Multi-Jurisdictional Hazard Mitigation Plan

Decorative Image

Photo by Nicholas Graehl 2022

San Diego County, California

2023

TABLE OF CONTENTS

INTRODUCTION 1

1. SECTION ONE: Determine the Planning Area and Resources 5

    1.1. Planning Area: San Diego County 5

    1.2. Community Rating System Requirements 18

2. SECTION TWO: Build the Planning Team 22

    2.1. Planning Participants 23

    2.2. Planning Process 27

3. SECTION THREE: Create an Outreach Strategy 39

    3.1. Whole Community Approach 39

    3.2. Community Outreach Strategy 42

4. SECTION FOUR: Review Community Capabilities 45

    4.1. Capability Assessment 45

    4.2. National Flood Insurance Program (NFIP) 56

5. SECTION FIVE: Conduct a Risk Assessment 59

    5.1. Hazard Assessment Summary 61

    5.2. Hazard Profiles 68

    5.3. Vulnerability Assessment 126

6. SECTION SIX: Develop a Mitigation Strategy 218

    6.1. Mitigation Action Evaluation 218

    6.2. Mitigation Goals, Objectives, and Actions Implementation 222

7. SECTION SEVEN: Keep the Plan Current 235

    7.1. Mitigation Action Progress 235

    7.2. Plan Update Evaluation 244

    7.3. Plan Maintenance, Monitoring, Evaluation, & Updates 245

APPENDIX 1. BASE DATA SOURCES 2021 248

APPENDIX 2. HAZARD DATA SOURCES 2021 252

APPENDIX 3. OTHER SOURCES/REFERENcES 253

APPENDIX 4. SCRIPPS INSTITUTES OF OCEANOGRAPHY REFERENCES, UNIVERSITY OF SAN DIEGO 255

APPENDIX 5. SURVEY RESULTS FOR SD MULTIJURISDICTIONAL HAZARD MITIGATION PLAN REVISION 262

APPENDIX 6. MEETINGS 270

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INTRODUCTION

PLAN DESCRIPTION

Across the United States, natural and human-caused disasters lead to increasing levels of death, injury, property damage, and interruption of business and government services. The impact on families and individuals can be immense, and damages to businesses can result in regional economic consequences. The time, money, and effort to respond to and recover from these disasters divert public resources and attention from other important programs and situations.

With experience in presidential disaster declarations, gubernatorial proclamations, and local emergency proclamations, San Diego County, California recognizes the consequences of disasters, the need to reduce impacts of natural and human-caused hazards, and the importance of increasing regional resiliency.

Elected and appointed County officials also know that carefully selected mitigation actions (in the forms of projects and programs) can become long-term, cost-effective means for reducing natural and human-caused hazard impacts.

This *San Diego County, California, Multi-Jurisdictional Hazard Mitigation Plan* (The/This Plan) was prepared with input from:

- County Residents
- County of San Diego Groups, Agencies and Departments
- Eighteen Incorporated Cities
- The Port of San Diego
- Water Districts
- Fire Protection Districts
- Air Pollution Control District
- The National Weather Service
- Scripps Institution of Oceanography, University of California San Diego
- California Office of Emergency Services (Cal OES)
- Federal Emergency Management Agency (FEMA).

This plan update included over three years of coordination with planning participants and will help guide the region toward greater disaster resilience in harmony with the community layout and needs.

PLAN PURPOSE

Federal legislation has historically provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the most current legislation to improve this planning process (Public Law 106-390). The legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, DMA 2000 establishes a pre-disaster hazard mitigation program and requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

Section 322 of DMA 2000 specifically addresses mitigation planning at state and local levels. It identifies new 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 prior to a disaster. States and communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds. Local and Tribal Hazard Mitigation Plans must demonstrate their proposed mitigation measures are based on a sound planning process that account for the risk to and the capabilities of the individual communities.

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

- Preparing and submitting a standard or enhanced state mitigation plan
- Reviewing and updating the state mitigation plan every three years
- Providing technical assistance and training to local governments to assist them in applying for HMGP grants and in developing local mitigation plans
- Reviewing and approving local plans if the state is designated a managing state and has an approved enhanced plan.

The intent of DMA 2000 is to facilitate cooperation and collaboration between state and local authorities, which encourages and rewards local and state pre-disaster planning and promotes sustainability as disaster resilience strategy. This enhanced planning network is intended to enable local and state governments to articulate accurate needs for mitigation—resulting in faster allocation of funding and more effective risk reduction projects.

FEMA prepared an Interim Final Rule, published in the Federal Register on February 26, 2002 (44 CFR Parts 201 and 206), which establishes planning and funding criteria for states and local communities.

This plan was prepared to meet state and federal statutes and requirements, thus making the County and all participating jurisdictions and special districts eligible for funding and technical assistance from state and federal hazard mitigation programs.

EXISTING AUTHORITIES

In the early 1960s, the incorporated cities and the County of San Diego formed a Joint Powers Agreement which established the Unified San Diego County Emergency Services Organization (USDCESO) and the Unified Disaster Council (UDC) as the policy making group. This Plan is intended to serve many purposes, including:

- *Enhance Public Awareness and Understanding*– to help County residents better understand the natural and human-caused hazards that threaten public health, safety, and welfare; economic vitality; and the operational capability of important institutions.

- *Create a Decision Tool for Management* – to provide information that managers and leaders of local government, business and industry, community associations, and other key institutions and organizations need to take action to address vulnerabilities to future disasters.

- *Promote Compliance with State and Federal Program Requirements*– to ensure San Diego County and its incorporated cities can take full advantage of state and federal grant programs, policies, and regulations that encourage or mandate that local governments develop comprehensive hazard mitigation plans.

- *Enhance Local Policies for Hazard Mitigation Capability*– to provide the policy basis for mitigation actions that should be promulgated by participating jurisdictions to create a more disaster-resistant future, and to document each jurisdiction's ability to expand on and improve existing policies and programs.
- *Provide Inter-Jurisdictional Coordination of Mitigation-Related Programming* – to ensure proposals for mitigation initiatives are reviewed and coordinated among the participating jurisdictions within the County.
- *Achieve Regulatory Compliance* – To qualify for certain forms of federal aid for pre- and post-disaster funding, local jurisdictions must comply with the federal DMA 2000 and its implementing regulations (44 CFR Section 201.6). DMA 2000 intends for hazard mitigation plans to remain relevant and current. Therefore, it requires State Hazard Mitigation Plans are updated every three years and local plans, including this San Diego County Plan, every five years. This means San Diego's Multi-Jurisdictional Hazard Mitigation Plan uses a five-year planning cycle, which is designed to coordinate the region's edits of data, assumptions, goals, objectives, and actions/projects before the plan is submitted for re-approval to Cal OES and FEMA.

The UDC, the San Diego County Board of Supervisors, City Councils, and governing Boards for each participating municipality or special district will adopt the Plan (according to their existing authorities) once the State of California and FEMA have granted provisional plan approval in the form of an "Approved Pending Adoption" Letter.

SECTION ONE: Determining the Planning Area and Resources

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CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

1. SECTION ONE: DETERMINE THE PLANNING AREA AND RESOURCES

Overall, San Diego County is comprised of 18 incorporated cities and a vast number of unincorporated communities. The county's total population in 2020 was approximately 3.3 million—making San Diego County the second most populous county in the state.[1]

1.1. PLANNING AREA: SAN DIEGO COUNTY

San Diego County, one of 58 counties in the state of California, was established on February 18, 1850, just after California became the 31st state. The County stretches 65 miles from north to south, and 86 miles from east to west, covering 4,261 square miles.[2] Elevation ranges from sea level to about 6,500 feet. Orange and Riverside Counties border the north, the agricultural communities of Imperial County border the east, the Pacific Ocean lies west, and the State of Baja California, Mexico borders the south.

1.1.1. UNINCORPORATED COMMUNITIES (POPULATION: 505,675)[3]

The Unincorporated County consists of approximately 34 Community Planning and Sub-regional Areas. Many of the communities in the Unincorporated County jurisdiction are in the mountains, desert, North County, or on the border of Mexico. Rancho Santa Fe, an affluent residential and resort community, is one of the exceptions, located within the urban core area. The community of Julian is in the central mountains, along a principal travel route between the desert and Metropolitan San Diego, and is a common tourist destination. Alpine is located east of El Cajon on Interstate 8 and is considered a gateway to San Diego County's wilderness areas of mountains, forests, and deserts.

The Sub-regional Planning Areas are Central Mountain, County Islands, Mountain Empire, North County Metro, and North Mountain. Communities within the Central Mountain Sub-region are Cuyamaca, Descanso, Guatay, Pine Valley, and Mount Laguna. The County Islands Community Plan area consists of Mira Mesa, Greenwood, and Lincoln Acres. The North Mountain Sub-region is mostly rural and includes Santa Ysabel, Warner Springs, Palomar Mountain, Mesa Grande, Sunshine Summit, Ranchita and Oak Grove. The Mountain Empire Sub-region contains Tecate, Potrero, Boulevard, Campo, Jacumba, and the remainder of the plan area.

The Community Planning Areas are Alpine, Bonsall, Borrego Springs, Boulevard, Crest/Dehesa/Granite Hills/Harbison Canyon, Cuyamaca, Descanso, Desert, Fallbrook, Hidden Meadows, Jacumba, Jamul/Dulzura, Julian, Lake Morena/Campo, Lakeside/Pepper Drive-Bostonia, Otay, Pala-Pauma, Palomar/North Mountain, Pendleton/Deluz, Pine Valley, Portrero, Rainbow, Ramona, San Dieguito (Rancho Santa Fe), Spring Valley, Sweetwater, Tecate, Twin Oaks, Valle De Oro, and Valley Center.

The following subsections provide County of San Diego *Economy, Physical Features, Infrastructure,* and *Jurisdictional* summaries, with data and research provided within the

[1] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[2] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[3] 2020 Jurisdiction Population Estimate from SANDAG: https://datasurfer.sandag.org/dataoverview

County of San Diego's existing *"Adopted Operational Plan Fiscal Years 2021-2022 and 2022-2023"*:

1.1.2. ECONOMY

San Diego offers a vibrant and diverse economy, along with a strong and committed partnership of local government and businesses dedicated to the creation and retention of quality jobs for its residents. The San Diego County business climate continues to thrive due to the diversification of valuable assets, such as world class research institutions; proximity to Mexico and the Pacific Rim; a well-educated, highly productive work force; and an unmatched entrepreneurial spirit.

Gross Domestic Product (GDP) can be an indicator of the nation's economic health, and its growth is driven by multiple sectors, including net exports of goods and services, government consumption expenditures, and gross investment. According to the U.S. Bureau of Economic Analysis (BEA), calendar year 2020 saw a decrease in real GDP, as the national economy was impacted by the response to the global COVID-19 pandemic.

The economic impacts of the COVID-19 pandemic prompted federal fiscal stimulus efforts, which provided support to economic activity in 2020 and potentially in 2021 (COVID-19 pandemic economic impacts are regularly assessed). As the State of California economically recovers from the COVID-19 pandemic, experts predict consumers will resume pre-pandemic behaviors like spending money on clothing, cars, housing, and furniture. In 2019, San Diego County accounted for more than $222.3 billion (7.9%) of California's GDP and 8.4 percent of the State's population (based on U.S. Census data).

San Diego's abundant and diverse supply of labor at competitive rates is one of the area's greatest assets. A 2019 study using 2019 data found that 23% of San Diego County's workforce is either in the retail or hospitality sectors. San Diego County also includes the largest concentration of U.S. military in the world, which is an important contributor to the region's economy.[4]

1.1.3. EMPLOYMENT

According to the California Employment Development Department, low and middle San Diego County wage workers made more than the state average, however, high wage earners made less than the state average. In 2019, the median household income for San Diego County was nearly $79,000, but other factors, like inflation, could have reduced spending availability. [5]

The COVID-19 pandemic also affected jobs that relied on tourism. A study using 2019 data found that 23% of San Diego County's workforce were employed in the retail or leisure & hospitality sectors. Therefore, unemployment numbers increased during the COVID-19 Pandemic.[6]

Unemployment rates rose to 15.9% by the end of April 2020, dropped to 6.8% by November 2020, and fell again to 6.3% by May 2021. This unemployment rate was slightly higher than

[4] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[5] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[6] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

the national average of 5.5%, but also significantly lower than the state's rate of 7.5%.[7] [8] Overall, the region's job and unemployment numbers are improving, and labor supply is still strong.

There are several reasons for the strong labor supply in San Diego. The area's appealing climate and renowned quality of life are two main factors that attract a quality workforce. The excellent quality of life continues to be an important advantage for San Diego companies in attracting and retaining workers. In addition, local colleges and universities augment the region's steady influx of qualified labor. [9]

1.1.4. PHYSICAL FEATURES

The physical, social, and economic development of the region has been influenced by its unique geography, which encompasses over 70 miles of coastline, broad valleys, lakes, forested mountains, and the desert. The county can be divided into three basic geographic areas, all generally running in the north-south direction. The coastal plain extends from the ocean to inland areas for 20 to 25 miles. The foothills and mountains, rising in elevation to 6,500 feet, comprise the middle section of the county. The third area is the desert, extending from the mountains into Imperial County, 80 miles east of the coast. San Diegans can live in the mountains, work near the ocean, and take recreational day trips to the desert.

One of San Diego's greatest assets is its climate, with mild winters, pleasant summers, and an abundance of sunshine and light rainfall. [10] San Diego County experiences climatic diversity due to its varied topography. Traveling inland, temperatures tend to be warmer in the summer and cooler in the winter. In the local mountains, the average daily highs are 70 degrees and lows are about 55 degrees. [11] The local mountains also get a light snowfall several times a year. East of the mountains is the Anza Borrego Desert—where rainfall is minimal, and summers are hot.

The dry, mild climate of San Diego County is conducive to productivity. Outdoor work and recreational activities are possible almost year-round. In addition, storage and indoor work can be handled with minimum investment in heating and air conditioning, although extreme heat events have recently increased in both frequency and severity.

1.1.5. INFRASTRUCTURE

According to FEMA's *Local Mitigation Planning Handbook*, infrastructure systems are critical for life safety and economic viability, and include transportation, power, and water systems. Many critical facilities depend on infrastructure to function. For example, hospitals need electricity and water to continue treating patients. As with critical facilities, the continued operations of infrastructure systems during and after a disaster are key factors in the severity of regional impacts and the speed of recovery.[12]

[7] https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas

[8] https://www.labormarketinfo.edd.ca.gov/

[9] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[10] https://usafacts.org/issues/climate/state/california/county/san-diego-county?endDate=2022-06-06&startDate=2018-02-01#climate

[11] https://www.weather.gov/wrh/climate?wfo=sgx

[12] https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf

TRANSPORTATION

San Diego has a well-developed road system. There are freeways and state highways maintained by Caltrans, private roads maintained by property owners, and other public roads like those within incorporated cities (not within the *County Maintained System*). [13]

All urbanized areas in the region and some rural areas are served by public transit. The San Diego region is divided into two transit development boards: the San Diego Metropolitan Transit Development Board (MTDB), and the North County Transit Development Board (NCTD).

The Metropolitan Transit System (MTS) operates transit service under MTDB and owns assets of San Diego Trolley, Inc. (SDTI), San Diego Transit Corporation (SDTC), and the San Diego & Arizona Eastern (SD&AE) Railway Company (which owns 108 miles of track and right-of-way). Pre-COVID-19 Pandemic, MTS served approximately 3 million people in San Diego County, generated 88 million annual passenger trips (300,000 trips each workday), and responded to demand by scheduling 7,000 trips each workday. MTS licenses and regulates taxicabs, jitneys, and other private for-hire passenger transportation services by contract with the cities of San Diego, Chula Vista, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, Santee, and portions of San Diego County's unincorporated areas. Routes also connect with other regional operators' routes, and San Diego Trolley operates the light rail transit system under MTDB. [14]

Alternatively, the North County Transit District (NCTD) is governed by Board of Directors with voting members from Carlsbad, Del Mar, Encinitas, Escondido, Oceanside, Solana Beach, San Marcos, Vista, and San Diego County, and one non-voting member from the City of San Diego. NCTD operates within a geographical area of approximately 1,020 square miles, and primarily carries passengers in North San Diego County (from the Pacific Ocean east to Ramona, and from the Orange County border south to Del Mar, with connections extending to downtown San Diego). NCTD provides about 10.3 million passenger trips per year, and its bus system has 30 routes.

In addition, NCTD runs special Express Buses for certain sporting and special events in San Diego. Other services include SPRINTER hybrid rail, COASTER commuter trains, FLEX demand response, and LIFT ADA paratransit service. NCTD shares the use of its tracks with rail partners: Amtrak, Metrolink, BNSF, and Pacific Sun Railroad. Amtrak and Metrolink operate more than 264 commuter trains on our tracks every week, while BNSF and Pacific Sun move more than 9.6 million pounds of freight. [15] [16]

GAS & ELECTRICITY (POWER)

San Diego Gas & Electric (SDG&E) is a public utility company that provides natural gas and electric service to 3.7 million consumers through 1.4 million electric meters and 873,000 natural gas meters in San Diego County and South Orange County.[17] Overall, SDG&E's service area encompasses 4,100 square miles, two counties, and 25 communities. SDG&E is a subsidiary of Sempra Energy, a Fortune 500 energy services holding company based in

[13] https://www.sandiegocounty.gov/content/sdc/dpw/roads/maintroad.html

[14] https://www.sdmts.com/about/about-mts

[15] NCTD-At-A-Glance-Fact-Sheet-February-2022.pdf (gonctd.com)

[16] Facts Sheets | North County Transit District (gonctd.com)

[17] About Us | San Diego Gas & Electric (sdge.com)

San Diego. All petroleum products in the region are delivered via a pipeline system operated by Kinder Morgan Energy Partners. [18] [19]

WATER

The San Diego County Water Authority (Water Authority) is a public agency serving the San Diego region as a wholesale supplier of water. Water Authority works through its 24 member agencies to provide a safe, reliable water supply to support the region's $240 billion economy and the quality of life of 3.3 million residents.[20] The 24 member agencies are comprised of six cities, three public utility districts, three irrigation districts, eleven municipal water districts, and one federal agency (military base) and cover a service area of 934,778 acres.[21]

In 2020, Metropolitan Water District of Southern California supplied 18% of San Diego County Water Authority's water, while 82% came from local and other supplies. Metropolitan Water District imports the water from two sources: the Colorado River and the *State Water Project* (Bay-Delta) in Northern California.[22] [23] Traveling hundreds of miles over aqueduct systems (including pump stations, treatment plants and reservoirs), water is transported through the Water Authority's five primary pipelines, then distributed to the member agencies for delivery to the public.

In 2020, 127 gallons of water per person, per day, were used in San Diego County.[24]

1.1.6. PLANNING AREA: LOCAL JURISDICTIONS

The planning area for this document also includes local jurisdictions, such as the eighteen incorporated cities and special districts. More details are provided in participating jurisdictions' respective annexes.

Carlsbad (Population: 114,746)

Carlsbad is a coastal community located 35 miles north of Downtown San Diego. It is bordered by Encinitas to the south, Vista and San Marcos to the east, and Oceanside to the north. Carlsbad is home to world-class resorts, such as the La Costa Resort and Spa and the Four Seasons Resort at Aviara (offering championship-level golf and tennis facilities). Carlsbad's commercial/recreational landscape also includes Legoland, which opened in spring 1999.

The City of Carlsbad has a strong economy, much of which has come from industrial development. For example, Callaway Golf, Cobra Golf, Ionis Pharmaceuticals, and Immune Response are a few of the local companies located in Carlsbad.[25] [26]

[18] https://www.sdge.com/more-information/our-company

[19] https://www.sdge.com/more-information/our-company/about-us#:~:text=3.7%20million%20consumers,Diego%20and%20southern%20Orange%20counties.

[20] https://www.sdcwa.org/about-us/

[21] https://www.sdcwa.org/wp-content/uploads/2020/11/overview-fs.pdf

[22] https://www.mwdh2o.com/media/12208/2022-annual-achievement-report-full.pdf

[23] https://www.sdcwa.org/wp-content/uploads/2020/11/overview-fs.pdf

[24] Ibid

[25] https://ir.ionispharma.com/news-releases/news-release-details/isis-pharmaceuticals-changes-name-ionis-pharmaceuticals

[26] https://ir.callawaygolf.com/corporate-governance/contact-the-board

City of Carlsbad residents are served by four high performing school districts (Carlsbad Unified, Encinitas Union, San Dieguito Union & San Marcos Unified). Distinguished private and parochial schools also serve Carlsbad (including the internationally renowned Army & Navy Academy), which offer specialties in STEM/STEAM, the arts, International Baccalaureate, and other curricula.[27] [28]

Chula Vista (Population: 275,487)

The City of Chula Vista is located at the center of one of the richest cultural, economic, and environmentally diverse zones in the United States. It is the second-largest city in San Diego County and boasts more than 52 square miles of coastal landscape, canyons, rolling hills, mountains, quality parks, and trails. Chula Vista is a leader in conservation and renewable energy and has outstanding public schools.

Established neighborhoods, contemporary communities, start-up firms, corporations, nationally recognized entertainment venues, the nation's only warm weather athlete training center (the Chula Vista Elite Athlete Training Center), an award-winning nature center, and a historic downtown all contribute to Chula Vista's attraction for both families and businesses.[29]

A range of educational opportunities, from preschool to college are available in Chula Vista. Chula Vista Elementary School District (CVESD) is the largest K-6 district in California with over 28,500 students and 46 campuses. The CVESD is a high-performing and frequently honored district for student academic achievement, The city is also home to the Sweetwater Union High School District (SUHSD), the largest secondary school 7-12 district in California. The district encompasses 41,000 students, and 24,000 adult students on 32 campuses.[30]

Coronado (Population: 20,192)

The City of Coronado is a small, 13.5 square mile beach community, with an island feel. The military bases of the Naval Air Station North Island and Naval Amphibious Base occupy 5.3 square miles, and Coronado is connected to San Diego by a 2.3-mile bridge and to Imperial Beach (its neighbor to the south) by a six-mile scenic highway (the Silver Strand).[31]

It is primarily a bedroom community for San Diego and an internationally renowned tourist destination. This vibrant community welcomes more than two million visitors annually to soak up the sun and the sand, while enjoying the lush surroundings and village appeal of Coronado. The city contains world-class resorts, including the Hotel Del Coronado, and highly acclaimed restaurants.

Coronado Unified School District serves local students and includes eight schools.[32]

Del Mar (Population: 4,268)

Incorporated in 1959, the City of Del Mar is a quaint, seaside village located 20 miles north of San Diego. Del Mar is the smallest city in the County, covers just 2.2 square miles, and is known for its vibrant small-town atmosphere. Del Mar attracts residents and upwards of 2

[27] https://www.carlsbadca.gov/residents/schools

[28] https://www.armyandnavyacademy.org/

[29] https://trainatchulavista.com/about-olympic-athlete-training-site/

[30] chulavistaca.gov/residents/education

[31] https://www.coronado.ca.us/210/About-Coronado

[32] https://coronadousd.net/Our-District/index.html

million visitors annually from all over the world, who come to enjoy the beautiful dog-friendly beaches, hiking trails, scenic views, and the many shops and dining opportunities located within the Del Mar Village.

The community is primarily comprised of single-family residential neighborhoods, with retail uses and restaurants in the downtown, a small commercial area, and several hotels. Located 27 miles north of Downtown San Diego, this coastal community is known for its affluence and comfortable standard of living. It is a beautiful, wooded hillside area overlooking the ocean and has a resort-like atmosphere. The Del Mar Racetrack and Thoroughbred Club serve as Del Mar's most noted landmark. This racetrack is also the location for the annual San Diego County Fair. The City of Del Mar's shoreline includes the Del Mar City Beach and the Torrey Pines State Beach.

The city provides law enforcement services through a contract with the San Diego County Sheriff's Department, and fire administration is provided through a mutual agreement between the cities of Del Mar, Encinitas, and Solana Beach.[33]

El Cajon (Population: 106,215)

El Cajon is located 15 miles east of the City of San Diego. El Cajon is an inland valley surrounded by rolling hills and mountains. As one of the most eastern cities in the County, El Cajon has a warm and dry climate. El Cajon is a diverse residential, commercial, and industrial area, and serves as the main commerce center for several surrounding communities.

Gillespie Field, a general aviation airport, is a major contributing factor to the city's vibrant industrial development. There are three School Districts that serve El Cajon residents: Cajon Valley Unified School District, La Mesa-Spring Valley Unified School District, and Grossmont Union High School District. There are also several charter schools within the city.[34]

Encinitas (Population: 62,007)

Encinitas is located along six miles of Pacific coastline in the northern half of San Diego County. Approximately 21 square miles, Encinitas is characterized by coastal beaches, cliffs, flat-topped coastal areas, steep mesa bluffs, and rolling hills. Incorporated in 1986, the city encompasses the communities of Old Encinitas, New Encinitas, Olivenhain, Leucadia, and Cardiff-By-The-Sea. Encinitas is bordered by Carlsbad to the north, Solana Beach to the south and the community of Rancho Santa Fe to the east.

The Los Angeles/San Diego (LOSSAN) rail passes through the city, and other transit corridors traversing the city include El Camino Real and Coast Highway 101. The San Elijo Lagoon Reserve boasts the largest coastal wetland in San Diego County and is home to nearly 300 different bird species throughout the year.The century-old Downtown 101 coastal shopping district features historic architecture, quaint shops, sidewalk cafes, specialty retail stores and upscale restaurants.

The city is served by the Encinitas Union School and San Dieguito Union High School Districts.[35]

[33] https://www.delmar.ca.us/764/About-Del-Mar

[34] https://www.elcajon.gov/resident-services/living-in-el-cajon/el-cajon-schools

[35] https://coronavirus.encinitasca.gov/public-schools

Escondido (Population: 151,038)

Escondido is located 30 miles north of San Diego and is approximately 18 miles inland from the coast. In 1994, the people of Escondido conceived a vision of cultural excellence.[36] Today, the $73.4 million California Center for the Arts stands as a product of this vision. Inland North San Diego County, of which Escondido is at the core, is emerging as a regional economic leader at the forefront of job development and new industries. Escondido has a comprehensive mix of successful businesses—supplying a diverse job base and high quality of life.[37]

There is a unique mix of agriculture, industrial firms, high-tech firms, recreational centers, parks, and residential areas in the city. The area's largest shopping mall, the North County Fair, houses major retail and smaller stores. California State University, San Marcos and Palomar Community College are located within minutes of Escondido.

Escondido is served by two public school districts—Escondido Union and San Pasqual Union.[38]

Imperial Beach (Population: 26,137)

Imperial Beach claims the distinction of being the "Most Southwesterly City – in the continental United States." The city is in the Southwest corner of San Diego County, only five miles from the Mexican Border and 15 miles from downtown San Diego. With a population of 26,137, Imperial Beach occupies an area of 4.4 square miles. Imperial Beach offers some of the least expensive housing west of Interstate 5. It is primarily a resort/recreation community with a vast beach area, as well as a 12,000-foot pier for fishing. Looking south, just across from the international border, Tijuana's famous "Bullring by the Sea," the Plaza De Monumental can be seen.

The city is served by two school districts—South Bay Union and Sweetwater Union.[39]

La Mesa (Population: 61,121)

La Mesa is centrally located 12 miles east of Downtown San Diego, and is a suburban residential community as well as a commercial and trade center. The area is characterized by rolling hills and has many hilltop home sites that take advantage of the beautiful views.

La Mesa offers affordable housing within a wide range of prices, as well as high-end luxury homes atop Mount Helix. La Mesa has an abundance of mixed-use condominiums for those who prefer a downtown village atmosphere. There is balance between single-family housing and multi-family housing within La Mesa's city limits. One of the region's major retail facilities, Grossmont Center, is in the heart of the city and adjacent to another major activity center—Grossmont Hospital.

The La Mesa-Spring Valley Elementary School District provides elementary and junior high schools. There are two high schools in the area and Grossmont College, a two-year community college, is also located in La Mesa.[40]

[36] https://artcenter.org/about/history/

[37] https://escondido.org/employment-in-escondido

[38] https://escondido.org/escondido-schools

[39] https://www.imperialbeachca.gov/community

[40] https://www.guhsd.net/

Lemon Grove (Population: 27,627)

Lemon Grove lies about nine miles east of Downtown San Diego and has the charm of small-town living with the conveniences of big city proximity. Initially the site of expansive lemon orchards, the city remains a small town with a rural ambiance.[41]

The Sheriff's Department Lemon Grove Substation has provided contract law enforcement services to the City of Lemon Grove and unincorporated communities of Spring Valley, Rancho San Diego, Jamul, Mt. Helix, Casa De Oro, La Mesa, and El Cajon since 1977.[42]

The city is also served by two school districts—Lemon Grove School and Grossmont Union High School Districts, which include six elementary schools, one middle school, and three high schools.[43]

National City (Population: 56,173)

Incorporated in 1887, National City is one of the county's oldest incorporated areas. Just five miles south of the City of San Diego, National City is the South Bay's center of industrial activity and has a rich history. The city embodies a proud tradition of commerce, urban agriculture, production, and transportation.[44]

There are a great number of historical sites in National City and homes in the area are usually 50 years or older. Stately Victorians reflect the early part of the century when shipping and import/export magnates lived there. Additionally, the San Diego Naval Station overlaps both Cities of San Diego and National City and is the largest naval facility in the country.

Served by National Elementary and Sweetwater High School districts, National City also offers several private schools for all grade levels. National City is best known for its Mile of Cars; the title describing its abundant auto dealerships. Two large shopping malls, Plaza Bonita, and South Bay Plaza are also located in National City.

Oceanside (Population: 174,068)

Oceanside is centrally located between San Diego and Los Angeles. Located just 36 miles north of Downtown San Diego, Oceanside is bordered by Camp Pendleton to the north, Carlsbad to the south, Vista to the east and the Pacific Ocean to the west. The current population of makes Oceanside the largest coastal community.

Industrial real estate rates tend to be lower than the county average, and housing tends to be more affordable than in other areas of Southern California coastal cities. With a near-perfect year-round climate and recognition as one of the most livable places in the nation, Oceanside offers both an incomparable lifestyle and abundant economic opportunity. Its extensive recreational facilities include 3.5 miles of sandy beaches, Oceanside Harbor, and Oceanside Lagoon. [45]

[41] https://www.lemongrove.ca.gov/community

[42] https://www.lemongrove.ca.gov/city-hall/law-enforcement

[43] https://www.lemongrove.ca.gov/community/local-schools

[44] https://www.nationalcityca.gov/government/city-manager/economic-development

[45] https://visitoceanside.org/

The city is served by the Oceanside Unified School District with 15 elementary, six middle, and three high school options.[46]

Port of San Diego

The Port was established in 1962 under the Port Act and is charged with implementing the Tidelands Trust Doctrine.[47] [48] The Port of San Diego manages San Diego Bay and 34 miles of its natural waterfront for the people of California.

For over 50 years, the Port's five member cities (Chula Vista, Coronado, Imperial Beach, National City, and San Diego) have worked together to develop and promote commerce, navigation, recreation, and fisheries on and around San Diego Bay.

Self-funded, The Port contributes billions annually to San Diego's economy, benefiting the community, local businesses, and employees. Businesses at The Port provide thousands of well-paying jobs, supporting individuals and families throughout the region. The Port is governed by a seven-member Board of Port Commissioners representing five cities and provides leadership that transcends local boundaries. The Port's daily operations are carried out by a workforce of over 550 dedicated employees.[49]

The Port of San Diego is the fourth largest of the eleven ports in California, and it has invested hundreds of millions of dollars in public improvements within its five member cities.

The Port oversees two maritime cargo terminals, two cruise ship terminals, 22 public parks, the Harbor Police Department, and the leases of hundreds of tenant and subtenant businesses around San Diego Bay. These include 17 hotels, 74 restaurants, three specialty retail centers and numerous other attractions including museums and bay tours. [50]

Each year, millions of people enjoy a remarkable way of life offered by San Diego Bay and its waterfront communities. [51]

Poway (Population: 48,841)

Poway is located 23 miles northeast of the City of San Diego, within the well-populated I-15 corridor. Poway is distinct because it is set into the foothills. Poway's main recreational facility is the 350-acre Lake Poway Park. This lake also serves as a reservoir for the water supplied to San Diego by the Colorado River Aqueduct. The area has many recreational facilities, providing complete park sites, trails, and fishing opportunities.

Poway is also home to the Blue Sky Ecological Reserve—700 acres of natural habitat with hiking, horseback riding and interpretive trails. The Poway Center for the Performing Arts is an 809-seat professional theater that also provides local entertainment.[52]

The Poway Unified School District (PUSD) is excellent and has consistently been rated as top tier. PUSD operates 25 elementary schools (K-5), one elementary & middle school combination (TK-8th), six middle schools (6-8), one continuation high school, five

[46] https://www.oside.us/

[47] https://pantheonstorage.blob.core.windows.net/administration/San-Diego-Unified-Port-District-Act.pdf

[48] https://pantheonstorage.blob.core.windows.net/administration/California-Public-Trust-Doctrine.pdf

[49] https://www.portofsandiego.org/people

[50] https://www.portofsandiego.org/about-port-san-diego/history

[51] https://www.portofsandiego.org/about-port-san-diego

[52] https://www.powaycenter.com/156/Technical-Information

comprehensive high schools (9-12), and one adult school. Twenty-six schools are in the City of San Diego and twelve schools are in Poway. The district serves over 36,000 students and is the third largest school district in the county.[53]

San Diego (Population: 1,386,932)

The City of San Diego is the largest city in San Diego County and is the second largest city in the state. San Diego is renowned for its idyllic climate, 70 miles of pristine beaches and a dazzling array of world-class family attractions. Popular attractions include the world-famous San Diego Zoo, San Diego Zoo Safari Park, SeaWorld San Diego, LEGOLAND California, Cabrillo National Monument, and Old Town State Historic Park.

