fund
Responsible Agency/Department	County Fire Department
Comments	This project was adapted from 2011-17 included as part of the 2011 MJHMP. Since then, the fire department has received additional funding from State sources to increase Fire Crew staffing.

2022-77. Santa Barbara County Fire Crew Camp

The County shall seek funding for the purchase of land and development of a facility for the Santa Barbara County Fire Department's Fire Crew Program. Currently, the County Fire Crew Program is situated in a remote area of the County. The current program includes a Crew Superintendent, two 20-person Fire Crews with supervision, and several vehicles to transport the crews to incidents and projects. Due to the shortage of Fire Crews throughout the nation and the State of California, CAL FIRE has provided direction and funding for the expansion of crew programs throughout the State. County Fire has begun the process of crew expansion but has identified several issues with expansion in the current location.

County Fire may expand the current Fire Crew Program from a Crew Superintendent and two 20-person crews to an additional Crew Superintendent and an additional two 20-person crews. Typical fire crew programs operate with camps located throughout a county in tactically beneficial locations. The current location for our Fire Crew Program will be unable to logistically support a doubling of personnel and response from that location is not the most tactically beneficial for response to certain areas of the County.

The County Fire Crew responds to initial attack fires, conducts several fuel reduction projects, and responds to fires statewide. County Fire is required to keep wildland fires in the State Responsibility Area under 10 acres or less. In addition to fire response, the County Fire Crew has also responded to assist with mitigation efforts at the Refugio Oil Spill and the Montecito Debris Flow. The identification and purchase of a suitable property and the development of facilities for a second camp for the expansion of the County Fire Crew program would improve County Fire's ability to respond to wildland fires and other applicable emergencies. Measurable improvements would be in terms of response time and the increase of County resources responding to mitigate ensuing fires and incidents.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$25,000,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, Coastal Conservancy Wildfire Resilience Grant, CalFire Prevention Grants, CalOES Grant, Fire Safe Council Grant, USGS
Responsible Agency/Department	County Fire Department, CAL FIRE, General Services, Public Works Department, USFS, all other local jurisdictions

Mitigation Priority and Performance	
Comments	Sourced from MAC member recommendations and public survey results

2022-78. Sediment Management Program

To prepare for future post-fire debris flows, the County shall establish its approach to sediment management to support beach nourishment and shoreline protection, including the following:

1. Develop a sediment management plan and permitted disposal program in coordination with BEACON to remove beach-quality sediments from existing channels, flood plains, and debris basins as part of routine maintenance that can be deposited on appropriate beaches. During emergency maintenance activities, such as post debris flows or floods, the County and BEACON shall coordinate with regulatory agencies and the U.S. Army Corps of Engineers to ensure that beach quality sediment, including cobbles and fines, are transported to beaches in the county rather than to landfills, quarries, or construction sites.
2. Consider all watersheds in the county that may benefit from the post-fire installation of debris capture devices (e.g., debris basins, debris nets), particularly in areas adjacent to highways that could be closed off by debris flows.
3. Acquire potential stockpile site(s) for the storage and sorting of sediments removed from channels, debris basins, and debris flows during yearly or emergency maintenance. Potential sites that meet the following criteria shall be considered for purchase:
    4. Sites of at least 30 to 40 acres in size; and
    5. Accessible from a major highway that is reasonably proximate to sediment generation locations.
6. Assist County Flood Control District, BEACON, and participating cities in fully funding an effective Sediment Management Program (see also, 2022-81. *County Funding Pursual*).

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Mudflow & Debris Flow, Coastal Hazards (Sea Level Rise)
Estimated Timeline	2027
Estimated Cost/Funding Source	$1,929,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Building Resilient Infrastructure and Communities Grant, Department of Water Resources Grants, Department of Boating and Waterways Grants
Responsible Agency/Department	County Flood Control District, BEACON, partnering with cities
Comments	This action was adapted from 2016-29 and updated based on coordination with the County Office of Emergency Management, County Flood Control District, and BEACON.

Objective 3.F. Monitor and publicize the effectiveness of mitigation actions implemented countywide.

2022-79. County Staff Training and Accountability

The County shall work to train staff and complete mitigation measures by implementing the following:

1. Encourage planning staff to attend seminars and lectures on an annual basis on naturally occurring hazards so that they may better assist the appropriate governing bodies as they process future developments.
2. Require that staff give annual updates on plan developments and mitigation strategies to other staff and public officials.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$20,000 annually/General fund for staff salaries and materials
Responsible Agency/Department	County Office of Emergency Management
Comments	MAC member recommendations, public survey input

2022-80. Monitoring and Publicizing Hazard Mitigation Actions

The County Office of Emergency Management shall monitor the effectiveness of the mitigation actions included in this Mitigation Implementation Plan on an annual basis and include the findings in a brief status report for public review. The County shall create a new page maintained by the Office of Emergency Management on the County's website that publicizes the mitigation actions the County is implementing and the effectiveness of these mitigation actions and preventing or addressing vulnerabilities to hazards.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	FEMA Emergency Management Performance Grant, General fund for staff salaries and materials
Responsible Agency/Department	County Office of Emergency Management, partnering with cities
Comments	MAC member recommendations, public survey results

Objective 3.G. Position the County and participating agencies to apply for and receive grant funding from FEMA and other sources.

2022-81. County Funding Pursual

The County shall pursue grant funding to finish major projects and establish mitigation programs, including, but not limited to, the following:

Projects:

- Carpinteria Dune and Living Shoreline Management Plan;
- Coastal Regional Sediment Management Plan Update and Sediment Management Program;
- Goleta Beach Adaptive Management Plan;
- North Lompoc flood attenuation;

Programs:

- Assist County Flood Control District, BEACON, and participating cities in fully funding an effective Sediment Management Program (as identified above) to clear debris basins before the winter season and deposit beach quality sediments on area beaches;
- Seek out specific grants for specific hazards, such as pursuing funding to alleviate flood hazards in County Parks properties.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	\$500,000 - \$1.5 million/FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, CalOES 404 Grant, Department of Water Resources Small Communities Grant
Responsible Agency/Department	County Office of Emergency Management, partnering with BEACON and participating cities
Comments	MAC member recommendations, public survey results

2022-82. Grant Funding for Coastal Utilities Relocation

The County Community Services Department - Parks Division shall continue to seek grant funding to relocate threatened utilities landward out of Goleta Beach County Park to the Caltrans SR 217 right-of-way, consistent with the Goleta Beach County Park Adaptive Management Plan. The County would need to pursue funding from the California Coastal Conservancy, FEMA, or other agencies. The County should coordinate with utility service providers and Caltrans on this potential project.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Coastal Hazards
Estimated Timeline	2025

Mitigation Priority and Performance	
Estimated Cost/Funding Source	$2,000,000/ FEMA Hazard/Pre-Disaster Mitigation Grant, FEMA Flood Mitigation Assistance Grant, Caltrans Grant, Coastal Conservancy Grant, Department of Parks and Recreation Grants
Responsible Agency/Department	County Community Services Department – Parks Division
Comments	Sourced from County LPT input. This project would require several years to implement due to the complexity of coordinating with several utility service providers and Caltrans.

GOAL 4. MINIMIZE THE RISKS TO LIFE AND PROPERTY ASSOCIATED WITH URBAN AND HUMAN-CAUSED HAZARDS.

Objective 4.A. Minimize risks from biological hazards, including disease, invasive species, and agricultural pests.

2022-83. Pandemic Preparedness

The County shall prepare for public health emergencies such as pandemics by implementing the following measures, as learned through response to the COVID-19 pandemic:

1. Continue stockpiles of essential personal protective equipment (PPE).
2. Identify sites that were used as mass testing and vaccination sites for the COVID-19 pandemic and identify additional sites with space for drive-by and walk-in testing and vaccinations.
3. Pursue funding and resources for local and countywide public health agencies, including vehicles, staffing, PPE, etc.
4. Maintain a plan for public agencies to implement remote working conditions and social distancing, based on protocols used during the height of the COVID-19 pandemic.
5. Continue communication and coordination efforts amongst the County Public Health Department, local hospitals, healthcare workers, and first responders to distribute information about the effects and transmission of diseases causing epidemics and pandemics along with specific preventative measures.
6. Work with the County public information officer (PIO) to prepare materials to mitigate misinformation and dispel rumors about diseases, particularly on social media.
7. Continue general public and patient education regarding basic hygiene, cough/sneeze etiquette, and other disease prevention methods.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Pandemic/Public Health Emergency
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$300,000/General fund for staff salaries and materials, Department of Public Health (COVID relief funds)
Responsible Agency/Department	County Public Health Department

Mitigation Priority and Performance	
Comments	Sourced from MAC member recommendations and other local HMPs (San Luis Obispo County)

2022-84. Weed Management Area

The County shall continue to participate in the management of the Santa Barbara County Weed Management Area, an association of state and local public agencies, non-governmental organizations, non-profit groups, and private citizens who are concerned about the problem of invasive and noxious weeds in Santa Barbara County and California. Invasive and noxious weeds are plants that are non-native and lower the value of agriculture, threaten natural habitats, and create flood and fire risks for infrastructure. Grants from the California Department of Food and Agriculture may fund weed management areas. Goals of the Weed Management Area shall include:

1. Mapping invasive thistles throughout the County and uploading to CalFlora.
2. Verify locations of invasive species identified on maps.
3. Continuing to reach out to landowners on how to manage weeds.
4. Developing a plan to acquire resources to spray invasive weeds.
5. Pursue additional funding to keep the program going after the current grant ends.

In partnership with Santa Barbara County Weed Management Area, the Cachuma Resource Conservation District provides weed-related services to the agricultural community. The team helps to identify invasive weeds, develop solutions to control them, and coordinate with public agencies and non-profit organizations. This program will continue over the next five years and will continue outreach efforts.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Agricultural Pests, Invasive Species
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$65,000/General fund for staff salaries and materials
Responsible Agency/Department	County Agricultural Commissioner's Office
Comments	Sourced from MAC member recommendations

2022-85. Citrus Greening Prevention

Otherwise known as Huanglongbing (HLB) citrus greening is a citrus plant disease vectored by the Asian citrus psyllid (*Diaphorina citri Kuwayama* or ACP). Infected trees produce fruits that are green, misshapen, and bitter, unsuitable for sale as fresh fruit or juice. Most infected trees die within a few years. The insect has been observed in residential trees throughout the County, but HLB has not been confirmed in the County. The County shall continue to coordinate with the California Department of Food and Agriculture to monitor fruit movement, quarantine diseased treats, conduct surveys, trap the insects, and provide inspections of residential and commercial facilities. The County shall also continue to pursue public outreach to inform residents of the threat of the disease.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Agricultural Pests, Invasive Species
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$20,000 annually/General fund for staff salaries and materials
Responsible Agency/Department	County Agricultural Commissioner's Office
Comments	Sourced from MAC member recommendations

Objective 4.B. Be prepared and respond to urban hazards, including terrorism, civil disturbance, and cyber threats.

2022-86. Civil Disturbances and Community Relations

To reduce the potential for violence at public gatherings and improve community relations between police and civilians, the County Sheriff's Department shall update annual training to include the newest and best practices for de-escalation and managing protestors to avoid violent confrontations. This training should educate officers about the use of force and anti-racism. All officers shall attend this annual training.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Civil Disturbance
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$25,000 annually/General Fund, FEMA Homeland Security Grant
Responsible Agency/Department	County Sheriff's Office
Comments	Sourced from public survey results

2022-87. Response to Cyber Threat

The County shall maintain the level of staffing and resources provided to the IT departments and use the latest technology for securing sensitive information. The County shall continue or develop a cyber security training program that all employees are required to complete or renew annually.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Cyber Threat
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$80,000 annually/General Fund, FEMA Homeland Security Grant
Responsible Agency/Department	County General Services Department
Comments	Sourced from MAC member recommendations, public survey results

Objective 4.C. Minimize risks from energy production, including hazardous oil and gas activities.

2022-88. Oil and Gas Pipeline Safety

The County shall ensure that annual safety audits are conducted for all oil and gas production, processing, and storage facilities, consistent with state, federal, and local regulations. The County, or its agent, shall participate in these safety audits. All deficiencies noted in each audit shall be addressed promptly, in timeframes as recommended by the audit's conclusions.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Earthquake & Liquefaction, Oil Spill, Hazardous Materials Release
Estimated Timeline	Ongoing, annual
Estimated Cost/Funding Source	$20,000 annually/General fund for staff salaries and materials
Responsible Agency/Department	County Planning and Development Department – Energy Division
Comments	Sourced from MAC member recommendations, participating agency safety elements

2022-89. Air Quality Awareness – Hazardous Materials and Natural Gas Release

Air monitoring operations should be conducted in the event of any hazardous materials release or large-scale natural gas event that releases or has the potential to release harmful airborne substances, to ensure air quality is safe and not hazardous. The Operational Area Hazardous Materials Response Team (HMRT), in response to an industrial disaster or at the request of the Incident Commander or Unified Command, will initiate air monitoring operations. APCD will also coordinate with the County Public Health Department to initiate air monitoring operations if appropriate.

The EOC Public Information Officer and/or Unified Command Joint Information Center, APCD, and County Public Health Department will issue public information regarding air quality related to the incident. Air monitoring should be conducted throughout a hazardous materials release incident and air quality updates should be regularly disseminated to the public.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Hazardous Materials Release, Natural Gas Release
Estimated Timeline	As needed
Estimated Cost/Funding Source	$20,000 - $100,000/APCD funding
Responsible Agency/Department	Santa Barbara County APCD, in conjunction with County Public Health Department
Comments	Sourced from MAC member recommendations

2022-90. Air Quality Awareness – Oil Spills

When an oil spill occurs, APCD should immediately gather information and determine if any air quality issues are a concern and continue to monitor the situation. The awareness of an oil spill may come from a variety of sources, including notification from the State Warning Center, Sheriff's Dispatch, or the County Office of Emergency Management. APCD is a member of the County Planning Systems Safety and Reliability Review Committee (SSRRC), which reviews ways to reduce the risks of project-related hazards that may result in loss of life and injury and damage to property and the natural environment. Once APCD has awareness of an oil spill they should contact the County Fire Department and gather the following information:

- Update on the current situation;
- Potential impacts of the spill;
- Whether access to the spill area requires PPE;
- Whether the Fire Department has determined any air quality or toxic plume or the potential for one;
- Location of the Incident Command Post;
- Time and location of the Planning Meeting and Operational Briefing;
- Whether a Liaison Officer has been assigned for APCD staff to report to; and
- The contact information for the Public Information Officer.

Air monitoring and grab sampling should be conducted throughout a large-scale oil spill incident and air quality updates should be regularly disseminated to the public.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Oil spills
Estimated Timeline	As needed
Estimated Cost/Funding Source	$20,000 - $100,000/APCD funding
Responsible Agency/Department	Santa Barbara County APCD, in conjunction with the County Public Health Department and the County Office of Emergency Management
Comments	Sourced from MAC member recommendations

2022-91. Air Quality Awareness – Radiological Emergency

In coordination with the County Office of Emergency Management and the San Luis Obispo County Office of Emergency Services, Santa Barbara County APCD will provide meteorological data and forecast conditions to develop recommendations for a threshold of action during or following a radiological event. The three primary thresholds include recommending doing nothing (i.e., no public notification needed), shelter in place, or evacuation. While the Diablo Canyon Nuclear Power Plant (NPP) is in San Luis Obispo County and Santa Barbara County is outside of the Diablo Canyon NPP Emergency Protective Zones (EPZs), the county is within 50 miles of the Ingestion Pathway Zone (IPZ) (refer to Section 5.6.9, *Radiological Accident*). Therefore, the Santa Barbara County APCD must work closely with the San Luis Obispo County APCD to evaluate the potential impacts that a radiological emergency may have on residents and the environment throughout Santa Barbara

County. Ensuring an open line of communication, and inclusion of the APCDs into the standard emergency procedures will assist with data sharing and ensure the public is aware and better prepared should an event occur.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Radiological Emergency
Estimated Timeline	As needed
Estimated Cost/Funding Source	$20,000 - $100,000/APCD funding
Responsible Agency/Department	Santa Barbara County APCD, in conjunction with the County Public Health Department and the County Office of Emergency Management, in coordination with the County of San Luis Obispo
Comments	Sourced from MAC member recommendations

GOAL 5: PREPARE TO ADAPT AND RECOVER FROM THE IMPACTS OF CLIMATE CHANGE AND ENSURE REGIONAL RESILIENCY.

Objective 5.A. Use the latest climate science to implement hazard mitigation strategies in response to climate change.

2022-92. Implement the 2030 Climate Action Plan

The County shall continue to prepare its Climate Action Plan (CAP) with a goal of adoption in 2023. In December 2018, the County Board of Supervisors directed staff to develop a 2030 CAP to (1) achieve a GHG emission reduction goal of 50 percent below 1990 levels by 2030, and (2) incorporate climate adaptation measures. Ongoing activities for implementation of the CAP include: 1) Conducting monitoring and reporting of progress toward 2030 CAP goals; 2) Updating baseline data for emissions, etc.; 3) Implementing emission reduction actions; 4) Identifying funding for implementation.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Wildfire, Extreme Heat, Energy Shortage, Climate Change
Estimated Timeline	2023
Estimated Cost/Funding Source	$300,000/General fund dollars for staff time and technical consultant, FEMA Building Resilient Infrastructure and Communities Grant
Responsible Agency/Department	County Community Services Department, Planning and Development Department
Comments	This project was adapted from 2016-30 from the 2017 MJHMP, which involved the ECAP that sunset in 2020. All departments will play a role in implementing actions and achieving the emission targets set by the County Board of Supervisors.

2022-93. Energy Resiliency and Reduction of Fossil Fuel Consumption

The County shall consider the following measures to reduce fossil fuel consumption:

1. Work toward transitioning the County vehicle fleet to zero-emission vehicles.
2. Work with transit providers to upgrade all public transit vehicles to zero-emission vehicles.
3. Incentivize and encourage renewable energy use and pursue additional availability for all residents.
4. Work with energy providers to minimize their role in wildfires and power outages.
5. Encourage and streamline microgrid development in collaboration with local partners.
6. Provide incentives and facilitate monetary support for individuals and businesses that switch to renewable energy sources.
7. Provide incentives and facilitate monetary support for home improvements to reduce energy consumption for disadvantaged community members.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Energy Shortage, Climate Change
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$50,000/FEMA Building Resilient Infrastructure and Communities Grant
Responsible Agency/Department	County Community Services Department, Planning and Development Department, Public Works Department, General Services Department, SBCAG
Comments	Sourced from MAC member recommendations, public survey results

Objective 5.B. Identify, assess, and prepare for the impacts of climate change.

2022-94. Santa Barbara County Climate Action Campaign

The County shall design and launch a Santa Barbara County Climate Action campaign that provides clear direction and comprehensive resources to empower community members to self-organize and take action to reduce carbon emissions and improve resiliency. The campaign would take a multi-prong approach to community engagement that includes an online action platform, BrightAction, that would serve as the backbone for the campaign.

BrightAction provides a customizable list of actions that individuals or groups can take to reduce emissions and plans to add resiliency actions. The Fremont Green Challenge site is an example of how the platform can be customized. All BrightAction content is natively translated into Spanish. The BrightAction platform would be coupled with a deep engagement campaign led by outreach organizers who would develop volunteer leaders and leverage programs like CivicSpark and Climate Corp.

Mitigation Priority and Performance	
STAPLEE Priority	Medium

Mitigation Priority and Performance	
Hazards Mitigated	Wildfire, Extreme Heat, Energy Shortage, Climate Change
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$150,000/General fund, Central Coast Community Energy, Tri-County Regional Energy Network, and various grant funding opportunities.
Responsible Agency/Department	County Community Services Department
Comments	Sourced from MAC member recommendations

2022-95. Establish Resilience Hubs

A resilience hub provides a physical space or set of resources that support community resilience—such as access to power, shelter, and information—during climate-driven emergencies, including wildfires, extreme heat events, and coastal and inland flooding, as well as future Public Safety Power Shutoff (PSPS) events. They can also be used as a community gathering space year-round. The development of resilience hubs has been identified as a key community priority. The goal of this measure would be to select at least two sites (one in North County and one in South County) that currently operate as existing trusted locations (e.g., school, community center, etc.) and enable them to operate as resilience centers and support the community before, during, and after hazardous events (e.g., warming/cooling center, food distribution, training, off-grid charging). The establishment of these resilience hubs requires planning, community engagement, conceptual design, specification development, site modifications, and supply and operation of the hubs.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Wildfire, Earthquake, Flood, Extreme Heat, Energy Shortage, Climate Change
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	The cost could range from $1 million to $3 million depending on site needs/State funding specified in the budget for resiliency centers, IOU funding, Resilience Challenge Grant, FEMA Building Resilient Infrastructure and Communities Grant
Responsible Agency/Department	County Community Services Department, Planning and Development Department, Office of Emergency Management, General Services Department
Comments	Sourced from MAC member recommendations. This action may require coordination with cities, non-profits, or other private entities

2022-96. Sea Level Rise Planning

The County shall continue to evaluate and prepare long-term adaptive management plans for the protection and/ or relocation of major public infrastructure on the coast and shall plan for the strategic retreat in areas prone to sea level rise. This action shall include continued implementation of existing shoreline management plans such as the Goleta Beach County Park Adaptive Management Plan.

Mitigation Priority and Performance	
STAPLEE Priority	High

Mitigation Priority and Performance	
Hazards Mitigated	Flood, Coastal Hazards (Sea Level Rise)
Estimated Timeline	2027
Estimated Cost/Funding Source	$200,000/General fund for staff salaries and materials, Caltrans Grant, Department of Water Resources Grant
Responsible Agency/Department	County Planning and Development Department, Community Services Department – Parks Division, Public Works Department
Comments	Sourced from MAC member recommendations, public survey results

2022-97. Goleta Bay Kelp Forest Restoration

This project rebuilds the Goleta Bay Kelp Forest that was decimated in the 1980/1990 El Nino storm events. The benefits of the project are carbon sequestration for a reduction in climate temperature, and the protection of beaches on the Goleta coast, including Goleta Beach County Park. The project is to be implemented in phases to test the kelp base mechanism's ability to be weighted/secured to the sandy seabed and maintain ecological existence with kelp crabs. The project is being, and the initial test phase is funded, by a non-profit group, Friends of Goleta Beach.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Flood, Coastal Hazards (Sea Level Rise, Erosion), Climate Change
Estimated Timeline	2027
Estimated Cost/Funding Source	$700,000/Friends of Goleta Beach, General fund for staff salaries and materials, FEMA Building Resilient Infrastructure and Communities Grant, Department of Water Resources Grant
Responsible Agency/Department	Community Services Department – Parks Division
Comments	Sourced from MAC member recommendations

2022-98. Isla Vista Coastal Resilience

The County shall continue to monitor coastal erosion of the bluffs in Isla Vista and implement policies that are necessary to protect coastal resources and development. Specific actions can include developing a Master Plan for Isla Vista, pursuing Local Coastal Program amendments, and/or developing a study of the long-term effects of coastal hazards such as bluff erosion, winter storms, and sea level rise on bluff-top development along the entire length of Isla Vista with monitoring and management recommendations.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Flood, Coastal Hazards (Sea Level Rise, Erosion), Climate Change
Estimated Timeline	2027
Estimated Cost/Funding Source	$50,000 annually/ Hazard Mitigation Grant, Local Coastal Program Local Assistance Grant, General Fund
Responsible Agency/Department	County Planning and Development Department
Comments	Sourced from MAC member (County Planning and Development) recommendations

Objective 5.C. Coordinate with the public, private, and nonprofit sectors to implement strategies to address regional hazards exacerbated by climate change.

2022-99. Establish Climate Change Task Force

As part of the Safety Element Update, the County Planning and Development Department developed an advisory task force called the Core Team that consists of representatives from various County departments and external advisors who provided input on the Climate Change Vulnerability Assessment. The group will continue to review consultant work on the Climate Change Adaptation Plan to achieve the following:

1. Assess vulnerability to climate change
2. Monitor climate change conditions
3. Forecast short-term and long-term impacts
4. Develop related mitigation projects and programs

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Drought, Flood, Coastal Hazards (Sea Level Rise), Agricultural Pests, Climate Change
Estimated Timeline	2022
Estimated Cost/Funding Source	$25,000 annually/ FEMA Building Resilient Infrastructure and Communities Grant, FEMA Emergency Management Program Grant, General Fund
Responsible Agency/Department	County Planning and Development Department
Comments	This mitigation action is adapted from 2016-1 included as part of the 2017 MJHMP.