San Diego's arts and culture and culinary arts are also booming. New culinary arts talents prepare award-winning meals throughout the region's 6,400 eating establishments, and Balboa Park (the largest urban cultural park in the U.S.) is home to 15 museums, numerous art galleries, beautiful gardens, and the Tony Award-winning Old Globe Theatre.[54] [55]

The city is served by the San Diego Unified School District for elementary, middle, and high school options.[56]

San Marcos (Population: 94,833)

San Marcos is located between Vista and Escondido, approximately 35 miles north of Downtown San Diego. San Marcos is known for its resort climate, rural setting, central location, and affordable housing prices. Although San Marcos has experienced rapid growth over the last decade, it continues to maintain the small-town atmosphere that initially attracted many new residents.[57]

It is also home to two of the region's major educational facilities, Palomar College and California State University, San Marcos.[58] The city is served by the San Marcos Unified School District, which is the seventh largest district in San Diego with 19 schools—10 elementary schools, two K-8 schools, three middles schools, three high schools, and one independent study school.[59] [60]

Santee (Population: 60,037)

"Sunny climate, good schools, small-town friendliness"—Santee prides itself on having a lean government that responds to its citizens' concerns. Collectively, these are among the key attributes of the city. Santee is ideally located between the Pacific Ocean and the mountains of the Cleveland National Forest. While Santee is considered part of the East County Region, the city is only 18 freeway miles from San Diego's premier beaches. Santee is connected to the coastline by State Route 52, a six-lane freeway that connects Interstate 5 in La Jolla to State Route 67. State Route 125 also intersects with State Route 52, forming a transportation hub in the heart of Santee. Since the expansion of the San Diego Trolley, Santee residents

[53] https://www.powayusd.com/en-US/District/About-Us

[54] https://www.sandiego.org/articles/about-san-diego-ca.aspx

[55] https://www.balboapark.org/performing-arts/the-old-globe

[56] https://www.sandiegounified.org/schools/all_schools

[57] https://www.san-marcos.net/live/about-us

[58] https://www.san-marcos.net/live/about-us

[59] https://www.smusd.org/about_us

[60] https://drive.google.com/file/d/15YZn-2ZnVwoAxEy-UTf1ETQvK9oVy7m9/view

can ride the Trolley to Mission Valley, Downtown San Diego and as far as the U.S./Mexico Border.

Santee lies 18 miles northeast of Downtown San Diego and is bordered on the east and west by slopes and rugged mountains. The San Diego River runs through this community, which was once a dairy farming area. It is now a residential area that has experienced phenomenal growth since the 1970's.

Water services are provided by Padre Dam Municipal Water District. The Santee School District and Grossmont Union High School District oversee K-12 education. Elementary and middle school students attend one of the nine available schools, while high school students attend Santana or West Hills High School. Higher education facilities include San Diego Christian College, a 4-year private accredited college located in Town Center. Nearby are San Diego State University and Grossmont Community College. [61] [62]

Solana Beach (Population: 12,941)

Solana Beach was incorporated in 1986 and is a four square-mile city regarded as one of the county's most attractive coastal communities. Solana Beach is known for its small-town atmosphere and pristine beaches, and has one of the highest median income levels in the County—as well as an outstanding school system (recognized with state and national awards of excellence).

The Pacific Ocean is to the west; the City of Encinitas to the north, and the City of Del Mar to the south. The unincorporated village of Rancho Santa Fe is located on the east side. Property values in this upscale community have appreciated significantly since incorporation. The business community has equally enjoyed the prosperity of a healthy economy, as Solana Beach is home for many artisans, high-tech businesses, and professionals.

The elementary school district is composed of five elementary schools, two of which are within the city limits. The middle school is under the administration of the San Dieguito Union High School District. High school students in the area attend Torrey Pines High School located to the southeast of Solana Beach. Additionally, there are several private and parochial schools in Solana Beach.[63]

Lomas Santa Fe, located east of the freeway, is a master planned community, which features shopping, homes, and condominiums, two golf courses and the family-oriented Lomas Santa Fe Country Club.

Vista (Population: 98,381)[64]

Vista is a thriving community that continues to grow and develop many new activities and attractions. The Moonlight Amphitheatre, AVO Playhouse, and the Wave Waterpark are just some of the many cultural activities the offered to Vista residents. Vista's Business Park is home to over 800 companies, with many global businesses relocating their headquarters, manufacturing, distribution, and marketing facilities to this business park. In addition, Vista

[61] https://www.cityofsanteeca.gov/our-city/about-santee-new

[62] https://www.santeesd.net/schools/district_school_sites

[63] https://www.ci.solana-beach.ca.us/index.asp?SEC=6BACDB03-96AC-47CC-9F5C-57082740FDAF&Type=B_BASIC

[64] https://datasurfer.sandag.org/dataoverview

Village has brought revitalization to the downtown area with dining, entertainment, shopping, and public amenities.[65]

The City of Vista is approximately 19 square miles and contracts with Vista Irrigation District for its water services. The city operates its own fire department and contracts with the San Diego Sheriff's Department for law enforcement services. [66]

There are 17 elementary and magnet schools, six middle schools, and seven high schools and magnet schools.[67]

Tribal Communities

Indigenous Americans have lived in the region for thousands of years. The four tribal groupings that make up the indigenous American Indians of San Diego County are the Kumeyaay (also referred to as Diegueño or Mission Indians), the Luiseño, the Cupeño, and the Cahuilla.

San Diego County has the largest number (18) of Indian reservations of any county in the United States.

The reservations include total land holdings of an estimated 193 square miles.[68]

Tribes can develop a Tribal Mitigation Plan independently or participate in a Multi-Jurisdictional Hazard Mitigation Plan, either with other Tribes or with one or more local governments.[69]

Special Districts

A Special District is an independent unit of local government set up to perform a specific function or a restricted number of related functions, such as street lighting or waterworks. A special district might be composed of cities, townships, counties, or any part or combination.

The 61 Special Districts in San Diego County are separate legal entities (governed by the Board of Supervisors) that provide for specialized public improvements and services deemed to benefit properties and residents financed by specific taxes and assessments.

The Special Districts provide authorized services including sanitation, flood control, road, park, lighting maintenance, fire protection, or ambulance service to specific areas in the county.[70] Therefore, Special Districts have the option to either create their own Local Hazard Mitigation Plan or partner with a local government to create a plan annex.[71]

[65] https://www.moonlightstage.com/about-us/rentals/avo-playhouse

[66] https://www.cityofvista.com/residents/about-vista

[67] https://www.vistausd.org/our_schools

[68] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[69] https://www.fema.gov/sites/default/files/2020-06/fema-tribal-planning-handbook_05-2019.pdf

[70] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf.

[71] https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf

1.2. COMMUNITY RATING SYSTEM REQUIREMENTS

Flooding is a hazard that affects San Diego County. Meeting National Flood Insurance Program (NFIP) requirements is the most cost-effective way to reduce the flood risk to new buildings and infrastructure.[72]

The Community Rating System (CRS) is a FEMA program and rewards communities that go beyond the minimum standards for floodplain management under the NFIP. Communities can potentially improve their Community Rating System and lower NFIP premiums by developing a CRS Plan.

For more information on the National Flood Insurance Program, see http://www.fema.gov/national-flood-insurance-program.

The following table compares CRS and Hazard Mitigation Plan requirements/tasks:

TABLE 1: FEMA LOCAL MITIGATION PLANNING HANDBOOK WORKSHEET 1.1 DESCRIBES THE CRS REQUIREMENTS MET BY THE SAN DIEGO COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.

Community Rating System (CRS) Planning Steps	Local Mitigation Planning Handbook Tasks (44 CFR Part 201)
Step 1. Organize	Task 1: Determine the Planning Area and Resources Task 2: Build the Planning Team 44 CFR 201.6(c)(1)
Step 2. Involve the public	Task 3: Create an Outreach Strategy 44 CFR 201.6(b)(1)
Step 3. Coordinate	Task 4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)
Step 4. Assess the hazard	Task 5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)
Step 5. Assess the problem	
Step 6. Set goals	Task 6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i) 44 CFR 201.6(c)(3)(ii) 44 CFR 201.6(c)(3)(iii)
Step 7. Review possible activities	
Step 8. Draft an action plan	
Step 9. Adopt the plan	Task 8: Review and Adopt the Plan 44 CFR 201.6(c)(5)
Step 10. Implement, evaluate, revise	Task 7: Keep the Plan Current Task 9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)

Any jurisdiction or special district may participate in the hazard mitigation planning process. However, to request FEMA approval, each of the local jurisdictions must meet all requirements of 44 CFR §201.6. In addition to the requirement for participation in the process, the federal regulation specifies the following requirements for multi-jurisdictional plans:

[72] https://www.fema.gov/floodplain-management/manage-risk

- The risk assessment must assess each jurisdiction's risk where they may vary from the risks facing the entire planning area. (44 CFR §201.6(c)(2)(iii))
- There must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan. (44 CFR §201.6(c)(3)(iv))
- Each jurisdiction requesting approval of the plan must document that is has been formally adopted. (44 CFR §201.6(c)(5))

A hazard mitigation plan must clearly list the jurisdictions that participated in the plan and are seeking plan approval. The San Diego County Multi-Jurisdictional Hazard Mitigation Plan meets all requirements, including CRS requirements.

More information about this topic is discussed in Section 4 and 6 of this plan.

1.2.1. CATEGORIES OF FLOODPLAIN MANAGEMENT ACTIVITIES

Floodplain management is a community-based effort to prevent or reduce the risk of flooding, resulting in a more resilient community. Multiple groups with a stake in protecting their communities from flooding conduct floodplain management functions like zoning, building codes, enforcement, education, and other tasks.

While FEMA has minimum floodplain management standards for communities participating in the National Flood Insurance Program (NFIP), adopting higher local standards will lead to safer, stronger, more resilient communities.[73]

The different categories of floodplain management activities are detailed within this section. Related community capabilities and potential local projects (to be completed at future dates) are described respectively in Section 4 and Section 6 of this plan:

1. **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

   - Floodplain mapping and data
   - Planning and zoning
   - Open space preservation
   - Stormwater management
   - Floodplain regulations
   - Drainage system maintenance
   - Erosion setbacks
   - Building codes

2. **Property protection** activities are usually undertaken by property owners on a building-by- building or parcel basis.

   - Relocation
   - Retrofitting
   - Acquisition
   - Sewer backup protection
   - Building elevation
   - Insurance

[73] Floodplain Management | FEMA.gov

3. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.

   - Wetlands protection
   - Water quality improvement
   - Erosion and sediment control
   - Coastal barrier protection
   - Natural area preservation
   - Environmental corridors
   - Natural area restoration
   - Natural functions protection

4. **Emergency services** measures are taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

   - Hazard threat recognition
   - Critical facilities protection
   - Hazard warning
   - Health and safety maintenance
   - Hazard response operations
   - Post-disaster mitigation actions

5. **Structural projects** keep flood waters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.

   - Reservoirs
   - Channel modifications
   - Levees/floodwalls
   - Storm drain improvements
   - Diversions

6. **Public information** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

   - Map information
   - Library
   - Outreach projects
   - Technical assistance
   - Real estate disclosure
   - Environmental education

SECTION TWO: Build the Planning Team

Decorative Image

CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

2. SECTION TWO: BUILD THE PLANNING TEAM

This *San Diego County, California Multi-Jurisdictional Hazard Mitigation Plan (The Plan)* was prepared with input from:

- County Residents
- County of San Diego Groups, Agencies and Departments
- Eighteen Incorporated Cities
- The Port of San Diego
- Water Districts
- Fire Protection Districts
- Air Pollution Control District
- The National Weather Service/ National Oceanic and Atmospheric Administration
- Scripps Institution of Oceanography, University of California San Diego
- California Office of Emergency Services (Cal OES)
- Federal Emergency Management Agency (FEMA).

County resident participation will be discussed in Section 3 of this plan.

Feedback and approval of this plan is provided by Cal OES and FEMA.

2.1. PLANNING PARTICIPANTS

Below is a detailed list of all other planning participant names, positions/titles, and agencies:

TABLE 2: COUNTY OF SAN DIEGO GROUPS, AGENCIES AND DEPARTMENTS:

Name	Title	Department
Jeff Toney	Director	Office of Emergency Services
Stephen Rea	Assistant Director	Office of Emergency Services
Dominique D. Fonseca	Emergency Services Coordinator	Office of Emergency Services
Nick Zubel	Senior Emergency Services Coordinator	Office of Emergency Services
Rob Andolina	Emergency Services Coordinator	Office of Emergency Services
Shannon Nuzzo	Emergency Services Coordinator	Office of Emergency Services
Michael Robles	Senior Geographic Information Systems Analyst	Office of Emergency Services
Ryan DeHart	Senior Emergency Services Coordinator	Office of Emergency Services (Fmr.)
Garrett Cooper	Deputy Director	Agriculture, Weights & Measures
Jesus Amial	Administrative Analyst	Agriculture, Weights & Measures
Austin Shepherd	Deputy Commissioner/Sealer	Agriculture, Weights & Measures
Vince Acosta	IT/GIS Coordinator	Agriculture, Weights & Measures
Brian Christison	Emergency Medical Services Coordinator	Emergency Medical Services
Todd Burton	Environmental Health Specialist III	Environmental Health & Quality
Brad Long	Supervising Environmental Health Specialist	Environmental Health & Quality
Amy Harbert	Director	Environmental Health & Quality
Dave Nissen	Deputy Chief	Fire
Ryan Silva	Battalion Chief	CAL FIRE/Fire
Jessica A. Martinez	Community Risk Reduction Program Coordinator	Fire
Ashley Risueno	Administrative Analyst	Fire
Jo Ann Julien	Health Planning and Program Specialist	Health & Human Service Agency
Sandi Hazlewood	Chief, Departmental Operations	Parks & Recreation
Judy Tjiong-Pietrezak	Senior Park Project Manager	Parks & Recreation
Chelsea Jander	Senior Park Project Manager	Parks & Recreation
Marco Mares	Region Manager	Parks & Recreation
Jason Hemmens	Deputy Director	Parks & Recreation
Tyler Farmer	Group Program Manager	Planning & Development Services
Mike Madrid	Land Use/Environmental Planner-Long Range Planning	Planning & Development Services
Robert Efird	Program Manager-Long Range Planning	Planning & Development Services (Fmr,)
Vince Nicoletti	Deputy Director	Planning & Development Services

Name	Title	Department
Shannon Ackerman	GIS Analyst-Quartic Solutions	Planning & Development Services (GIS)
Jason Batchelor	GIS Coordinator	Planning & Development Services (GIS)
Ian Dawes	Senior GIS Analyst	Planning & Development Services (GIS)
Donna Johnson	Senior Emergency Services Coordinator	Public Health Services
Derek Gade	Assistant Director	Public Works
Mehdi Khalili	Civil Engineer	Public Works (Flood Control)
Matthew Schmid	Senior Civil Engineer	Public Works (Roads)
Greg Carlton	Senior Civil Engineer	Public Works (Roads)
Leann Carmichael	Senior Hydrologist	Public Works (Sustainability Planning Division)
Rene Vidales	Program Coordinator	Public Works
Richard Chin	Project Manager	Public Works (Roads)

EIGHTEEN INCORPORATED CITIES:

Name	City	Title
Don Rawson	Carlsbad	Emergency Services Coordinator
Kim Young	Carlsbad	Assistant Director of Emergency Services
David Harrison	Carlsbad	Assistant Director of Emergency Services (Fmr.)
Jones-Kirk, Marie	Carlsbad	Emergency Services Manager
Marlon King	Chula Vista	Emergency Services Manager
Jayson Summers	Coronado	Division Chief
Clem Brown	Del Mar	Environmental Sustainability & Special Projects Manager
Corina Jimenez	Encinitas	Senior Management Analyst
Lois Yum	Encinitas	Management Analyst
Jeff Murdock	Escondido	Emergency Preparedness Manager
Andy McKellar	Heartland (El Cajon, La Mesa, Lemon Grove)	Emergency Preparedness Coordinator
John French	Imperial Beach	Fire Chief
Walter Amedee	National City	Management Analyst III
David Parsons	Oceanside	Division Chief
Pete Lawrence	Oceanside	Division Chief
Katelynn Rise	Oceanside	Emergency Services Assistant
Russ Cunningham	Oceanside	Principal Planner
Susy Turnbull	Poway	Disaster Preparedness Coordinator
Tiffany Allen	San Diego	Senior Homeland Security Coordinator
Jamie Smith	San Marcos	Emergency Manager
Dave Pender	San Marcos	Fire Battalion Chief

Name	City	Title
Justin Matsushita	Santee	Deputy Fire Chief
Dustyn Garhartt	Santee	Fire Captain
DeVerna Rogers	Santee	Recreation Supervisor
Patricia Letts	Solana Beach	Administrative Assistant III
Rigma Viskanta	Solana Beach	Senior Management Analyst
Ned Vanderpol	Vista	Fire Chief
Edward Kramer	Vista	Emergency Manager
Jamie Smith	Vista	Emergency Management Coordinator (Fmr.)

PORT OF SAN DIEGO

Name	Jurisdiction	Title
Dave Foster	Port of San Diego	Homeland Security Program Manager
Cid Tesoro	Port of San Diego	Vice President, Facilities & Engineering

WATER AND IRRIGATION DISTRICTS:

Name	District	Title
Lisa Coburn-Boyd	Otay Water District	Environmental Compliance Specialist
Emilyn Zuniga	Otay Water District	Safety and Security Specialist
Larry Costello	Padre Dam Municipal Water District	Safety and Risk Manager
Charmaine Esnard	Rainbow Municipal Water District	Risk Management Officer
Lisa Prus	San Diego County Water Authority	Supervising Management Analyst
Eric Rubalcava	San Diego County Water Authority	Principal Asset Management Specialist
Anjuli Corcovelos	San Diego County Water Authority	Senior Water Resources Specialist
Clay Clifton	Sweetwater Authority	Program Specialist
Alisa Nichols	Vista Irrigation District	Management Analyst

FIRE PROTECTION DISTRICTS:

Name	District	Title
Jason McBroom	Alpine Fire Protection District	Fire Marshal
Dave McQuead	Rancho Santa Fe Fire Protection District	Fire Chief
Gehrig Browning	San Miguel Fire Protection District	Division Chief
Andrew Lawler	San Miguel Fire Protection District	Division Chief
W. Brent Napier	San Miguel Fire Protection District	Deputy Fire Marshal
Colton Israels	San Miguel Fire Protection District	Fire Inspector

AIR POLLUTION CONTROL DISTRICT:

Name	District	Title
David Sodeman	Air Pollution Control District	Chief, Department Operations
Domingo Vigil	Air Pollution Control District	Deputy Director

THE NATIONAL WEATHER SERVICE (NWS)/ NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA):

Name	Organization	Title
Alex Tardy	NWS/NOAA	Warning Coordination Meteorologist, Manager

SCRIPPS INSTITUTION OF OCEANOGRAPHY, UNIVERSITY OF CALIFORNIA SAN DIEGO:

Name	Institute	Association (Titles N/A)
Dan Cayan	Scripps Institution of Oceanography, UC San Diego	California Nevada Applications Program
Alexander Gershunov	Scripps Institution of Oceanography, UC San Diego	California Nevada Applications Program
Laura Engeman	Scripps Institution of Oceanography, UC San Diego	Center for Climate Change Impacts and Adaptations
Julie Kalansky	Scripps Institution of Oceanography, UC San Diego	California Nevada Applications Program

2.2. PLANNING PROCESS

The overall planning process for The Plan was led by the County of San Diego Office of Emergency Services (County OES), who established a Hazard Mitigation Planning Group (HMPG) to coordinate development of the Plan. Representatives from each listed incorporated city, special district and the unincorporated county were designated by their jurisdiction as the HMPG member.

Each HMPG member identified a Local (internal) Mitigation Planning Team for their department, jurisdiction, special district, and other organizations that included decision-makers from police, fire, emergency services, community development/planning, transportation, economic development, public works, and emergency response/services personnel, as appropriate.

The Local Mitigation Planning Team assisted in identifying the specific hazards/risks that are of concern to each jurisdiction and to prioritize hazard mitigation measures. The HMPG members brought this information to HMPG meetings— held regularly to provide jurisdiction-specific input to the multi-jurisdictional planning effort and to assure that all aspects of each jurisdiction's concerns were addressed. A list of the lead contacts for each participating jurisdiction is included above, in Section 2.

All HMPG members were provided an overview and training of hazard mitigation planning elements at the HMPG meetings. The HMPG training was designed after FEMA's "Local Mitigation Planning Handbook" worksheets, which led the HMPG members through the process of defining the jurisdiction's assets, vulnerabilities, capabilities, goals, objectives, and actions. The HMPG members were also given additional action items at each meeting to be completed by their Local Mitigation Planning Team.

HMPG members also participated in workshops to present the risk assessment, preliminary goals, objectives, and actions. In addition, several HMPG members met with OES staff specifically to discuss hazard-related goals, objectives, and actions. Preliminary goals, objectives and actions developed by jurisdiction staff were then reviewed with necessary partners for approval.

Throughout the planning process, the HMPG members were given maps of the profiled hazards as well as detailed jurisdiction-level maps that illustrated the profiled hazards and critical infrastructure. These maps were created using data sources listed in references. These data sources contain the most recent data available for the San Diego region. A large portion of this data was supplied by the regional GIS agency, SanGIS.

The SanGIS data is updated periodically with the new data being provided by the local agencies and jurisdictions. This ensured the data used was the most recent available for each participating jurisdiction. The HMPG members reviewed these maps and were provided the opportunity to communicate updates or changes to the critical facilities/assets or hazard layers to County OES in November 2021. Data received from HMPG members were added to the hazard database and used in the modeling process described in the Risk Assessment portion of the Plan (Section 5). The data used in this plan revision is considered more accurate than the original plan.

2.2.1. EXISTING POLICIES, PLANS, PROGRAMS, & RESOURCES

Hazard Mitigation Planning Group (HMPG) members and their corresponding Local Mitigation Planning Teams prior to and during the planning process reviewed several existing policies, plans, studies, guides, programs, and other resources. These items included FEMA documents, emergency services documents as well as county and local general plans, community plans, local codes and ordinances, and other similar documents. The documents included, but were not limited to:

- San Diego County/Cities General Plans & Safety Element
- San Diego County Strategic Plan/Initiatives
- San Diego County Emergency Operations Plan 2018
- Legislation
- Various Local Community Plans
- Various Local Codes and Ordinances
- FEMA Local Mitigation Handbook March 2013
- FEMA Mitigation Ideas January 25, 2013
- Integrating Hazard Mitigation and Climate Adaptation Planning – ICLEI
- Climate Change Impacts in the United States – U.S. Government Printing Office
- Local Mitigation Plan Review Tool 2019
- California State Hazard Mitigation Plan 2018
- Unified San Diego County Emergency Services Organization Operational Area Emergency Plan dated September 2010

Task Four of the FEMA Local Mitigation Handbook, Sections 1, 4, and 7 of this plan, and jurisdiction-specific annexes describe the process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans. The County of San Diego specifically meets with all necessary partners to collaborate on planning mechanisms/updates, conducts an approval process through the public, department leadership, Unified Disaster Council (UDC) voting/approval, then Board of Supervisor and other elected official approval. All listed steps were conducted on necessary and required bases.

This specific update of The Plan required incorporation of updates into the County's Safety Element (lead by Planning & Development Services) and Emergency Operations Plan (lead by County OES) to demonstrate progress of local hazard mitigation efforts. Plan leads (listed in Section 2 of this plan) met as needed to collaborate on cohesive updates, then discuss how and where to include the update within their respective plans.

Additionally, listed below is a summary of existing departments in the County and their responsibilities related to hazard mitigation planning and implementation, as well as existing planning documents and policies/regulations related to mitigation efforts within the community. The administrative and technical capabilities of the County, as discussed below, and in Section 4 of this plan, provide an identification of the staff, personnel, and department resources available to implement the actions identified in Section 6 of this 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 building and infrastructure, planners,

and engineers with an understanding of natural or human-caused hazards, floodplain managers, surveyors, personnel with GIS skills and scientists familiar with hazards in the community:

- **San Diego County Planning Development Services**

  The goals of these departments are to maintain and protect public health, safety, and well-being, and preserve and enhance the quality of life for County residents by maintaining a comprehensive general plan and zoning ordinance, implementing habitat conservation programs, ensuring regulatory conformance, and performing comprehensive community outreach.

  - **Advanced Planning Division**: Provides land use and environmental review, maintains a comprehensive general plan and zoning ordinance, issues land use and building permits, and enforces building and zoning regulations. It is also responsible for long-range planning through development and implementation of a comprehensive County General Plan.
  - **Building Division:** Review site and building plans for compliance with all applicable codes.
  - **Code Compliance Division**: Enforces building, grading, zoning, brushing and clearing, junk, graffiti, signs, abandoned vehicle complaints and noise control.
  - **Land Development Division:** Provides engineering and review services for construction and development projects throughout the unincorporated areas of San Diego County.
  - **Project Planning Division:** reviews “discretionary” projects—projects that builders and homeowners cannot do “by right,” but which may be approved by PDS’s director, the Zoning Administrator, the Planning Commission, or the Board of Supervisors if the projects meet certain conditions. Discretionary projects include lot splits, major subdivisions and conditionally permitted uses. They also process applicants' requests for General Plan Amendments and Zoning changes.

- **San Diego County Department of Public Works**

  Preserve, enhance, and promote quality of life and public safety through the responsible development of reliable and sustainable infrastructure and services.

  - **Land Development Division:** Provides engineering and review services for construction and development projects throughout the unincorporated areas of San Diego County. Services such as Stormwater, Flood Control, Map Processing, Cartography, Surveys, the Geographic and Land Information Systems and dealing with land development issues are the daily job of this division. The division processes more than 5,000 permits each year.
  - **Transportation Division:** Roads Section is the most visible part of DPW, responding to requests for services ranging from pothole repair to tree trimming. Traffic Engineering provides traffic management and determines the need for stop signs and traffic lights. Route Locations updates the County’s General Plan Circulation Element, provides transportation planning support and more. County Airports include eight unique facilities scattered throughout the area. McClellan-Palomar Airport provides commercial service to Los Angeles and Phoenix; Ramona Airport is home to the busiest aerial firefighting base in the USA; and, the County Sheriff's air force, ASTREA, is based at Gillespie Field.

- **Engineering Services Division:** The division includes Wastewater, Flood Control, Design Engineering, Environmental Services, Construction Engineering, Materials Lab, Project Management and Flood Control Engineering and Hydrology. The Director of Public Works has assigned the Deputy Director of Engineering Services as the County Engineer and Flood Control Commissioner.
- **Management Services Division:** This division provides a variety of services to department employees and the public. It includes Personnel, Financial Services, Communications, Recycling, Inactive Landfills and Management Support. Special Districts serve small areas in unincorporated areas providing a variety of services to residents in rural areas.

- **San Diego County Housing & Community Development**

  Improve the quality of life in our communities—helping families find safe and affordable housing, and partnering with property owners to increase the supply and availability of affordable housing. This department provides many valuable services to both property owners and tenants, and strives to create more livable neighborhoods that residents are proud to call home.

  Key service programs include improving neighborhoods by assisting residents with low-income, increasing the supply of affordable, save housing and rehabilitating both business and residential properties in San Diego County. They serve the communities of: Chula Vista, Coronado, Del Mar, El Cajon, Escondido, Imperial Beach, Lemon Grove, Poway, San Marcos, Santee, Solana Beach, Vista, and the unincorporated areas of San Diego County.

  The Community Development Block Grant Program (CDBG) provides funding to agencies or businesses that provide a benefit to persons with low- and moderate-income, prevent or eliminate slums and blight, or meet needs having a particular urgency.

  In addition to funding housing and shelter programs, the County also allocates grant funds toward various community improvements in the Urban County area. These include Developer Incentive programs, Housing Opportunity for Persons with Acquired Immunodeficiency Syndrome (AIDS), and the Emergency Solutions Grant Program. Participating cities, community residents, nonprofit organizations and other county departments may submit grant proposals.

- **County of San Diego Emergency Medical Services (EMS)**

  The mission of this department is to ensure all residents of and visitors to San Diego County receive timely and high-quality emergency medical services, specialty care, prevention services, disaster preparedness and response. Emergency Medical Services (EMS) is a branch of the Health and Human Services Agency's (HHSA) Public Health Services (PHS). It is the 'local EMS agency' (LEMSA), as defined in California law.

- **County of San Diego Office of Emergency Services**

  The Office of Emergency Services (OES) coordinates the overall county response to disasters. OES is responsible for alerting and notifying appropriate agencies when disaster strikes, coordinating all agencies that respond, ensuring resources are available and mobilized in times of disaster, developing plans and procedures for

response to and recovery from disasters, and developing and providing preparedness materials for the public.

This department's function is to protect life and property within the San Diego County Operational Area in the event of a major emergency or disaster by:

1. Alerting and notifying appropriate agencies when disaster strikes
2. Coordinating all Agencies that respond
3. Ensuring resources are available and mobilized in times of disaster
4. Developing plans and procedures for response to and recovery from disasters
5. Developing and providing preparedness materials for the public.

- **County of San Diego Sheriff's Department**

  The San Diego County Sheriff's Department is the chief law enforcement agency in San Diego County. The department is comprised of approximately 4,000 employees, both sworn officers and professional support staff. The department provides general law enforcement, detention, and court services for the people of San Diego County in a service area of approximately 4,200 square miles. In addition, the department provides specialized regional services to the entire county, including the incorporated cities and the unincorporated areas of the county.

  The San Diego County Sheriff's Department provides contract law enforcement services for the cities of Del Mar, Encinitas, Imperial Beach, Lemon Grove, Poway, San Marcos, Santee, Solana Beach, and Vista. In these cities the Sheriff's Department serves as their police department, providing a full range of law enforcement services including patrol, traffic, and investigative services.

  In the unincorporated (non-city) areas, the Sheriff's Department provides generalized patrol and investigative services. The California Highway Patrol has the primary jurisdiction for traffic services in unincorporated areas.

  The San Diego County Sheriff's Department operates seven detention facilities. Male arrestees are booked at the San Diego Central Jail and Vista Detention Facility, while female arrestees are booked at the Las Colinas and Vista Detention Facilities. The remaining jails house inmates in the care of the Sheriff.

- **California Department of Forestry and Fire Protection**

  CAL FIRE is an emergency response and resource protection department that responds to wildland fires that burn across the state. In addition, department personnel respond to other emergency calls, including structure fires, automobile accidents, medical aid, swift water rescues, civil disturbance, search and rescue, floods, and earthquakes.

  CAL FIRE is the State's largest fire protection organization, whose fire protection team includes extensive ground forces, supported by a variety of fire-fighting equipment. CAL FIRE has joined with Federal and local agencies to form a statewide mutual aid system. This system ensures a rapid response of emergency equipment by being able to draw on all available resources regardless of jurisdiction. CAL FIRE is responsible for wildland fire protection within the District's State Responsibility Areas, even though the Fire District is the first responder to an incident.

2.2.2. INVITATION TO PARTICIPATE

The San Diego County Operational Area consists of the County of San Diego and the eighteen incorporated cities located within the county's borders. Planning for emergencies, training and exercises are all conducted on a regional basis. In 1961 the County and the cities formed a Joint Powers Agency (JPA) to facilitate regional planning, training, exercises, and responses. This JPA is known as the Unified San Diego County Emergency Services Organization (USDCESO). Its governing body is the Unified Disaster Council (UDC) (as described in Section 1 of this plan).

The membership of the UDC is defined in the JPA. Each city and the County have one representative. Representatives from the cities can be an elected official, the City Manager or from the municipal law enforcement or fire agency. The County is represented by the Chairperson of the County Board of Supervisors, who also serves as Chair of the UDC.

In addition, there are 26 fire protection districts and 17 water districts within the San Diego Region. Each were offered the opportunity to participate in the development of this plan.

The original development of the Hazard Mitigation Plan, as well as this current revision, were conducted under the auspices of the UDC. At the direction of the UDC, the San Diego County Office of Emergency Services (County OES) acted as the lead agency in the revision of this plan. San Diego County OES requested input from each jurisdiction in the county.

Each municipality, special district, and neighboring jurisdictions were formally invited to attend a meeting to develop an approach to the planning process and to form the Hazard Mitigation Planning Group (HMPG). These invitations were in the form of an email to each jurisdiction. At the August 29, 2019 UDC meeting, it was announced that the plan was reaching the five-year mark and required updating.[74]

Each jurisdiction/participating party (documented within Section 2 of this plan) later confirmed their participation in the HMPG. In addition to the eighteen incorporated cities, County OES provided an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as business, academia and other private or non-profit organizations interested in the involvement of the planning process.

The HMPG formed to undertake the planning process and meeting dates were set for all members to attend. Each participating jurisdiction then formed their own Local Hazard Mitigation Planning Team. Details on the membership of those teams can be found in each jurisdiction's annex. Local Hazard Mitigation Planning Teams met either before or after the overall HMPG met to discuss regional meeting topics and assignments.

The UDC received briefings regularly on the progress of the planning process. UDC meetings are open to the public, with agendas and notices posted according to California's Brown Act, with emailed invitations and reminders sent out one to two weeks prior to the meetings. Included on that email list are representatives from the following agencies:

- American Red Cross
- Chambers of Commerce

[74] https://www.sandiegocounty.gov/content/dam/sdc/oes/docs/UDC_Documents/2019/October/04.%20August%20UDC%20Minutes_2019.pdf.

- Federal Agencies (USN, USMC, USCG, DHS)
- Hospitals
- Port of San Diego
- State Agencies (Cal OES, DMV, Caltrans)
- School Districts
- Universities and colleges
- Utilities (Power- SDG&E, Water – San Diego County Water Authority and Water Districts, Cable, telephone, and internet – Cox Communications)

Tribal Communities were also invited to participate in this plan update and/or discuss Tribal Hazard Mitigation Plans on April 26, 2022.

2.2.3. HAZARD MITIGATION PLANNING GROUP MEETINGS

The Hazard Mitigation Planning Group (HMPG) met regularly, as did the County of San Diego Local (County-specific) Hazard Mitigation Planning Group. The following is a list of meeting dates and objectives:

1. **Initial HMPG and County Planning Meetings:**

   September 2019—Kickoff meetings and Formation of HMPG

2. **HMPG Meeting 1:**

   October 8, 2019—Overview of Planning Process/Assessing Risks, Identify Partners, and Review Due Dates

3. **County Local Planning Meeting 1:**

   November 1, 2019—2018 Plan Version Capabilities Review, Assignment of Review, Review Objectives and Due Dates

4. **HMPG Meeting 2:**

   December 3, 2019—Review Schedule and Process, Review/Complete FEMA Task 4 (Review Community Capabilities)

5. **County Local Planning Meeting 2:**

   January 21, 2020—Review Objectives/Due Dates and Discuss Subject Matter Experts for each project, Assignment of County Departments for FEMA worksheet Tasks, Discuss Community Assets

6. **FEMA Meeting:**

   November 13, 2020—Meeting with federal and state partners to review the current plan update process

7. **HMPG Refresher Meeting:**

   January 11, 2021—Review updated planning calendar/schedule and allowed time for questions-and-answer session with state and federal partners

8. **Refresher County Planning Meeting:**

   January 18, 2021—Review updated planning calendar/schedule and allowed time for questions-and-answer session with state and federal partners

9. **County Local Planning Meeting 3:**

   March 1, 2021—Discussion from Subject Matter Experts about assignments/projects and update on progress/completion of FEMA Tasks 1-4

10. **County Local Planning Meeting 4:**

    March 15, 2021—Discussion from Subject Matter Experts about assignments/projects and update on progress/completion of FEMA Tasks 1-4

11. **County Local Planning Meeting 5:**

    April 12, 2021—Discussion from Subject Matter Experts about assignments/projects and update on progress/completion of FEMA Tasks 1-4

12. **HMPG Meeting 3:**

    April 26, 2021—Review Risk Assessment/Development of Mitigation Plan, GIS roles, Hazard Identification/Risk Assessment Processes, due dates, and Review/Complete FEMA Tasks 1-4

13. **Hazards Workshops/Seminars:**

    May-July 2021 (Tuesdays and Thursdays) —Subject Matter Experts present about different operational area hazards and suggest mitigation actions. Panel discussions and opportunity for planning group questions

14. **County Local Planning Meeting 6:**

    July 22, 2021—Review supplemental data associated with the risks, Discuss Risk Assessment Process and county mitigation strategies with Subject Matter Expert guidance

15. **County Local Planning Meeting 7:**

    October 20, 2021—Discuss assignment turnover to new project manager, Review/Complete FEMA Task 5 (Conduct a Risk Assessment)

16. **HMPG Meeting 4:**

    October 26, 2021—Review updated schedule/due dates, Hazard Identification Process, Risk Assessment Process, Hazard Profiling and Loss Estimation, Review/Complete FEMA Task 5 (Conduct a Risk Assessment)

17. **Cal OES 2021 HMGP Webinar**

    November 18, 2021—Discussion of HMGP sub-application instructions and requirements

18. **Cal OES Grant Program Notice of Interest (NOI) Webinar:**

    December 14, 2021

19. **County Local Planning Meeting 8:**

    January 19, 2022—Review/Complete FEMA Task 6 (Develop a Mitigation Strategy)

20. **HMPG Meeting 5:**

    February 1, 2022—Finalize FEMA Planning Worksheets for Task 6, Discuss Public Survey and Forum, Start FEMA Worksheets for Task 7, Discuss deadlines

21. **County Local Planning Meeting 9:**

    February 11, 2022—Review/Complete FEMA Task 7 (Keep the Plan Current)

22. **Cal OES Sub-Application Development Series:**

    February 2022—Discussion of HMGP sub-application instructions and requirements for various hazards

23. **HMPG Meeting 6:**

    March 7, 2022—Finalize FEMA Task 7 Worksheets, Discuss Cal OES/FEMA Funding and Training Opportunities, Discuss action items and deadlines

24. **Whole Community Outreach Survey:**

    April 1, 2022—Release was communicated with and shared by planning partners

25. **HMPG Individual Meeting Series:**

    March-April 2022—Check in meetings with all planning participants to ensure deadlines are met and final question were answered

26. **Plan Peer Review:**

    April 28-29, 2022—County Office of Emergency Services peers compared existing plan draft to FEMA grading requirements (2019 Local Plan Review Tool) and provided feedback

27. **Public Forum:**

    May 28, 2022—All planning participants and the public were invited to review key survey results and provided resources for further input

Work drafts, products, and the final plan were shared electronically. Additional meetings not included on the above list were impromptu requests for one-on-one guidance and virtual/in-person meetings with planning partners.

Not all partners were able to attend all meetings. Follow-up phone calls, question-and-answer sessions, and in-person meetings were conducted with those not able to attend to ensure they were kept current on the process, assignments, and deadlines.

Follow-up meetings with planning partners continued until final draft submission to Cal OES and FEMA (June 2022).

2.2.4. HAZARD MITIGATION PLANNING GROUP MILESTONES

The approach taken by the Hazard Mitigation Planning Group (HMPG) relied on sound planning concepts and a methodical process to identify County vulnerabilities and to propose the mitigation actions necessary to avoid or reduce those vulnerabilities. Each step in the planning process was built upon the previous—providing a high level of assurance that the mitigation actions proposed by the participants and the priorities of implementation are valid. Specific milestones in the process included:

Planning Group Meetings (September 2019 – June 2022):
As listed in the previous section, a series of HMPG meetings were held in which the HMPG considered the probability of a hazard occurring in an area and its impact on public health and safety, property, the economy, and the environment, and the mitigation actions that

would be necessary to minimize impacts from the identified hazards. These meetings were held every month or two (depending on the progress made), September 2019 through June 2022. The meetings evolved as the planning process progressed and were designed to aid the jurisdictions in completing FEMA worksheets that helped define hazards within their jurisdictions, their existing capabilities and mitigation goals and action items for the Hazard Mitigation Plan.

Hazards Workshops/Seminars (June 2021-July 2021):
A series of workshops discussed the impact of all hazards impacting the operational area to educate local planners and community members. Topics discussed included, but were not limited to, climate change, sea level rise, drought, changes to precipitation patterns and extreme weather, wildfire, terrorism, and potential future impacts. The information presented in these workshops were incorporated into the risk assessment process as well in the development of mitigation goals, objectives, and actions.

Risk Assessment (June 2021 – January 2022):
The HMPG used the list of hazards from the 2018 Multi-jurisdictional Hazard Mitigation Plan to determine if they were still applicable to the region and if there were any new threats identified that should be added to the plan. Specific geographic areas subject to the impacts of the identified hazards were mapped using a Geographic Information System (GIS). The HMPG had access to updated information and resources regarding hazard identification and risk estimation. This included hazard specific maps, such as floodplain delineation maps, earthquake shake potential maps, and wildfire threat maps; GIS-based analyses of hazard areas; the locations of infrastructure, critical facilities, and other properties located within each jurisdiction and participating special district; and an estimate of potential losses or exposure to losses from each hazard.

The HMPG also conducted a methodical, qualitative examination of the vulnerability of important facilities, systems, and neighborhoods to the impacts of future disasters. GIS data and modeling results were used to identify specific vulnerabilities that could be addressed by specific mitigation actions. The HMPG also reviewed the history of disasters in the County and assessed the need for specific mitigation actions based on the type and location of damage caused by past events. The process used during the completion of the initial plan and first update was utilized for this update.

Finally, the assessment of community vulnerabilities included a review of current codes, plans, policies, programs, and regulations used by local jurisdictions to determine whether existing provisions and requirements adequately address the hazards that pose the greatest risk to the community. This was a similar process to that used in the original plan and first update.

Goals, Objectives, and Alternative Mitigation Actions (January 2022- February 2022)

Based on this understanding of the hazards faced by the County, the goals, objectives, and actions identified in the 2018 plan were reviewed to see what had been completed and could be removed and which were not able to be completed due to funding or other challenges. HMPG members then added updated priorities in the form of listed goals, objectives, and actions, as required for the completion of the update. This was done by the members working with their local planning groups and in a series of one-on-one meetings with County Office of Emergency Services staff. Additionally, plan compatibility with existing plans and regulations was considered and accounted for.

Mitigation Plan and Implementation Strategy (January 2022- February 2022):
Each jurisdiction reviewed their priorities for action from among their goals, objectives, and actions, developing a specific implementation strategy including details about the organizations responsible for carrying out the actions, their estimated cost, possible funding sources, and timelines for implementation.

Mitigation Action Progress Report (February 2022- June 2022)
If applicable, jurisdictions completed a progress report for their previous 2018 plan. All HMPG members were also asked to complete a FEMA Plan Evaluation (Section 7 of this plan) as a resource to help keep this plan current.

SECTION THREE: Create an Outreach Strategy

Decorative Image

Photo by Kevin Pack
CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

3. SECTION THREE: CREATE AN OUTREACH STRATEGY

The County of San Diego's Hazard Mitigation Outreach Strategy is based on the Federal Emergency Management Agency's (FEMA's) Whole Community Approach and governed by existing department, local, state, and federal plans, regulations, and budgets.

The Whole Community Approach supports inclusive management practices, and it's three principles help guide the County of San Diego's Hazard Mitigation Outreach Strategy.

3.1. WHOLE COMMUNITY APPROACH

The County of San Diego/the Operational Area develop and update emergency plans in accordance with local, state, and federal policies and guidance. The Federal Emergency Management Agency (FEMA) provides a strategic framework to guide all members of the emergency management community as they determine how to integrate the Whole Community Approach and related concepts into their daily practices. FEMA's guidance and this plan are not intended to be all-encompassing or offer specific actions that require adoption of certain protocols.

Instead, the Whole Community Approach is acknowledged as a general process by which the public, emergency management representatives, organizational and community leaders, tribal partners, and government officials can understand and assess the needs of their respective communities, then determine the best ways to organize and strengthen resources, capacities, and interests. The Whole Community Approach, overall, is intended to increase individual preparedness, prompt engagement with vital community partners, and enhance community resiliency and security. More information about this approach and other concepts can be located on FEMA's website (www.FEMA.gov).

Community resilience within emergency management consists of three key factors:

1. The ability of first responder agencies (e.g., fire, law, emergency medical services) to divert from their day-to-day operations to the emergency effectively and efficiently.
2. The strength and inclusivity of the emergency management system and organizations within the region to include the Emergency Operations Center (EOC), mass notification systems, emergency public information systems, etc.
3. The civil preparedness of the region's people, businesses, and community organizations.

Enhancing all three of these factors constantly focuses the Operational Area on improving the region's resiliency. Emergency response effectiveness also largely depends on the preparedness and resiliency of the collective communities within a region. Different types of communities exist including, but not limited to, communities of place, interests, beliefs, and circumstances, which can exist geographically and virtually (e.g., online gatherings/forums, etc.). While multiple factors can contribute to community resilience and effective emergency management resources and outcomes, FEMA recommends three principles to establish a Whole Community Approach:

1. Understand and meet the actual needs of the whole community
2. Engage and empower all parts of the community
3. Strengthen what works well in communities

A deep understanding of the unique and diverse needs of a population (including demographics, values, norms, community structures, networks, relationships, and experiences) is crucial for emergency managers to best ascertain the population's real-life safety needs and motivation to participate in preparation and mitigation activities prior to an emergency event.

A Whole Community Approach towards building community resilience requires finding ways to support and strengthen the relationships, institutions, structures, assets, and networks that already exist, work well in communities, and address issues that are important to community members. Engaging the whole community and empowering local action in this manner will best position all stakeholders to plan for/meet the actual needs of a community and strengthen local capacity/resilience to recover from threats and hazards.[75]

This plan was developed in alignment with the Whole Community Approach through collaboration with and guidance from representatives of the California Governor's Office of Emergency Services (Cal OES), Cal OES' Office of Access and Functional Needs (OAFN), County departments/agencies/groups, special districts, OA City departments, law enforcement, fire services, emergency management, people with access and functional needs, tribal community liaisons, business and industry partners, and various other public and private stakeholders.

3.1.1. INCLUSIVE EMERGENCY MANAGEMENT PRACTICES

The County of San Diego and the County Office of Emergency Services (County OES) are committed to achieving and fostering a Whole Community emergency management system that is fully inclusive of all individuals. Individual differences include, but are not limited to, ability, access and functional needs, age, life experience, military/veteran status, race, ethnicity, socio-economic class, marital status, parental status, gender/gender expression, sexual orientation, national origin, and religion.

Through the integration of community-based organizations, service providers, government programs, individuals with disabilities, and individuals with access and functional needs into the planning process, meaningful partnerships are developed and leveraged.

These partnerships help enable the region to support community in the San Diego Operational Area, and all programs, services, and activities provided to people during emergency events, to the maximum extent feasible, will be inclusive of all individuals. The following items are examples of inclusive service delivery and support:

- Accessible transportation
- Assistance animals
- Dietary restrictions and needs
- Assistive equipment and services
- Accessible public messaging
- Evacuation assistance
- Restoration of essential services
- Language translation and interpretation services

[75] https://www.fema.gov/sites/default/files/2020-07/whole_community_dec2011__2.pdf

- Service delivery site Americans with Disabilities Act of 1990 (ADA) compliance

The County of San Diego partners with a broad network of trusted community organizations and agencies (e.g., churches, non-profit organizations, refugee resettlement organizations) called the “Partner Relay” to accomplish inclusive practices through sharing emergency information with communities that may have limited English proficiency.

In addition to observing inclusive preparation, mitigation, and response practices, the County of San Diego also incorporates existing and new local, state, and federal laws that govern emergency planning and response efforts. Examples of the County of San Diego’s compliance with federal laws that prohibit discrimination on the basis of disability within emergency management programs include this plan’s incorporation of:

- Americans with Disabilities Act of 1990
- Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988
- Individuals with Disabilities Education Act of 1975
- Post-Katrina Emergency Management Reform Act of 2006
- Rehabilitation Act of 1973
- Fair Housing Act Amendments of 1988
- Architectural Barriers Act of 1968
- Twenty-First Century Communications and Video Accessibility Act of 2010
- Telecommunications Act of 1996

Additionally, the County of San Diego complies with California Government Code § 8593.3, which requires government agencies to integrate planning for the needs of individuals with access and functional needs into emergency operations plans. Code § 8593.3 compliance also includes planning for individuals who have:

- Developmental or intellectual disabilities
- Physical disabilities
- Chronic conditions
- Injuries
- Limited English proficiency or people who do not speak English
- Low-income,

and individuals who are:

- Older adults
- Children
- Pregnant
- Living in institutionalized settings,

and individuals who are experiencing:

- Homelessness
- Transportation disadvantages, including, but not limited to, people who are dependent on public transit.

For further details on County OES' Whole Community Approach to emergency management and the integration of inclusive emergency management practices, refer to the County of San Diego's Emergency Operations Plan: Basic Plan.[76]

3.2. COMMUNITY OUTREACH STRATEGY

The County Office of Emergency Services (County OES) recognized the importance of public feedback throughout the plan update process to account for community hazard concerns and to gauge community preparedness and education needs. Therefore, County OES' Community Outreach Strategy provided multiple ways and opportunities for the public to provide input:

- Webpage and Email Address
- Telephone availability
- Survey
- Public Forum

3.2.1. WEBPAGE AND EMAIL ADDRESS

A Hazard Mitigation Plan webpage, as part of the San Diego County Office of Emergency Services' (County OES') website, was developed and published years ago to provide the public with information and methods to provide feedback—such as the dedicated hazard mitigation email address that is checked daily by County OES staff for any public questions and/or feedback.

Other Items posted on the webpage include the current plan and jurisdiction annexes.[77]

3.2.2. TELEPHONE, MAIL, & FAX AVAILABILITY

The San Diego County Office of Emergency Services' home website provides the public with contact information to ask questions and/or provide feedback via telephone, mail and/or fax.[78]

3.2.3. SURVEY

A detailed community engagement survey (for both this plan and the County's Emergency Operations Plan) was developed by the County Office of Emergency Services' (County OES') Planning Participants, translated into six total languages, published on County OES' website for public response, shared via all County OES social media accounts, then advertised via a County News Center article.[79]

The survey was also shared with all regional Planning Participants and other partners (such as the Partner Relay, Unified Disaster Council (UDC) members, Emergency Managers, the County Committee for Persons with Disabilities, County Employee Resource Groups and

[76] https://www.sandiegocounty.gov/content/sdc/oes/emergency_management/oes_jl_oparea.html

[77] https://www.sandiegocounty.gov/oes/emergency_management/oes_jl_mitplan.html.

[78] https://www.sandiegocounty.gov/content/sdc/oes.html.

[79] https://www.countynewscenter.com/help-the-county-update-emergency-plans/.

County policy aides), with the request for these partners to share the survey with their community networks.

The survey sought public input about top hazard concerns and gauged the public's hazard education and readiness so future hazard mitigation projects/action items (detailed in Section 6 of this plan) can incorporate this feedback and enhance community preparedness before a disaster occurs. Survey respondents were also asked to provide their email address if they were interested in attending County OES' Community Engagement Public Forum, described in the next section.

The community engagement survey was active from April 1, 2022 to May 9, 2022 and received 500 total responses.

The survey results, and related public forum recording, were posted to County OES' Hazard Mitigation Plan webpage for 30 days.[80]

3.2.4. PUBLIC FORUM

The County Office of Emergency Services' (County OES') contacted the survey recipients who requested a Public Forum invitation on May 16, 2022 to provide Public Forum details, instructions, and to offer language translation services upon request. County OES then hosted the recorded Community Engagement Public Forum on Monday, May 23, 2022, at 10 AM, via a virtual collaboration platform. The forum presenters discussed the community engagement survey results and shared methods to: receive personal disaster plans, hazard preparation and mitigation resources, ask more hazard mitigation questions and/or provide additional feedback.

The public forum recording, and related survey results, were posted to County OES' Hazard Mitigation Plan webpage for a minimum of 30 days. [81]

3.2.5. FEEDBACK INCORPORATION

Public involvement was valuable in the development of this plan update. The areas of concern provided via all outreach methods were used by each jurisdiction while developing and/or updating mitigation goals, objectives, and actions. Additionally, public feedback was also used, in conjunction with hazard data, to determine the top hazards of concern for the region profiled in Section 5 of this plan.

The public can continue public participation in the plan maintenance process by emailing the hazard mitigation email address, calling the County Office of Emergency Services' (County OES) during business hours and/or providing feedback during future outreach opportunities that will be advertised on our website, social media platforms and shared with regional partners.

City-, special district-, or other organization-specific feedback should be provided directly to those parties via their advertised methods.

[80] https://www.sandiegocounty.gov/oes/emergency_management/oes_jl_mitplan.html

[81] https://www.sandiegocounty.gov/oes/emergency_management/oes_jl_mitplan.html

SECTION FOUR: Review Community Capabilities

Decorative Image

Photo by Jeff Hall
CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

4. SECTION FOUR: REVIEW COMMUNITY CAPABILITIES

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities and must be included in a hazard mitigation plan by the Planning Group.

The Planning Group may also identify additional types of capabilities relevant to mitigation planning.

4.1. CAPABILITY ASSESSMENT

The primary types of capabilities for reducing long-term vulnerability through mitigation planning are:

- Planning and Regulatory
- Administrative and Technical
- Financial
- Education and Outreach

4.1.1. PLANNING AND REGULATORY

Planning and Regulatory Capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards.

This jurisdiction has the following in place:

TABLE 3: PLANNING AND REGULATORY CAPABILITIES

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/ Master Plan	Yes, 2021	The County of San Diego General Plan, which includes the Safety Element and references back to the Hazard Mitigation Plan, outlines projects and strategies that could be implemented in the areas of conservation, housing, noise and land-use. Per the Plan: This document is the first comprehensive update of the San Diego County General Plan since 1978 and is the result of the collective efforts of elected and appointed officials, community groups, individuals, and agencies who spent countless hours developing a framework for the future growth and development of the unincorporated areas of the County. This document replaces the previous General Plan and is based on a set of guiding principles designed to protect the County's unique and diverse natural resources and maintain the character of its rural and semi-rural communities. It reflects an environmentally sustainable approach to planning that balances the need for adequate infrastructure, housing, and economic vitality, while maintaining and preserving each unique community within the County, agricultural areas, and extensive open space.

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
		Safety Element: Establishes policies and programs to protect the community from risks associated with seismic, geologic, flood, and wildfire hazards.
Capital Improvements Plan	Yes, 2021	The Capital Improvement Program consists of improvements to roads and bridges; facilities at the eight County-owned and operated airports and airstrips; flood control facilities in unincorporated developed areas; and wastewater facilities owned and operated by the County. These services keep our roads and related infrastructure up to date to promote safe, viable and livable communities and make it easier for residents to lead healthy lives. The Department of Public Works project management team is responsible for overall management and coordination of planning, budget, design, environmental clearance and permitting, right-of-way acquisition and utility coordination for County roads. Funds are approved by the Board of Supervisors though a yearly Detailed Work Program. In a typical fiscal year, approximately 30 projects are in construction with about 70 other projects in the development stages. The Capital Improvement Program anticipated budget for Fiscal Year 2020-21 is over $122 million.
Local Emergency Operations Plan (EOP)	Yes, 2018	The Operational Area EOP is developed to be inclusive of multiple hazards, with a regional focus and template versions of the plan that local municipalities can develop into their own EOP. The County EOP includes annexes in the following relevant categories: • Emergency Management • Fire and Law Mutual Aid • Multi-Causality Operations • Public Health Operations • Terrorism
Continuity of Operations Plan	Yes, Updated Annually	The San Diego County Continuity of Operation plan (COOP) / Program is guided by the Chief Administrative Officer (CAO) COOP Policy of 2013 and identifies and tests redundant and inoperable systems for maintaining critical functions during disasters. There is a separate and specific annex of each plan for Pandemic. On an annual basis, each agency is required to submit and updated COOP and Site Evacuation Plan (SEP) to the County COOP Coordinator (OES Position) and this is submitted to a repository where each plan can be accessed by leadership within the county. Each plan is required to be tested every two years.
Transportation Plan	Yes, 2018	• Bicycle Transportation Plan • Pedestrian Area Transportation Plan • Active Transportation Plan

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Stormwater Management Plan	Yes, 2018	On May 8, 2013, the San Diego Regional Water Quality Control Board (Regional Board) adopted a new Municipal Separate Storm Sewer System (MS4/Stormwater) Permit (National Pollution Discharge Elimination System Permit, No. R9-2013-0001) that covered the San Diego County Copermittees. Order No. R9-2015-0001 was adopted on February 11, 2015, amending the Regional MS4 Permit to extend coverage to the Orange County Copermittees. Order No. R9-2015-0100 was adopted on November 18, 2015, amending the Regional MS4 Permit to extend coverage to the Riverside County Copermittees and make minor revisions. This Permit mandates that the County of San Diego develop new and updated Runoff Management Plans and Programs, including Water Quality Improvement Plans and a Jurisdictional Runoff Management Program. These documents were submitted to the Regional Board on June 26, 2015. Permit requirements are generally implemented in the unincorporated County under authority of the Watershed Protection, Stormwater Management, and Discharge Control Ordinance (WPO). The amended MS4 Permit, like all previous iterations, requires the County to establish and maintain adequate legal authority to implement all updated MS4 Permit provisions. The WPO has been amended to ensure that it is current with the minimum requirements of the recently amended MS4 Permit. The amendments include updating terminology and definitions related to land development priority development projects (PDPs), removal of outdated sections, minor updates to discharge prohibitions, and the incorporation of an optional program to allow development projects to satisfy some of its stormwater compliance obligations at off-site locations. On January 27, 2016, the County Board of Supervisor's adopted the Watershed Protection, Stormwater Management, and Discharge Control Ordinance (WPO). The WPO became effective February 26, 2016.
Community Wildfire Protection Plan (CWPP)	Yes, 2016-2020	Thirty-three communities have CWPP approved and in place: • Alpine • Crest • Camp & Lake Morena • Deer Springs • Descanso • Dulzura / Barrett • El Capitian • Eucalyptus Hills • Fallbrook • Greater Sunshine Summit • Harrison Park • Julian • Kensington X • Los Tules at Warner Springs • Mt. Laguna • Outer Jamul

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Community Wildfire Protection Plan (CWPP), continued		• Palomar Mountain • Pine Valley • Potrero – Tecate • Ramona • Rancho Penasquitos • Rancho Santa Fe • Real East County • Resource Conservation District of Greater San Diego County of San Diego • San Diego County Northeast • San Diego County Southwest • Scripps Ranch • Stoneridge at Warner Springs Estates • Talmadge • Valley Center • Vista Wynola Estates The International Fire Chiefs Association released their guide to help develop and implement a Community Wildfire Preparedness Plan in communities and across the country. It has a local community level approach to include code, development review, ordinances and local authority, and is used by leaders in the Fire Service, including subject matter experts, and local, state, and federal officials.
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes	• Disaster Recovery Plan • Climate Adaptation Plan • Wildfire Resiliency Strategy

Building Code, Permitting, and Inspections	Yes/N	Are codes adequately enforced?
Building Code	Yes	Yes
Site plan review requirements	Yes	Projects on lots that touch County or FEMA floodplain or floodways are routed to County Flood Control for review to ensure compliance with the County Flood Damage Prevention Ordinance which was last revised on 11/29/2019.

Land Use Planning and Ordinances	Yes/N	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Zoning ordinance	Yes	Yes
Subdivision ordinance	Yes	Yes
Special purpose ordinances (floodplain management, storm water management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Yes	Projects on lots that touch County or FEMA floodplains or floodways are routed to County Flood Control for review to ensure compliance with the County Flood Damage Prevention Ordinance (FDPO) which was last revised on 11/29/2019. FDPO is an effective measure for reducing flood hazard impacts; and it is adequately administered and enforced.
Flood insurance rate maps	Yes	County's FDPO uses County floodplain and floodway maps available through SanGIS and FEMA FIRMs available through FEMA Map Service Center to effectively reduce flood hazard impacts. It is adequately administered and enforced.

4.1.2. ADMINISTRATIVE AND TECHNICAL

Administrative and Technical Capabilities include staff, their skills, and tools that can be used for mitigation planning and to implement specific mitigation actions.

For smaller jurisdictions without local staff resources, if there are public resources at the next higher-level government that can provide technical assistance, this may be indicated within the comments:

TABLE 4: ADMINISTRATIVE AND TECHNICAL CAPABILITIES

Administration	Yes/No	Describe capability Is coordination effective?
Planner(s) or engineer(s) with knowledge of land development and land management practices	Yes	Planning & Development Services (PDS)/ Lead Planner; County Fire CRR Battalion Chief
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Yes	PDS/Building Inspectors; Fire Prevention Specialist I & II
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	Yes	County Fire Pre-Fire Division Chief
Mitigation Planning Committee	Yes	San Diego County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Planning Team

Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	County drainage crews inspect and maintain public drainage facilities annually and perform maintenance as necessary to ensure optimal conveyance. Defer to Department of Public Works (DPW) Transportation for Roads right-of-way maintenance.
Mutual aid agreements	Yes	Mutual aid agreements with CPFD Region I and VI Mutual Aid Agreement are in place. This agreement extends the MHOAC program's mutual aid response from Region VI to include all of Region I. If the County of San Diego faces an issue that our Operational Area cannot get the necessary resources within our county or within Region VI, then all the resources within Region I will be made available for our operational area in accordance with the mutual aid agreement.
Staff	**Yes/No FT/PT1**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Floodplain Administrator	Yes	Staffing is adequate to enforce regulations. Staff are trained on hazards and mitigation. Staff are certified as Certified Floodplain Managers and regularly participate in continuing education provided by FEMA, ASFPM, FMA, etc. There is effective coordination between agencies and staff.
Emergency Manager	Yes	The Office of Emergency Services employed 8 Emergency Services Coordinators / Senior Emergency Services Coordinators, as well as Temporary Admin Analyst Positions to Assist. County Fire coordinates with County Fire Incident Management Teams. Emergency Medical Services Coordinator and (2) Emergency Medical Services Specialists, Emergency Services Coordinator, PH/BT Quality Assurance Specialists are employed out of Health and Human Services. All the existing staff listed above are trained on local hazards and mitigation plans and have developed the relationships with outside agencies to have successful collaboration and support when needed.
Staff with education or expertise to assess the community's vulnerability to hazards	Yes	Public Health Services (PHS) has Health Planning and Program Specialists and Epidemiologists with technical assistance from the California Department of Public Health, Office of Health Equity, and other partners and subject matter experts to assess the community's vulnerability to hazards; The State has created assessments and health profiles for the various counties on vulnerability to the impacts of climate change. Staff referenced here do not enforce regulations. Staff referenced here are trained on the public health impacts of climate change and some also receive various levels of training in NIMS/ICS. More training would be desirable. There is good coordination and communication between the individuals and organizations referenced here. County Fire oversees the County Science Advisory Board; County Fire Environmental Scientists. The Hazard Incident Response Team are experts in Hazardous Waste spills / releases. Staff at the Office of Emergency Services are experts in all hazards and oversee the production of Concept of Operations (response plans and procedures) for a multitude of natural and human-caused disasters.

Community Planner	Yes	The following county departments recorded having Community planners on staff: • OES • PHS • DPW • PDS
Scientists familiar with the hazards of the community	Yes	The following county departments recorded having Scientists on staff: • OES • PHS • DPW • PDS
Personnel skilled in GIS and/or HAZUS	Yes	The following county departments recorded having GIS Personnel on staff: • OES • PHS • DPW • PDS
Grant writers	Yes	The following county departments recorded having Grant Writers on Staff: • OES • PHS • DPW • PDS

Technical	Yes/No	Describe capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	The County and individual municipalities have multiple notification systems and protocols used during emergency events. AlertSanDiego is the opt-in notification system, WEA (Wireless Emergency Alert) is coordinated and used, as well as the SDEmergency App and website. • **Flood Warning** Flood Warning uses a network of automated rain, stream, reservoir and weather stations known as the ALERT Flood Warning System. Weather changes are reported in real-time to our Kearny Mesa office. ALERT systems are used around the world to provide real-time flood warning to local communities at risk from flooding threat. ALERT is an acronym that stands for Automatic Local Evaluation in Real-Time. • **San Diego Flood Warning System** The San Diego County Flood Warning System is made up of 120 rain gages, stream gages, weather stations, and lake level stations that report data in real time to the Flood Control Weather Center in Kearny Mesa. The system is internet-based and each of its sensors has defined alarms, that when activated, are used by the flood warning system to automatically

		assemble a warning message and send it out to the appropriate emergency managers by email or cell phone. The website has numerous links that allow the user to view and download the sensor data, view updating graphs and maps, and access other weather-related resources. • OES and PHS collaborate on Partner Relay to ensure messages are getting to residents with limited English proficiency. Additionally, Partner Relay hosts 3 workshops per year to warn residents and organizations serving homeless, refugees and other community-based organizations about emergency preparedness topics. Yes, this capability has been used to assess/mitigate risk in the past (e.g., during the Lilac Fire) and in between emergencies with the workshops for CBOs.
Hazard data and information	Yes	Hazard Data is used for both this plan, and the Counties Emergency Operations Plan. County OES also uses this data for our Concept of Operations and in assistance of hazard specific plans for other departments. HHSA and PHS have health statistics, and data about the social determinants of health (e.g., Live Well indicators). The Live Well Team and Community Health Statistics Unit maintain this data and information. Yes, this work has been used to assess and mitigate risk in the past both for the County and its partners by making this information widely and publicly available and promoting awareness of it (e.g., through workshops on the public health impacts of climate change, presentations on the Community Health Assessment data).
Grant writing	Yes	Mitigation grants (HMA / HMGP) Grants are applied for by multiple departments within the county (Flood Authority / OES / PDS). All of which have grant writing experience.
Hazus analysis	Yes	HAZUS Analysis is utilized for the Hazard Mitigation Plan.

4.1.3. FINANCIAL

This jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation:

TABLE 5: FUNDING RESOURCES

Funding Resource	Access/ Eligibility (Yes/No)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Community Development Block Grants (CDBG)	Yes	
Capital improvements project funding	Yes	Yes
Authority to levy taxes for specific purposes	Potentially	San Diego Flood Control District Act provides potential, but Prop 218 requires a vote by property owners.
Fees for water, sewer, gas, or electric service	No	
Impact fees for homebuyers or developers for new developments/homes	Yes	Special Drainage Area Developer Fees provided to Flood Control District

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4.1.4. EDUCATION AND OUTREACH

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information:

TABLE 6: EDUCATION AND OUTREACH PROGRAMS

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Department of Environmental Health & Quality (DEHQ) does educational outreach to permitted business on regulations only. Public Health Services (PHS) works with the following departments or groups for disaster resilience and mitigation: County OES, Community Action Partnership (Resident Leadership Academy, CinA, WalkNRoll, Exchange) & Office of Refugee Coordination, PHS, HHSA Regions, Integrative Services, Live Well San Diego team/CHWs, Partner Relay efforts with various community-based organizations serving refugees, homeless, and community groups representing limited English proficiency residents; OES has a working group on access and functional needs, the County also has an Employee Resource Group called Diverse Abilities which takes an active interest in access and functional needs (AFN) populations and emergency preparedness. PHS also collaborates with a number of partners and community-based organizations on various activities (e.g., Vista Community Clinic). PHS has the ability to collaborate with any of the groups listed above to help implement future mitigation activities.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Department of Environmental Health & Quality (DEHQ) does educational outreach to public schools on environmental education Public Health Services (PHS) works with the following departments or groups on public information/education programs: County OES, CAP (RLA, CinA, Exchange) & Office of Refugee Coordination, PHS, HHSA Regions, DPW (Recycling and stormwater), DEH, AWM as well. Live Well San Diego team/Community Health Workers (CHW), Partner Relay (messages during and in between emergencies plus 3 educational workshops per year on emergency preparedness topics). Resident Leadership Academy (RLA) Network workshops on public health impacts of climate change. El Cajon Collaborative, East County, and all HHSA Regions to receive workshop on public health impacts of climate change (2021). PHS has the ability to collaborate with

		any of the groups listed above to help implement future mitigation activities.
Natural disaster or safety related school programs	Yes	Public Health Services (PHS) works with the following departments or groups on natural disaster programs: County OES, CAP (potentially O'Farrell, RLA, NCRC), PHS, Live Well San Diego team/CHWs. PHS has the ability to collaborate with any of the groups listed above to help implement future mitigation activities for natural disasters.
StormReady certification	Yes	Department of Environmental Health & Quality (DEHQ) does educational outreach to public schools on environmental education
Firewise Communities certification	Yes	The National Weather Service Storm Ready Program was created to help communities develop disaster mitigation plans and prepare for extreme weather events. The National Weather Service has outlined five requirements to receive a storm ready certification (StormReady): Establish a 24-hour warning point and emergency operations center 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. San Diego County Flood Control District's (SDCFCD) applied for a Storm Ready certification in 2018 and received it shortly afterward. SDCFCD's ALERT flood warning system has over 450 sensors continuously monitoring and transmitting hydrologic and weather information to the base station at the Kearny Mesa Weather Center. If any of the parameters exceed predetermined thresholds, alarm notifications are sent to emergency officials and flood control staff. This allows field crews and emergency staff to know where to concentrate storm cleanup or storm mitigation efforts. During precipitation events, Flood Control staff monitor weather conditions and ensure flood warning system integrity 24/7.

		Could the program/organization help implement future mitigation activities? The program's framework ensures communities frequently create or modify disaster mitigation plans to prepare for the increasing vulnerability of natural hazards. Flood Control holds and participates in exercises with partners to improve existing technology, ensure we utilize best communication practices, and make certain mitigation plans are relevant for current and future risks and hazards.
Public-private partnership initiatives addressing disaster-related issues	Yes	Public Health Services (PHS) works with the following departments or groups on public-private partnership initiatives: County OES, HHSA Regions, CAP & Office of Refugee Coordination, Live Well San Diego team/CHWs Disaster Medical Surge Plan, Healthcare Disaster Coalition. PHS has the ability to collaborate with any of the groups listed above to help implement future mitigation activities to address disaster-related issues

4.2. NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

As a participant in the National Flood Insurance Program (NFIP) (discussed previously in Section 1 of this plan), a community develops capabilities for conducting flood mitigation activities. The hazard mitigation plan must describe each jurisdiction's participation in the NFIP.

Participating communities must describe their continued compliance with NFIP requirements. The mitigation plan must do more than state that the community will continue to comply with the NFIP. Each jurisdiction must describe their floodplain management program and address how they will continue to comply with the NFIP requirements. The local floodplain administrator is often the primary source for this information.