2022-100. Establish Drought Task Force

A Drought Task Force has been established "to seek countywide solutions to the current drought situation, and to provide the best advice possible to local decision-makers." The Drought Task Force includes representatives from the County Executive Office, Office of Emergency Management, Public Works, Agricultural Commissioner, County Fire Department, Central Coast Water Authority, and COMB. The County shall maintain the Drought Task Force to 1) Assess vulnerability to drought risk; 2) Monitor drought conditions; 3) Monitor water supply; 4) Plan for drought; 5) Develop related mitigation projects and programs.

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Drought, Agricultural Pests
Estimated Timeline	2027
Estimated Cost/Funding Source	$50,000/ FEMA Building Resilient Infrastructure and Communities Grant, FEMA Emergency Management Program Grant, General Fund
Responsible Agency/Department	County Executive Office (CEO)
Comments	This mitigation action is adapted from 2016-32 included as part of the 2017 MJHMP.

2022-101. Coordinate with the Santa Barbara County Regional Climate Collaborative

The Santa Barbara County Regional Climate Collaborative is a multi-sector network of public, private, and/or nonprofit entities working together to advance climate mitigation and resiliency efforts in Santa Barbara County. The Collaborative advances regional-scale climate solutions through coordination and partnership and fill the need to work more effectively across jurisdictional boundaries. The Collaborative currently has four subcommittees: Sea Level Rise Adaptation, Clean Energy Assurance, Equity Advisory and Outreach Committee, and Land Stewardship & Carbon Farming.

Current members include: the County of Santa Barbara; Cities: Santa Barbara, Goleta, Carpinteria, Buellton; Santa Barbara County Association of Governments (SBCAG), BEACON, University of California, Santa Barbara (UCSB), Community Environmental Council (CEC), LegacyWorks, The Energy Coalition, Central Coast Green Building Council (CCGBC), Land Trust of Santa Barbara County, Wild Farmlands Foundation, Santa Barbara County Air Pollution Control District (APCD), Santa Barbara County Taxpayers Association, EconAlliance, Coastal Conservancy, Central Coastal Alliance United for A Sustainable Economy (CAUSE), MICOP, Independent Living Resource Center (ILRC), Sierra Club, Santa Barbara 350, Rural Community Development Corporation of California, Santa Ynez Valley Chumash Environmental Office, CommUnify, Wilderness Youth Project, La Casa de la Raza; (NEW) Santa Maria Energy, Guadalupe Nipomo Dunes Center, Santa Barbara Bicycle Coalition (SBBIKE)/ Coalition for Sustainable Transportation (COAST), League of Women Voters, Carpinteria Valley Association, Santa Barbara County Action Network (SBCAN).

Mitigation Priority and Performance	
STAPLEE Priority	Medium
Hazards Mitigated	Wildfire, Coastal Hazards (Erosion), Extreme Heat, Energy Shortage, Climate Change
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	The County currently provides staffing support and fiscal sponsorship. Ongoing discretionary funding consists of member dues.
Responsible Agency/Department	County Community Services Department
Comments	Sourced from MAC member recommendations. The Collaborative has established an Equity Advisory and Outreach Committee.

Objective 5.D. Ensure climate change hazard mitigation addresses vulnerable and disadvantaged communities.

2022-102. Drought and Water Supply Planning

Certain areas of the county, such as the Cuyama Valley or Carpinteria, can be easily cut off from urban services during hazardous events or emergencies (e.g., if Highway 101 or Highway 166 are closed). The Cuyama Valley also relies solely on groundwater and may not have sufficient backup water supplies in cases of emergency. The County shall consider maintaining backup water supplies at strategic locations within the county, particularly for areas of the county that can be easily cut off or rely primarily on groundwater, such as the Cuyama Valley.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Drought, Climate Change
Estimated Timeline	2027
Estimated Cost/Funding Source	$100,000/ FEMA Building Resilient Infrastructure and Communities Grant, FEMA Hazard Mitigation Grant, Department of Water Resources Grant
Responsible Agency/Department	County Flood Control and Water Conservation District, County Water Agency
Comments	Sourced from MAC member recommendations and public survey results. This action may require coordination with cities, non-profits, or other private entities

2022-103. Extreme Heat Planning

The County shall develop an extreme heat plan that includes, but is not limited to, the following planning considerations:

- Increase urban forest cover and shade structures to increase shade cover and lower urban temperatures.
- Conduct outreach to agricultural workers and other outdoor employees about the risks of extreme heat and worker needs.
- Consider developing an alert system for extreme heat for workers and employers.
- Consider incentivizing the development of greenhouses in allowable locations, consistent with County land use regulations, which may be more space, water, and energy-efficient, and better protect crops and workers from extreme weather conditions.
- As part of the Recreation Master Plan, currently under preparation by the County Community Services Department – Parks Division, the County shall consider opportunities for parks and recreation facilities to provide cooling facilities, including indoor air-conditioned spaces, misters, and water features such as swimming pools, splash pads, and sprinklers/fountains.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	Extreme Heat, Climate Change
Estimated Timeline	2027
Estimated Cost/Funding Source	$100,000/County Board of Supervisors funded the Recreation Master Plan project through 2024
Responsible Agency/Department	Community Services Department – Parks Division, Office of Emergency Management, County Planning and Development Department
Comments	Sourced from MAC member recommendations, public survey results

2022-104. Plan Alignment

The County Planning and Development Department will work to align plans and policies that govern the actions of other departments, integrating hazard mitigation and climate change adaptation strategies, where appropriate. This work would involve the development of a crosswalk or other tool to support the examination and alignment of plans, policies, and actions.

Mitigation Priority and Performance	
STAPLEE Priority	High
Hazards Mitigated	All
Estimated Timeline	Ongoing
Estimated Cost/Funding Source	$100,000/General fund for staff salaries and materials, FEMA Hazard Mitigation Grant
Responsible Agency/Department	County Planning and Development Department, Community Services Department – Sustainability Division, Office of Emergency Management
Comments	Sourced from MAC member recommendations

8.0 PLAN MAINTENANCE

8.1 MONITORING, EVALUATING, AND UPDATING THE PLAN

This section sets forth the intended process for monitoring, evaluating, and maintaining the 2022 MJHMP. The County of Santa Barbara (County) and its departments have been continually implementing mitigation actions and monitoring their effectiveness since the last update of the Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) in 2017. Some deferred projects from 2011 were completed successfully, while others are ongoing or still pending. The County was very successful in implementing the 2017 mitigation actions as noted in Table 7-1. The remaining mitigation actions outlined in the 2017 LHMP are ongoing at the time of this 2022 update.

The County of Santa Barbara Office of Emergency Management (OEM) is responsible for ensuring that this plan is being monitored, evaluated, and implemented on a continuing and as-needed basis. County OEM will call the Mitigation Advisory Committee (MAC) and the County Local Planning Team (LPT) to meet on an annual basis to review the mitigation actions outlined in this plan and to discuss progress. During these meetings, the MAC and LPT will develop a list of items to be updated, added, or removed in future revisions of this plan.

The MJHMP is evaluated by the MAC annually to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. This includes re-evaluation of goals, objectives, and mitigation actions for each jurisdiction by the MAC. The MAC also reviews the goals and mitigation actions to determine their relevance to changing situations in the county, as well as changes in State or Federal regulations and policy. The MAC reviews the risk assessment portion of the MJHMP and its annexes to determine if this information should be updated or modified, given any new available data. The responsible parties for the mitigation actions report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised. Any updates or changes necessary can be processed through annual updates of the MJHMP, if needed.

Major disasters affecting the County, any legal changes, new or emerging hazards, change in community vulnerability, new or changing mitigation needs, and/or other events may trigger a meeting of the MAC or County LPT to evaluate the MJHMP, at which point they will be responsible for determining if the plan needs to be updated before the mandatory five-year mark. The LPT will focus on evaluating the MJHMP in light of technological, budgetary, political changes, new or modified data or hazard information, or other significant events that may occur during each year.

In addition to holding at least one annual meeting, the MAC and County LPT will meet to evaluate and update the MJHMP every five years. To ensure that this update occurs in a timely fashion, after completion of the third year following plan adoption, the MAC and County LPT will undertake or attempt to hire a consultant to support the following activities:

- Thoroughly analyze, evaluate, and update the risk of natural and human-caused hazards.
- Complete a new community survey and conduct robust public outreach.

- Update goals and objectives for hazard mitigation planning.
- Provide a detailed review and revision of the mitigation strategy.
- Prepare a new mitigation implementation plan.
- Coordinate with the participating agencies to update the annexes to the MJHMP.
- Prepare an updated draft MJHMP and submit it to the California Office of Emergency Services (CalOES) and the Federal Emergency Management Agency (FEMA) for preliminary review.
- Submit the updated draft MJHMP to the Board of Supervisors for adoption.
- Submit the adopted MJHMP to FEMA for final approval.

8.2 IMPLEMENTATION THROUGH EXISTING PLANS AND PROGRAMS

The County implements the MJHMP through existing plans, programs, and procedures, as detailed in Section 4.0, *Capability Assessment*. The MJHMP provides a baseline of information on the hazards impacting Santa Barbara County and the existing institutions, plans, policies and ordinances that help to implement the MJHMP (e.g., Comprehensive Plan, building codes, floodplain management ordinance). Implementation responsibilities of mitigation actions is integrated into the operational functions of the responsibility parties identified, including responsibility for seeking funding needed for implementation.

After FEMA approval and County Board of Supervisors (Board) adoption, the MJHMP is integrated into the Safety and Seismic Safety Element of the County Comprehensive Plan by Board Resolution. Under AB 2140, the County may adopt its current, FEMA-approved MJHMP into the Safety Element of its Comprehensive Plan. This adoption makes the County eligible to be considered for part or all of its local-share costs on eligible Public Assistance funding to be provided by the state through the California Disaster Assistance Act (CDAA) (see Section 2.0, *Plan Purpose and Authority* for the adopting resolutions).

The Comprehensive Plan and the MJHMP are complementary documents that work together to achieve the goal of reducing risk exposure to the county's citizens. An update to the Comprehensive Plan may trigger an update to the MJHMP. Likewise, MJHMP revisions through annual reviews may trigger an update to the Comprehensive Plan, specifically the Safety Element. County planning efforts and capital improvements directed by the County are also influenced by the content and recommendations of the MJHMP. The MJHMP is also utilized and referenced to update the County Emergency Operations Plan and the County Comprehensive Plan, as well as the efforts to develop the County's Climate Change Adaption Plan.

8.3 ONGOING PUBLIC OUTREACH AND ENGAGEMENT

The public will continue to be involved whenever the plan is updated and as appropriate during the monitoring and evaluation process. Before the adoption of updates, the County will provide multiple opportunities for the public to comment on the revisions. A public notice (in English and in Spanish) will be published before the meetings to announce the comment period and meeting locations. Moreover, the County will engage stakeholders in community emergency planning. As described in Section 3.4, *Public Outreach and Engagement*, the public outreach strategy used during development of the current update will provide a framework for public engagement through the plan maintenance process. It can be adapted for ongoing public outreach as determined to be feasible by the MAC and the LPT. Tools for engaging the public may include direct emails, community surveys, community partnerships, fact sheets, social media postings, press releases, websites, and virtual and/or in-person workshops.

8.4 POINT OF CONTACT

Comments or suggestions regarding this plan may be submitted at any time to Kelly Hubbard, Director, Office of Emergency Management, using the following information:

Kelly Hubbard, MS, CEM, Director
Office of Emergency Management
4408 Cathedral Oaks Road
Santa Barbara, CA 93110
khubbard@sbcoem.org
805-681-5526 (office)
805-319-0110 (cell)

9.0 REFERENCES

COMMUNITY PROFILE & CAPABILITY ASSESSMENT

Air Pollution Control District (APCD). 2021. "APCD - About the District." November 21, 2021. https://www.ourair.org/apcd/about-the-district/.

APCD. 2022. APCD Capabilities 2022.

BEACON. 2021a. "BEACON - Who We Are." November 21, 2021. https://beacon.ca.gov/who-we-are/.

———. 2021b. "BEACON Science Advisory Committee Activities." November 21, 2021. https://beacon.ca.gov/sac-activities/#bylaws.

CA DMV. 2021. "California DMV Statistics." https://www.dmv.ca.gov/portal/file/california-dmv-statistics-pdf/.