Jurisdictions where FEMA has issued a floodplain map but are currently not participating in the NFIP may meet this requirement by describing the reasons why the community does not participate. Plan updates must meet the same requirements and document any change in floodplain management programs.

The information listed below details this community's participation in and continued compliance with the NFIP and identified areas for improvement that could be potential mitigation actions (listed in Section 6 of this plan):

TABLE 7: LOCAL MITIGATION

NFIP Topic	Source of Information
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	FEMA NFIP or Insurance Specialist
How many structures are exposed to flood risk within the community?	Community Floodplain Administrator (FPA)
Describe any areas of flood risk with limited NFIP policy coverage	Community FPA and FEMA Insurance Specialist
Staff Resources	
Is the Community FPA or NFIP Coordinator certified?	Community FPA
Is floodplain management an auxiliary function?	Community FPA
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA
What are the barriers to running an effective NFIP program in the community, if any?	Community FPA
Compliance History	
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records
Regulation	
When did the community enter the NFIP?	Community Status Book http://www.fema.gov/national-flood-insurance- program/national-flood-insurance-program- community-status-book
Are the FIRMs digital or paper?	Community FPA
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA
Provide an explanation of the permitting process.	Community FPA, State, FEMA NFIP
	Flood Insurance Manual http://www.fema.gov/flood-insurance-manual
	Community FPA, FEMA CRS Coordinator, ISO representative
Community Rating System (CRS)	
Does the community participate in CRS?	Community FPA, State, FEMA NFIP
What is the community's CRS Class Ranking?	Flood Insurance Manual http://www.fema.gov/flood-insurance-manual
Does the plan include CRS planning requirements	Community FPA, FEMA CRS Coordinator, ISO representative

SECTION FIVE: Risk Assessment

Decorative Image

Photo by Rob Andolina

San Diego County, California

2023

5. SECTION FIVE: CONDUCT A RISK ASSESSMENT

The Hazard Mitigation Planning Group (HMPG) conducts a risk assessment to determine the potential impacts of hazards to the people, economy, and built and natural environments of the community. The risk assessment provides the foundation for the rest of the mitigation planning process, which is focused on identifying and prioritizing actions to reduce risk to hazards.

In addition to informing the mitigation strategy, the risk assessment also can be used to establish emergency preparedness and response priorities, for land use and comprehensive planning, and for decision making by elected officials, city and county departments, businesses, and organizations in the community.

Risk Assessment requires the collection and analysis of hazard-related data to enable local jurisdictions to identify and prioritize appropriate mitigation actions that will reduce losses from potential hazards.

When the plan revision process began in 2019, a complete review of the hazards identified in the original plan and first update was conducted to determine if they were still valid and should be kept as a target for mitigation measures or removed from the list. The HMPG also reassessed hazards that were not considered for mitigation actions in 2018 to determine if that decision was still applicable or if they should be moved to the active list. Finally, we examined potential or emerging hazards, including climate change, to see if any should be included on the active list.

The data used was the most recent data available from SanGIS and the participating jurisdictions. This data changed the model results; in some cases, raising the risks and reducing it in others. The overall result was a more accurate picture of the risks facing the region.

While many of the mitigation measures listed in the original plan and revision were accomplished, the risk of the hazard did not significantly diminish. This is easily seen in both the wildfire and earthquake hazards. While mitigation measures have been put in place (such as the update of the fire code and vegetation management measures), wildfire remains, and will continue to be, the greatest hazard risk to the San Diego region. The HMPG reviewed all events since 2018 (wildfires, etc.) and all were profiled accurately in the original plan.

The review of other hazards showed the updated data was consistent with previous growth in the region. Any significant changes to the hazard profiles were the result of the incorporation of climate change into this plan.

Risk Assessment is the process of identifying the potential impacts of hazards that threaten an area, including both natural and human-caused events. A natural event causes a hazard when it harms people or property. Such events would include floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. Human-caused hazard events are caused by human activity and include technological hazards and terrorism.

Technological hazards are generally accidental and/or have unintended consequences (for example, an accidental hazardous materials release). Terrorism is defined by the Code of Federal Regulations as “…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.”

Natural hazards that have harmed the County in the past are likely to happen in the future. Consequently, the process of risk assessment includes determining whether the hazard has occurred previously. Approaches to collecting historical hazard data include researching newspapers and other records, conducting a planning document and report literature review in all relevant hazard subject areas, gathering hazard-related GIS data, and engaging in conversation with relevant experts from the community.

In addition, a variety of sources were used to determine the full range of all potential hazards within San Diego County. Even though a particular hazard may not have occurred in recent history in San Diego County, it is important during the hazard identification stage to consider all hazards that may potentially affect the study area.

Hazard profiling entails describing the physical characteristics of hazards such as their magnitude, duration, past occurrences, and probability. This stage of the hazard mitigation planning process involves creating base maps of the study area, then collecting and mapping hazard event profile information obtained from various federal, state, and local government agencies.

Building upon the original hazard profiles, The County Office of Emergency Services (County OES) used the existing hazard data tables (created for the original Hazard Mitigation Plan and revision) and updated them using current data. The revised hazard data was mapped to determine the geographic extent of the hazards in each jurisdiction in the County.

The level of risk associated with each hazard in each jurisdiction was also estimated and assigned a risk level of high, medium, or low depending on several factors unique to that hazard. The hazards assessed were both natural and human-caused.

Probability of future events are described in the plan as:

- Highly Likely – Occurs at intervals of 1 – 10 years
- Likely - Occurs at intervals of 10 - 50 years
- Somewhat Likely - Occurs at intervals greater than every 50 years

Analyzing risk involves evaluating vulnerable assets, describing potential impacts, and estimating losses for each hazard. Vulnerability describes the degree to which an asset is susceptible to damage from a hazard. Vulnerability also depends on an asset’s construction, contents, and the economic value of its functions.

Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. Often, indirect effects can be much more widespread and damaging than direct effects. Risk analysis predicts the extent of injury and damage that may result from a hazard event of a given intensity within an area. It identifies the effects of natural and human-caused hazard events by estimating the relative exposure of existing and future population, land development, and infrastructure to hazardous conditions.

The analysis helps set mitigation priorities by allowing local jurisdictions to focus attention on areas most likely to be damaged or most likely to require early emergency response during a hazard event.

Disaster records were reviewed for repetitive losses. No repetitive losses were found for coastal storms, erosion, tsunamis, dam failures, earthquakes, landslides, wildfire, or liquefaction. Repetitive loss due to flooding is covered in the respective hazard profile of this plan.

Exposure analysis identifies the existing and future assets located in an identified hazard area. It can quantify the number, type and value of structures, critical facilities, and infrastructure located in those areas, as well as assets exposed to multiple hazards. It can also be used to quantify the number of future structures and infrastructure possible in hazard prone areas based on zoning and building codes.

5.1. HAZARD ASSESSMENT SUMMARY

The Hazard Mitigation Planning Group (HMPG) reviewed the hazards identified in the original Hazard Mitigation Plan and evaluated each to see if they still posed a risk to the region. In addition, the hazards listed in the FEMA Local Mitigation Planning Handbook were also reviewed to determine if they should be added to the list of hazards to include in the plan revision.[82]

All hazards identified by FEMA included: avalanche, coastal storm, coastal erosion, dam failure, drought/water supply, earthquake, expansive soils, extreme heat, flooding, hailstorm, house/building fire, land subsidence, landslide, liquefaction, severe winter storm, tornado, tsunami, wildfire, windstorm, and volcano.

Although not required by the FEMA Disaster Mitigation Act of 2000, human-caused hazards, such as hazardous materials release, nuclear materials release, and terrorism, were also reviewed by the HMPG. Climate change was reviewed and discussed as an individual hazard. However, the HMPG determined the impact of climate change on the identified hazards should instead be included in hazard evaluations and their impacts.

Hazard identification is the process of identifying all hazards that threaten an area, including both natural and human-caused events. In the hazard identification stage, The HMPG determined hazards that potentially threaten San Diego County.

The hazard screening process involved narrowing the all-inclusive list of hazards to those most threatening to the San Diego region. The screening effort required extensive input from a variety of HMPG members, including representatives from City governments, County agencies, special districts, fire agencies and law enforcement agencies, the California Office of Emergency Services, local businesses, community groups, the 2020 Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, and the public.

The County Office of Emergency Services (County OES), with assistance of Geographic Information Systems (GIS) experts from the County of San Diego's Planning and Development Services, used information from FEMA and other nationally and locally available databases to map the County's hazards, infrastructure, critical facilities, and land uses. This mapping effort was utilized in the hazard screening process to determine which hazards would present the greatest risk to the County of San Diego and to each jurisdiction within the County.

It was also determined that the coastal storm, erosion, and tsunami hazards should be profiled together because the same communities in the County have the potential to be affected by all three hazards. In the development of the initial plan, the HMPG indicated that, because the majority of the development in San Diego is relatively recent (within the last 60 years), an urban-type fire that destroys multiple city blocks is not likely to occur alone, without a wildfire in the urban/wild-land interface occurring first.

[82] Local Mitigation Planning Handbook (fema.gov).

Therefore, it was determined that structure fire and wildfire should be addressed as one hazard category in the plan. This current revised plan continues to discuss structure fire and wildfire together.

Similarly, the original plan and first revision addressed earthquake and liquefaction as one category because liquefaction does not occur unless an adequate level of ground shaking from an earthquake occurs first. With the decommissioning of the San Onofre Nuclear Generating Station, it was also decided to incorporate nuclear materials release (resulting from an accident) under hazardous materials release.

The table below is the HMPG's summary of hazard description information and identification of hazards are most significant to the planning area:

TABLE 8: HAZARD IDENTIFICATION

Hazard	Location (Geographic Area Affected)	Maximum Probable Extent (Magnitude/Strength)	Probability of Future Events	Overall Significance Ranking
Avalanche	Negligible	Weak	Unlikely	Low
Dam Failure	Significant	Severe	Unlikely	Medium
Drought	Significant	Severe	Likely	High
Earthquake	Significant	Extreme	Occasional	High
Erosion	Limited	Moderate	Likely	Medium
Expansive Soils	Limited	Weak	Likely	Medium
Extreme Cold	Limited	Weak	Unlikely	Low
Extreme Heat	Extensive	Severe	Likely	High
Flood	Significant	Severe	Likely	High
Hail	Limited	Weak	Unlikely	Low
Hurricane	Limited	Weak	Unlikely	Low
Landslide	Extensive	Severe	Unlikely	Medium
Lightning	Significant	Weak	Likely	Medium
Sea Level Rise	Negligible	Weak	Unlikely	Low
Severe Wind	Extensive	Weak	Highly Likely	Medium
Severe Winter Weather	Significant	Moderate	Likely	Medium
Storm Surge	Negligible	Weak	Unlikely	Low
Subsidence	Negligible	Weak	Unlikely	Low
Tornado	Negligible	Weak	Unlikely	Low
Tsunami	Negligible	Weak	Unlikely	Low
Wildfire	Extensive	Extreme	Highly Likely	High
Climate Change	Extensive	Extreme	Highly Likely	High
Terrorism / Cyber Terrorism	Extensive	Extreme	Likely	High
CBRNE Threats	Limited	Moderate	Occasional	Low
Pandemic Disease	Extensive	Extreme	Likely	High

Definitions for Classifications Location (Geographic Area Affected)

- **Negligible:** Less than 10 percent of planning area or isolated single-point occurrences
- **Limited:** 10 to 25 percent of the planning area or limited single-point occurrences
- **Significant:** 25 to 75 percent of planning area or frequent single-point occurrences
- **Extensive:** 75 to 100 percent of planning area or consistent single-point occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)

- **Weak:** Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
- **Moderate:** Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days
- **Severe:** Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months
- **Extreme:** Extreme classification on scientific scale, immediate onset, or extended duration of event, resulting in catastrophic damage and uninhabitable conditions

TABLE 9: HAZARD SEVERITY

Hazard	Scale / Index	Weak	Moderate	Severe	Extreme
Drought[83]	Palmer Drought Severity Index3	-1.99 to +1.99	-2.00 to -2.99	-3.00 to -3.99	-4.00 and below
Earthquake[84] [85]	Modified Mercalli Scale4	I to IV	V to VII	VII	IX to XII
	Richter Magnitude5	2, 3	4, 5	6	7, 8
Hurricane Wind[86]	Saffir-Simpson Hurricane Wind Scale6	1	2	3	4, 5
Tornado [87]	Fujita Tornado Damage Scale7	F0	F1, F2	F3	F4, F5

Probability of Future Events

- **Unlikely:** Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.
- **Occasional:** 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
- **Likely:** 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years
- **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.

[83] Cumulative meteorological drought and wet conditions: http://ncdc.noaa.gov/

[84] Earthquake intensity and effect on population and structures: http://earthquake.usgs.gov

[85] Earthquake magnitude as a logarithmic scale, measured by a seismograph: http://earthquake.usgs.gov

[86] Hurricane rating based on sustained wind speed: http://nhc.noaa.gov

[87] Tornado rating based on wind speed and associated damage: http://spc.noaa.gov

Overall Significance

- **Low:** Two or more criteria fall in lower classifications, or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.
- **Medium:** The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
- **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

Based on this FEMA Standardized evaluation, in accordance with information covered within the HAZUS Data Evaluations, Hazard Seminar Series, and input from Subject Matter Experts and the public, the County of San Diego has prioritized the following hazards into High, Medium, and Low rankings (in no order of prioritization within individual categories):

High	Medium	Low
• Drought	• Dam Failure	• Avalanche
• Extreme Heat	• Erosion	• Extreme Cold
• Flood	• Expansive Soils	• Hail
• Sea Level Rise	• Landslide	• Hurricane
• Wildfire	• Lightning	• Subsidence
• Climate Change	• Severe Weather	• Tornado
• Terrorism / Cyber-Terrorism	• Severe Winter Weather	• CBRNE Threats
• Pandemic Disease	• Storm Surge	
• Earthquake		
• Tsunami		

A High ranking indicates the hazard has a "Highly Likely" probability of occurrence and/or a severe impact on the community. The Medium ranking indicated a "Likely" or "Occasional" potential for occurrence or impact. Hazards with a low probability of occurrence but with a potentially high impact were also ranked as Medium. The Low ranking indicates that the potential for the event to occur is "Unlikely" (remote and/or the impact of the event is minimal to the community).

Many of these hazards were ranked differently by individual jurisdictions. For example, tsunamis received a relatively High ranking among coastal jurisdictions, while inland jurisdictions did not consider them for mitigation action. Additionally, all jurisdictions rated wildfire High. The hazards selected by each jurisdiction and related mitigation goals and actions are included in Section 5 and 6 of their annexes.

The final list of hazards to be profiled for San Diego County was determined by the HMPG, using assessment data and public survey input, as:

- Climate Change
- Dam Failure
- Drought
- Earthquake
- Extreme Heat

- Flood
- Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats))
- Liquefaction
- Rain-Induced Landslide
- Tsunami/Coastal Storms/Sea Level Rise/Erosion
- Wildfire/Structure Fire

Climate Change will be addressed as both a hazard and a factor that could affect the location, extent, probability of occurrence, and magnitude of climate-related hazards listed above.

5.1.1. HAZARD OMISSION RATIONALE

During the initial evaluation, the Hazard Mitigation Planning Group (HMPG) determined certain hazards were not included in the original plan's profiling step because they were not prevalent hazards within San Diego County, were found to pose only minor or very minor threats to San Diego County compared to the other hazards (status had not changed), and would, therefore, not be included in this revision.

Only hazards that received a High or Medium ranking in Section 5.1 (other than CBRNE threats due to their potentially serious impacts) were considered in this mitigation planning process.

The table below gives a brief description of omitted hazards and the reason for their exclusion:

TABLE 10: HAZARD OMISSION

Hazard	Description	Reason for Exclusion
Avalanche	A mass of snow moving down a slope. There are two basic elements to a slide; a steep, snow-covered slope and a trigger	Snowfall in County mountains not significant; poses very minor threat compared to other hazards
Expansive soils	Expansive soils shrink when dry and swell when wet. This movement can exert enough pressure to crack sidewalks, driveways, basement floors, pipelines and even foundations	Presents a minor threat to limited portions of the County
Hailstorm	Can occur during thunderstorms that bring heavy rains, strong winds, hail, lightning, and tornadoes	Occurs during severe thunderstorms; most likely to occur in the central and southern states; no historical record of this hazard in the region.
Land subsidence	Occurs when large amounts of ground water have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rocks fall in on themselves.	Soils in the County are mostly granitic. Presents a minor threat to limited parts of the county. No historical record of this hazard in the region.
Tornado	A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm (or sometimes because of a hurricane) and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado is a result of the high wind velocity and wind-blown debris.	Less than one tornado event occurs in the entire State of California in any given year; poses very minor threat compared to other hazards. No historical record of this hazard in the region.
Volcano	A volcano is a mountain that is built up by an accumulation of lava, ash flows, and airborne ash and dust. When pressure from gases and the molten rock within the volcano becomes strong enough to cause an explosion, eruptions occur	No active volcanoes in San Diego County. No historical record of this hazard in the region.
Windstorm	A storm with winds that have reached a constant speed of 74 miles per hour or more	Maximum sustained wind speed recorded in the region is less than 60 miles per hour and would not be expected to cause major damage or injury.

5.1.2. HAZARD IDENTIFICATION SOURCES

Once the hazards of concern for San Diego County were determined, the available data was collected, using sources including the internet, direct communication with various agencies, discussions with in-house experts, and historical records. Specific sources included the United States Geological Survey (USGS), California Geological Survey (CGS), Federal Emergency Management Agency (FEMA) HAZUS, FEMA Flood Insurance Rate Maps (FIRM), United States Forest Service (USFS), California Department of Forestry – Fire and Resource Assessment Program (CDF-FRAP), National Oceanographic and Atmospheric

Administration (NOAA), San Diego Geographic Information Source (SanGIS), San Diego Association of Governments (SANDAG), San Diego County Flood Control District, Southern California Earthquake Data Center (SCEDC), California Seismic Safety Commission (CSSC), California Integrated Seismic Network (CISN), California Department of Fish and Game (CDFG), Drought Outlook websites, and input gathered from local jurisdictions districts and agencies.

When necessary, agencies were contacted to ensure the most updated data was obtained and used. Historical landmark locations throughout the County were obtained from the National Register and from the San Diego Historical Resources Board.

5.2. HAZARD PROFILES

A hazard profile is a description of the physical characteristics of a hazard and a determination of various hazard descriptors, including magnitude, duration, frequency, probability, and extent. The hazard data that was collected in the hazard identification process were mapped to determine the geographic extent of the hazards in each jurisdiction in the County and the level of risk associated with each hazard.

Because Nuclear Materials Release, Hazardous Materials Release, and Terrorism hazards are sensitive issues and release of information could pose further unnecessary threat, the HMPG decided that each of these hazards would be further profiled and assessed in a separate, “For Official Use Only” Appendix and would be exempt from public distribution and disclosure by Section 6254 (99) of the California Government Code *(Planning Partners, see separate FOUO Attachment A)*.

Most hazards were given a risk level of high, medium, or low depending on several factors unique to the hazard. The hazards identified and profiled for San Diego County, as well as the data used to profile each hazard are presented in this section. The hazards are presented in alphabetical order; and this does not signify level of importance to the HMPG.

The final list of high-ranking hazards to be profiled for San Diego County was determined as Climate Change, Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Human Caused Hazards (Terrorism & Hazardous Material Incidents (CBRNE Threats)), Liquefaction, Rain-Induced Landslide, Tsunami/Coastal Storms/Sea Level Rise/Erosion, and Wildfire. A comprehensive list of hazards that are possible in San Diego County is detailed in the next subsection (in alphabetical order). Planning Partners should refer to the existing, For Official Use Only (FOUO) Threat and Hazard Identification Risk Assessment (THIRA) for hazard ranking information.

TABLE 11: HAZARD PROFILES

Hazard	Data Collected for Hazard Identification	Justification for Inclusion
Climate Change	• National Climate Assessment • Scripps Institution of Oceanography • California Environmental Protection Agency and Office of Environmental Health Hazard Assessment	• Sea levels measured at a station in La Jolla have risen at a rate of 6 inches over the last century • In north San Diego County, there have been a number of significant cliff failures in recent years
Dam Failure	• FEMA-HAZUS • Dam Inundation Data (SanGIS) • San Diego County Water Authority (SDCWA) (Olivenhain Dam) • FEMA FIRM maps • Topography (SANDAG) • FEMA Hazards website	• Dam failure • 58 dams exist throughout San Diego County • Many dams over 30 years old • Increased downstream development
Drought	• California Department of Water Resources • San Diego County Water Authority	• Statewide multiple year droughts have occurred numerous times since 1976
Earthquake	• USGS • CGS • URS • CISN • SanGIS • SANDAG • FEMA-HAZUS 99 • FEMA Hazards website	• Several active fault zones pass through San Diego County
Extreme Heat	• Spatial Hazard Events and Losses Database for the United States	• There have been 52 heat events in San Diego County since 2013
Flood	• FEMA FIRM Maps • Topography • Base flood elevations (FEMA) • Historical flood records • San Diego County Water Authority • San Diego County Dept. of Sanitation and Flood Control • FEMA Hazards website	• Much of San Diego County is located within the 100-year floodplain • Flash floods and other flood events occur regularly during rainstorms due to terrain and hydrology of San Diego County • There have been multiple Proclaimed States of Emergency between 1950-2019 for floods in San Diego County
Human-Caused Hazards: (Hazardous Materials Release)	• County of San Diego Dept. of Environmental Health, Hazardous Materials Division	• San Diego County has several facilities that handle or process hazardous materials • Heightened security concerns since September 2001
Human-Caused Hazards: (Nuclear Materials Release/CBRNE Threats)	• San Onofre Nuclear Generating Station (SONGS) and Department of Defense	• The potential exists for an accidental release of radioactive material stored at San Onofre or from nuclear ships in San Diego Bay • Heightened security concerns since September 2001

Hazard	Data Collected for Hazard Identification	Justification for Inclusion
Human-Caused Hazards: (Terrorism/Cyber-Terrorism)	• County of San Diego Environmental Health Department Hazardous Materials Division	• The federal and state governments have advised every jurisdiction to consider the terrorism hazard • Heightened security concerns since September 2001
Liquefaction	• Soil-Slip Susceptibility (USGS) • FEMA-HAZUS MH • FEMA Hazards website	• Steep slopes or alluvial deposit soils in low-lying areas are susceptible to liquefaction during earthquakes or heavy rains. San Diego County terrain has both of these characteristics and lies within several active earthquake zones
Rain-Induced Landslide	• USGS • CGS • Tan Map Series • Steep slope data (SANDAG) • Soil Series Data (SANDAG) • FEMA-HAZUS • FEMA Hazards website • NEH	• Steep slopes within earthquake zones characterize San Diego County, which creates landslide risk. • There have been two Proclaimed States of Emergency for landslides in San Diego County
Tsunami/Coastal Storms/Sea Level Rise/Erosion	• Historical Coastlines (NOAA) • Shoreline Erosion Assessment (SANDAG) • Maximum Tsunami Run up Projections (USCA OES) • FEMA FIRM Maps • FEMA Hazards website • Coastal Zone Boundary (CALTRANS) • Tsunamis and their Occurrence along the San Diego County Coast (report, Westinghouse Ocean Research Laboratory) • Tsunami (article, Scientific American) • National Research Council's Report on Sea Level Rise in California, Oregon and Washington: Past, Present and Future • Sea Level Rise Adaptation Strategy for the San Diego Bay	• Sea levels measured at a station in La Jolla have risen at a rate of 6 inches over the last century • Coastline stabilization measures have been implemented at various times in the past (erosion) • Extensive development along the coast
Wildfire	• CDF-FRAP • USFS • CDFG • Topography • Local Fire Agencies • Historical fire records • FEMA Hazards website	• San Diego County experiences wildfires on a regular basis • Twelve States of Emergency were declared for wildfires between 1950-2020 • Terrain and climate of San Diego • Santa Ana Winds

5.2.1. CLIMATE CHANGE

Nature of Hazard

Climate change is not a hazard in and of itself, but rather is a factor that could affect the location, extent, probability of occurrence, and magnitude of climate-related hazards.

According to the Intergovernmental Panel on Climate Change (IPCC), warming of the climate system is unequivocal, as is now evident from observations of increased global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.[88] The overwhelming majority of climate scientists agree that human activities, especially burning of fossil fuels, are responsible for most of the global warming observed.[89]

The Scripps Institution of Oceanography planning partners define Climate Change as any systematic change in the long-term statistics of climate elements and weather events (such as temperature, pressure, or winds) sustained over several decades or longer. [90] Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.

Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.[91]

Disaster History

Climate change is already affecting California and the San Diego region. More historical information, provided by Scripps Institution of Oceanography (University of California, San Diego), is detailed in the respective Vulnerability Assessment section of this plan.

Location & Extent/Probability of Occurrence & Magnitude

According to the Scripps Institution of Oceanography planning partners, Climate Change effects such as heat waves, wildfire, and floods will occur unevenly across San Diego County. The most vulnerable populations to impacts from extreme events are those who inhabit locations with greatest or most unusual physical effects, those who lack resources, who are uninsured, who are socially isolated, or have already compromised health.

Climate change will occur throughout San Diego County, but the expression of climate change will differ across the complex landscape of the region depending on the type of event, e.g., heat, flooding, drought, or wildfire. Heat waves and wildfire will likely have greatest magnitude over inland regions, and runoff from heavy rainfall will be concentrated in stream channels.

[88] IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[89] Ibid

[90] https://glossary.ametsoc.org/wiki/Climate_change

[91] https://www.ipcc.ch/sr15/chapter/glossary/

Coastal regions are vulnerable to oceanic flooding and the increasing occurrence of heat waves, whose temperatures are likely lower than in inland regions but rarely occurred historically. However, the health impacts of less intense heat waves on those living in the coastal zone may be more severe than elsewhere in the county because the population is less acclimated to the heat. Neighborhoods with less access to air conditioning and natural shading from vegetation are more susceptible to extreme heat.

Greenhouse gas mitigation remains important as observations, modeling, and physical principles show conclusively that the accumulation of anthropogenic greenhouse gasses in the atmosphere has driven the rapid warming observed globally over several decades (the last two decades in particular). Because:

1. greenhouse gasses such as CO2 have long, several decade lifetimes
2. the earth system is still not equilibrated (still warming) to the increased greenhouse gasses already resident in the atmosphere
3. global society's fossil fuel (burns carbon, releases CO2) economy is difficult to replace so further accumulation of greenhouse gasses in the atmosphere is inevitable, the Earth's atmosphere, ocean, land, and ice will warm further.

Reducing greenhouse gas emissions is thus a critical immediate and long-range mitigation action (e.g., Franco et al., 2018).

Climate change impacts are already impacting the region especially as it relates to temperature and extreme heat. Recent weather and climate impacts provide a fingerprint of climate change impacts in San Diego County. These include terrestrial floods, coast sea level extremes, erosion and wave damage, heat waves, and wildfires, such as the 2003 and 2007 conflagrations. Compound extremes should be considered, such as the wildfire-followed-by flood and debris flow event that occurred in Montecito/Santa Barbara County in 2017.

Implementing appropriate warnings and communication or extremes such as heatwaves and/or smoke from wildfires, and developing responses to prepare for these extremes is critically important, especially in the most vulnerable communities. To move forward, the region can assess current measures, such as cooling centers to take refuge from extreme heat, urban greening, residential and commercial structure fire resistance and community fire mitigation and escape routes.

Other ways to prevent mitigate further impacts include:

- Testing and monitoring adaptation strategies to mitigate the impacts of climate change is important. Such efforts include the Cardiff Dunes to mitigate coastal flooding.
- Identifying thresholds to determine when it may be necessary to relocate or redesign infrastructure.
- Continual improvement of extreme forecasts to allow longer lead times to prepare for the extremes.

The climate is projected to continue to change over this century and beyond.[92] The climate change factor is increasing risk for some natural hazards, and this assessment includes information about how risk will change into the future.

[92] Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Ch. 2: Our Changing Climate. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67. doi:10.7930/J0KW5CXT.

By assessing ongoing changes in risk—in addition to the traditional practice of risk assessment based on observed hazard events—this plan's hazard mitigation strategies can better reduce risk from hazards expected going forward. In general, to prepare and mitigate impacts of climate change, develop integrated multi-agency, multi-jurisdiction approach that uses best information, best practices, and considers needs of under-resourced, disadvantaged communities and individuals.

The probability of Climate Change occurrence is "Highly Likely".

5.2.2. DAM FAILURE

Nature of Hazard

Dam failures can result in severe flood events. When a dam fails, a large quantity of water is suddenly released with a great potential to cause human casualties, economic loss, lifeline disruption, and environmental damage. A dam failure is usually the result of age, poor design, or structural damage caused by a major event such as an earthquake or flood.

Disaster History

Two major dam failures have been recorded in San Diego County. The Hatfield Flood of 1916 caused the failure of the Sweetwater and Lower Otay Dams, resulting in 22 deaths. Most of those deaths were attributed to the failure of Lower Otay Dam (County of San Diego Sanitation and Flood Control, 2002).

Location & Extent/Probability of Occurrence & Magnitude

The figure below displays the locations and extent of dam failure hazard areas for the County of San Diego. Dam failures are rated as one of the major “low-probability, high-loss” events:

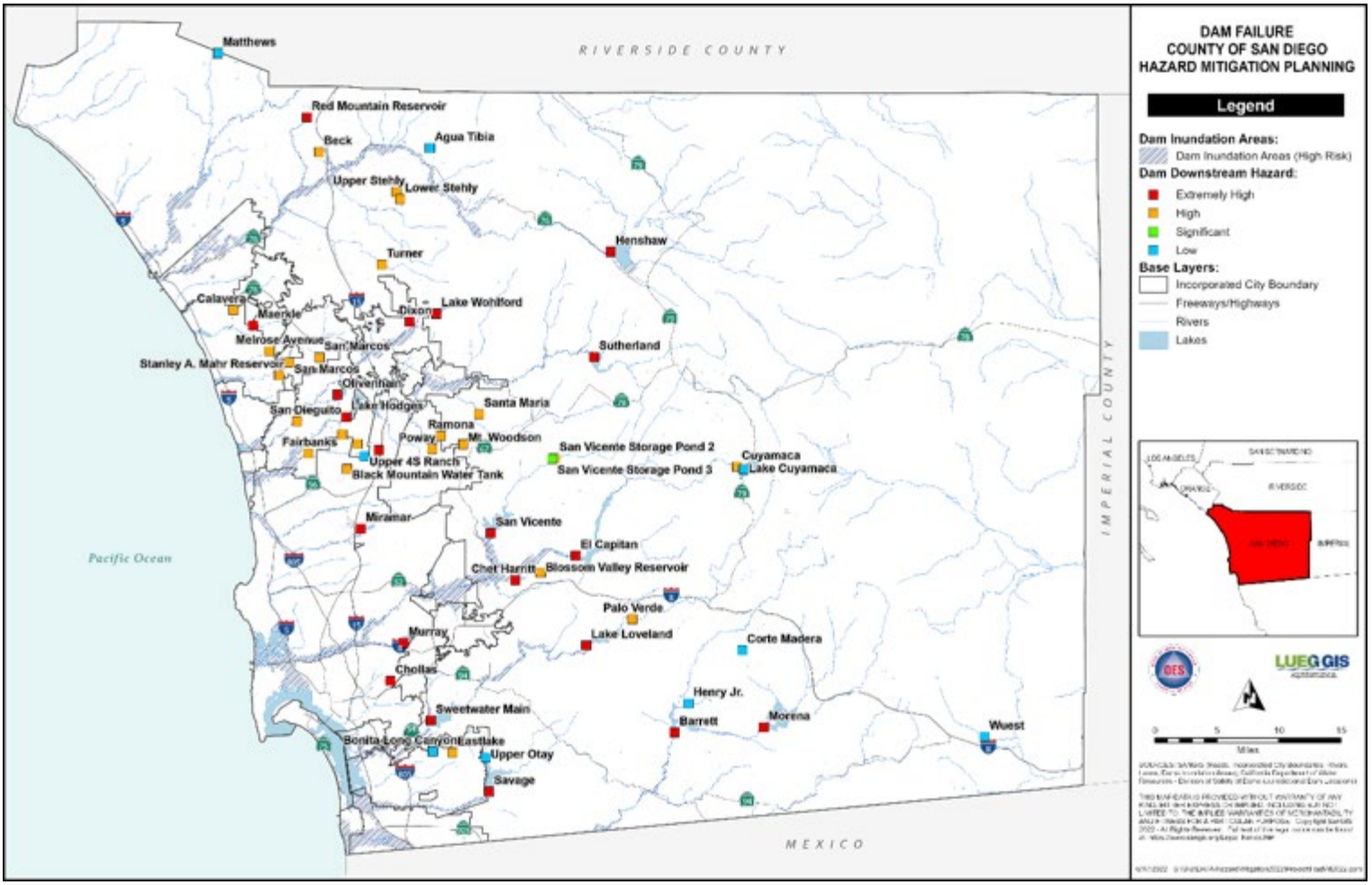

Figure 1: Map of San Diego County Dam Inundation Areas

Dam inundation map data was used to profile dam failure risk levels. These maps were created by agencies that own and operate dams. The County Office of Emergency Services (County OES) obtained this data from SanGIS, a local GIS data repository. The dam inundation map layers show areas that would be flooded in the event of a dam failure. If an area lies within a dam inundation zone, it was considered at high risk. A dam is characterized as high hazard if it stores more than 1,000 acre-feet of water, is higher than 150 feet tall, has potential for downstream property damage, and potential for downstream evacuation. Ratings are set by FEMA and confirmed with site visits by engineers. A simple way to define high risk of dam failure is if failure of the dam is likely to result in loss of human life. Most dams in the County are greater than 50 years old and are characterized by increased hazard potential due to downstream development and increased risk due to structural deterioration in inadequate spillway capacity (Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, 2014). The potential for dam failure is somewhat "Likely".

Climate Change Considerations

The most extreme events are going to become more extreme regarding climate change effects. These events are primarily atmospheric rivers and will become more so in the future based on global climate models (Gershunov et al., 2019). The increase in extreme precipitation will increase the risk of dam failure.

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include conducting dam safety and emergency spill operations.

5.2.3. DROUGHT

Nature of the Hazard

Warming temperatures statewide could result in reduced water supply for the San Diego region. The State Water Project and Colorado River provide 75% to 95% of the water supply for the San Diego region, depending on the year.[93] Both of these water supplies originate in mountain snowpack. Over the past 50 years across most of the Southwest, there has been less late-winter precipitation falling as snow, earlier snowmelt, and earlier arrival of most of the year's streamflow.[94] Projections of further warming will result in reduced snowpack, which could translate into reduced water supply for the San Diego region's cities, agriculture, and ecosystems.[95] In fact, studies indicate that San Diego's sources of water could shrink by 20 percent or more by 2050.[96] An additional threat to water supply is the vulnerability of the levees protecting the California Delta, which feeds the State Water Project.[97] According to the California Adaptation Planning Guide, jurisdictions in the San Diego region must carefully consider the vulnerability of their water supply.[98]

Local water managers also report that higher temperatures could lead to increased demand for water for irrigation. Water shortages could become more frequent and more severe in the future, straining the local economy. The potential for drought in San Diego is highly likely.

[93] Ibid.

[94] Garfin, G., G. Franco, H. Blanco, A. Comrie, P. Gonzalez, T. Piechota, R. Smyth, and R. Waskom, 2014: Ch. 20: Southwest. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 462-486. doi:10.7930/J08G8HMN.

[95] California Adaptation Planning Guide, Understanding Regional Characteristics (2012)

[96] San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation.

[97] California Adaptation Planning Guide, Understanding Regional Characteristics (2012)

[98] Ibid.

The desalinization plant in Carlsbad slightly off-sets that potential. The plant, designed to produce 50 million gallons per day, was estimated to provide 8% of the regions water resources by 2020.

A U.S. Drought Monitor, using the Palmer Drought Severity Index, can be found at http://droughtmonitor.unl.edu/.

Disaster History

The depression era drought of 1929-1934 was the worst drought in California's history. Its impact was felt statewide. At that time, San Diego was self-sufficient, relying on local water supplies. The region would not begin to import water until 1947.

The drought of 1987-1992 was extremely severe and resulted in the Metropolitan Water District ordered a 50% reduction in water use. The San Diego County Water Authority considered banning outdoor water use. The rains of "Miracle March" in 1991 replenished rivers, reservoirs, and the Sierra snowpack.

A drought occurred in 2007 and lasted until 2011. Then, another drought began in 2012 just ended in 2017, following a series of winter storms that brought heavy rainfall to the state. The proclamation was extended again on July 8, 2021, amid deepening drought and record-breaking temperatures. The Governor requested Californians to voluntarily reduce water use by 15% to protect water reserves if drought conditions continue.

On April 21, 2021, California Governor Newsom, proclaimed a drought emergency, which enables state response to water supply shortfalls where conditions are extremely dry. This drought emergency proclamation was expanded to include new counties on May 10, 2021. By October 19, 2021, the Governor expanded the drought emergency proclamation to include San Diego County and seven other counties, which were the last of the 58 California counties to be included in the drought emergency proclamation.

On March 28, 2022, the Governor prompted local water suppliers, at the local level, to move to Level 2 of their Water Shortage Contingency Plans, which "requires locally appropriate actions that will conserve water across all sectors, and he directed the State Water Resources Control Board to consider a ban decorative watering at businesses and institutions.[99] Although key improvements have been made since 2016, California is still experiencing drought conditions.

Location & Extent/Probability of Occurrence & Magnitude

Since California is still experiencing drought conditions as of 2022, the probability of occurrence is "Highly Likely".

Climate Change Considerations

Although there is a lot of variability, projections indicate that there will be longer and more frequent drought that will be punctuated by extreme precipitation. The evaporative demand (atmospheric thirst) is an important component in driving the extent of future droughts (McEvoy et al, 2020).

Drought can increase wildfire risk and lead to fine fuel regrowth after a fire. This type of vegetation is more susceptible to fires, creating a feedback.

[99] https://drought.ca.gov/state-drought-response/

Extreme drought has the potential to intensify and change community composition and structure of ecosystems. Drought has severe consequences because it operates at spatial scales larger than other disturbances such as fire (Jennings et al., 2018).

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include water supply reliability that originates from a diversity of water supplies and conservation planning that addresses the impacts of drought on ecosystems.

5.2.4. EARTHQUAKE

Nature of the Hazard

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake.

When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can further amplify ground motions. The severity of these effects is dependent on the amount of energy released from the fault or epicenter. One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. The acceleration due to gravity is often called "g". A 100% g earthquake is very severe.

More damage tends to occur from earthquakes when ground acceleration is rapid. Peak ground acceleration (PGA) is a measure of the strength of ground movement. PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (980 cm/sec/sec). PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (10%, 5%, or 2%) of being exceeded in 50 years. These ground motion values are used for reference in construction design for earthquake resistance. The ground motion values can also be used to assess relative hazard between sites, when making economic and safety decisions.

Another tool used to describe earthquake intensity is the Richter scale. The Richter scale was devised as a means of rating earthquake strength and is an indirect measure of seismic energy released. The scale is logarithmic with each one-point increase corresponding to a 10-fold increase in the amplitude of the seismic shock waves generated by the earthquake. In terms of actual energy released, however, each one-point increase on the Richter scale corresponds to about a 32-fold increase in energy released. Therefore, a magnitude (M) 7 earthquake is 100 times (10 X 10) more powerful than a M5 earthquake and releases 1,024 times (32 X 32) the energy. An earthquake generates different types of seismic shock waves that travel outward from the focus or point of rupture on a fault. Seismic waves that travel through the earth's crust are called body waves and are divided into primary (P) and secondary (S) waves. Because P waves move faster (1.7 times) than S waves they arrive at the seismograph first. By measuring the time delay between arrival of the P and S waves and knowing the distance to the epicenter, seismologists can compute the Richter scale magnitude for the earthquake.

The Modified Mercalli Scale (MMI) is another means for rating earthquakes, but one that attempts to quantify intensity of ground shaking. Intensity under this scale is a function of

distance from the epicenter (the closer to the epicenter the greater the intensity), ground acceleration, duration of ground shaking, and degree of structural damage. This rates the level of severity of an earthquake by the amount of damage and perceived shaking, as displayed in the table below:

TABLE 12: MODIFIED MERCALLI SCALE

MMI Value	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	Full Description
I.			Not felt
II.			Felt by persons at rest, on upper floors, or favorably placed.
III.			Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV.			Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motorcars rock. Windows, dishes, doors rattle. In the upper range of IV, wooden walls and frame creak.
V.	Light	Pictures Move	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clock stop, start, change rate.
VI.	Moderate	Objects Fall	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked.
VII.	Strong	Nonstructural Damage	Difficult to stand. Noticed by drivers of motorcars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roofline. Fall of plaster, loose bricks, stones, tiles, cornices. Some cracks in masonry C. Small slides and caving in along sand or gravel banks. Concrete irrigation ditches damaged.
VIII.	Very Strong	Moderate Damage	Steering of motorcars affected. Damage to masonry C, partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, and elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Cracks in wet ground and on steep slopes.
IX.	Very Violent	Extreme Damage	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land.
X.			Rails bent greatly. Underground pipelines completely out of services.
XI.			Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.

Several major active faults exist in San Diego County, including the Rose Canyon, La Nacion, Elsinore, San Jacinto, Coronado Bank and San Clemente Fault Zones. The Rose Canyon Fault Zone is part of the Newport-Inglewood fault zone, which originates to the north in Los Angeles, and the Vallecitos and San Miguel Fault Systems to the south in Baja California.

The Rose Canyon Fault extends inland from La Jolla Cove, south through Rose Canyon, along the east side of Mission Bay, and out into San Diego Bay. The Rose Canyon Fault is considered the greatest potential threat to San Diego as a region, due to its proximity to areas of high population. The La Nacion Fault Zone is located near National City and Chula Vista. The Elsinore Fault Zone is a branch of the San Andreas Fault System. It originates near downtown Los Angeles and enters San Diego County through the communities of Rainbow and Pala; it then travels in a southeasterly direction through Lake Henshaw, Santa Ysabel, Julian; then down into Anza-Borrego Desert State Park at Agua Caliente Springs, ending at Ocotillo, approximately 40 miles east of downtown.

The San Jacinto Fault is also a branch of the San Andreas Fault System. This fault branches off from the major fault as it passes through the San Bernardino Mountains. Traveling southeasterly, the fault passes through Clark Valley, Borrego Springs, Ocotillo Wells, and then east toward El Centro in Imperial County. This fault is the most active large fault within County of San Diego. The Coronado Bank fault is located about 10 miles offshore. The San Clemente Fault lies about 40 miles off La Jolla and is the largest offshore fault at 110 miles or more in length (Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, 2014).

Disaster History

Historic documents record a very strong earthquake struck San Diego on May 27, 1862; damaging buildings in Old Town and opening cracks in the earth near the San Diego River mouth. This destructive earthquake was centered on either the Rose Canyon or Coronado Bank faults and descriptions of damage suggest that it had a magnitude of about 6.0 (M6).

The strongest recently recorded earthquake in San Diego County was a M5.3 earthquake that occurred on July 13,1986 on the Coronado Bank Fault, 25 miles west of Solana Beach. In recent years there have been several moderate earthquakes recorded within the Rose Canyon Fault Zone as it passes beneath the City of San Diego. Three temblors shook the city on 17 June 1985 (M3.9, 4.0, 3.9) and a stronger quake occurred on 28 October 1986 (M4.7) (Demere, SDNHM website 2003). The most recent significant earthquake activity occurred on June 15, 2004 with a M5.3 on the San Diego Trough Fault Zone approximately 50 miles SW of San Diego. It was reported as an IV on the MMI (Southern California Seismic Network).

Location & Extent/Probability of Occurrence & Magnitude

The figures below display the location and extent of the profiled earthquake hazard areas for San Diego County:

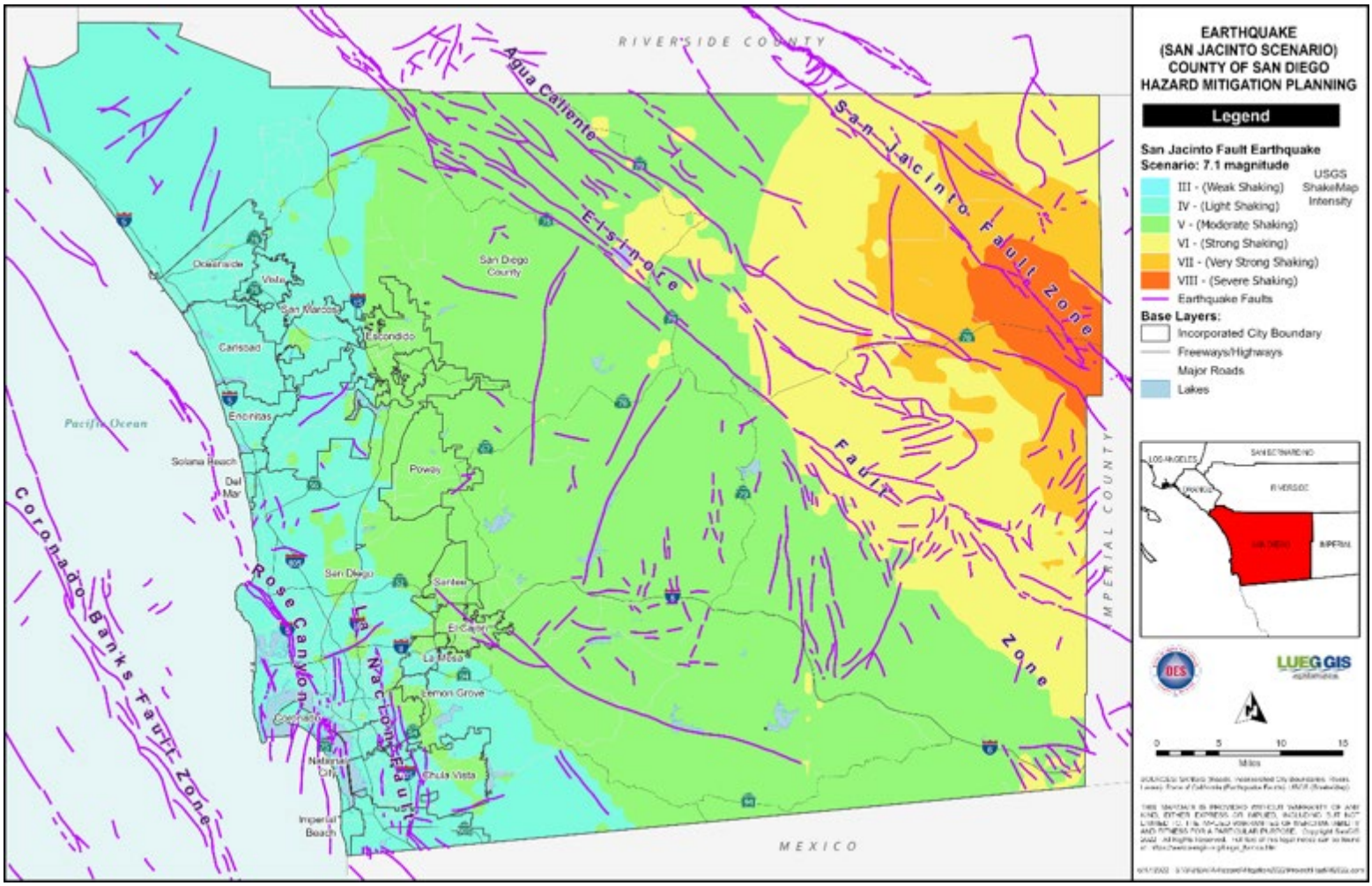

Figure 2: Map of San Diego County San Jacinto Fault Earthquake Scenario

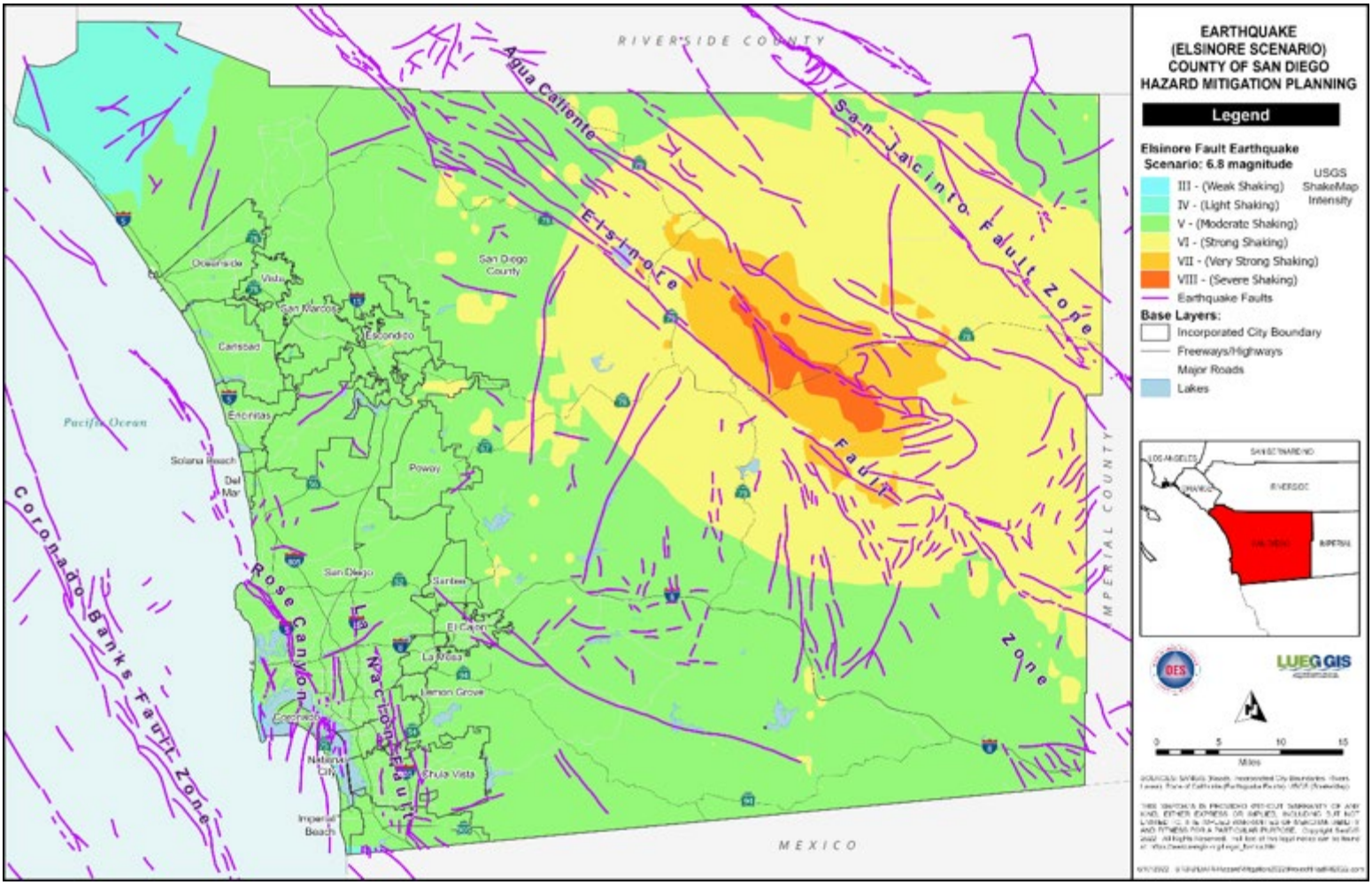

Figure 3: Map of San Diego County Elsinore FAULT EARTHQUAKE SCENARIO

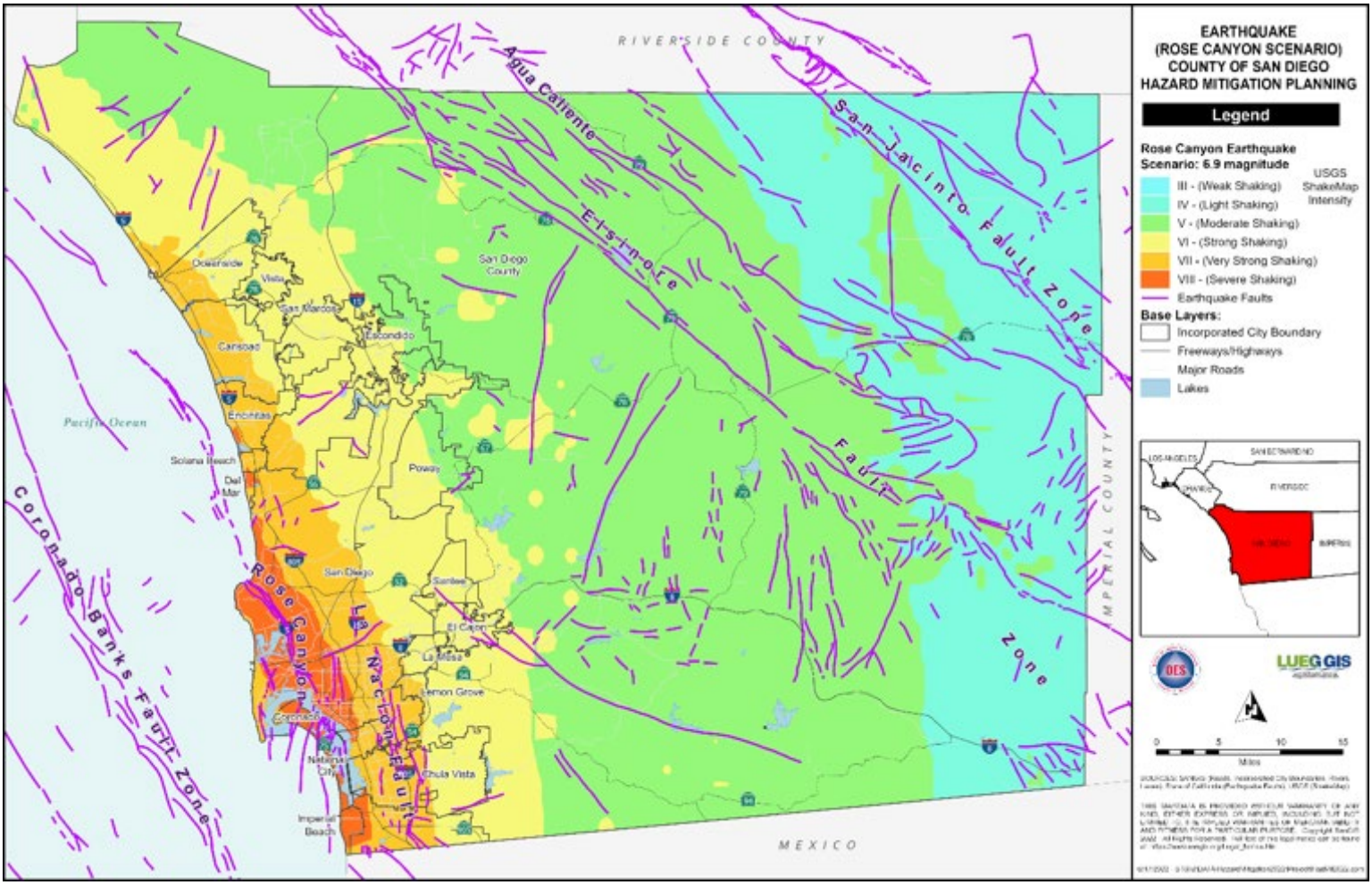

Figure 4: Map of San Diego County Rose Canyon Fault Earthquake Scenario

This is based on a United States Geological Survey (USGS) earthquake model that shows probabilistic peak ground acceleration for every location in San Diego County. Since 1984, earthquake activity in San Diego County has increased twofold over the preceding 50 years (Demere, SDNHM website 2003). All buildings that have been built in recent decades must adhere to building codes that require them to be able to withstand earthquake magnitudes that create a PGA of 0.4 or greater. Ongoing field and laboratory studies suggest the following maximum likely magnitudes for local faults: San Jacinto (M6.4 to 7.3), Elsinore (M6.5 to 7.3), Rose Canyon (M6.2 to 7.0), La Nacion (M6.2 to 6.6), Coronado Bank (M6.0 to 7.7), and San Clemente (M6.6 to 7.7) (Demere, SDNHM website 2003).

Data used to profile earthquake hazard included probabilistic PGA data from USGS and a Scenario Earthquake Shake map for Rose Canyon from the California Integrated Seismic Network (CISN). From these data, the Hazard Mitigation Planning Group (HMPG) determined that risk level for earthquake is determined to be high if an area lies within a 0.3 or greater PGA designation. Earthquakes were modeled using HAZUS-MH, which uses base information to derive probabilistic peak ground accelerations much like the PGA map from USGS that was used for the profiling process.

The potential for an earthquake in the San Diego region is considered somewhat “Likely”.

Climate Change Considerations

Not applicable.

5.2.5. EXTREME HEAT

Nature of the Hazard

Although extreme heat does not cause structural damage like floods, fires, and earthquakes, heat waves claim many lives due to heat exhaustion and heat stroke. According to a California Energy Commission Study, from 1994 to 2009, heat waves have claimed more lives in California than all declared disaster events combined.[100]

Despite this history, not a single heat emergency was formally proclaimed at the state level or as a federal disaster between 1960 and 2008. The author of an account of a heat wave which killed 739 people in Chicago in July 1995 suggests that the hidden nature of social vulnerability combined with the inconspicuous nature of heat events (unlike floods, fires, and earthquakes) prevent them from being declared as legitimate disasters.[101] However, the California State Hazard Mitigation Plan considers extreme heat a legitimate disaster type.[102]

Extreme heat is exacerbated by the “urban heat island effect”, whereby impervious surfaces, such as concrete and asphalt, absorb heat and result in greater warming in urban areas compared to rural areas. Urban heat islands exacerbate the public health impacts that heat waves have upon the more vulnerable populations.[103] San Diego County has among the highest percentages of impervious surfaces in the states, increasing the potential impacts of

[100] Messner, Steven, Sandra C. Miranda, Karen Green, Charles Phillips, Joseph Dudley, Dan Cayan, Emily Young. Climate Change Related Impacts in the San Diego Region by 2050. PIER Research Report, CEC-500-2009-027-D, Sacramento, CA: California Energy Commission. 2009.

[101] Klinenberg, Eric. *Heat Wave: A Social Autopsy of Disaster in Chicago*, The University of Chicago, 2002

[102] Governor’s Office of Emergency Services (2013) California Multi-Hazard Mitigation Plan

[103] Ibid.

heat islands.[104] In fact, Southern California's urban centers are warming more rapidly than other parts of the state.[105]

Extreme heat events put vulnerable populations (such as older adults, children, people who are chronically ill, and people who work outside) at risk of heat-related illnesses and even death. Extreme heat events highlight the importance of thoughtful social vulnerability analysis.[106] For example, socially isolated older adults are especially vulnerable. People who live in urban areas with high impervious surface coverage and no access to air conditioning are also especially vulnerable.[107]

Extreme heat also has secondary impacts, such as power outages and poor air quality. Heat events, and the increased use of air conditioning, can lead to power outages, which makes the events even more dangerous.[108] Hotter temperatures may also lead to poorer air quality because ozone formation, a component of smog, increases with higher temperatures.[109]

Disaster History

Following the events of 2006, when there was a prolonged period of extreme heat across the state of California, San Diego County developed an Excessive Heat Preparedness and Response Plan.[110]

According to Spatial Hazard Events and Losses Database for the United States (SHELDUS) there have been four extreme heat events in San Diego in the past 18 years resulting in four heat related fatalities and 28 heat related injuries.

Location & Extent/Probability of Occurrence & Magnitude

San Diego is facing an increase in the frequency, duration, and strength of heat waves in the coming decades. While greater warming is expected in inland areas, residents of coastal areas are vulnerable when the temperature spikes, because they are less accustomed to the heat, and they are less likely to have air conditioning.

Research also indicates that heat waves are likely to become more humid in the future and with nighttime temperatures staying high, further stressing public health.[111] Extreme warm temperatures in the San Diego region mostly occur in July and August, but as climate warming takes hold, the occurrences of these events will likely begin in June and could continue to take place into September.[112]

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[104] English et al. (2007). Executive Summary, Heat-Related Illness and Mortality Information for the Public Health Network in California

[105] Ibid.

[106] Governor's Office of Emergency Services (2013) California Multi-Hazard Mitigation Plan

[107] English et al. (2007). Executive Summary, Heat-Related Illness and Mortality Information for the Public Health Network in California

[108] Ibid.

109 USGCRP (2009). *Global Climate Change Impacts in the United States* . Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). United States Global Change Research Program. Cambridge University Press, New York, NY, USA.

[110] Messner, Steven, Sandra C. Miranda, Karen Green, Charles Phillips, Joseph Dudley, Dan Cayan, Emily Young. Climate Change Related Impacts in the San Diego Region by 2050. PIER Research Report, CEC-500-2009-027-D, Sacramento, CA: California Energy Commission. 2009.

[111] Gershunov, A., and K. Guirguis (2012), California heat waves in the present and future, Geophysical Research Letters., 39, L18710

[112] Messner, Steven, Sandra C. Miranda, Karen Green, Charles Phillips, Joseph Dudley, Dan Cayan, Emily Young. Climate Change Related Impacts in the San Diego Region by 2050. PIER Research Report, CEC-500-2009-027-D, Sacramento, CA: California Energy Commission. 2009.

The potential for extreme heat event is considered “Highly Likely”.

Climate Change Considerations

An increase in the intensity, frequency and duration of extreme heat events is expected in the context of climate change. Furthermore, observations have shown, and projections indicate, that the flavor of extreme heat events have and will continue to change with more and more humid heat events (that drive nighttime heat events) (Gershunov et al., 2009, Gershunov et al., 2012).

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include preparation, with strong attention to weather forecasts and ready social services, infrastructure (e.g. Cooling Centers), and programs to support installation of air conditioning units in communities lacking access.

5.2.6. FLOOD

Nature of the Hazard

A flood occurs when excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto a river’s bank or to adjacent floodplains. Floodplains are lowlands adjacent to rivers, lakes, and oceans that are subject to recurring floods. Most injuries and deaths from flood occur when people are swept away by flood currents, and property damage typically occurs as a result of inundation by sediment-filled water.

Several factors determine the severity of floods, including rainfall intensity and duration. A large amount of rainfall over a short time span can result in flash flood conditions. A sudden thunderstorm or heavy rain, dam failure, or sudden spills can cause flash flooding. The National Weather Service’s definition of a flash flood is a flood occurring in a watershed where the time of travel of the peak of flow from one end of the watershed to the other is less than six hours.

There are no watersheds in San Diego County that have a longer response time than six hours. In this county, flash floods range from the stereotypical wall of water to a gradually rising stream. The central and eastern portions of San Diego County are most susceptible to flash floods where mountain canyons, dry creek beds, and high deserts are the prevailing terrain.

Disaster History

From 1770 until 1952, 29 floods were recorded in San Diego County. Between 1950 and 1997, flooding prompted 10 Proclaimed States of Emergency in the County of San Diego. Several very large floods have caused significant damage in the County of San Diego in the past. The Hatfield Flood of 1916 destroyed the Sweetwater and Lower Otay Dams and caused 22 deaths and $4.5 million in damages.

The flood of 1927 caused $117,000 in damages and washed out the Old Town railroad bridge (Bainbridge, 1997). The floods of 1937 and 1938 caused approximately $600,000 in damages. (County of San Diego Sanitation and Flood Control, 1996). In the 1980 floods, the San Diego River at Mission Valley peaked at 27,000 cubic feet per second (cfs) and caused $120 million in damage (Bainbridge, 1997).

The table below displays a history of flooding in San Diego County, as well as loss associated with each flood event:

TABLE 13: HISTORY RECORDS OF LARGE FLOODS IN SAN DIEGO COUNTY

Date	Loss Estimation	Source of Estimate	Comments
1862	Not available	County of San Diego Sanitation and Flood Control	6 weeks of rain
1891	Not available	County of San Diego Sanitation and Flood Control	33 inches in 60 hours
1916	$4.5 million	County of San Diego Sanitation and Flood Control	Destroyed 2 dams, 22 deaths
1927	$117,000	County of San Diego Sanitation and Flood Control	Washed out railroad bridge Old Town
1937 & 1938	$600,000	County of San Diego Sanitation and Flood Control	N/A
1965	Not available	San Diego Union	6 killed
1969	Not available	San Diego Union	All of State declared disaster area
1979	$2,766,268	County OES	Cities of La Mesa, Lemon Grove, National City, San Marcos, San Diego and unincorporated areas
1980	$120 million	County of San Diego Sanitation and Flood Control; Earth Times	San Diego river topped out in Mission Valley
1987	$640,500	State OES	N/A
1995	$Tens of Millions	County OES	San Diego County Declared Disaster Area
2003	Not Available	County OES	Storm floods areas impacted by the 2003 firestorm.
Sept 2004	Not Available	San Diego Union-Tribune	Series of storms caused localized flooding
Oct 2004	Not Available	San Diego Union-Tribune	Flash-flood in Borrego Springs
Jan-Mar 2005	Not Available	Cal EMA (formerly State OES)	San Diego County Declared Disaster Area
Jan 2017	$14.5 million (estimated)	County OES	San Diego County Declared Disaster Area

Location & Extent/Probability of Occurrence & Magnitude

In regions, such as San Diego, without extended periods of below-freezing temperatures, floods usually occur during the season of highest precipitations or during heavy rainfalls after long dry spells. The areas surrounding the river valleys in all of San Diego County are susceptible to flooding because of the wide, flat floodplains surrounding the riverbeds, and the numerous structures that are built in the floodplains.

One unusual characteristic of San Diego's hydrology is that it has a high level of variability in its runoff. The western watershed of the County of San Diego extends about 80 miles north from the Mexican border and approximately 45 miles east of the Pacific Ocean. From west to east, there are about 10 miles of rolling, broken coastal plain, 10 to 15 miles of foothill ranges

with elevations of 600 to 1,700 feet; and approximately 20 miles of mountain country where elevations range from 3,000 to 6,000 feet. This western watershed constitutes about 75% of the County, with the remaining 25% mainly desert country.

There are over 3,600 miles of rivers and streams which threaten residents and over 200,000 acres of flood-prone property. Seven principal streams originate or traverse through the unincorporated area. From north to south, they are the Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, Otay, and Tijuana Rivers (Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, 2006).

FEMA FIRM data was used to determine hazard risk for floods in the County of San Diego. FEMA defines flood risk primarily by a 100-year flood zone, which is applied to those areas with a 1% chance, on average, of flooding in any given year. Any area that lies within the FEMA-designated 100-year floodplain is designated as high risk. Any area found in the 500-year floodplain is designated at low risk. Base flood elevations (BFE) were also used in the HAZUS-MH modeling process. A BFE is the elevation of the water surface resulting from a flood that has a 1% chance of occurring in any given year (i.e. the height of the base flood).

The figure below displays the location and extent of flood hazard areas for the County of San Diego:

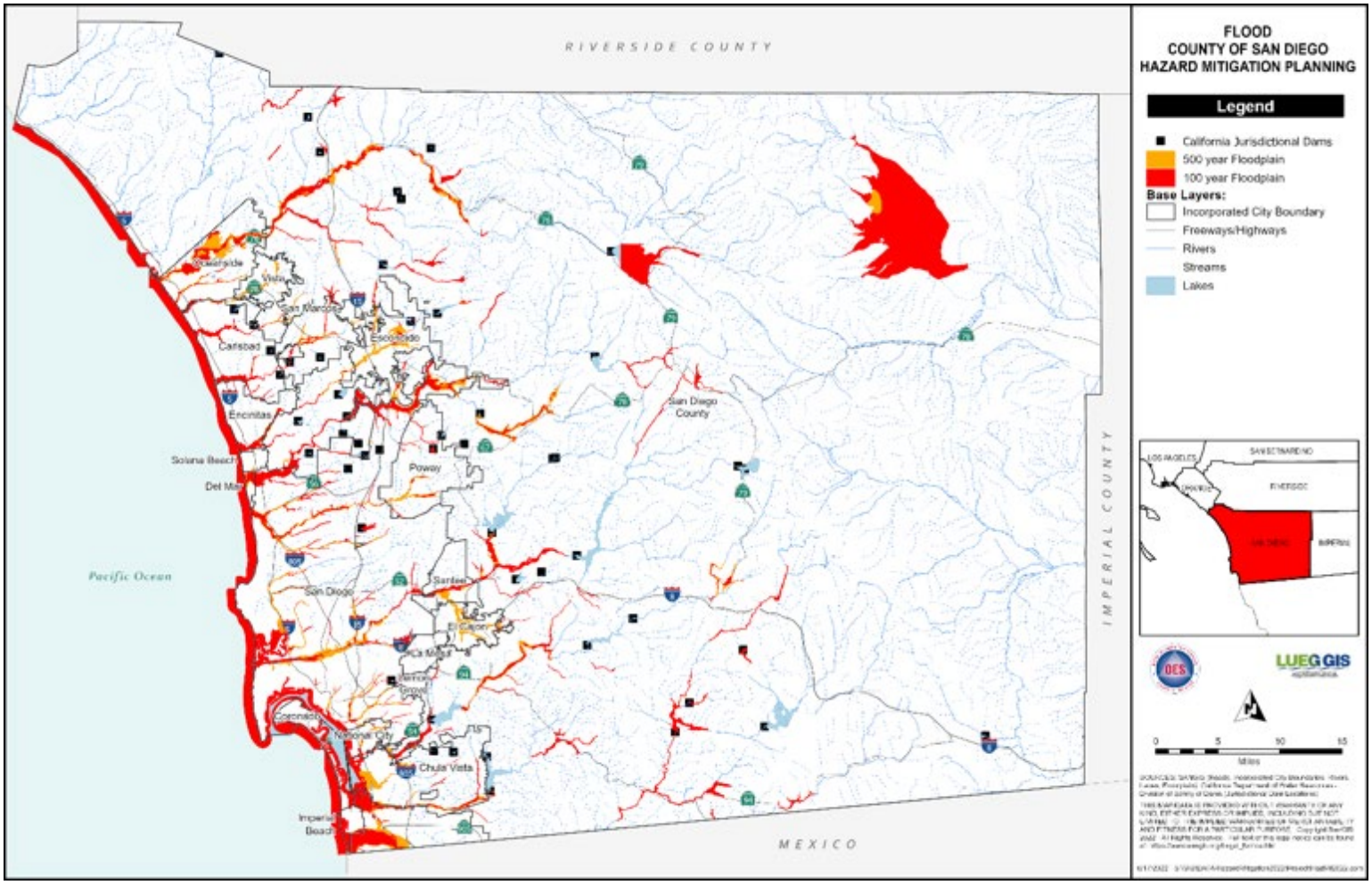

Figure 5: Map of San Diego County 100-Year and 500-Year Floodplains

As shown, high hazard (100-year floodway) zones in San Diego County are generally concentrated within the coastal areas, including bays, coastal inlets, and estuaries. Major watershed areas connecting the local mountain range to the coastal region, where flash floods are more common, show several 100-year flood hazard areas.