California Department of Water Resources. 2017. "Groundwater Information Center Interactive Map Application." July 2017. https://gis.water.ca.gov/app/gicima/.

California EDD. 2021. "Santa Barbara County Profile." 2021. https://www.labormarketinfo.edd.ca.gov/geography/santabarbara-county.html.

California Energy Commission. 2021. "California Energy Consumption Database." California Energy Consumption Database. November 1, 2021. http://ecdms.energy.ca.gov/.

Caltrans. 2019. "2019 Traffic Volumes on California State Highways." 2019. https://dot.ca.gov/programs/traffic-operations/census/traffic-volumes/2017/route-7-10.

———. 2020. "2019 California Public Road Data." State of California. https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/california-public-road-data/prd-2019v3-a11y.pdf.

CDC/ATSDR. 2021. "CDC/ATDSR Social Vulnerability Index." 2021. https://www.atsdr.cdc.gov/placeandhealth/svi/index.html.

CEC. 2016. "Utility Annual Power Content Labels for 2015." California Energy Commission - Utility Annual Power Content Labels for 2015. 2016. http://www.energy.ca.gov/pcl/labels/.

———. 2021a. "California Retail Fuel Outlet Annual Reporting (CEC-A15) Results." 2021. https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting.

———. 2021b. "Electric Generation Capacity and Energy." 2021. https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/electric-generation-capacity-and-energy.

———. 2021c. "2019 Total System Electric Generation." November 16, 2021. https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2020-total-system-electric-generation/2019.

Central Coast Community Energy. 2021. "Central Coast Community Energy." 3CE. 2021. https://3cenergy.org/.

City of Santa Barbara. 2020. "Charles E. Meyer Desalination Plant." February 10, 2020. https://www.santabarbaraca.gov/gov/depts/pw/resources/system/sources/desalination/default.asp.

County of Santa Barbara. 2015. “Energy and Climate Action Plan.” 2015. https://www.countyofsb.org/sustainability/ecap/.

———. 2019. “Strategic Energy Plan for the County of Santa Barbara.” https://www.countyofsb.org/csd/asset.c/327.

———. 2020a. “Agricultural Production Report.” https://countyofsb.org/uploadedFiles/agcomm/Content/Other/crops/2020.pdf.

———. 2020b. “County of Santa Barbara FY 2020-21 Adopted Budget.” May 2020. https://www.countyofsb.org/ceo/asset.c/4166.

County of Santa Barbara Comprehensive Plan. 2016. “Land Use Element.” http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/LandUseElement.pdf.

County of Santa Barbara Public Works Department. 2020. “Debris Management Plan.”.

DWR DSOD. 2019. “Dams Within Jurisdiction of the State of California.” September 2019. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/2019-Dams-Within-Jurisdiction-of-the-State-of-California-Alphabetically-by-County_a_y20.pdf.

ESRI. 2019. “ESRI Community Profile, Santa Barbara County.”.

FMMP. 2018. “Santa Barbara County Important Farmland 2016.” California Department of Conservation. 2018. ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2016/sba16.pdf.

Governor’s Office of Planning and Research (OPR). 2021. “OPC Spotlight: Beach Erosion Authority for Clean Oceans and Nourishment (BEACON.” https://resilientca.org/case-studies/beach-erosion-authority-for-clean-oceans-and-nou/.

Montecito Fire Protection District. 2021. “Montecito Fire Protection District - About Us.” November 16, 2021. https://www.montecitofire.com/montecito-fire-protection-district.

Santa Barbara County. 2021. “Climate Change Vulnerability Assessment.” https://s3-us-west-2.amazonaws.com/mysocialpinpoint/uploads/redactor_assets/documents/8c4aa5d7d81a96f8896bce055b229c2e7ec3c010a9866b35a18b7ae86aef7067/44589/SantaBarbaraCounty_CCVA_Report_PublicDraft_withExecSummary__09-21-21_reduced.pdf.

Santa Barbara County Department of Water Resources. 2021. “Water Supply.” 2021. https://www.countyofsb.org/pwd/watersupply.sbc.

Santa Barbara County Environmental Health Services. 2003. “Septic System Sanitary Survey.” Santa Barbara County Public Health Department. 2003. http://cosb.countyofsb.org/phd/default_all.aspx?id=19274&menu2id=174&pghead=18958&footer=18960.

Santa Barbara County Fire Department. 2021a. “Defensible Space Program.” 2021. https://www.sbcfire.com/defensible-space-program.

———. 2021b. Responsibility for Channel Islands Incident Response.

Santa Barbara County Flood Control and Water Conservation District. 2021. “2021 Updated Debris Basin Maintenance and Management Plan.” http://www.countyofsb.org/uploadedFiles/pwd/Content/Water/Environmental/2021%20Updated%20Debris%20Basin%20Plan%20Final.pdf.

Santa Barbara County Public Works. 2020. "County of Santa Barbara 2020 Groundwater Basins Summary Report." https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/WaterAgency/GW%20Data%20Report%202020.pdf.

Santa Barbara County Water Agency. 2021. "Water Wise in Santa Barbara County." Water Wise in Santa Barbara County. 2021. http://www.waterwisesb.org/wastewater.wwsb#:~:text=Wastewater%20Treatment%20Plants%20in%20Santa%20Barbara%20County&text=Most%20wastewater%20treatment%20plants%20are,as%20cities%20or%20the%20County.

Santa Barbara LAFCO. 2021. "Cities and Districts in Santa Barbara County." 2021. http://www.sblafco.org/cities_districts.sbc.

SBCAG. 2013. "2040 Santa Barbara County Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) Final Environmental Impact Report.".

———. 2018. "Regional Growth Forecast 2050 Santa Barbara County." October 2018. http://www.sbcag.org/uploads/2/4/5/4/24540302/forecast_2050_draft.pdf.

———. 2021. "Connected 2050 Regional Transportaiton Plan Sustainable Communities Strategy." http://www.sbcag.org/uploads/2/4/5/4/24540302/connected_2050_final.pdf.

UCSB Economic Forecast Project. 2018. "Santa Barbara Community Indicators." 2018. https://efp.ucsb.edu/Pages/CIP/.

U.S. Census Bureau. 2021. "U.S. Census Bureau QuickFacts - Santa Barbara County, California." 2021. https://www.census.gov/quickfacts/santabarbaracountycalifornia.

HAZARDS ASSESSMENT

Barbara H. Allen-Diaz. 2009. Climate Change Affects Us All. California Agriculture, 63/2: 51–3. University of California, Agriculture and Natural Resources.

Burciaga, M. 2018. "Storm brings hail, heavy rains to Santa Barbara County; breaks 112-year record at Santa Maria Airport." Santa Maria Times, November 29, 2018, updated February 27, 2019. Accessed: 4 November 2021. Retrieved from: https://santamariatimes.com/news/local/storm-brings-hail-heavy-rains-to-santa-barbara-county-breaks-112-year-record-at-santa/article_649076db-46cb-5997-971a-9c82f36b2ecf.html.

Cachuma Resource Conservation District. 2021. Most Common Invasive Plants. Cachuma Resource Conservation District. Accessed: 4 October 2021. Retrieved from: https://www.rcdsantabarbara.org/most-common-invasive-plants.

California Climate Change Center. 2006. Climate Change: Challenges and Solutions for California Agricultural Landscapes.

California Coastal Commission. 2019. Oil Spills. Accessed: 26 October 2021. Retrieved from: https://www.coastal.ca.gov/publiced/oilspills.html.

California Department of Conservation. 2019. California Announces New Oil and Gas Initiatives. Retrieved from: https://www.conservation.ca.gov/index/Pages/News/California-Establishes-Moratorium-on-High-Pressure-Extraction.aspx.

California Department of Fish and Wildlife (CDFW). 2014. Major Oil Spills and Incidents in California. Accessed: 26 October 2021. Retrieved from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=29364&inline.

California Department of Food and Agriculture. 2020. Official Notice - Amendment Notice of Treatment for the Asian Citrus Psyllid.

California Department of Forestry and Fire Protection (CAL FIRE). 2017. CAL FIRE SLO Twitter. Accessed: 26 October 2021. Retrieved from: https://twitter.com/CALFIRE_SLO/status/883810939446771712.

——. 2021. Emergency Fund Fire Suppression Expenditures.

California Department of Public Health (CDPH). 2013. Preparing California for Extreme Heat: Guidance and Recommendations. Accessed: 4 November 2021. Retrieved from: https://healthyplacesindex.org/wp-content/uploads/2018/02/2013_cph_preparing_california_for_extreme_eat.pdf.——. 2021. Vector-Borne Disease Section. Accessed: Retrieved from: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/VBDS.aspx.

California Department of Water Resources (DWR). 2021a. Best Available Map (BAM). Accessed: 1 November 2021. Retrieved from: https://gis.bam.water.ca.gov/bam/#skip-to-content.

——. 2021b. California's Groundwater Online. Accessed: 3 November 2021. Retrieved from: https://storymaps.arcgis.com/stories/2a301109fd984ab98b0217c7c6a6e754.

——. 2021c. Drought. Accessed: 27 October 2021. Retrieved from: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Water-Basics/Drought/Files/Publications-And-Reports/DroughtBrochure2021update_ay11.pdf.

——. 2021d. Drought in California. Accessed: 27 October 2021. Retrieved from: https://water.ca.gov/Programs/All-Programs/Drought.

California Energy Commission. 2018. Annual Averages. Accessed: 28 October 2021. Retrieved from: https://cal-adapt.org/tools/annual-averages/.

California Geological Survey. 2019a. Landslides. Accessed: 1 November 2021. Retrieved from: https://www.conservation.ca.gov/cgs/landslides#debrisflows.

——. 2019b. Post-Fire Debris Flow Facts. Accessed: 1 November 2021. Retrieved from: https://www.conservation.ca.gov/index/Pages/Fact-sheets/Post-Fire-Debris-Flow-Facts.aspx.

California Invasive Plant Council (Cal-IPC). 2021. About invasive plants. Retrieved from: https://www.cal-ipc.org/plants/impact/.

California Natural Resources Agency. 2018. California's Fourth Climate Change Assessment. Accessed: 26 October 2021. Retrieved from: https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.

California Office of Emergency Services (Cal OES). 2018. California State Hazard Mitigation Plan. Accessed: 26 October 2021. Retrieved from: https://www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/hazard-mitigation-planning/state-hazard-mitigation-plan.

——. 2021a. Nuclear Power Preparedness Program. Accessed: 26 October 2021. Retrieved from: https://www.caloes.ca.gov/cal-oes-divisions/planning-preparedness/nuclear-power-preparedness-program.

——. 2021b. Hazardous Materials Spill Reports – Santa Barbara County, Reporting Period 2006 to 2021. Accessed: 5 November 2021. Retrieved from: https://w3.calema.ca.gov/operational/malhaz.nsf/f1841a103c102734882563e200760c4a?SearchView.

California Public Utilities Commission (CPUC). 2019. Decision 19-10-054. Accessed: 5 November 2021. Retrieved from: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M319/K075/319075453.PDF.

———. 2021a. Natural Gas and California. Accessed: 5 November 2021. Retrieved from: https://www.cpuc.ca.gov/natural_gas/.

———. 2021b. Aliso Canyon Well Failure. Retrieved from: https://www.cpuc.ca.gov/regulatory-services/safety/pipeline-safety/aliso-canyon-well-failure.

Cayan, D. R., Bromirski, P., Hayhoe, K., Tyree, M., Dettinger, M., & Flick, R. 2006. 'Abstract: Projecting Future Sea Level' (Other Report). Projecting future sea level, p. 64. California Climate Change Center. Accessed: 5 October 2021. Retrieved from: http://pubs.er.usgs.gov/publication/70157139.

CBS Los Angeles. 2021. Drenching Rain Forces Alisal Fire Burn Area Residents In Santa Barbara County To Evacuate. Accessed: 26 October 2021. Retrieved from: https://losangeles.cbslocal.com/2021/10/25/residents-in-santa-barbara-near-alisal-fire-burn-area-brace-for-approaching-rain-storm/.

Center for Disease Control and Prevention (CDC). 2012. Lesson 1: Introduction to Epidemiology. Retrieved from: https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html.

———. 2016. SARS (10 Years After). Retrieved from: https://www.cdc.gov/dotw/sars/index.html.

———. 2017. Coastal Flooding, Climate Change, and Your Health: What You Can Do to Prepare.

———. 2019. 2009 H1N1 Pandemic (H1N1pdm09 virus). Retrieved from: https://www.cdc.gov/flu/pandemic-resources/2009-h1n1-pandemic.html.

———. 2021. Symptoms of COVID-19. Retrieved from: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html.

Charity Thoman. 2013. Meningococcal Outbreak at UC Santa Barbara. Santa Barbara Independent.

City of Carpinteria. 2019. Sea Level Rise Vulnerability Assessment and Adaptation Plan. Accessed: 1 November 2021. Retrieved from: https://carpinteriaca.gov/city-hall/community-development/planning/general-plan-local-coastal-plan-update/.

City of Goleta. 1997. Coastal Zoning Ordinance – Chapter 35, Article II. Accessed: 26 October 2021. Retrieved from: https://www.cityofgoleta.org/home/showdocument?id=120.

———. 2015. Coastal Hazards Vulnerability Assessment and Fiscal Impact Report. Accessed: 1 November 2021. Retrieved from: https://www.cityofgoleta.org/home/showpublisheddocument/11317/635908658293030000.

City of Santa Barbara. 2012. Certified Final Program Environmental Impact Report for the Plan Santa Barbara General Plan Update. Accessed: 4 November 2021. Retrieved from: https://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=16926.

———. 2021. Sea-Level Rise Adaptation Plan. Accessed: 1 November 2021. Retrieved from: https://www.santabarbaraca.gov/civicax/filebank/blobdload.aspx?BlobID=229622.

Climate Central. 2019. AMERICAN WARMING: The Fastest-Warming Cities and States in the U.S. Accessed: 4 November 2021. Retrieved from: https://www.climatecentral.org/news/report-american-warming-us-heats-up-earth-day.

CNN. 2014. 'Deltopia' party in California turns violent; dozens arrested. Retrieved from: https://www.cnn.com/2014/04/06/us/california-street-party-melee/index.html.

——. 2019. In the last 10 months, 140 local governments, police stations, and hospitals have been held hostage by ransomware attacks. Retrieved from: https://www.cnn.com/2019/10/08/business/ransomware-attacks-trnd/index.html.

Colorado Geological Survey. 2021. Debris and Mud Flows. Accessed: 1 November 2021. Retrieved from: https://coloradogeologicalsurvey.org/hazards/debris-flows/.

Community Environmental Council. 2020. Raise the Red Flag on the Causes of Wildfire. Accessed: 26 October 2021. Retrieved from: https://resource.cecsb.org/raise-the-red-flag-on-causes-of-wildfire/.

County of Santa Barbara. 2017. Coastal Resiliency Project: Sea Level Rise and Coastal Hazards Vulnerability Assessment. Accessed: 1 November 2021. Retrieved from: https://cosantabarbara.app.box.com/s/uon3kzbfsviq8xoevcxeeke64c2tk87f.

——. 2018. Petroleum Unit. Accessed: 5 November 2021. Retrieved from: https://www.countyofsb.org/plndev/energy/onshore.sbc.

County of Santa Barbara Planning and Development Department. 2021. Climate Change Vulnerability Assessment. Accessed: 4 November 2021. Retrieved from: https://s3-us-west-2.amazonaws.com/mysocialpinpoint/uploads/redactor_assets/documents/8c4aa5d7d81a96f8896bce055b229c2e7ec3c010a9866b35a18b7ae86aef7067/44589/SantaBarbaraCounty_CCVA_Report_PublicDraft_withExecSummary__09-21-21_reduced.pdf.

Community Environmental Council, Santa Barbara County Water Agency, and Satna Barbara County Flood Control District. 2003. Santa Barbara County Creek Care Guide, What you can do to protect our creeks. Accessed: 1 November 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/content/Water/Environmental/Creekcare%20Web%20version.pdf.

Department of Water Resources (DWR) Division of Safety of Dams (DSOD). 2021a. Division of Safety of Dams. Accessed: 5 November 2021. Retrieved from: https://water.ca.gov/programs/all-programs/division-of-safety-of-dams.

——. 2021b. Dams within Jurisdiction of the State of California Listed Alphabetically by County. Accessed: 5 November 2021. Retrieved from: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Dams-Within-Jurisdiction-of-the-State-of-California-Listed-Alphabetically-by-County-September-2021.pdf.

Earthquake Track. 2021. Recent Earthquakes near Santa Barbara, California, United States. Accessed: Retrieved from: https://earthquaketrack.com/us-ca-santa-barbara/recent.

Eliason, M. [@EliasonMike]. (2021. October 12, 2021) #Alisal Fire-Fire activity Tuesday morning in Refugio Canyon as the 6,000-acre fire continues to churn the bone dry vegetation. A Croman Corp. Sikorsky SH-3 heads back to refill its tank & head back to make another water drop on the fire [Tweet]. Twitter. https://twitter.com/EliasonMike/status/1447982887370825732.

Environmental Protection Agency (EPA). 2016. What Climate Change Means for California. Accessed: 4 November 2021. Retrieved from: https://www.epa.gov/sites/default/files/2016-09/documents/climate-change-ca.pdf.

——. 2021a. Climate Adaptation and Saltwater Intrusion. Accessed: 27 October 2021. Retrieved from: https://www.epa.gov/arc-x/climate-adaptation-and-saltwater-intrusion.

——. 2021b. Superfund Site: Casmalia Resources, Casmalia, CA Cleanup Activities. Accessed 5 November 2021. Retrieved from: https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0901257#bkground.

Federal Emergency Management Agency (FEMA). 2020. Flood Zones. Accessed: 29 October 2021. Retrieved from: https://www.fema.gov/glossary/flood-zones.

FEMA. 2021a. Coastal Hazards & Flood Mapping, A Visual Guide. Accessed: 29 October 2021. Retrieved from: https://www.fema.gov/sites/default/files/documents/fema_coastal-glossary.pdf.

——. 2021b. Protective Actions Research: Extreme Heat. Accessed: 3 November 2021. Retrieved from: https://community.fema.gov/ProtectiveActions/s/article/Extreme-Heat.

——. 2021c. Protective Actions Research: Tornado. Accessed: 4 November 2021. Retrieved from: https://community.fema.gov/ProtectiveActions/s/article/Tornado.

——. 2021d. Protective Actions Research: Hurricane. Accessed: 5 November 2021. Retrieved from: https://community.fema.gov/ProtectiveActions/s/article/Hurricane.

FloodList. 2021. USA – Deadly Flooding and Mudslides in California (Updated). Accessed: 29 October 2021. Retrieved from: https://floodlist.com/america/usa/flood-mudslide-california-january-2018.

Forbes. 2019. Cyberattack On LAPD Confirmed: Data Breach Impacts Thousands Of Officers. Retrieved from: https://www.forbes.com/sites/zakdoffman/2019/07/30/lapd-cyberattack-police-department-confirms-it-has-been-hacked/?sh=859b2da14bec.

Goleta Water District. 2021. Lake Cachuma: Our Largest Water Supply Source. Accessed: 27 October 2021. Retrieved from: https://www.goletawater.com/water-supply/lake-cachuma.

Guinness World Records. 2021. Highest recorded temperature on Earth. Accessed: 4 November 2021. Retrieved from: https://www.guinnessworldrecords.com/world-records/highest-recorded-temperature/.

Guzman-Morales, J. and Gershunov, A. 2019. "Climate change suppresses Santa Ana winds of Southern California and sharpens their seasonality." Geophysical Research Letters 46, no. 5 (2019): 2772-2780. Retrieved from: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GL080261.

Harvard University. 2021. Coronavirus, Climate Change, and the Environment A Conversation on COVID-19 with Dr. Aaron Bernstein, Director of Harvard Chan C-CHANGE. Retrieved from: https://www.hsph.harvard.edu/c-change/subtopics/coronavirus-and-climate-change/.

Henessee, S. 2021. “Hail hits Santa Barbara”. KEYT, March 10, 2021. Accessed: 4 November 2021. Retrieved from: https://keyt.com/news/2021/03/10/hail-hits-santa-barbara/.

Hodgson, M. 2019. “Santa Barbara County supervisors poised to declare end of drought-caused emergency” Lompoc record, March 16, 2019, updated May 20, 2019. Accessed: 15 May 2022. Retrieved from: https://lompocrecord.com/news/local/santa-barbara-county-supervisors-poised-to-declare-end-of-drought-caused-emergency/article_9e79969e-f2fe-54ca-bd4d-9acf925ca88f.html

International Union for Conservation of Nature (IUCN). 2021. Invasive alien species and climate change. Retrieved from: https://www.iucn.org/resources/issues-briefs/invasive-alien-species-and-climate-change.

Jervis, L. 2020. “Laurie Jervis: Late Season Extreme Heat Leads to Accelerated Grape Harvest”. Noozhawk, November 2, 2020. Accessed: 5 November 2021. Retrieved from: https://www.noozhawk.com/article/laurie_jervis_late_season_extreme_heat_leads_to_accelerated_grape_harvest.

Jesse Roman, Angelo Verzoni, & Scott Sutherland. 2020. Greetings from the 2020 Wildfire Season. Accessed: 18 October 2021. Retrieved from: http://www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2020/November-December-2020/Features/Wildfire.

KCBX. 2014. Riot breaks out at Deltopia in Isla Vista, 26 hospitalized. Retrieved from: https://www.kcbx.org/santa-barbara-county/2014-04-06/riot-breaks-out-at-deltopia-in-isla-vista-26-hospitalized.

Keon Zemoudeh. 2016. MAP: Where oil runs in Santa Barbara. KCRW. Accessed: Retrieved from: https://www.kcrw.com/culture/shows/curious-coast/map-where-oil-runs-in-santa-barbara.

Lara Cooper. 2015. Norovirus Outbreak Sickens Hundreds in Santa Barbara County. Noozhawk.

Live Science. 2012. Dangerous Sundowner Winds Explained. Accessed: 4 November 2021. Retrieved from: https://www.livescience.com/18508-dangerous-sundowner-winds-explained.html.

Lompoc Record. 2020. 25-barrel crude oil spill reported at HVI Cat Canyon facility near Los Alamos. Accessed: 26 October 2021. Retrieved from: https://lompocrecord.com/news/local/25-barrel-crude-oil-spill-reported-at-hvi-cat-canyon-facility-near-los-alamos/article_be5cb530-ff64-52b5-9d63-7ddfa2606bf9.html.

———. 2015. Flash flood shuts down Highway 166; more than 100 vehicles stranded. Accessed: 29 October 2021. Retrieved from: https://lompocrecord.com/news/local/flash-flood-shuts-down-highway-166-more-than-100-vehicles-stranded/article_e01bf6d9-ea67-5751-b6f5-fcc4b5797ca9.html.

Los Angeles Times. 1991. Most of Toxic Chemical Taken From Crash Site: Derailment. Retrieved from: https://www.latimes.com/archives/la-xpm-1991-08-02-mn-226-story.html.

———. 2014. Isla Vista shooting suspect targeted sorority, neighbors. Retrieved from: https://www.latimes.com/local/lanow/la-me-ln-isla-vista-shooting-witnesses-describe-gunman-20140524-story.html.

———. 2021. Utilities Commission approves gas storage plan at Aliso Canyon over residents’ objections. Retrieved from: https://www.latimes.com/california/story/2021-11-05/utilities-commission-approves-gas-storage-plan-at-aliso-canyon-site-over-residents-objections.

Mercury News. 2017. Don’t be distracted by the red fox’s beauty; it has a darker side. Retrieved from: https://www.mercurynews.com/2017/09/27/dont-be-distracted-by-the-red-foxs-beauty-it-has-a-darker-side/.

Mitchell, P.W. 2014. Climate Change Effects on Expansive Soil Movements. Accessed: 5 October 2021. Retrieved from: https://www.cfms-sols.org/sites/default/files/Actes/1159-1162.pdf.

National Aeronautics and Space Administration (NASA). 2017. NASA Data Show California’s San Joaquin Valley Still Sinking. Accessed: 5 October 2021. Retrieved from: http://www.nasa.gov/feature/jpl/nasa-data-show-californias-san-joaquin-valley-still-sinking.

National Drought Mitigation Center. 2021. Types of Drought. Accessed: 27 October 2021. Retrieved from: https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx.

National Interagency Fire Center. 2021. Wildland Fire Open Data. Accessed: 26 October 2021. Retrieved from: https://data-nifc.opendata.arcgis.com/.

National Geographic. 2015. Worst Drought in 1,000 Years Predicted for American West. Accessed: 26 October 2021. Retrieved from: https://www.nationalgeographic.com/science/article/150212-megadrought-southwest-water-climate-environment.