Based on FEMA records, there have been numerous repetitive losses (losses of at least $1,000 each) in San Diego County. These losses are provided in the table below:

TABLE 14: REPETITIVE LOSS DUE TO FLOODS IN SAN DIEGO COUNTY

Jurisdiction	Number of Repetitive Losses	Jurisdiction	Number of Repetitive Losses	Jurisdiction	Number of Repetitive Losses
Carlsbad	1	Chula Vista	1	Coronado	1
Del Mar	16	El Cajon	2	Encinitas	2
Escondido	2	Imperial Beach	5	La Mesa	2
Lemon Grove	0	National City	4	Oceanside	20
Poway	8	San Diego	53	San Marcos	1
Santee	1	Solana Beach	6	Vista	1
County of San Diego	40				

Based on the historical record, the likelihood of flooding in the San Diego region is “Highly Likely”.

Climate Change Considerations

The most extreme events are going to become more extreme regarding climate change effects. These events are primarily atmospheric rivers and will become more so in the future based on global climate models (Gershunov et al., 2019). In addition, the increase in sea level increases the potential for severe flooding caused by the occurrence of coastal and inland flooding. Coastal flooding can cause pollution of coastal waters (Aguilera et al., 2019).

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include preparation, with strong attention to weather forecasts, assessing infrastructure flooding vulnerability, and developing plans to mitigate flood severity and frequency.

5.2.7. HUMAN-CAUSED HAZARDS (TERRORISM & HAZARDOUS MATERIALS INCIDENTS (CBRNE THREATS))

Nature of the Hazard

Human-caused hazards are distinct from natural hazards because they result directly from the actions of people. Two types of human-caused hazards can be identified as technological hazards and terrorism.

Technological hazards refer to incidents that can arise from human activities such as the manufacture, storage, transport, and use of hazardous materials, which include toxic chemicals, radioactive materials, and infectious substances. Technological hazards are assumed to be accidental and their consequences unintended.

Terrorism, on the other hand, encompasses intentional, criminal, and malicious acts involving weapons of mass destruction (WMDs) or conventional weapons. WMDs can involve the deployment of chemical, biological, radiological, nuclear, and explosive (CBRNE) weapons. Conventional weapons and techniques include the use of arson, incendiary explosives, armed attacks, intentional hazardous materials release, and cyber-terrorism (attack via computer).

Hazardous Materials Incidents (CBRNE Threats)

Technological hazards involving hazardous material releases can occur at facilities (fixed site) or along transportation routes (off-site). They can occur because of human carelessness, technological failure, intentional acts, and natural hazards. When caused by natural hazards, these incidents are known as secondary hazards, whereas intentional acts are terrorism. Hazardous materials releases, depending on the substance involved and type of release, can directly cause injuries and death and contaminate air, water, and soils. While the probability of a major release at any facility or at any point along a known transportation corridor is relatively low, the consequences of releases of these materials can be very serious.

Some hazardous materials present a radiation risk. Radiation is any form of energy propagated as rays, waves or energetic particles that travel through the air or a material medium. Radioactive materials are composed of atoms that are unstable. An unstable atom gives off its excess energy until it becomes stable. The energy emitted is radiation. The process by which an atom changes from an unstable state to a more stable state by emitting radiation is called radioactive decay or radioactivity.

Radiological materials have many uses in San Diego County including:

- by doctors to detect and treat serious diseases,
- by educational institutions and companies for research,
- by the military to power large ships and submarines.

With the decommissioning of San Onofre Nuclear Generating Station (SONGS), radiological materials are no longer used to generate commercial electric power within San Diego County. However, the stored spent fuel that remains on site does pose a hazard.

Radioactive materials, if handled improperly, or radiation accidentally released into the environment, can be dangerous because of the harmful effects of certain types of radiation on the body. The longer a person is exposed to radiation and the closer the person is to the radiation, the greater the risk. Although radiation cannot be detected by the senses (sight, smell, etc.), it is easily detected by scientists with sophisticated instruments that can detect even the smallest levels of radiation. Under extreme circumstances an accident or intentional explosion involving radiological materials can cause very serious problems. Consequences may include death, severe health risks to the public, damage to the environment, and extraordinary loss of, or damage to, property.

Terrorism

Following serious international and domestic terrorist incidents during the 1990's and early 2000's, citizens across the United States have paid increased attention to the potential for deliberate, harmful terrorist actions by individuals or groups with political, social, cultural, and religious motives. There is no single, universally accepted definition of terrorism, and it can be interpreted in a variety of ways. However, terrorism is defined in the Code of Federal

Regulations as "…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" (28 CFR, Section 0.85). The Federal Bureau of Investigation (FBI) further characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. However, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences. Terrorists utilize a wide variety of agents and delivery systems.

Disaster History

Hazardous Materials Incidents (CBRNE Threats)

Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. The State of California defines a hazardous material as a substance that is toxic, ignitable, or flammable, or reactive and/or corrosive. An extremely hazardous material is defined as a substance that shows high acute or chronic toxicity, carcinogenicity, bio-accumulative properties, persistence in the environment, or is water reactive (California Code of Regulations, Title 22). "Hazardous waste," a subset of hazardous materials, is material that is to be abandoned, discarded, or recycled, and includes chemical, radioactive, and biohazardous waste (including medical waste). An accidental hazardous material release can occur wherever hazardous materials are manufactured, stored, transported, or used. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas.

Numerous facilities in San Diego County generate hazardous wastes, in addition to storing and using large numbers of hazardous materials. There are thousands of sites with permits to store and maintain chemical, biological and radiological agents, and explosives in the County. Although the scale is usually small, emergencies involving the release of these substances can occur daily at both these fixed sites and on the County's streets and roadways.

Facilities that use, manufacture, or store hazardous materials in California must comply with several state and federal regulations. The Superfund Amendments and Reauthorization Act (SARA Title III), which was enacted in 1986 as a legislative response to airborne releases of methylisocyanate at Union Carbide plants in Bhopal, India and in Institute, West Virginia. SARA Title III, also known as the Emergency Planning and Community-Right-To-Know Act (EPCRA), directs businesses that handle, store, or manufacture hazardous materials in specified amounts to develop emergency response plans and report releases of toxic chemicals. Additionally, Section 312 of Title III requires businesses to submit an annual inventory report of hazardous materials to a state-administering agency.

The California legislature passed Assembly Bill 2185 in 1987, incorporating the provisions of SARA Title III into a state program. The community right-to-know requirements keep communities abreast of the presence and release of hazardous wastes at individual facilities.

A table within Attachment A shows a breakdown by jurisdiction of facilities in the County with permits to store and maintain chemical, biological and radiological agents, and explosives. Facilities with EPA ID Numbers are facilities that generate hazardous waste.

Hazardous materials spills and releases in San Diego County have occurred as a result of clandestine drug manufacturing; spills from commercial, military and recreational vessels on the region's waterways; traffic accidents; sewer breaks and overflows; and various accidents/incidents related to the manufacture, use, and storage of hazardous materials by

County industrial, commercial and government facilities. Although the emergency response history for San Diego County detailed in Attachment A chronicles various hazardous materials releases, the incidents do not necessarily indicate the degree of exposure to the public.

There has not been significant exposure to the San Diego County public due to human-caused releases of chemical or biological agents, although there have been several smaller-scale incidents. Chemical spills and releases from transportation and industrial accidents have resulted in short-term chemical exposure to individuals in the vicinity of the release. San Diego beaches are routinely closed because of sewage spills and storm run-off. Bacterial levels can increase significantly in ocean and bay waters, especially near storm drain, river, and lagoon outlets, during and after rainstorms. Elevated bacterial levels may continue for a period of up to 3 days depending upon the intensity of rainfall and volume of runoff. Waters contaminated by urban runoff may contain human pathogens (bacteria, viruses, or protozoa) that can cause illnesses.

San Diego experienced its first significant E. coli bacteria outbreak in 10 years after patrons ate tainted food at local area restaurants in 2003. In 1992 and 1993 a similar outbreak occurred in San Diego County, which resulted in the death of a child after he ate tainted food from a Carlsbad fast-food restaurant. Additionally, in the early 1980s a hepatitis outbreak associated with poor food handling techniques resulting in the closure of a major restaurant in Mission Valley and the implementation of a food-handler certification program by the San Diego County Health Department.

The only known release of radiological agents in the County was the result of an accident at San Onofre Nuclear Generating Station (SONGS). In 1981, an accidental "ignition" of hydrogen gases in a holding tank of the San Onofre Nuclear Generating Station (SONGS) caused an explosion - which bent the bolts of an inspection hatch on the tank, allowing radioactive gases in the tank to escape into a radioactive waste room. From there, the radioactive material was released into the atmosphere. The plant was shut down for several weeks following the event (W.I.S.E. Vol.3 No.4 p.18). This incident occurred during the plant's operation of its Unit 1 generator, which has since been decommissioned. No serious injuries occurred.

On February 3, 2001, another accident occurred at SONGS when a circuit breaker fault caused a fire that resulted in a loss of offsite power. Published reports suggest that rolling blackouts during the same week in California were partially due to the shutdown of the SONGS reactors in response to the 3-hour fire. Although no radiation was released and no nuclear safety issues were involved, the federal Nuclear Regulatory Commission sent a Special Inspection Team to the plant site to investigate the accident.

Terrorism

While San Diego County has not experienced any high-profile attacks by groups or individuals associated with international terrorist organizations, the region has been the site of several incidents with domestic origins. Most notable is the August 1, 2003 arson attack on a mixed-use housing and office development under construction in the University City neighborhood. The blaze, which officials estimate caused around $50 million in damage, was allegedly set by the Earth Liberation Front, a radical environmentalist group.

San Diego has been linked to the 9-11 attacks in New York City and on the Pentagon; two of the confirmed hijackers of the commercial aircraft used in the attacks took flight school lessons while living in San Diego.

San Diego County has received numerous bomb threats to schools, government buildings, religious sites, and commercial facilities over the years. While most bomb threats are hoaxes, authorities have been required to mobilize resources and activate emergency procedures on a regular basis in response.

Other Human-Caused Disasters

On September 25th, 1978, San Diego was the scene of one of the worst air disasters in the United States. A mid-air collision between a Cessna 172 and a Pacific Southwest Airlines (PSA) Boeing 727 caused both planes to crash into the North Park neighborhood below. A total of 144 lives were lost including 7 people on the ground. More than 20 residences were damaged or destroyed.

In 1984, a shooter opened fire in a San Ysidro McDonald's restaurant, killing 21 people. This event was not considered an act of terrorism as no political or social objectives were associated with this event.

In 2019, a shooter opened fire at the Chabad of Poway Synagogue, which killed one person and injured three other people. The same shooter was also linked to a 2019 fire set to the Dar-ul-Arqam Mosque (also known as the Islamic Center of Escondido) in Escondido.[113] The shooter pleaded guilty on July 20, 2021, to murder and multiple charges of attempted murder, with added hate crime classifications in connection with the Chabad of Poway Synagogue shooting and pleaded guilty to a charge of arson in connection with Dar-ul-Arqam Mosque in Escondido. [114]

Location & Extent/Probability of Occurrence & Magnitude

Information related to the probability and magnitude of human-caused hazards is considered sensitive homeland security related information. As a result, this information is provided in a separate confidential document (*Planning Partners, see Attachment A*). The potential for a human-caused hazard is "Highly Likely".

Climate Change Considerations

Not applicable.

5.2.8. LIQUEFACTION

Nature of the Hazard

Liquefaction is the phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entails the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies and causes structures to collapse.

[113] https://www.cbs8.com/article/news/crime/accused-chabad-of-poway-synagogue-shooter-pleads-guilty/509-4c8b3421-71e5-45e4-b1da-eac4dfe24f55.

[114] https://www.nbcsandiego.com/news/local/poway-synagogue-shooter-to-be-sentenced-in-state-court/2731560/.

Disaster History

Liquefaction is not known to have occurred historically in San Diego County, although liquefaction has occurred in the Imperial Valley in response to large earthquakes (Magnitude 6 or greater) originating in that area. Although San Diego is one of several major California cities in seismically active regions, ground failures or damage to structures have not occurred because of liquefaction.

Historically, seismic shaking levels have not been sufficient to trigger liquefaction. Paleoseismic indicators of liquefaction have been recognized locally, and several pre-instrumental (prior to common use of seismographs) earthquakes could have been severe enough to cause at least some liquefaction.

Location & Extent/Probability of Occurrence & Magnitude

Recognizing active faults in the region, and the presence of geologically young, unconsolidated sediments and hydraulic fills, the potential for liquefaction to occur has been long recognized in the San Diego area. The regions of San Diego Bay and vicinity are thought to be especially vulnerable. The potential exists in areas of loose soils and/or shallow groundwater in earthquake fault zones throughout the County. The figure below displays the locations and extent of areas with a risk of liquefaction:

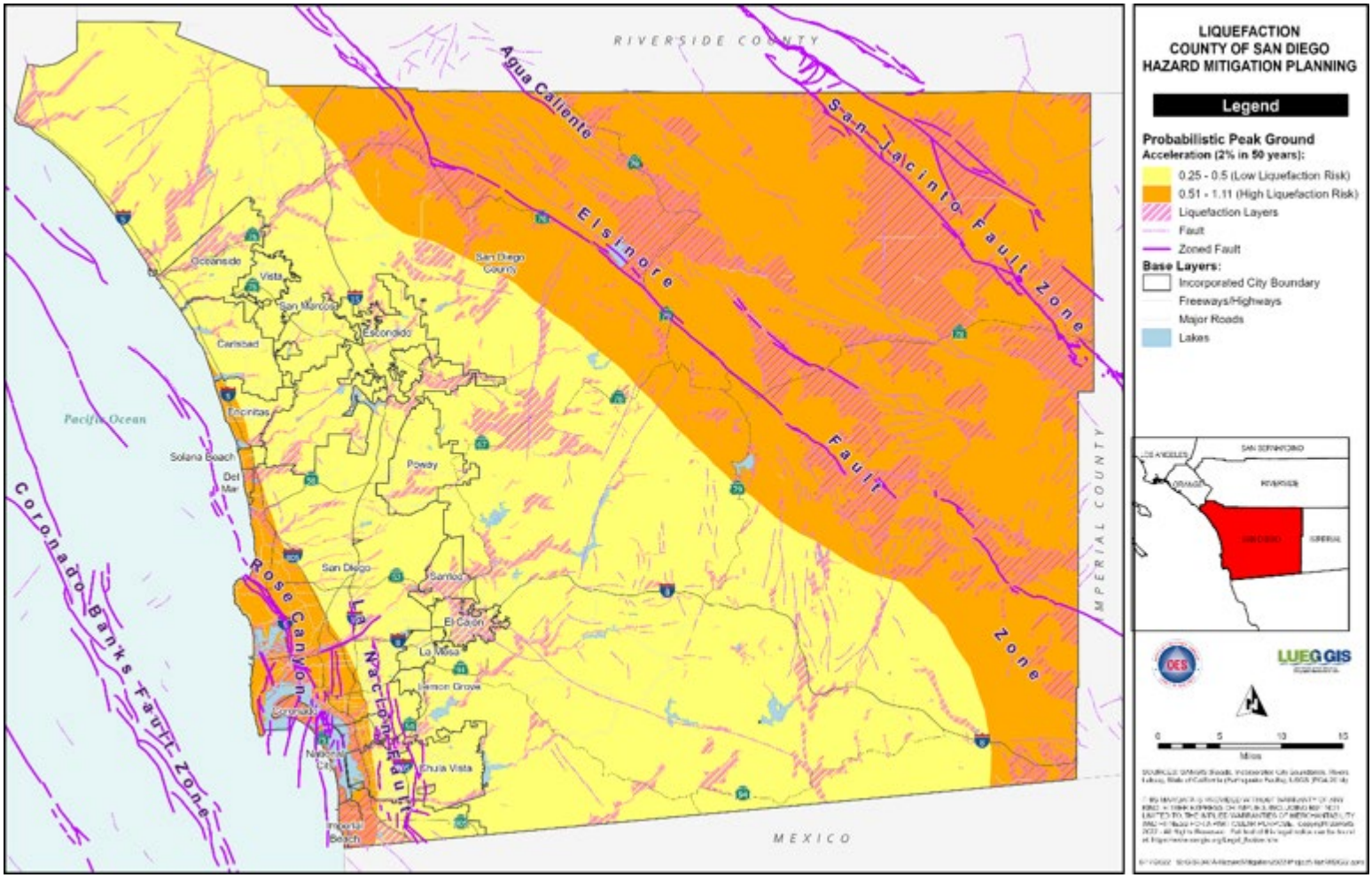

Figure 6: Map of San Diego County Liquefaction Risk Areas

Data used to profile liquefaction hazard included probabilistic PGA data from the United States Geological Survey (USGS) and a Scenario Earthquake Shake map for Rose Canyon from the California Integrated Seismic Network (CISN), along with existing liquefaction hazard areas from local maps.

Liquefaction hazards were modeled as collateral damages of earthquakes using HAZUS-MH, which uses base information and NEHRP soils data to derive probabilistic peak ground accelerations much like the PGA map from USGS. Soils were considered because liquefaction risk may be amplified depending on the type of soil found in a given area. The National Earthquake Hazards Reduction Program (NEHRP) rates soils from hard to soft, and give the soils ratings from Type A through Type E, with the hardest soils being Type A, and the softest soils rated at Type E.

Liquefaction risk was considered high if there were soft soils (Types D or E) present within an active fault zone. Liquefaction risk was considered low if the PGA risk value was less than 0.3, and hard soils were present (Types A-C). For example, an area may lie in a PGA zone of 0.2, which would be a low liquefaction risk in hard soils identified by the NEHRP. However, if that same PGA value is found within a soft soil such as Type D or E, a PGA of 0.2, when multiplied by 1.4 or 1.7 (amplification values for type D and E soil, shown below), would become a PGA value of at least 0.28 to 0.3. This would increase the liquefaction risk to high.

TABLE 15: PGA LIQUIFACTION RISK

PGA	Soil Type				
	A	B	C	D	E
0.1	0.80	1.00	1.20	1.60	2.50
0.2	0.80	1.00	1.20	1.40	1.70
0.3	0.80	1.00	1.10	1.20	1.20
0.4	0.80	1.00	1.00	1.10	0.90
0.5	0.80	1.00	1.00	1.00	0.80

Areas where soil types D or E are located are illustrated in the figure below.

The potential for liquefaction in San Diego is considered somewhat “Likely”.

Climate Change Considerations

Not applicable.

5.2.9. RAIN-INDUCED LANDSLIDE

Nature of the Hazard

Landslides occur when masses of rock, earth, or debris move down a slope, including rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways) and natural factors (geology, precipitation, and topography). Frequently they accompany other natural hazards such as floods, earthquakes, and volcanic eruptions. Although landslides sometimes occur during earthquake activity, earthquakes are rarely their primary cause.

The most common cause of a landslide is an increase in the down slope gravitational stress applied to slope materials (oversteepening). This may be produced either by natural

processes or by man's activities. Undercutting of a valley wall by stream erosion or of a sea cliff by wave erosion are ways in which slopes may be naturally oversteeped.

Other ways include excessive rainfall or irrigation on a cliff or slope. Another type of soil failure is slope wash, the erosion of slopes by surface-water runoff. The intensity of slope wash is dependent on the discharge and velocity of surface runoff and on the resistance of surface materials to erosion. Surface runoff and velocity is greatly increased in urban and suburban areas due to the presence of roads, parking lots, and buildings, which have zero filtration capacities and provide generally smooth surfaces that do not slow down runoff.

Mudflows are another type of soil failure and are defined as flows or rivers of liquid mud down a hillside. They occur when water accumulates under the ground, usually following long and heavy rainfalls. If there is no brush, tree, or ground cover to hold the soil, mud will form and flow down-slope.

Disaster History

Landslides and landslide-prone sedimentary formations are present throughout the coastal plain of western San Diego County. Landslides also occur in the granitic mountains of East San Diego County, although they are less prevalent. Ancient landslides are those with subdued topographic expressions that suggest movements at least several hundred and possibly several thousands of years before present. 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.

Significant landslides have occurred in: the Otay Mesa area, Oceanside, Mt. Soledad in La Jolla, Sorrento Valley, in the vicinity of Rancho Bernardo and Rancho Penasquitos, along the sides of Mission Gorge (San Carlos and Tierrasanta), western Santee, the Fletcher Hills area of western El Cajon, western Camp Pendleton, and the east side of Point Loma. Some of the more significant historical coastal bluff landslides have occurred along north La Jolla (Black's Beach), Torrey Pines, Del Mar, and Encinitas.

Landslides tend to be more widespread in these areas where the underlying sedimentary formations contain weak claystone beds that are more susceptible to sliding.

Remedial grading and other mitigation measures have stabilized many but not all landslides in urban areas and other developments within San Diego County. Published geologic maps and other sources of information pertaining to landslide occurrence may not differentiate between known or suspected landslides.

Moreover, published landslide maps (such as those used to compile the landslide areas for this effort) are not always updated or revised to reflect landslides that have been stabilized, or in some cases completely removed.

The landslide maps for this study have been compiled for planning and emergency responses preparedness, and the compilation sources may not reflect current or existing conditions.

Location & Extent/Probability of Occurrence & Magnitude

Data used to determine landslide risk were steep slope (greater than 25%), soil series data (SANDAG, based on USGS 1970s series), and soil-slip susceptibility from USGS. Because

landslide data in GIS format was not available for the entire county, a model was run using USGS soils and steep slope data to determine landslide risk areas for the entire County. Tan Landslide Susceptibility Maps that depict steep slope areas, landslide formations, and landslide susceptible areas based on a combination of slope, soils and geologic instability were also used in the analysis.

As shown in the figure below, the location and extent of landslide hazard areas are generally concentrated along canyons near the coastal areas with steep slopes:

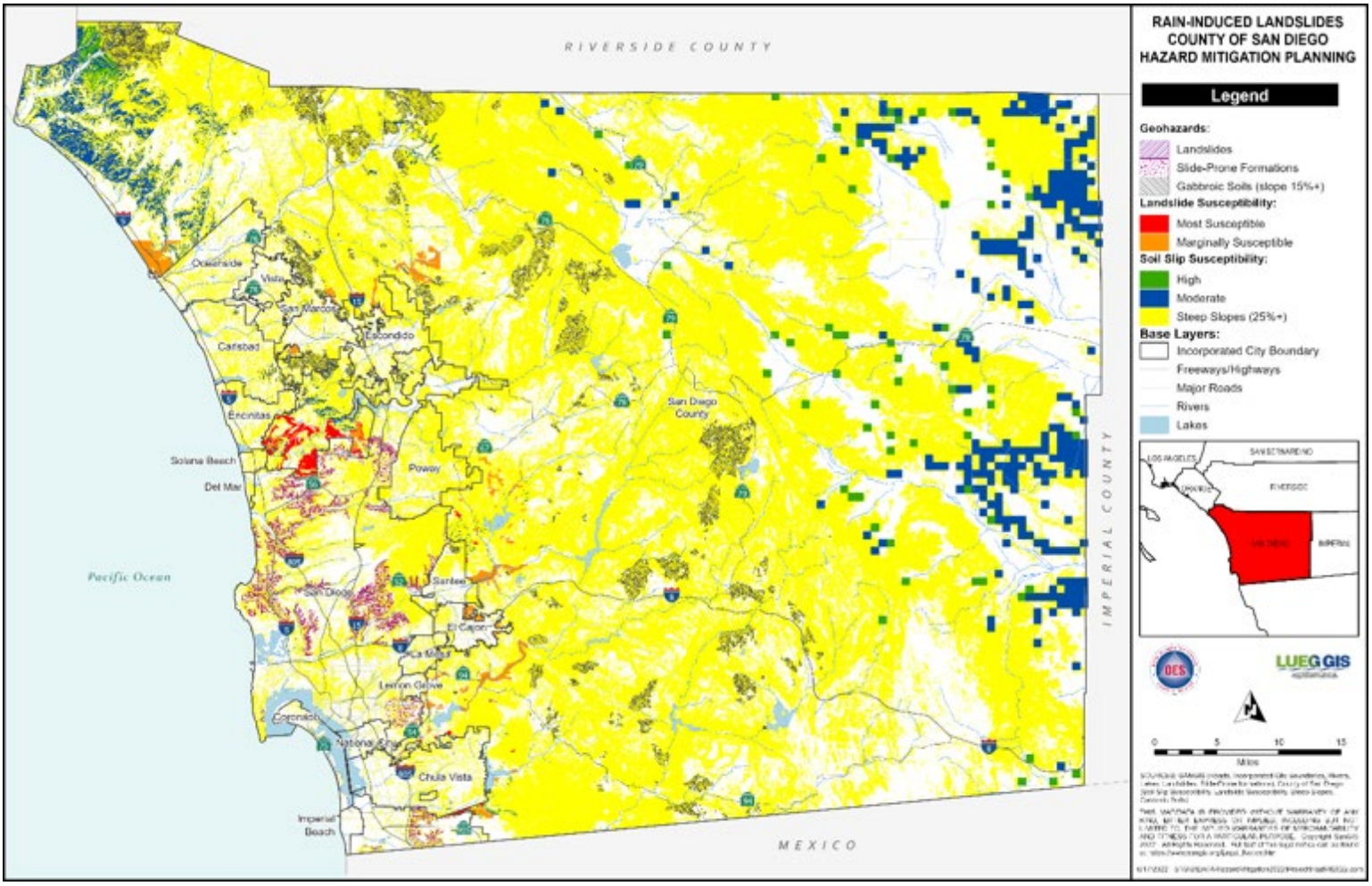

Figure 7: Map of San Diego County Rain-Induced Landslide Susceptibilities

The western portion of the county shows the soil-slip susceptibility data, while the eastern portion of the county shows the results of the model used to determine landslide risk for areas that were not included in the soil-slip susceptibility model. Housing development on marginal lands and in unstable but highly desirable coastal areas has increased the threat from landslides throughout San Diego County.

Based on historical occurrences, the potential for a rain-induced landslide is considered “Likely”.

Climate Change Considerations

Post-fire debris flows require high intensity precipitation. Global Climate models do not project hourly rates of precipitation. One study that dynamically downscaled climate projection suggested that hourly precipitation rates in the mountainous area increased in Central and Northern California (Huang et al, 2020), but it did show results over San Diego.

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include evaluation of vulnerable landscapes, monitoring and educating partners and the public, paying attention to weather forecasts of heavy and prolonged rainfall, especially in conditions when landscape is already soaked, consulting with experts in landslides/debris flows.

5.2.10. TSUNAMI/COASTAL STORMS/SEA LEVEL RISE/EROSION

Nature of the Hazard

These four hazards were mapped and profiled as a group because many of the factors and risks involved are similar and limited to the coastal areas. Coastal storms can cause increases in tidal elevations (called storm surge), wind speed, and erosion. The most dangerous and damaging feature of a coastal storm is storm surge. Storm surges are large waves of ocean water that sweep across coastlines where a storm makes landfall. Storm surges can inundate coastal areas, wash out dunes, and cause backwater flooding. If a storm surge occurs at the same time as high tide, the water height will be even greater.

With up to two feet of sea level rise projected by 2050, low-lying areas could become inundated more frequently and with increasingly higher water levels. In addition, storm related flooding may reach further inland and occur more often[115]. Beaches and cliffs could also see increased erosion as they are exposed to more hours of high sea levels and wave action.[116] The NOAA Sea Level Rise Viewer allows for planers to predict the impact of sea level rise over the next several decades. It can be found at https://coast.noaa.gov/digitalcoast/tools/slr.

According to the Sea Level Rise Adaptation Strategy for the San Diego Bay, the sectors that are most vulnerable to sea level rise are storm water, wastewater, shoreline parks, transportation facilities, commercial buildings, and ecosystems. Low-lying communities, such as Imperial Beach, Coronado, Mission Beach, and parts of La Jolla Shores, Del Mar, and Oceanside may be particularly vulnerable to sea level rise.[117] In addition, some of San Diego's military installations and the region controlled by the Port of San Diego may also be affected.[118] However, sea level rise is considered (on a scale of low, medium, high, very high) a low hazard for the region.

Coastal erosion is the wearing of coastal land. It is commonly used to describe the horizontal retreat of the shoreline along the ocean and is considered a function of larger processes of shoreline change, which include erosion and accretion. Erosion results when more sediment is lost along a particular shoreline than is deposited by the water body and is measured as a rate with respect to either a linear retreat or volumetric loss. Erosion rates are not uniform and vary over time at any single location. Various locations along the Coast of San Diego County are highly susceptible to erosion. Erosion prevention and repair measures such as installation of seawalls and reinforcement of cliffs have been required in different locations along the San Diego coast in the past. The risk/probability of coastal erosion in San Diego County is considered "Likely".

- A tsunami is a series of long waves generated in the ocean by a sudden displacement of a large volume of water. Underwater earthquakes, landslides, volcanic eruptions, meteoric impacts, or onshore slope failures can cause this displacement. Tsunami waves can travel at speeds averaging 450 to 600 miles per hour. As a tsunami nears the coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. After a major earthquake or other tsunami-inducing activity occurs, a tsunami could reach the shore within a few minutes. One coastal community may experience no

[115] San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation

[116] Ibid.

[117] Ibid.

[118] Ibid.

damaging waves while another may experience very destructive waves. Some low-lying areas could experience severe inland inundation of water and deposition of debris more than 3,000 feet inland. Historically the impact of Tsunamis on the San Diego coastline has been low, but inundation maps developed by the California Office of Emergency Services and the California Geologic Survey show the potential for moderate damage along low-lying areas. The California Geologic Survey has developed Tsunami Inundation maps that can be found at: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps.

Disaster History

In January and February 1983, the strongest-ever El Nino-driven coastal storms caused over 116 million dollars in beach and coastal damage. Thirty-three homes were destroyed, and 3,900 homes and businesses were damaged. Other coastal storms that caused notable damage were during the El Nino winters of 1977-1978 and 1997-1998 and 2003-2004. Other Proclamations occurred in December 2010. July 2015, and February 2017. The City of San Diego proclaimed for winter storms in 2013.

Coastal erosion is an ongoing process that is difficult to measure but can be seen in various areas along the coastline of San Diego County. Unstable cliffs at Beacon's Beach in Encinitas caused a landslide that killed a woman sitting on the beach in January 2000. In 1942, the Self-Realization Fellowship building fell into the ocean because of erosion and slope failure caused by groundwater oversaturated the cliffs it was built on.

Wave heights and run-up elevations from tsunami along the San Diego Coast have historically fallen within the normal range of the tides (Joy 1968). The largest tsunami effect recorded in San Diego since 1950 was May 22, 1960, which had a maximum wave height 2.1 feet (NOAA, 1993). In this event, 80 meters of dock were destroyed, and a barge sunk in Quivera Basin.

Other tsunamis felt in San Diego County occurred on November 5, 1952, with a wave height of 2.3 feet and caused by an earthquake in Kamchatka; March 9, 1957, with a wave height of 1.5 feet; May 22, 1960, at 2.1 feet; March 27, 1964 with a wave height of 3.7 feet, February 2010 with a wave height of 0.6 meters; June, 2011 with wave height of 2 feet; and January 15, 2022 with a wave height of 1-3 feet.[119]

It should be noted that damage does not necessarily occur in direct relationship to wave height, illustrated by the fact that the damages caused by the 2.1-foot wave height in 1960 were worse than damages caused by several other tsunamis with higher wave heights.

The California Tsunami Program, led by the California Governor's Office of Emergency Services (Cal OES) and the California Geological Survey (CGS), is responsible for updating the State's Tsunami Hazard Area Maps for emergency response planning and public safety. Communities use the State tsunami maps to develop and update their evacuation maps and plans. The State is constantly evaluating tsunami events, sources, and analysis techniques to ensure that coastal communities are safe from tsunami hazards.

The State has updated previous 2009 Tsunami Inundation Maps by working with local emergency management officials and Cal OES. Each County provides important considerations to CGS' decision on the inland boundaries of the Tsunami Hazard Area.

[119] https://www.ngdc.noaa.gov/hazel/view/hazards/tsunami/runup-more-info/36305.

The State tsunami website (www.tsunami.ca.gov), includes new Tsunami Hazard Area maps/data available to view and download using easy-to-use, interactive web applications. Find a location by typing in an address or use a current location to pinpoint the location on the Tsunami Hazard Map. This is useful to find out if you are in a Tsunami Hazard Area wherever you live, work, or visit. As local tsunami evacuation brochures are developed, they will also be added to the online map interface.[120]

Location & Extent/Probability of Occurrence & Magnitude

The figures below display the locations and extent of tsunami, coastal storm, erosion and sea level rise hazard areas for the County of San Diego. As shown in these figures, the highest risk zones in San Diego County are located within the coastal zone of San Diego County. Coastal storm hazards are most likely during El Nino events:

[120] California Tsunami Program, *"Tsunami Hazard Area Maps Talking Points."* 2022.