———. 2019. Tornadoes and Climate Change. Accessed: 5 November 2021. Retrieved from: https://www.nationalgeographic.org/article/tornadoes-and-climate-change/.

National Research Council (NRC). 2012. Sea Level Rise for the Coasts of California, Oregon, and Washington. Accessed: 1 November 2021. Retrieved from: https://www.adaptationclearinghouse.org/resources/sea-level-rise-for-the-coasts-of-california-oregon-and-washington-past-present-and-future.html.

National Weather Service (NWS). 2021a. Weather-Related Fatality and Injury Statistics. Accessed: 3 November 2021. Retrieved from: https://www.weather.gov/hazstat/#.

———. 2021b. Mountain and Valley Winds. Accessed: 4 November 2021: Retrieved from: https://www.weather.gov/safety/wind-mountain-valley.

National Institute for Occupational Safety & Health (NIOSH). 2021. OSHA-NIOSH Heat Safety Tool App. Accessed: Retrieved from: https://www.cdc.gov/niosh/topics/heatstress/heatapp.html.

National Institute of Environmental Health Services (NIH). 2018. Vectorborne and Zoonotic Diseases. Retrieved from: https://www.niehs.nih.gov/research/programs/climatechange/health_impacts/vectorborne/index.cfm.

National Oceanic and Atmospheric Administration (NOAA). 2005. Storm Data and Unusual Phenomena with Late Reports and Corrections. Accessed: 29 October 2021. Retrieved from: https://books.google.com/books?id=PoaQUEKivqkC&pg=RA1-PA120&lpg=RA1-PA120&dq=Santa+Barbara+County,+flash+flooding+and+mudslides+closed+down+Highway+101+at+Bates+Road+2005&source=bl&ots=ZDdp2KHs2m&sig=ACfU3U03BeQPsHNV8rlaMA4QgbcFjD5zMw&hl=en&sa=X&ved=2ahUKEwjnvNSswvfzAhWEaDABHfAMAugQ6AF6BAgREAM#v=onepage&q=Santa%20Barbara%20County%2C%20flash%20flooding%20and%20mudslides%20closed%20down%20Highway%20101%20at%20Bates%20Road%202005&f=false.

———. 2018. Tsunamis. Accessed: 18 October 2021. Retrieved from: https://www.noaa.gov/education/resource-collections/ocean-coasts/tsunamis.

———. 2021a. Drought Conditions for Santa Barbara County. Accessed: 18 October 2021. Retrieved from: https://www.drought.gov/states/California/county/Santa%20barbara.

———. 2021b. Drought Impacts on Wildfire Management. Drought.gov. Accessed: 18 October 2021. Retrieved from: https://www.drought.gov/sectors/wildfire-management.

———. 2021c. Natural Hazards Viewer. Accessed: 3 November 2021. Retrieved from: https://www.ncei.noaa.gov/maps/hazards/?layers=0.

———. 2021d. Storm Events Database – Santa Barbara County – January 1, 1990, to August 31, 2021. Accessed: 4 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Frost%2FFreeze&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=1990&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=SANTA%2BBARBARA%3A83&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

NOAA National Centers for Environmental Information (NCEI). 2021a. Storm Events Database – Tornado Search Results for Santa Barbara County, California Reporting Period 7/1/1950 to 7/31/2021. Accessed: 5 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Tornado&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=SANTA%2BBARBARA%3A83&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

———. 2021b. Storm Events Database – Tornado Search Results for California Reporting Period 7/1/1950 to 7/31/2021. Accessed: 5 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28C%29+Tornado&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=ALL&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

———. 2021c. Storm Events Database – Hurricane (Typhoon) Search Results for Santa Barbara County, California Reporting Period 7/1/1950 to 7/31/2021. Accessed: 5 November 2021. Retrieved from: https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Hurricane+%28Typhoon%29&beginDate_mm=07&beginDate_dd=01&beginDate_yyyy=1950&endDate_mm=07&endDate_dd=31&endDate_yyyy=2021&county=SANTA%2BBARBARA%3A83&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA.

NOAA National Hurricane Center (NHC). 2021. Saffir-Simpson Hurricane Wind Scale. Accessed: 5 November 2021. Retrieved from: https://www.nhc.noaa.gov/aboutsshws.php.

NOAA National Integrated Drought Information System (NIDIS). 2021. Current U.S. Drought Monitor Conditions for California. Accessed: 27 October 2021. Retrieved from: https://www.drought.gov/states/california.

NOAA National Severe Storms Library (NSSL). 2021. Severe Weather 101 – Hail Basics. Accessed: 4 November 2021. Retrieved from: https://www.nssl.noaa.gov/education/svrwx101/hail/.

NBC Los Angeles. 2018. List: Historic Tsunamis on California's Coast. Retrieved from: https://www.nbclosangeles.com/news/earthquakes/earthquake-tsunami-california-waves-history-damage/178803/.

New York Times. 2021. In City After City, Police Mishandled Black Lives Matter Protests. Retrieved from: https://www.nytimes.com/2021/03/20/us/protests-policing-george-floyd.html.

Noozhawk. 2015. Norovirus Outbreak Sickens Hundreds in Santa Barbara County. Retrieved from: https://www.noozhawk.com/article/norovirus_outbreak_sickens_hundreds_in_santa_barbara_county.

———. 2020a. Neal Graffy: Santa Barbara's Hottest Day, and a Record High of 133 Degrees. Retrieved from: https://www.noozhawk.com/article/santa_barbaras_hottest_day_and_a_record_high_of_133_degrees_20200617.

———. 2020b. Dramatic Moments Mark George Floyd Protest as Thousands Rally in Santa Barbara. Retrieved from: https://www.noozhawk.com/article/thousands_march_in_protest_of_george_floyd_death_santa_barbara_20200531.

——. 2020c. Santa Barbara Police Stand in Solidarity with Protesters Calling for an End to Brutality. Retrieved from: https://www.noozhawk.com/article/santa_barbara_ally_march_for_george_floyd_20200606.

NPG of California, LLC. 2021. Oil cleanup underway at Toro Canyon Creek near Summerland. Julia Nguyen. Accessed: 26 October 2021. Retrieved from: https://keyt.com/news/santa-barbara-s-county/2021/08/13/oil-cleanup-underway-at-toro-canyon-creek-near-summerland/.

Occupational Safety and Health Administration (OSHA). 2021. Heat Illness Prevention Campaign: Heat Safety Tool. Accessed: 3 November 2021. Retrieved from: https://www.osha.gov/heat/heat-app.

Ocean Protection Council (OPC). 2017. Rising Seas in California: An Update on Sea-Level Rise Science. Accessed: 1 November 2021. Retrieved from: https://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf.

——. 2018. State of California Sea-level Rise Guidance – 2018 Update. Accessed: 4 November 2021. Retrieved from: https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf.

Office of Governor. 2019. Wildfires and Climate Change: California's Energy Future, A Report from Governor Newsom's Strike Force. Accessed: 26 October 2021. Retrieved from: https://www.gov.ca.gov/wp-content/uploads/2019/04/Wildfires-and-Climate-Change-California%E2%80%99s-Energy-Future.pdf.

——. 2021. Governor Newsom Takes Action to Phase Out Oil Extraction in California. Retrieved from: https://www.gov.ca.gov/2021/04/23/governor-newsom-takes-action-to-phase-out-oil-extraction-in-california/.

One Ocean. 2019. Invasive Species. Accessed: 5 October 2021. Retrieved from: https://www.oceanprotect.org/resources/issue-briefs/invasive-species/.

Pacific Gas & Electric (PG&E). 2016. In Step With California's Evolving Energy Policy, PG&E, Labor and Environmental Groups Announce Proposal to Increase Energy Efficiency, Renewables and Storage While Phasing Out Nuclear Power Over the Next Decade. Accessed: 1 October 2021. Retrieved from: https://www.pge.com/en/about/newsroom/newsdetails/index.page?title=20160621_in_step_with_californias_evolving_energy_policy_pge_labor_and_environmental_groups_announce_proposal_to_increase_energy_efficiency_renewables_and_storage_while_phasing_out_nuclear_power_over_the_next_decade.

——. 2021. Public Safety Power Shutoff: PSPS Support. Accessed: 5 November 2021. Retrieved from: https://www.pge.com/en_US/residential/outages/public-safety-power-shuttoff/psps-support.page?.

Pipeline and Hazardous Materials Safety Administration (PHMSA). 2020. Pipeline Mileage and Facilities. Accessed: 5 November 2021. Retrieved from: https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-mileage-and-facilities.

Padilla, G. 2019. "Tornado Warning for Santa Barbara County Cancelled". KEYT, December 26, 2019. Accessed: 5 November 2021. Retrieved from: https://keyt.com/news/2019/12/25/tornado-warning-for-central-santa-barbara-county/.

Pararas-Carayannis, George. 1967. The Santa Barbara, California, Earthquakes and Tsunami(s) of December 1812. Retrieved from: http://www.drgeorgepc.com/Tsunami1812SantaBarbara.html.

Raiza Giorgi. 2019. Highway 154 closed indefinitely as crews clear culvert. Santa Ynez Valley Star.

Raupach, Timothy H., Olivia Martius, John T. Allen, Michael Kunz, Sonia Lasher-Trapp, Susanna Mohr, Kristen L. Rasmussen, Robert J. Trapp, and Qinghong Zhang. 2021. "The effects of climate change on hailstorms." Nature Reviews Earth & Environment 2, no. 3 (2021): 213-226. Accessed: 4 November 2021. Retrieved from: https://www.researchgate.net/profile/Qinghong-Zhang-6/publication/349143679_The_effects_of_climate_change_on_hailstorms/links/61484143a3df59440b9be252/The-effects-of-climate-change-on-hailstorms.pdf.

San Luis Obispo County Office of Emergency Services. 2014. San Luis Obispo County/Cities Nuclear Power Plant Emergency Response Plan. Retrieved from: https://www.slocounty.ca.gov/Departments/Administrative-Office/Emergency-Management/Forms-Documents/Nuclear-Power-Plant-Plans/Nuclear-Power-Plant-Administrative-Plan.pdf.

———. 2021. Emergency Planning Zone Information. Accessed: 26 October 2021. Retrieved from: https://www.prepareslo.org/en/emergency-planning-zone-information.aspx.

Santa Barbara Botanical Gardens. n.d. Plants of Concern Worst Invasive Plants in Santa Barbara County.

Santa Barbara Council Association of Governments (SBCAG). 2019. Draft New Cuyama Airport Land Use Compatibility Plan. Retrieved from: https://files.ceqanet.opr.ca.gov/254433-3/attachment/79Cd-vwVuobfrq2KXFPs4XN7kZzOjbW2-dZOK5zWJosFocRObiSEItFNYHwfF9uW5eloJoC9rGEa5gEI0.

Santa Barbara County. 2017. County of Santa Barbara Coast Resiliency Project: Sea Level Rise and Coastal Hazards Vulnerability Assessment. Accessed: 28 October 2021. Retrieved from: http://longrange.sbcountyplanning.org/programs/Coastal%20Resiliency%20Project/documents/FinalVulnAssessment.pdf.

———. 2018. Planning and Development – Energy Division. Accessed: 26 October 2021. Retrieved from: https://www.countyofsb.org/plndev/energy.sbc.

———. 2019. Santa Barbara County Parks Division Cachuma Lake Recreation Area AIS Protection Boat Launch Protocol. Retrieved from: https://www.countyofsb.org/parks/asset.c/1224.

Santa Barbara County Agricultural Commissioner's Office. 2011. Invasive and Noxious Weeds of Rangeland in Santa Barbara County. Retrieved from: https://livestockandland.org/PDF/Rangeland_Weeds.pdf.

Santa Barbara County IRWM Cooperating Partners. 2019. Santa Barbara County Integrated Regional Water Management Plan. Accessed: 26 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/IRWMP/IRWM-PLAN-UPDATE-Final_MASTER.pdf.

Santa Barbara County Fire Department. 2021a. 2020 Statistical Summary. Accessed: 4 October 2021. Retrieved from: https://www.sbcfire.com/annual-statistics.

———. 2021b. Notable Incidents and Deployments of 2019. Accessed: 26 October 2021. Retrieved from: https://www.sbcfire.com/notable-incidents.

Santa Barbara County Flood Control and Water Conservation District (County Flood Control District). 1974. Flood Plain Information, Montecito Streams, Vicinity of Montecito, Santa Barbara County, California. USACE. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/MontStreamsRpt1974.pdf.

——. 1993. 1993 precipitation report and hydrology methods. Accessed: 29 October 2021. Retrieved from: https://www.worldcat.org/title/1993-precipitation-report-and-hydrology-methods/oclc/37488149.

——. 1995. 1995 Floods. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/1995FloodsRpt.pdf.

——. 1998. 1998 Flood Report. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/1998FloodRpt.pdf.

——. 2011. Santa Barbara County Hydrology Report: Precipitation, Rivers/Streams, & Reservoirs, 2010-2011. Accessed: 29 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/2011%20Hydrology%20Report%20-%20Final-WPost(1).pdf.

——. 2021. Rainfall and Reservoir Summary. Accessed: 9 November 2021. Retrieved from: http://www.countyofsb.org/pwd/water/downloads/hydro/rainfallreports/rainfallreport.pdf.

Santa Barbara County Grand Jury. 2020. Juveniles in Gangs in Santa Barbara County has Accountability Been Forgotten? Accessed: 3 October 2021. Retrieved from: http://sbcgj.org/2020/JuvenileGangs.pdf.

Santa Barbara County Planning and Development Department. 2015. Seismic Safety and Safety Element - Santa Barbara County Comprehensive Plan. Accessed: 21 July 2017. Retrieved from: http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Seismic.pdf.

——. 2017. Santa Barbara County Energy Division Map. Accessed: 26 October 2021. Retrieved from: https://www.sbck.org/wp-content/uploads/2018/08/Oil-Gas-Facilites-Map-2017-06-06.pdf?fbclid=IwAR2BGG3EzFarXDBuIEgsni5Vv7TEhzuof-AnWQzCZw1AxU2EWbW6i7S9fI8.

——. 2021. Draft Climate Change Vulnerability Assessment. Accessed: 26 October 2021. Retrieved from: https://s3-us-west-2.amazonaws.com/mysocialpinpoint/uploads/redactor_assets/documents/8c4aa5d7d81a96f8896bce055b229c2e7ec3c010a9866b35a18b7ae86aef7067/44589/SantaBarbaraCounty_CCVA_Report_PublicDraft_withExecSummary__09-21-21_reduced.pdf.

Santa Barbara County Planning and Development Department, Energy Division. 2018. Venoco. Accessed: 28 October 2021. Retrieved from: http://www.sbcountyplanning.org/energy/projects/venoco.asp.

Santa Barbara County Planning Commission. 2016. Staff Report for Orcutt Hill Resource Enhancement Plan. Retrieved from: http://docplayer.net/129623719-Santa-barbara-county-planning-commission-staff-report-for-orcutt-hill-resource-enhancement-plan.html.

Santa Barbara County Public Health Department. 2010. Experience with Pandemic H1N1 Flu in Santa Barbara County. Retrieved from: https://www.countyofsb.org/phd/documents/Press_Release/2010-04-06%20H1N1%20Recap%20Press%20Release.pdf.

——. 2013. Provider Alert: Meningococcal Disease Outbreak in UC Santa Barbara Students. Retrieved from: https://www.countyofsb.org/phd/documents/Press_Release/Urgent_Press_Release/Meningococcal%20Outbreak%20Nov%202013.pdf.

——. 2017. SUSPECTED NOROVIRUS IN COUNTY SCHOOLS: Numerous instances of student gastro-intestinal upset in North County. Retrieved from: http://www.countyofsb.org/phd/documents/Press_Release/2017_Press_Releases/2017-05-26%20Suspected%20Norovirus%20PR.pdf.

——. 2021. Santa Barbara County Community Data Dashboard. Accessed: Retrieved from: https://experience.arcgis.com/experience/030e625c69a04378b2756de161f82ef6.

Santa Barbara County Public Works. 2018. Resource Recovery & Waste Management Division. Accessed: 28 October 2021. Retrieved from: http://www.countyofsb.org/pwd/rrwmd.sbc.

——. 2020. 'County of Santa Barbara 2020 Groundwater Basins Summary Report'. Accessed: Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/WaterAgency/GW%20Data%20Report%202020.pdf.

Santa Barbara County Public Works, Resource Recovery and Waste Management. 2018. Laguna County Sanitation District. Accessed: 28 October 2021. Retrieved from: http://www.countyofsb.org/pwd/laguna.sbc.

Santa Barbara County Water Agency. 2000. Water Resources of Santa Barbara County. Accessed: 28 October 2021. Retrieved from: https://www.countyofsb.org/uploadedFiles/pwd/Content/Water/WaterAgency/Water%20Resources%20of%20Santa%20Barbara%20County%202000.pdf.

——. Where Does Your Water Come From? Accessed: 28 October 2021. Retrieved from: http://www.waterwisesb.org/where.wwsb.

Santa Maria Airport. 2021. History. Accessed: 1 October 2021. Retrieved from: http://www.santamariaairport.com/about-the-airport/history/.

Santa Maria News. 2007. Santa Maria River Levee is Topic of City TV Show. Accessed: 27 October 2021. Retrieved from: https://www.cityofsantamaria.org/Home/ShowDocument?id=1374.

Santa Maria Times. 2020. Update: Peaceful afternoon protest turns destructive Sunday night in Santa Maria. Retrieved from: https://santamariatimes.com/news/local/update-peaceful-afternoon-protest-turns-destructive-sunday-night-in-santa-maria/article_e9e14adb-d296-54da-81d3-f13167407b68.html.

——. 2021. Judith Dale: Wildfires in Santa Barbara County, 2016 to 2019. Accessed: 26 October 2021. Retrieved from: https://santamariatimes.com/lifestyles/judith-dale-wildfires-in-santa-barbara-county-2016-to-2019/article_ba567bff-ad16-5a6e-9d85-226bcb76cce9.html.

Scully, J. 2018. "Santa Barbara County Warns of Extended Power, Gas, Potable Water Outages in Montecito Area," Noozhawk, January 9, 2018. Accessed: 5 November 2021. Retrieved from: https://www.noozhawk.com/article/santa_barbara_county_montecito_utility_outages_edison_socalgas_water.

Sean Breslin. 2017. Dangerous Flooding Strikes California, Arizona; Several Rescues Reported. The Weather Channel.

Southern California Edison (SCE). 2017. News Release: Thomas Fire Leads to Santa Barbara Area Outage. Accessed: 5 November 2021. Retrieved from: https://newsroom.edison.com/releases/releases-20171210.

———. 2021. Wildfire Safety: Customer Resources & Support. Accessed: 5 November 2021. Retrieved from: https://www.sce.com/wildfire/customer-resources-and-support.

State of California Natural Resources Agency Department of Water Resources. 2015. California's Groundwater Update 2013. Accessed: 5 October 2021. Retrieved from: https://cawaterlibrary.net/wp-content/uploads/2017/05/GWU2013_Ch5_CentralCoast_Final.pdf.

Texas State Historical Association. 2018. Texas Droughts. Accessed: 27 October 2021. Retrieved from: https://texasalmanac.com/topics/environment/texas-droughts.

The Tribune. 2017. Alamo Fire grows to 24,000 acres, now largest fire burning in California. Accessed: 26 October 2021. Retrieved from: https://www.sanluisobispo.com/news/local/article160383799.html.

The Independent. 2014. Cachuma Lake Given Maximum Protection from Invasive Species Santa Barbara County Extends Vessel Quarantine to 30 Days. County of Santa Barbara Community Services Department. Retrieved from: https://www.independent.com/2014/04/18/cachuma-lake-given-maximum-protection-from-invasive-species-santa-barbara-county-extends-vessel-quarantine-30-days/.

———. 2020a. The Bank of America Burning in Isla Vista on the 50th Anniversary. Retrieved from: https://www.independent.com/2020/02/25/the-bank-of-america-burning-in-isla-vista-on-the-50th-anniversay/.

———. 2020b. Thousands at Santa Barbara Courthouse Protest the Murder of George Floyd. Retrieved from: https://www.independent.com/2020/06/01/thousands-at-santa-barbara-courthouse-protest-the-murder-of-george-floyd/.

Timothy H. Raupach, Olivia Martius, John T. Allen, Michael Kunz, Sonia Lasher-Trapp, Susanna Mohr, Kristen L. Rasmussen, et al. 2021. The effects of climate change on hailstorms. Nature Reviews Earth & Environment, 2: 213–26. DOI: https://doi.org/10.1038/s43017-020-00133-9.

Tom Bolton. 2020. Highway 154 Briefly Shut Down Near Santa Barbara by Mud-Rock Slide. Noozhawk.

Tyler Hayden. 2017. Understanding Power Outages During the Thomas Fire. The Santa Barbara Independent. Accessed: 6 October 2021. Retrieved from: https://www.independent.com/2017/12/14/understanding-power-outages-during-thomas-fire/.

U.S. Army Corps of Engineers (USACE). 1978. Report on Floods of February and March 1978 in Southern California. Accessed: 2 November 2021. Retrieved from: https://books.google.com/books?id=EsUPAQAAIAAJ&pg=PR3&lpg=PR3&dq=1978+mudslides+in+santa+barbara+county&source=bl&ots=-5Hfc_ig40&sig=ACfU3U08MAE3CqP-Nk20qWhyfneUzjEtxw&hl=en&sa=X&ved=2ahUKEwjpvfCYgfrzAhWZLc0KHZWoBycQ6AF6BAgrEAM#v=onepage&q=1978%20mudslides%20in%20santa%20barbara%20county&f=true.

———. 2007. Advanced Measures Report Based on Technical Assistance Investigation, Santa Maria Valley Levees Santa Barbara County, CA. Accessed: 27 October 2021. Retrieved from: http://www.countyofsb.org/pwd/DMA2000/INFO_files/SantaMaria_PIR.pdf.

———. 2009. Environmental Assessment for the Santa Maria River Levee Improvement Project. Accessed: 27 October 2021. Retrieved from: https://ceqanet.opr.ca.gov/2009044003.

U.S. Bureau of Reclamation (USBR) 2021. Reclamation / Projects & Facilities / Dams. Accessed: 5 November 2021. Retrieved from: https://www.usbr.gov/projects/facilities.php?type=Dam#C.

U.S. Climate Data. 2021. California Climate Data – New Cuyama. Accessed: 3 November 2021. Retrieved from: https://www.usclimatedata.com/climate/new-cuyama/california/united-states/usca0757.

U.S. Department of Agriculture (USDA) and U.S. Geological Survey (USGS). 2018. The Increasing Wildfire and Post-Fire Debris-Flow Threat in Western USA, and Implications for Consequences of Climate Change. Accessed: 2 November 2021. Retrieved from: https://link.springer.com/chapter/10.1007%2F978-3-540-69970-5_9.

U.S. Department of Commerce. 1994. Climate of Santa Barbara, California. NOAA Technical Memorandum NWS WR-225. Accessed: 29 October 2021. Retrieved from: https://www.weather.gov/media/wrh/online_publications/TMs/TM-225.pdf.

U.S. Geological Survey (USGS). 2003. Tsunami Hazards in the Santa Barbara Channel. Accessed: 29 October 2021. Retrieved from: https://www.usgs.gov/centers/pcmsc/science/tsunami-hazards-santa-barbara-channel?qt-science_center_objects=0#qt-science_center_objects.

———. 2016. Land Subsidence From Ground-Water Pumping. Accessed: 27 October 2021. Retrieved from: https://geochange.er.usgs.gov/sw/changes/anthropogenic/subside/.

———. 2018. Santa Barbara and Foothill groundwater basins Geohydrology and optimal water resources management—Developed using density dependent solute transport and optimization models. Accessed: 27 October 2021. Retrieved from: https://pubs.er.usgs.gov/publication/sir20185059.

———. 2021a. Land Subsidence. Accessed: 27 October 2021. Retrieved from: https://www.usgs.gov/special-topic/water-science-school/science/land-subsidence?qt-science_center_objects=0#qt-science_center_objects.

———. 2021b. Post-wildfire Landslides Becoming More Frequent in Southern California. Accessed: 2 November 2021. Retrieved from: https://www.usgs.gov/news/post-wildfire-landslides-becoming-more-frequent-southern-california.

———. 2021c. What are tsunamis? Accessed: 2 November 2021. Retrieved from: https://www.usgs.gov/faqs/what-are-tsunamis?qt-news_science_products=0#qt-news_science_products.