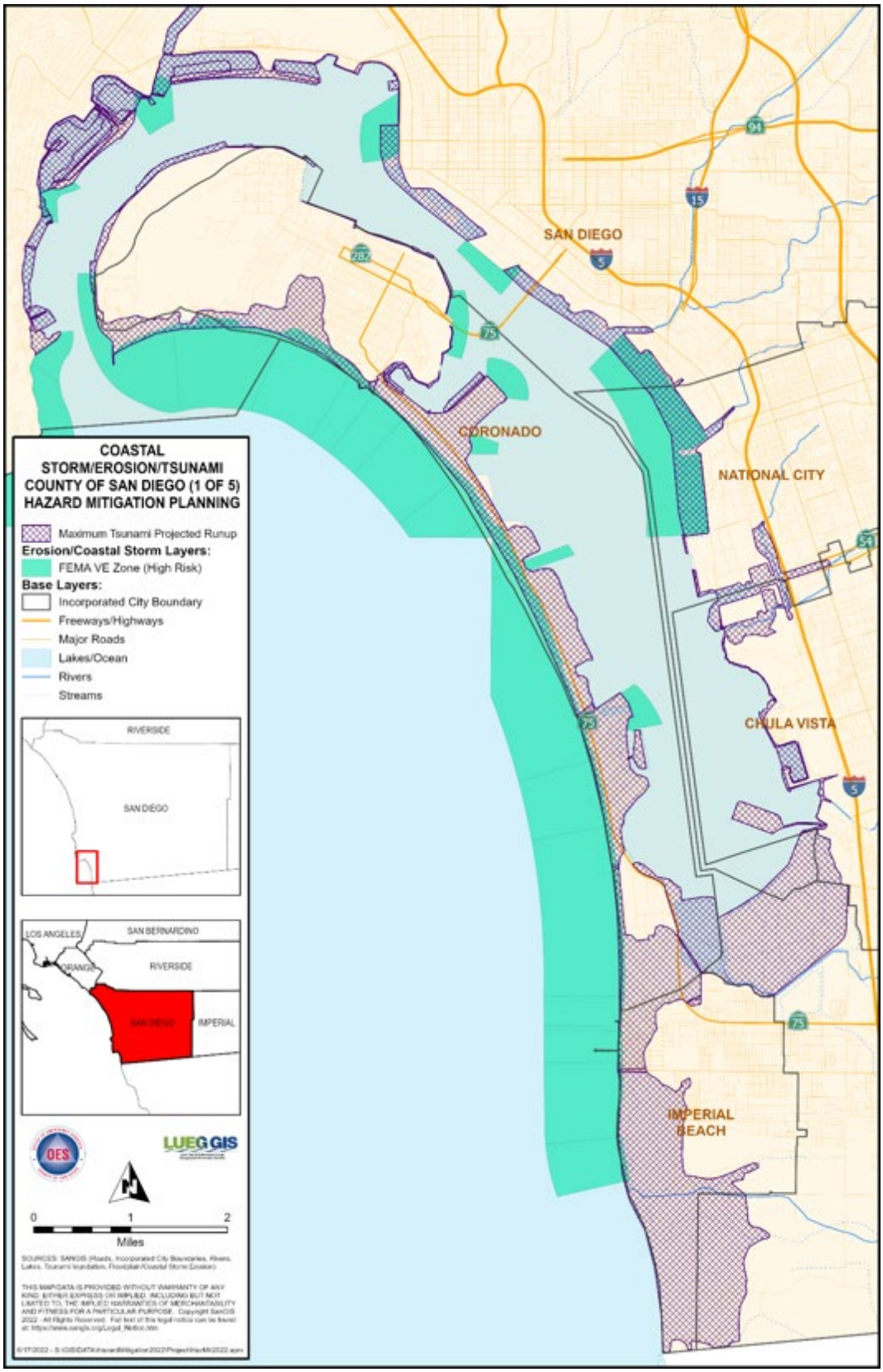

Figure 8: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (1 OF 5)

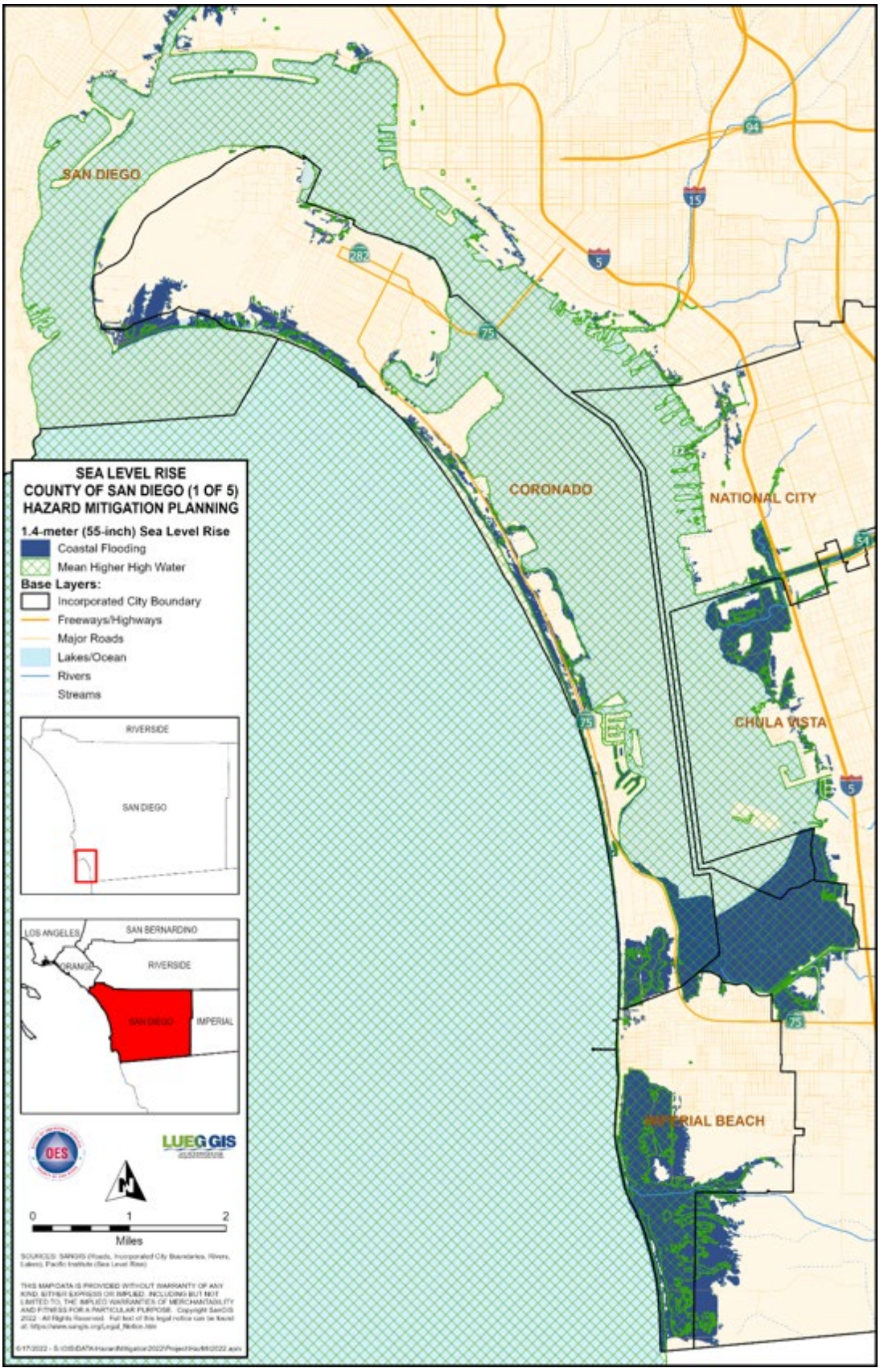

Figure 9: Map of San Diego County sea level rise hazard areas (1 of 5)

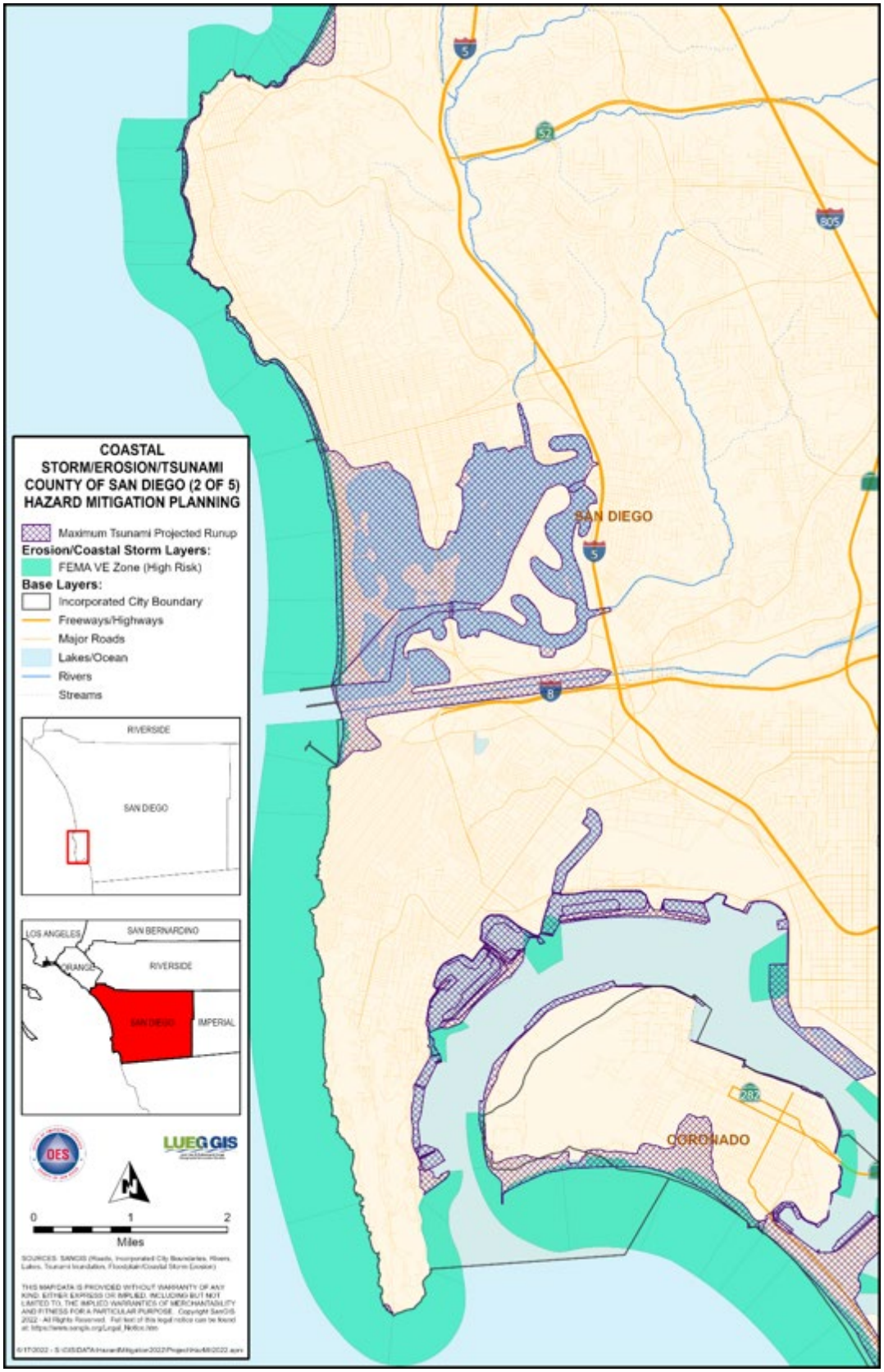

Figure 10: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (2 OF 5)

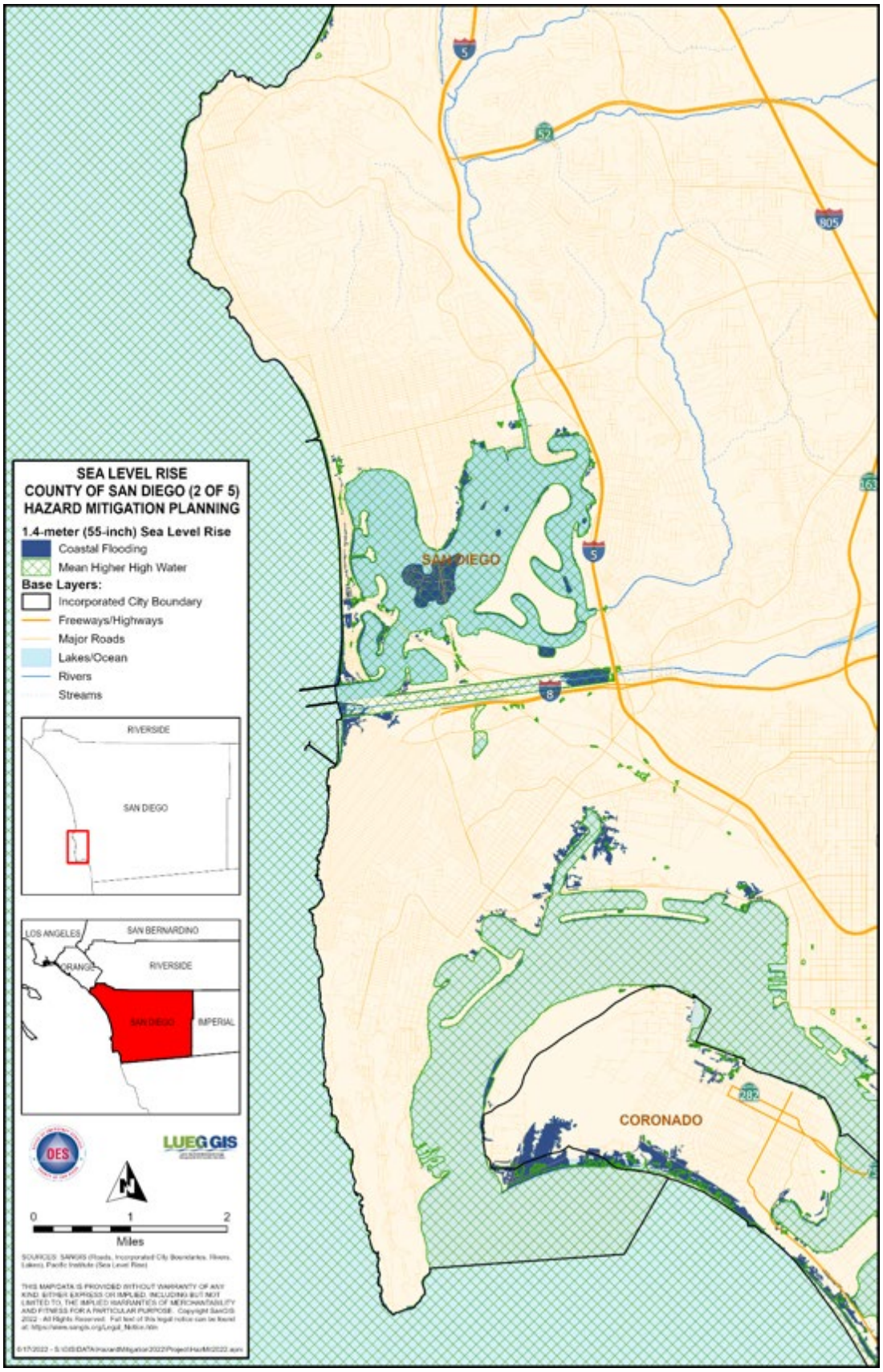

Figure 11: Map of San Diego County sea level rise hazard areas (2 of 5)

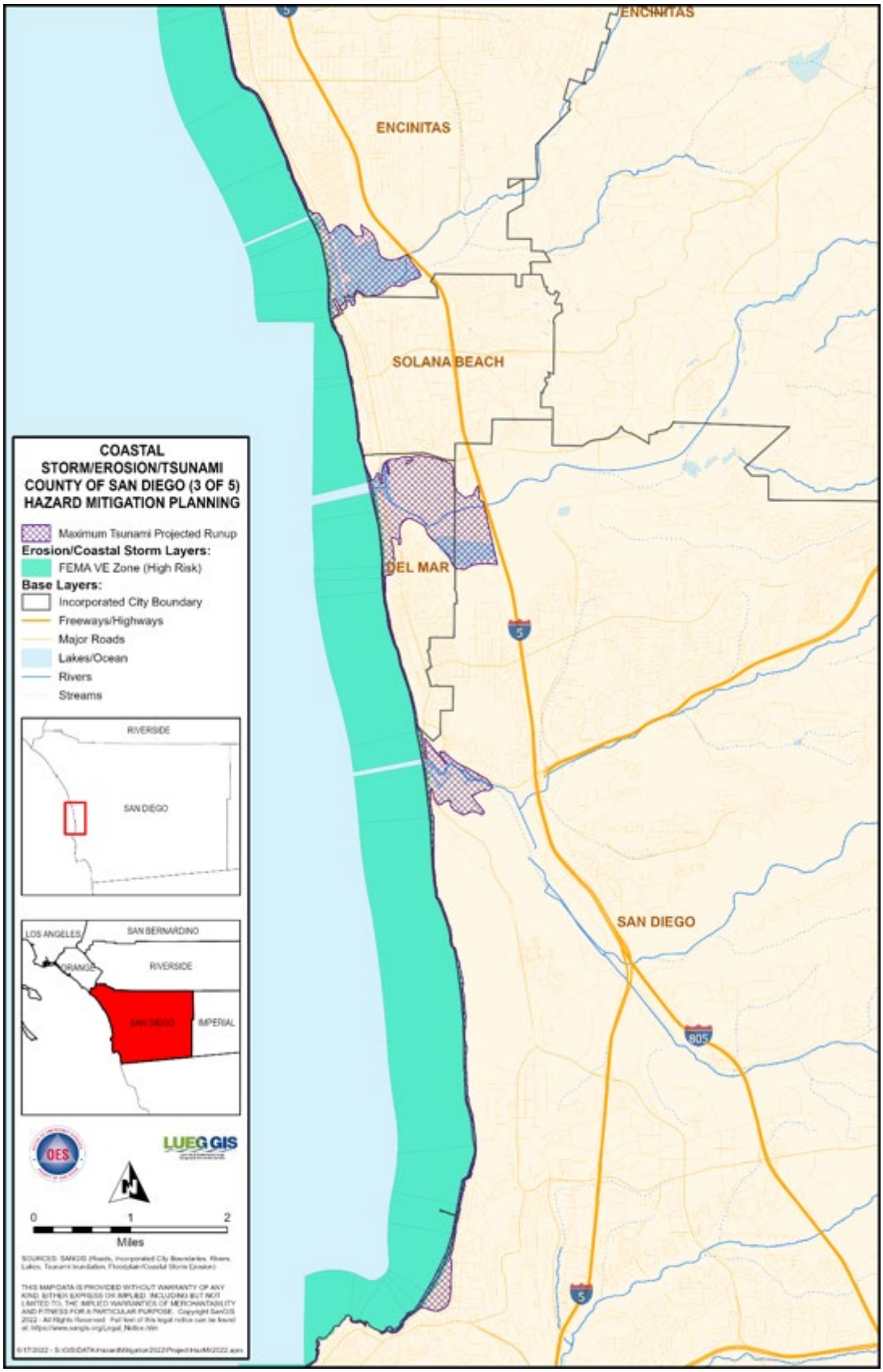

Figure 12: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (3 OF 5)

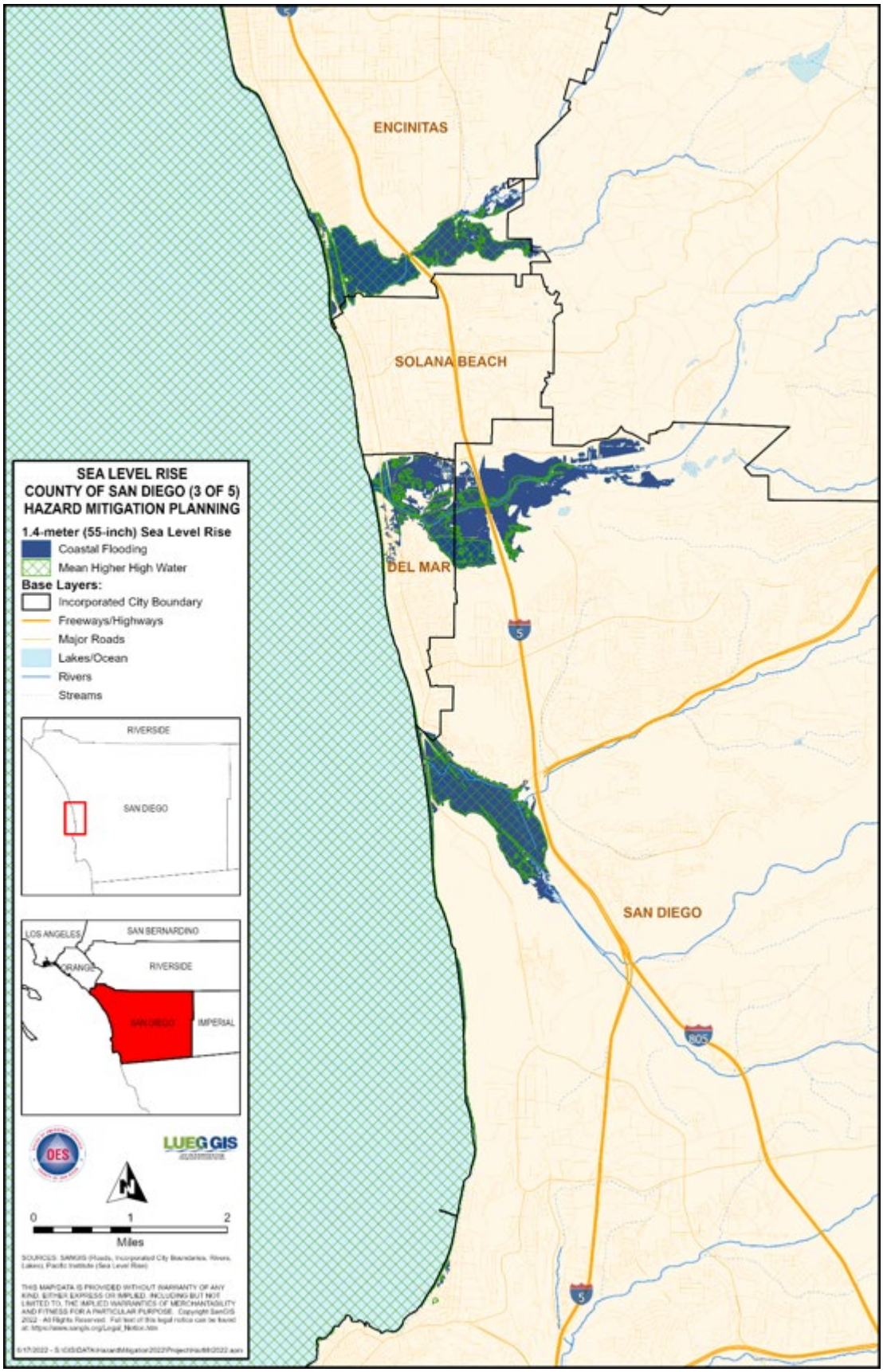

Figure 13: Map of San Diego County sea level rise hazard areas (3 of 5)

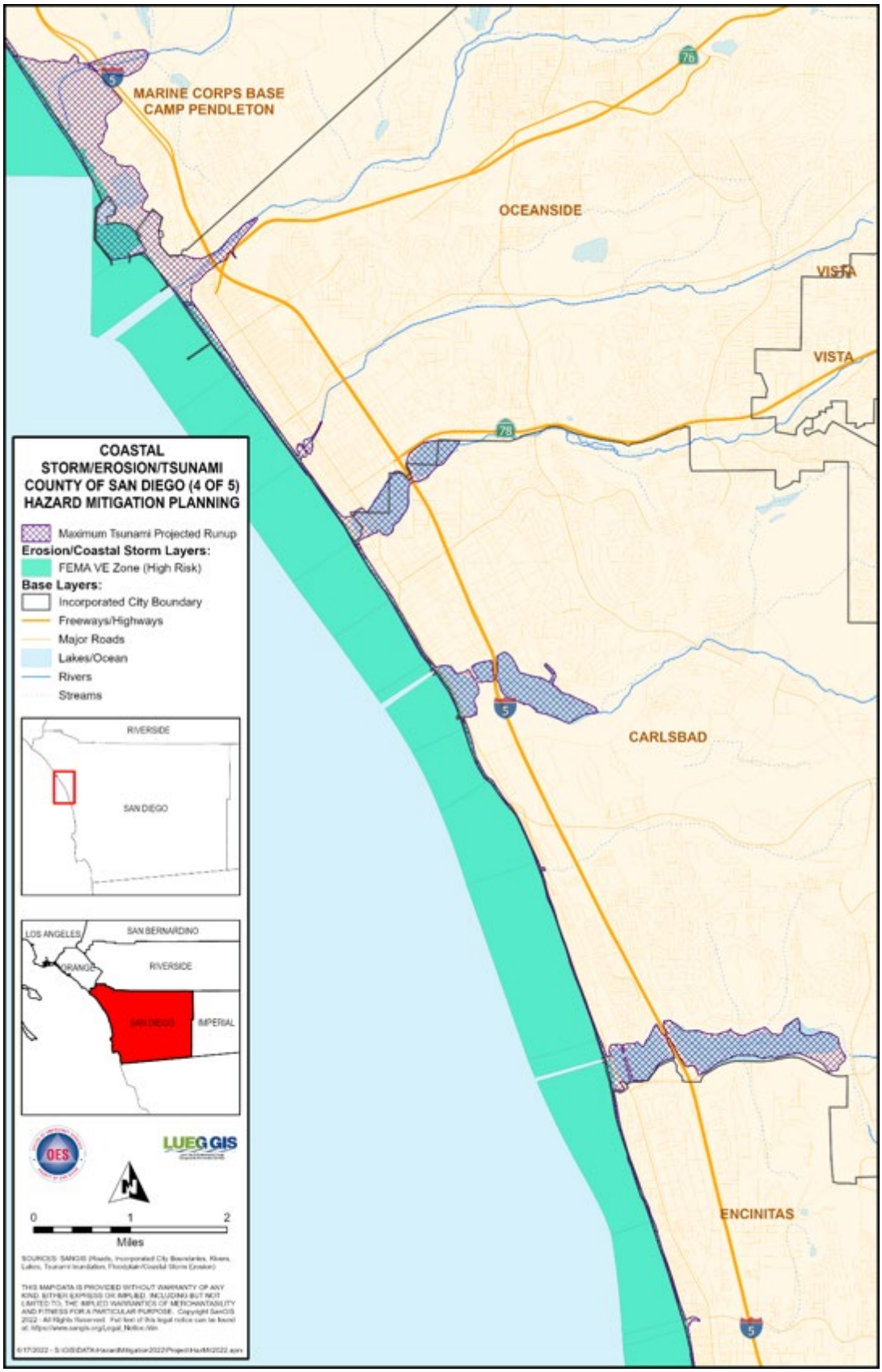

Figure 14: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (4 OF 5)

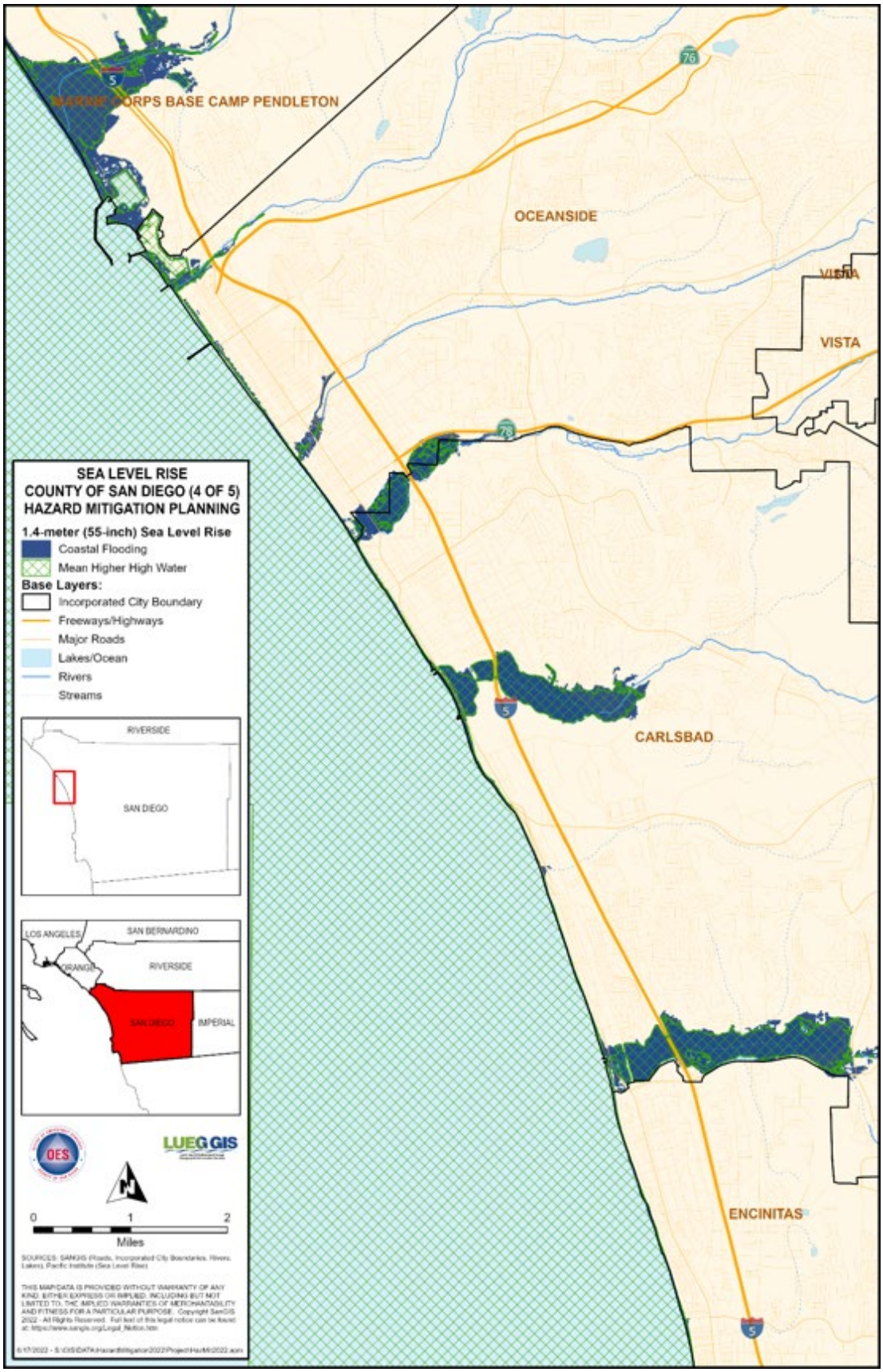

Figure 15: Map of San Diego County sea level rise hazard areas (4 of 5)

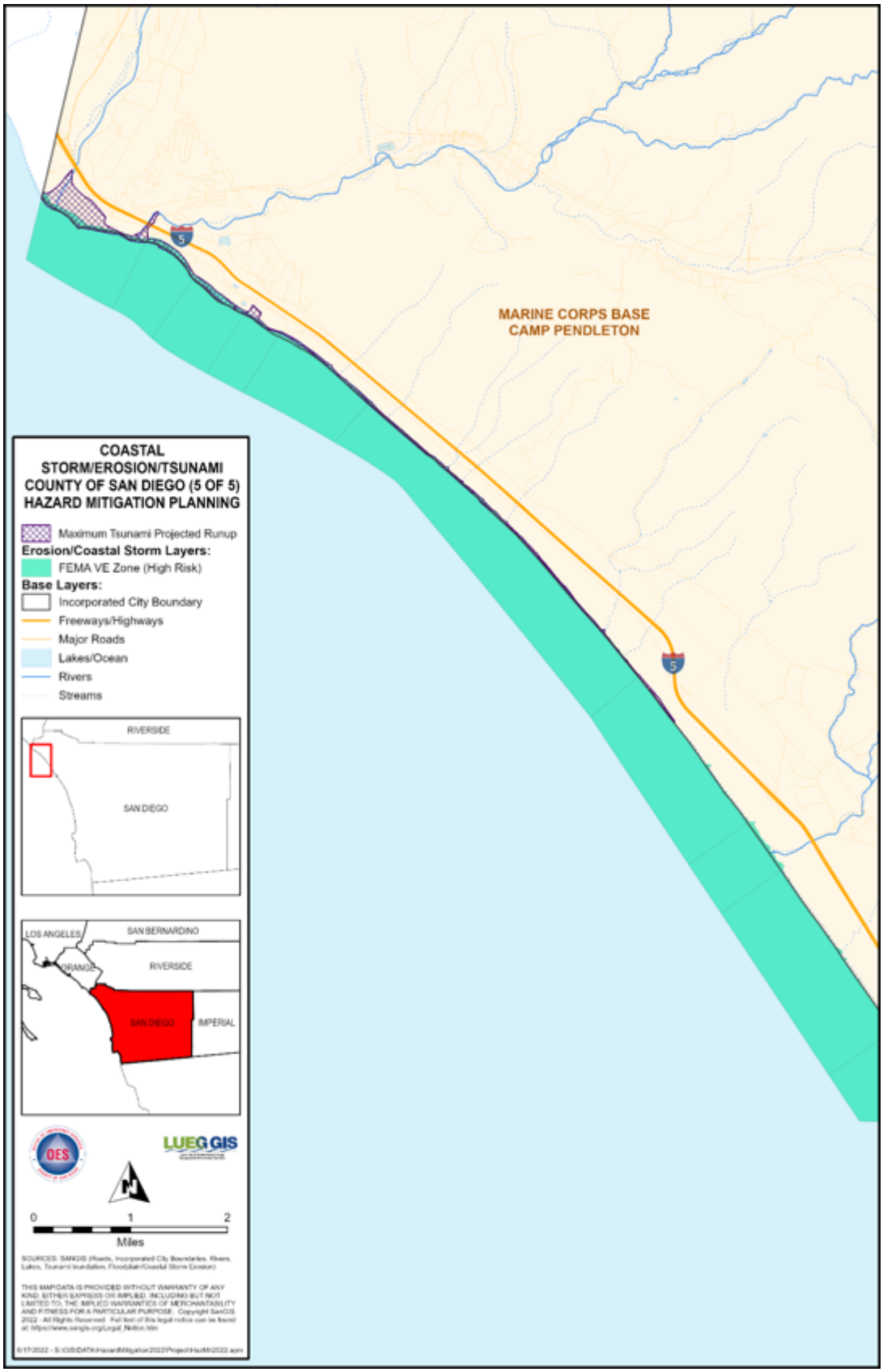

Figure 16: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (5 OF 5)

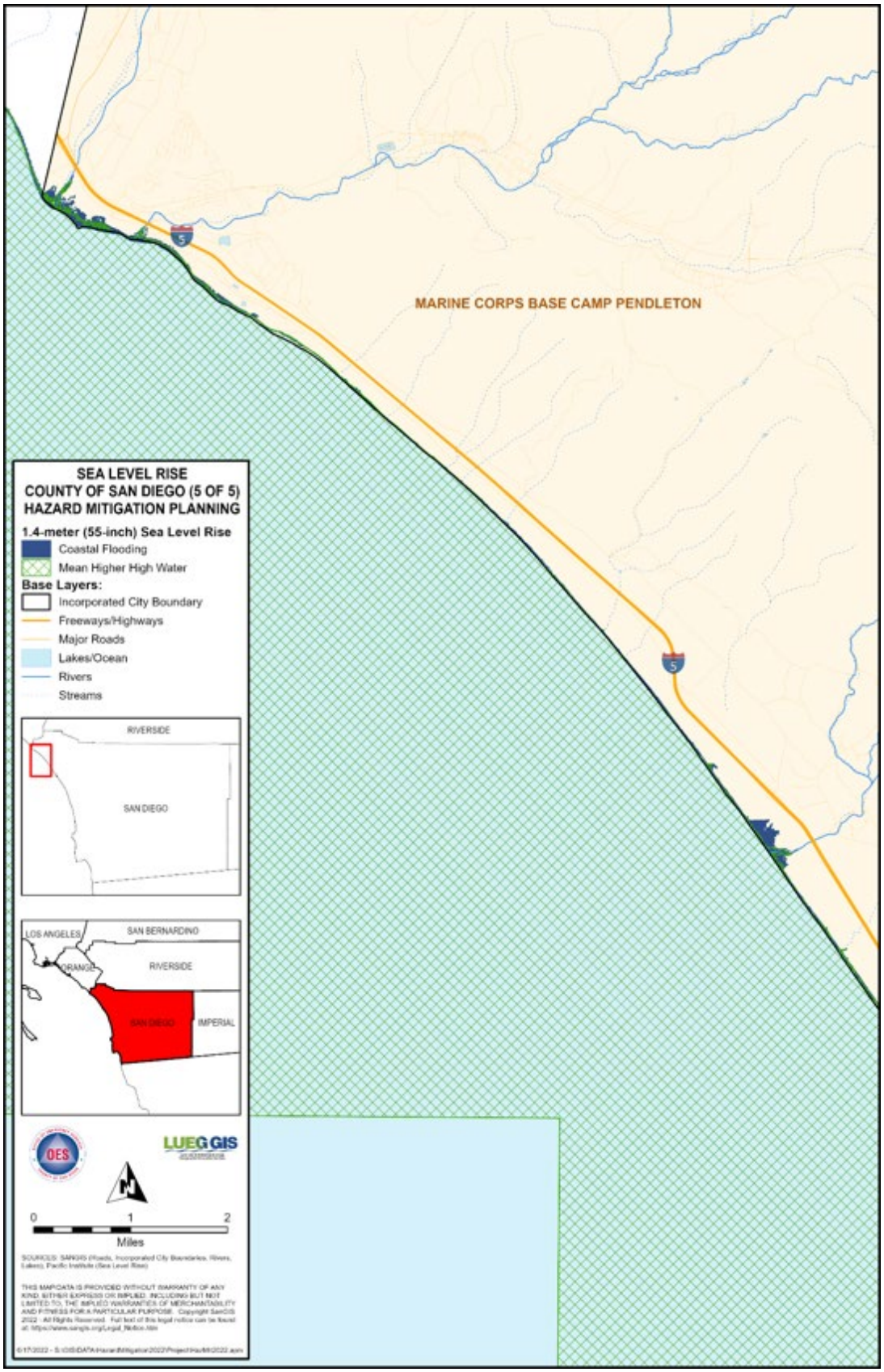

Figure 17: Map of San Diego County sea level rise hazard areas (5 of 5)

Maximum wind speeds along the coast are not expected to exceed 60 miles per hour, resulting in only minor wind-speed related damage. Coastal erosion risk is highest where geologically unstable cliffs become over-saturated by irrigation or rainwater. The greatest type of tsunami risk is material damage to small watercraft, harbors, and some waterfront structures (Joy 1968), with flooding along the coast, as shown in the run-up projections on the figure below.