———. 2022. How would sea level change if all glaciers melted? Accessed: 14 April 2022. Retrieved from: https://www.usgs.gov/faqs/how-would-sea-level-change-if-all-glaciers-melted#:~:text=There%20is%20still%20some%20uncertainty,coastal%20city%20on%20the%20planet.

U.S. Department of Health and Human Services. 2005. HHS Pandemic Influenza Plan. Retrieved from: https://www.cdc.gov/flu/pdf/professionals/hhspandemicinfluenzaplan.pdf.

U.S. Nuclear Regulatory Commission (NRC). 2021. Transportation of Radioactive Material. Accessed: 30 September 2021. Retrieved from: https://www.nrc.gov/reading-rm/basic-ref/students/for-educators/11.pdf.

———. 2021. Diablo Canyon, Emergency Planning Zone Map. Accessed: 26 October 2021. Retrieved from: https://www.nrc.gov/docs/ML1203/ML120380327.pdf.

University of California, Santa Barbara (UC Santa Barbara). 2019. Integrated approach for managing aquatic invasive species in California. Retrieved from: https://www.sciencedaily.com/releases/2019/12/191202190410.htm.

Ventura County Fire Department. 2019. VCFD Determines Cause of the Thomas Fire. Accessed: 26 October 2021. Retrieved from: https://vcfd.org/news/vcfd-determines-cause-of-the-thomas-fire/.

Western Regional Climate Center (WRCC). 2021. Cooperative Climatological Data Summaries – Southern California – Santa Barbara FAA COOP. Accessed 4 November 2021. Retrieved from: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7905.

Zeng, Zhenzhong, Alan D. Ziegler, Timothy Searchinger, Long Yang, Anping Chen, Kunlu Ju, Shilong Piao et al. "A reversal in global terrestrial stilling and its implications for wind energy production." Nature Climate Change, Nature Publishing Group, 2019, 9 (12), pp.979-985. ff10.1038/s41558-019-0622-6ff. ffhal-02440789. Accessed 4 November 2021. Retrieved from: https://hal.archives-ouvertes.fr/hal-02440789/document.

VULNERABILITY ASSESSMENT

Amtrak. 2021. California Train Routes. National Railroad Passenger Corporation. Available at: https://www.amtrak.com/california-train-routes.

Bill McCaffray. 2009. Mussel Problem in California Lakes. Alliance Wakeboard. July 8, 2009. Available at: https://www.alliancewake.com/wake/bt/mussel-problem-in-california-lakes/.

Bolton, Tom. 2021a. Hail and Snow on Cold Spring Bridge Spawn Crashes, Road Closures on Highway 154. Noozhawk. Available at: https://www.noozhawk.com/article/icy_conditions_on_cold_spring_bridge_spawn_crashes_road_closures_on_highway.

———. 2021b. Hail from Late-Winter Storm Blankets Parts of Santa Barbara County. Noozhawk. Available at: https://www.noozhawk.com/article/hail_from_late_winter_storm_blankets_parts_of_santa_barbara_county_south_co.

California Air Resources Board. Nd. Aliso Canyon Natural Gas Leak. Available at: https://ww2.arb.ca.gov/our-work/programs/aliso-canyon-natural-gas-leak.

———. 2021. Aliso Canyon Natural Gas Leak. California Air Resources Board Programs. 2021. Available at: https://ww2.arb.ca.gov/our-work/programs/aliso-canyon-natural-gas-leak.

California Department of Public Health. 2013. Preparing California for Extreme Heat: Guidance and Recommendations. Available at: https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/CCHEP-General/CDPH-EPA-2013-Preparing-CA-for-Extreme-Heat_ADA.pdf.

California Department of Food and Agriculture. 2020. Amendment Notice of Treatment for the Asian Citrus Psyllid. 2020. Available at: https://www.cdfa.ca.gov/plant/pdep/treatment/notices/2020/SantaBarbaraCounty/ACP-NOT-SantaBarbaraCountyAreawide_2020-08-05.pdf.

California Seismic Safety Commission. 2006. Status of the Unreinforced Masonry Building Law. Available at: https://ssc.ca.gov/wp-content/uploads/sites/9/2020/08/cssc_2006_urm_report_final.pdf.

Campbell, Sharon, Tomas A. Remenyi, Christopher J. White, and Fay H. Johnston. 2018. "Heatwave and Health Impact Research: A Global Review. Available at: https://www.sciencedirect.com/science/article/pii/S1353829218301205.

Carvalho, Leila, Gert-Jan Duine, Charles Jones, Katelyn Zigner, Craig Clements, Heather Kane, Chloe Gore, et al. 2020. "The Sundowner Winds Experiment (SWEX) Pilot Study: Understanding Downslope Windstorms in the Santa Ynez Mountains, Santa Barbara, California." Available at: https://escholarship.org/uc/item/7mj0n9kr.

California Department of Fish and Wildlife (CDFW). 2021. Quagga and Zebra Mussels Incident Description. 2021. Available at: https://wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels/Incident-Description.

County of Santa Barbara. 2017. Sea Level Rise & Coastal Hazards Vulnerability Assessment. July 2017. Available at: https://cosantabarbara.app.box.com/s/uon3kzbfsviq8xoevcxeeke64c2tk87f.

———. 2018a. Quagga & Zebra Mussel Information. 2018. Available at: https://www.countyofsb.org/parks/quagga.sbc.

———. 2018b. Weed Management. 2018. Available at: http://www.countyofsb.org/agcomm/wma/.

———. 2020. Financial Highlights.

———. 2020. Agricultural Production Report.

County of Santa Barbara Agricultural Commissioner's Office. 2011. Invasive and Noxious Weeds of Rangeland in Santa Barbara County.

Environmental Protection Agency (EPA). 2021b. Superfund Site: Casmalia Resources, Casmalia, CA Cleanup Activities. Accessed 5 November 2021. Retrieved from: https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0901257#bkground.

Federal Emergency Management Agency (FEMA). 2021. FEMA Flood Map Service Center | Search By Address. 2021. Available at: https://msc.fema.gov/portal/search?AddressQuery=santa%20barbara%20county#searchresultsanchor.

IRWM. 2018. DAC Mapping Tool. 2018. Available at: https://gis.water.ca.gov/app/dacs/.

IUNC. 2021. Invasive Alien Species and Climate Change. IUCN. 2021. Available at: https://www.iucn.org/resources/issues-briefs/invasive-alien-species-and-climate-change.

Jean Yamamur. 2021. "Mandatory Evacuation Order for Alisal Fire Burn Scar." The Santa Barbara Independent. October 24, 2021. Available at: https://www.independent.com/2021/10/24/mandatory-evacuation-order-for-alisal-fire-burn-scar/.

Los Angeles Times. 1991. Freight Train Derails, Closes Freeway: Seacliff. Available at: https://www.latimes.com/archives/la-xpm-1991-07-29-me-203-story.html.

NBC. 2021. 147,000+ May have had personal information compromised in Cyberattack: Scripps Health. Available at: https://www.nbcsandiego.com/news/local/scripps-health-employees-regaining-access-to-internal-systems-hit-by-cyberattack-2/2619540/.

National Oceanic and Atmospheric Administration (NOAA). 2007. Invasive Species Channel Islands. PLoS ONE. March 14, 2007. Available at: https://dx.plos.org/10.1371/journal.pone.0000295.

———. 2021. Refugio Beach Oil Spill. Available at: https://darrp.noaa.gov/oil-spills/refugio-beach-oil-spill.

———. 2021b. "What Is Subsidence?" April 15, 2021. Available at: https://oceanservice.noaa.gov/facts/subsidence.html.

NOAA National Severe Storms Laboratory (NSSL). 2021. SEVERE WEATHER 101: Frequently Asked Questions about Tornadoes. Accessed: 11 November 2021. Available at: https://www.nssl.noaa.gov/education/svrwx101/tornadoes/faq/.

Pacific Gas and Electric Company (PG&E). 2021. Decommissioning Diablo Canyon Power Plant in 2025. 2021. Available at: https://www.pge.com/en_US/safety/how-the-system-works/diablo-canyon-power-plant/diablo-canyon-power-plant/diablo-decommissioning.page.

Plummer, Christopher, and Tina Daunt. 1991. Freight Train Derails, Closes Freeway. Los Angeles Times. Available at: https://www.latimes.com/archives/la-xpm-1991-07-29-me-203-story.html.

Raupach, Timothy H., Olivia Martius, John T. Allen, Michael Kunz, Sonia Lasher-Trapp, Susanna Mohr, Kristen L. Rasmussen, Robert J. Trapp, and Qinghong Zhang. 2021. The Effects of Climate Change on Hailstorms. Nature Reviews Earth & Environment. Available at: https://www.nature.com/articles/s43017-020-00133-9.

Ready. 2021. Cybersecurity. Available at: https://www.ready.gov/cybersecurity.

Robert D Niehaus, Inc. 2018. "The Economic Impacts of the Montecito Mudslides A Preliminary Assessment.".

San Luis Obispo County Office of Emergency Services. 2014. San Luis Obispo County/Cities Nuclear Power Plant Emergency Response Plan. Retrieved from: https://www.slocounty.ca.gov/Departments/Administrative-Office/Emergency-Management/Forms-Documents/Nuclear-Power-Plant-Plans/Nuclear-Power-Plant-Administrative-Plan.pdf.

——. 2021. Emergency Planning Zone Information. Accessed: 26 October 2021. Retrieved from: https://www.prepareslo.org/en/emergency-planning-zone-information.aspx.

Santa Barbara County Planning and Development Department. 2015. Seismic Safety and Safety Element - Santa Barbara County Comprehensive Plan. Accessed: 21 July 2017. Retrieved from: http://longrange.sbcountyplanning.org/programs/genplanreformat/PDFdocs/Seismic.pdf.

——. 2018a. Petroleum Code. Retrieved from: https://www.countyofsb.org/plndev/codes/PetroCode.sbc.

——. 2018b. Coastal Resource Enhancement Fund. Retrieved from: http://countyofsb.org/plndev/projects/energy/cref.sbc.

——. 2018c. Fishery Enhancement Fund (FEF). Retrieved from: http://www.countyofsb.org/plndev/energy/mitigationprograms/fef.sbc.

——. 2018d. Local Fisherman's Contingency Fund (LFCF). Retrieved from: http://www.countyofsb.org/plndev/energy/mitigationprograms/lfcf.sbc.

Santa Barbara County Public Health Department. 2021a. COVID-19 Quarterly Report January 2021- March 2021.

———. 2021b. Santa Barbara County COVID-19 Quarterly Report.

Santa Barbara County Workforce Development Board and Santa Barbara Foundation. 2020. Santa Barbara County COVID-19 Impact Report. 2020. Available at: http://www.sbcwdb.org/uploadedFiles/sbcwdb/content-2020/reports/workforce-intelligence/Santa%20Barbara%20COVID%20Report.pdf.

Santa Maria Times. 2021. Santa Barbara County adult ICU capacity now at 6.7%. Accessed: 11 November 2021. Available at: https://santamariatimes.com/news/local/santa-barbara-county-adult-icu-capacity-now-at-6-7/article_f6f1eda4-fdfd-5333-aab9-6f0b07d905d3.html.

The Independent. 2013. La Goleta Gas Storage Questions Answered. Available at: https://www.independent.com/2013/05/23/la-goleta-gas-storage-questions-answered/.

The Santa Barbara Independent. 2013. "La Goleta Gas Storage Questions Answered." May 23, 2013. Available at: https://www.independent.com/2013/05/23/la-goleta-gas-storage-questions-answered/.

U.S. Air Force (USAF). 2021. "Vandenberg Space Force Base." About Us. Accessed 2021. Available at: https://www.vandenberg.spaceforce.mil/About-Us/.

U.S. Department of Agriculture (USDA) National Agricultural Statistics Service Information (NASS). 2017. "2017 Census of Agriculture County Profile." 2017. Available at: https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/California/cp06083.pdf.

U.S. Fish and Wildlife Service (USFWS). 2014. Quagga And Zebra Mussel Damage Is Expensive! Available at: https://www.fws.gov/nevada/nv_species/invasive_species/mussels.htm.

U.S. Geological Survey (USGS). 2021. What Is Debris Flow. USGS. Open-File Report. 2021.

Vandenberg Space Force Base (SFB). 2021. Vandenberg Space Force Base. Available at: https://www.vandenberg.spaceforce.mil/About-Us/.