The risk of damage from sea level rise is considered somewhat “Likely” with the risk of damage from coastal erosion considered to be “Likely” and tsunami “Highly Likely”.

Data used to profile this group of hazards included the digitized flood zones from the FEMA FIRM Flood maps, NOAA historical shoreline data, and Caltrans’ coastal zone boundary for the coastal storm/erosion hazard. Maximum tsunami run up projections modeled by the University of Southern California and distributed by the California Office of Emergency Services were used for identifying tsunami hazard. The tsunami model was the result of a combination of inundation modeling and onsite surveys and shows maximum projected inundation levels from tsunamis along the entire coast of San Diego County.

NOAA historical tsunami effects data were also used, which showed locations where tsunami effects have been felt, and when available, details describing size and location of earthquakes that caused the tsunamis. *The Shoreline Erosion Assessment and Atlas of the San Diego Region Volumes I and II* (SANDAG, 1992) were reviewed for the shoreline erosion category. This publication shows erosion risk levels of high, moderate, and low for the entire coastline of San Diego County.

For modeling purposes, the VE Zone of the FEMA FIRM map series was used as the high hazard value for coastal storms and coastal erosion. The VE Zone is defined by FEMA as the coastal area subject to a velocity hazard (wave action). Coastal storm and erosion risk were determined to be high if areas were found within the VE zone of the FEMA FIRM maps. Tsunami hazard risk levels were determined to be high if an area was within the maximum projected tsunami run-up and inundation area.

5.2.11. WILDFIRE/STRUCTURE FIRE

Nature of Hazard

A structure fire hazard is one where there is a risk of a fire starting in an urban setting and spreading uncontrollably from one building to another across several city blocks, or within high-rise buildings.

A wildfire is an uncontrolled fire spreading through vegetative fuels and exposing or possibly consuming structures. They often begin unnoticed and spread quickly. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires.

A wildfire is in a wildland area in which development is essentially nonexistent—except for roads, railroads, power lines and similar facilities. An Urban-Wildland/Urban Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels. Significant development in San Diego County is located along canyon ridges at the wildland/urban interface. Areas that have experienced prolonged droughts or are excessively dry are at risk of wildfires.

People start more than 80 percent of wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires. Wildfire behavior is

based on three primary factors: fuel, topography, and weather. The type, and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior.

The continuity of fuels, expressed in both horizontal and vertical components is also a determinant of wildfire potential and behavior. Topography is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the speed at which the fire travels, and the ability of firefighters to reach and extinguish the fire. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildfires.

San Diego County's topography consists of a semi-arid coastal plain and rolling highlands which, when fueled by shrub overgrowth, occasional Santa Ana winds and high temperatures, creates an ever-present threat of wildland fire. Extreme weather conditions such as high temperature, low humidity, and/or winds of extraordinary force may cause an ordinary fire to expand into one of massive proportions.

Large fires would have several indirect effects beyond those that a smaller, more localized fire would create. These may include air quality and health issues, road closures, business closures, and others that increase the potential losses that can occur from this hazard. Modeling for a larger type of fire would be difficult, but the consequences of the three largest San Diego fires this century (October, 2003, October 2007 and May 2014) should be used as a guide for fire planning and mitigation.

Disaster History

San Diego County's third worst wildfire in history, known as the Laguna Fire, destroyed thousands of acres in the backcountry in September of 1970. The fire resulted in the loss or destruction of 383 homes and 1,200 other structures.

In October 2003, the second-worse wild-land fire in the history of San Diego County destroyed 332,766 acres of land, 3,239 structures and 17 deaths at a cost of approximately $450M.

San Diego County's worst wildfire occurred in October 2007. At the height of the firestorm there were seven fires burning within the County. The fires destroyed 369,000 acres (13% of the County), 2,670 structures, 239 vehicles, and two commercial properties. There were 10 civilian deaths, 23 civilian injuries and 10 firefighter injuries. The cost of fire exceeded $1.5 billion.

Wildland fires prompted seven (7) Proclaimed States of Emergency, and Urban/Intermix Fires prompted four (4) Proclaimed States of Emergency in the County of San Diego between 1950-2020. The table below lists the most recent major wildfires in San Diego County.

TABLE 16: MAJOR WILDFIRES IN SAN DIEGO COUNTY LARGER THAN 5,000 ACRES

Fire	Date	Acres Burned	Structures Destroyed	Structures Damaged	Deaths
Conejos Fire	July 1950	62,000	Not Available	Not Available	0
Laguna Fire	October 1970	190,000	382	Not Available	5
Harmony Fire (Carlsbad, Elfin Forest, San Marcos)	October 1996	8,600	122	142	1
Viejas Fire	January 2001	10,353	23	6	0
Gavilan Fire (Fallbrook)	February 2002	6,000	43	13	0
Pines Fire (Julian, Ranchita)	July 2002	61,690	45	121	0
Cedar Fire	October 2003	280,278	5,171	63	14
Paradise Fire	October 2003	57,000	415	15	2
Otay Fire	October 2003	46,291	6	0	0
Roblar (Pendleton)	October 2003	8,592	0	0	0
Mataguay Fire*	July 2004	8,867	2	0	0
Horse Fire*	July 2006	16,681	Not Available	Not Available	0
Witch Creek Fire*	October 2007	197,990	1,125	77	2
Harris Fire*	October 2007	90,440	255	12	5
Poomacha Fire*	October 2007	49,410	139	Not Available	0
Ammo Fire*	October 2007	21,004	Not Available	Not Available	0
Rice Fire*	October 2007	9,472	208	Not Available	0
Bernardo, Poinsettia &	May 2014	26,000	65	19	0
Border Fire	June 2016	7,609	18	4	2
Valley Fire	September 2020	16,390	66	Not Available	0

** Information gathered from the California Department of Forestry and Fire Protection website*

Location & Extent/Probability of Occurrence & Magnitude

The wildfire maps use the most recent USGS Fire Regime data. Data for Regimes II and IV were utilized to develop the risk tables for the participating jurisdictions:

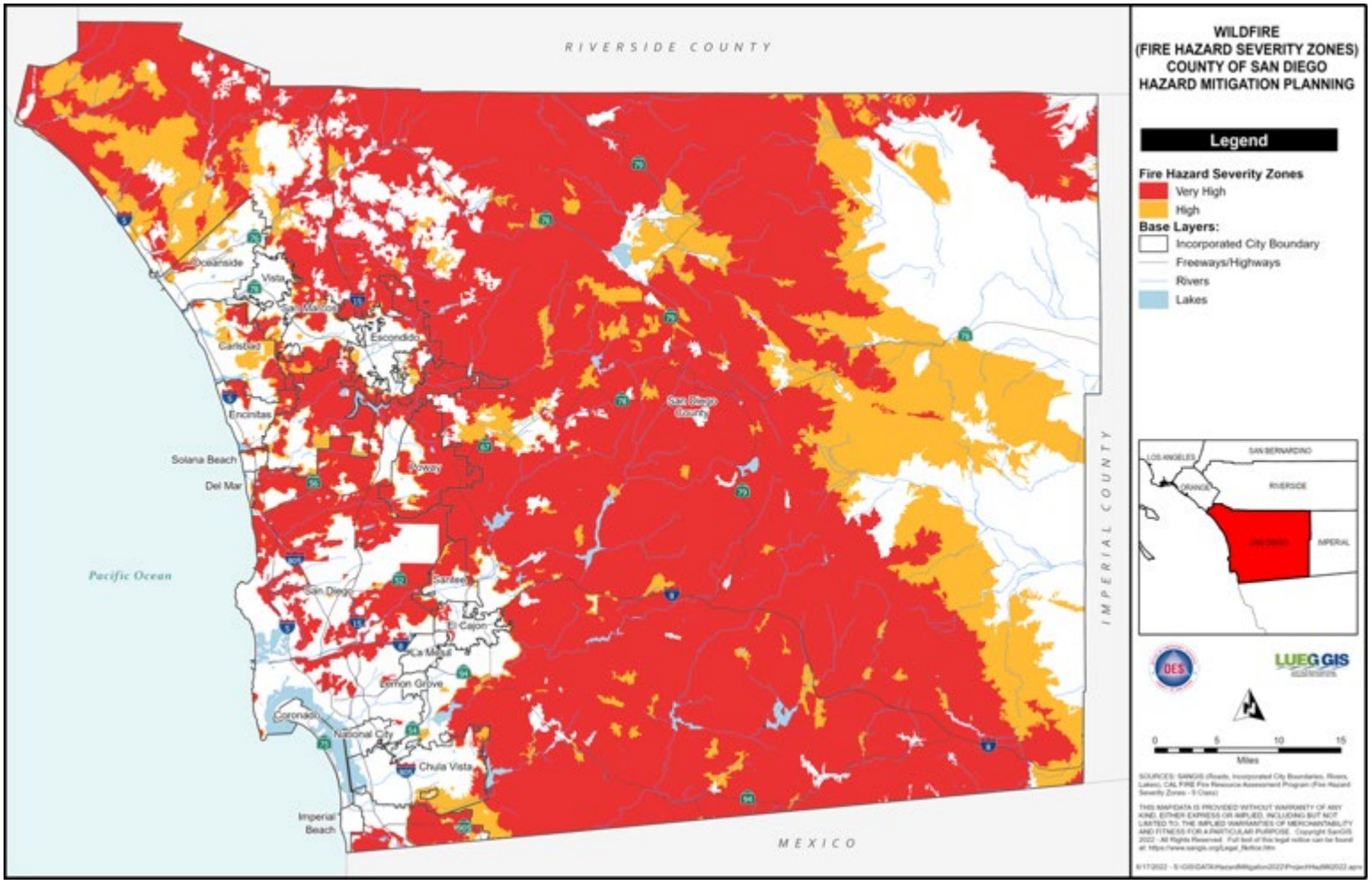

Figure 18: CAL FIRE Fire Hazard Severity Zones (High and Very High)

Under current climate conditions, the wildfire threat to property, lives, and ecosystems in the San Diego region is very high. With hotter temperatures and possibly fewer rainy days in the coming decades, vegetation could become drier. As a result, it is likely that San Diego region will see an increase in the frequency and intensity of fires, making the region more vulnerable to devastating fires like the ones seen in 2003 and 2007.[121] The fire season could also become longer and less predictable, making firefighting efforts more costly.[122]

Building density is also a factor in potential building loss during a wildfire. A recent study in the Ecological Society of America's publication *Ecological Applications*[123] indicates that the area of the building clusters, the number of buildings in the cluster and building dispersion all contribute to the potential for building loss. While all three factors had a positive influence on the number of structures lost, larger building structures were most strongly associated with building loss. The most likely reason being that more buildings are exposed. Two other top factors were the number of buildings in the cluster and the distance to the nearest building. In the Mediterranean California model the closer the buildings were to each other the less likely they were to be affected.

An increase in wildfire also impacts public health. Fire-related injuries and death are likely to increase as wildfires occur more frequently.[124] Wildfires can also be a significant contributor to air pollution. Wildfire smoke contains numerous toxic and hazardous pollutants that are dangerous to breath and can worsen lung disease and other respiratory conditions.[125]

The potential for a wildfire in the San Diego region is considered "Highly Likely".

5.2.12. ALL-HAZARD EVACUATIONS

Evacuation is a process by which people must move from a place where there is immediate or anticipated danger, to a place of safety, and offered appropriate and accessible temporary shelter facilities. A decision to evacuate areas will be made through Unified Command. Law enforcement agencies are the primary lead for evacuation activities, with other agencies playing supporting roles. The overarching goal of evacuation planning in San Diego County is to maximize the preservation of life while reducing the number of people that must evacuate and the distance they must travel to seek refuge.

The County of San Diego Emergency Operations Plan's (EOP's) Annex Q (Evacuation Annex) is written in coordination with this plan, and describes how emergency personnel will cooperate, decide, and implement responses to a disaster that requires an evacuation of people and their pets. The EOP Evacuation Annex aims to lessen the impact a large-scale evacuation can have on the host communities by providing estimates for the number of people who may require sheltering or transportation assistance and the estimated number of pets that may need to be evacuated.[126]

[121] San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation.

[122] Ibid.

[123] Alexander, Patricia M., et. al. (2016). Factors related to Building Loss Due to Wildfires in the Conterminous United States. *Ecological Applications, 0(0),* 1-16.

[124] Ibid.

[125] Ibid.

[126] San Diego County Emergency Operations Plan

Legal Considerations

It is important to note evacuation strategies, routes, and locations may vary due to the type, severity, movement, and other unique features of a hazard. For example, the maps below can be used to evacuate during a Tsunami hazard:

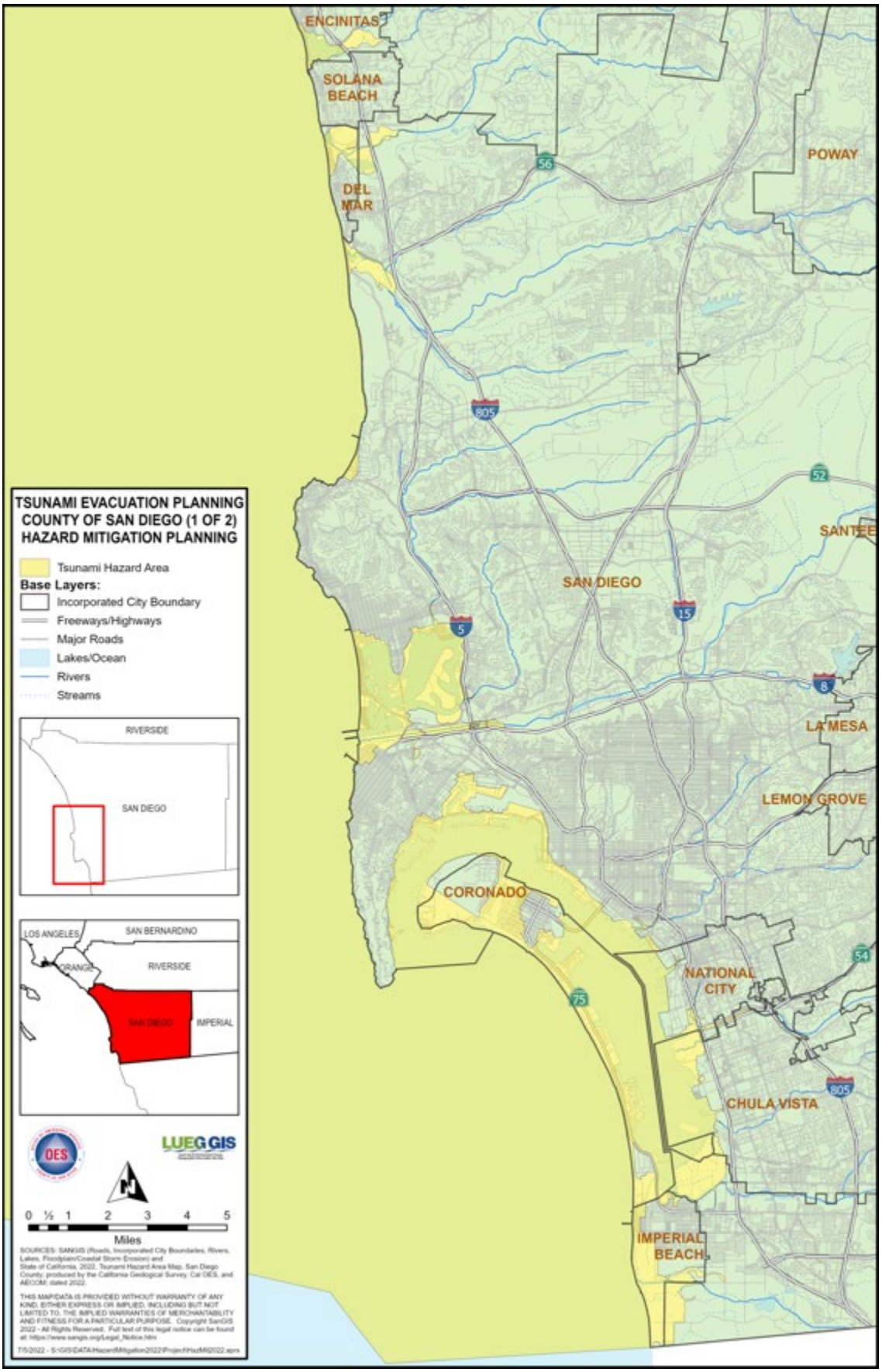

Figure 19: County of San Diego, Tsunami Evacuation Map 1

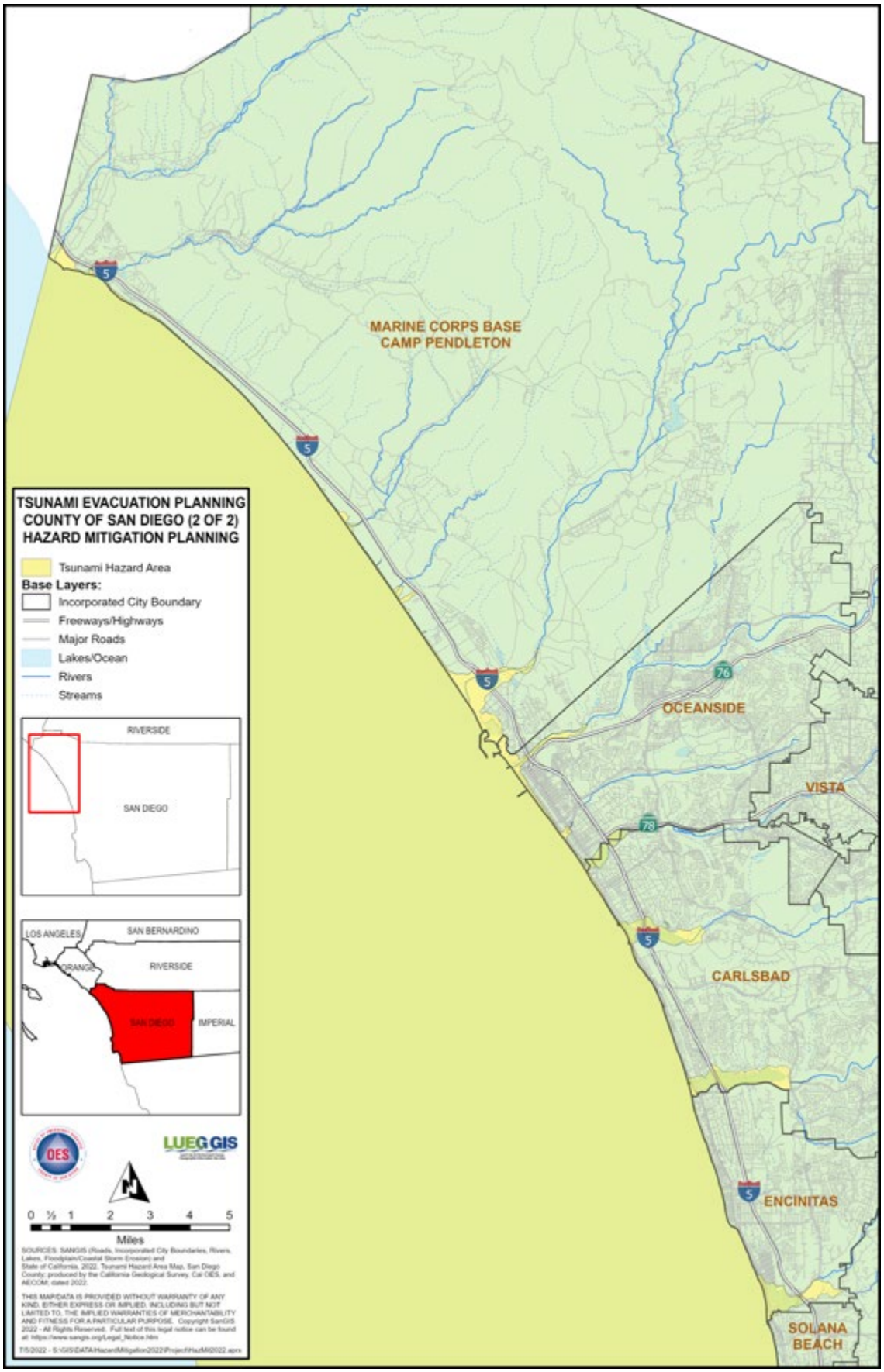

Figure 19: County of San Diego, Tsunami Evacuation Map 2

The EOP Evacuation Annex provides hazard specific considerations, general evacuation transportation routes and capacities, evacuation resources available locally and through mutual aid, and disability and access and functional needs considerations. [127]

Evacuation orders should be issued when there is a clear and immediate threat to the health and safety of the population, and it is determined that evacuation is the best option for protection. The State of California, San Diego County, and the jurisdictions within, through the Unified Disaster Council, have agreed to use the language below, as described in FireScope, to communicate evacuations:

Evacuation Warning: The alerting of people in an affected area(s) of potential threat to life and property. An Evacuation Warning considers the probability that an area will be affected within a given time frame and prepares people for a potential evacuation order. Evacuation Warnings are particularly necessary when dealing with a variety of issues such as special needs populations and large animals.

Evacuation Order: Requires the immediate movement of people out of an affected area due to an imminent threat to life.

Shelter-In-Place: Advises people to stay secure at their current location. This tactic shall only be used if an evacuation will cause a higher potential for loss of life. Consideration should be given to assigning incident personnel to monitor the safety of those remaining in place. The concept of shelter-in-place is an available option in those instances where physical evacuation is impractical. This procedure may be effective for residential dwellings in the immediately impacted areas, or for large facilities that house a high percentage of non-ambulatory persons (e.g., hospitals and convalescent homes). Sheltering-in-place attempts to provide a safe haven within the impacted area.

In 2005, the Chief Legal Counsel for the San Diego Sheriff's Department maintained an opinion based on case law that Penal Code Section 409.5 does not authorize forcible or mandatory evacuations. The Chief Legal Counsel stated, "without a specific legislative amendment to Penal Code Section 409.5, it would be improper to infer statutory authority to forcibly evacuate people who do not wish to be evacuated, unless their presence in the closed area, resulted from an entry made after the area was closed pursuant to 409.5(a) or 409.5(b)." See Attachment 4 for Penal Code 409.5.

Emergency responders shall make every effort to inform people that failure to evacuate may result in serious physical injury or death and that future opportunities to evacuate may not exist. Law enforcement will document the location of individuals that refuse to evacuate. Once, Unified Command orders an evacuation, it is critical that public information dissemination, sheltering resources, and security and protection of private property are provided to a level where the public feels evacuation is more desirable than staying behind.

This plan specifically provides a condensed version of potential evacuation routes and temporary evacuation locations to be used under a range of emergency scenarios. However, during a true hazard, please be advised Unified Command and law enforcement instructions are subject to change depending on hazard types and conditions.

[127] San Diego County Emergency Operations Plan

Evacuation Routes:

Evacuations that must be conducted during the standard working commuting hours will severely impact evacuation routes. If possible, alternate routes should be used or contraflow methods should be explored.

The following maps show the major highways within the San Diego OA and the most congested segments of those highways during the morning and evening commutes.

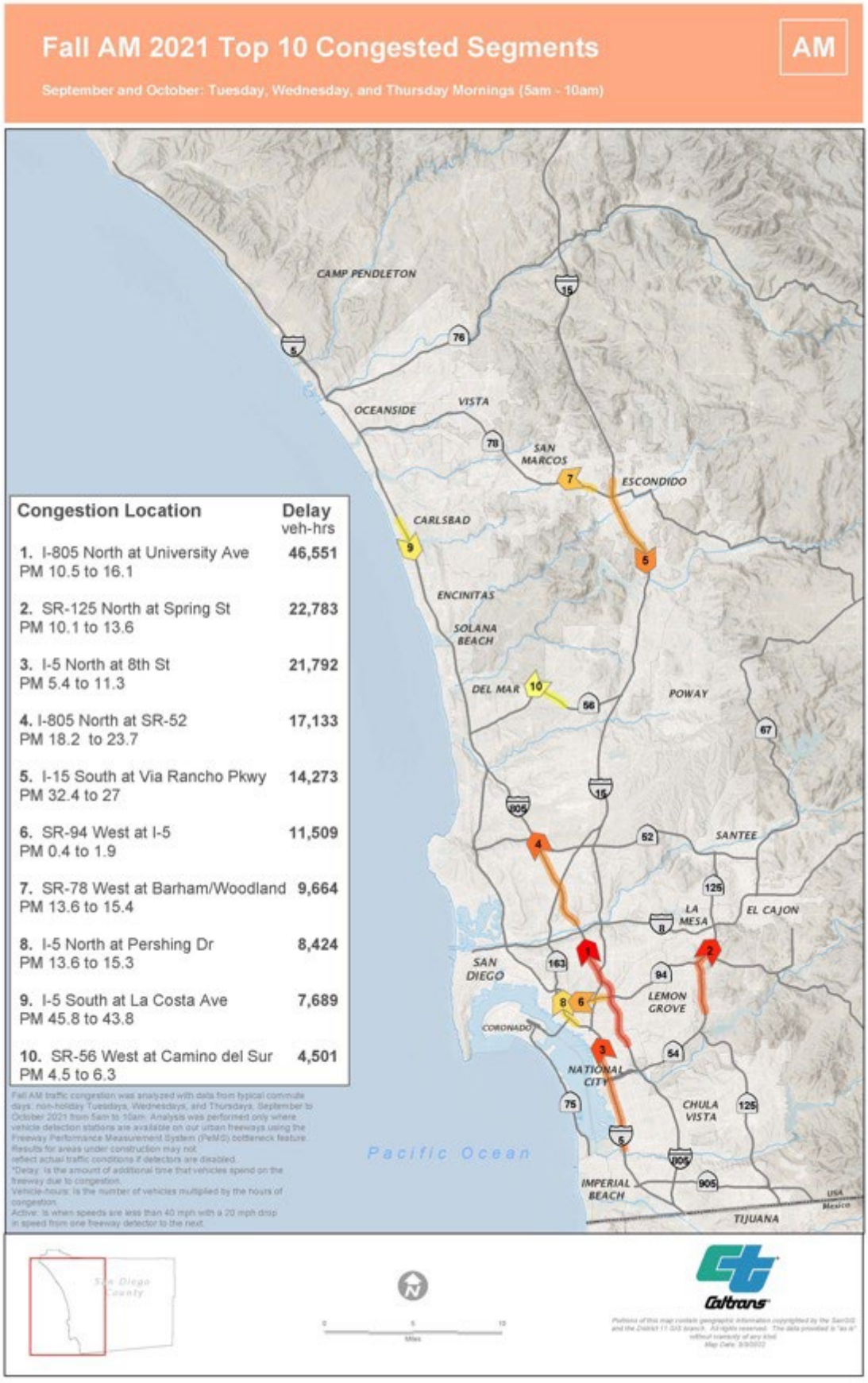

Figure 21: San Diego County 2021 Top 10 Morning Congested Segments

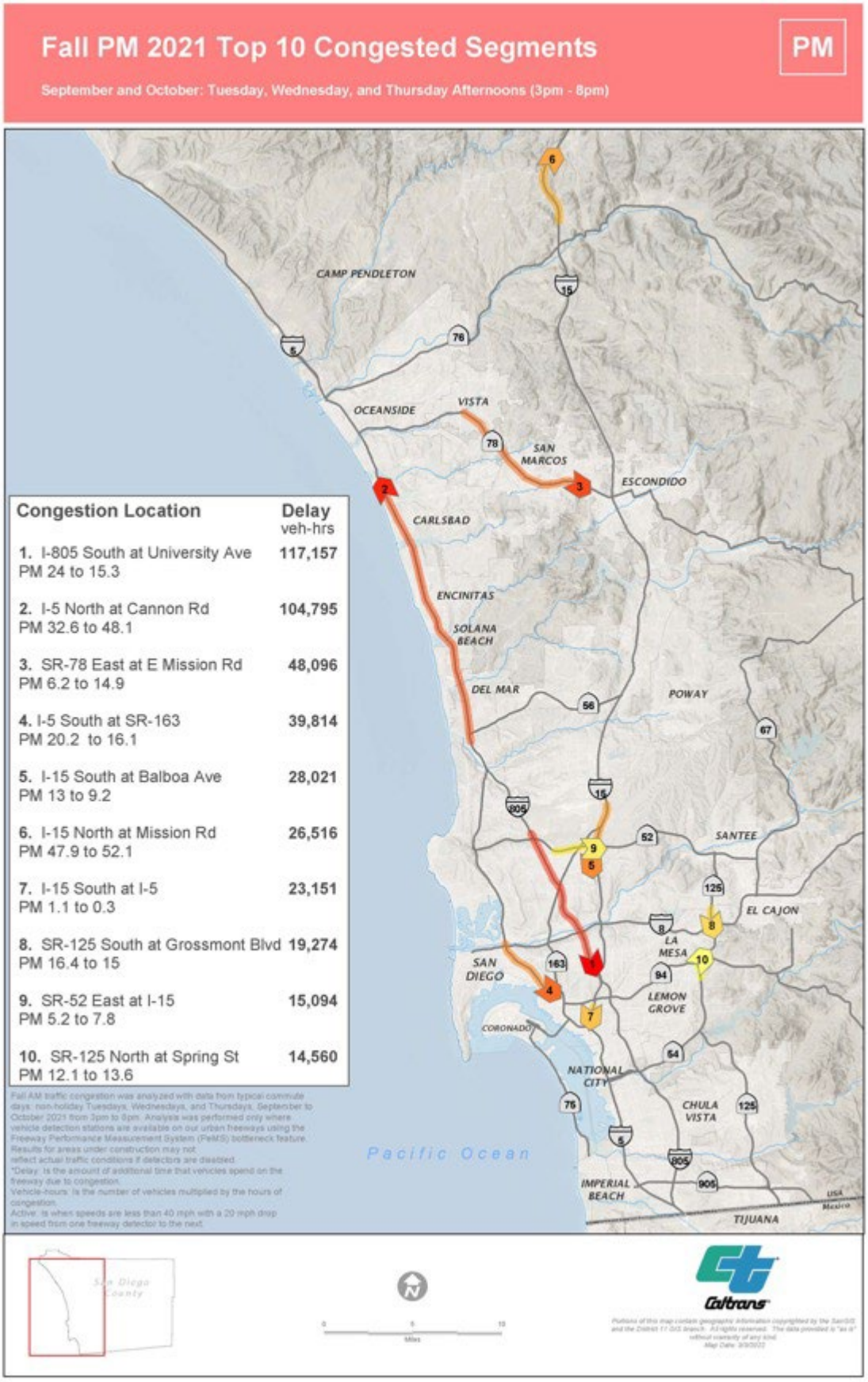

Figure 22: San Diego County 2021 Top 10 Afternoon Congested Segments

Temporary Evacuation Points & Sheltering

When law enforcement implements an evacuation order, they will coordinate with the Unified Command to decide on a location to use as a Temporary Evacuation Point (TEP). A TEP is a site with limited resources and staffing, as its primary purpose is to provide evacuees with a safe and protected place to congregate temporarily until people can return home or relocate to another facility. TEP location choices are situationally dependent, but can be places like a school, community center, or church.

The Operational Area Emergency Operations Center (OA EOC), along with the OA EOC Care & Shelter Branch, will coordinate the locations to be used as emergency shelters if necessary. The OA EOC staff may assist, as requested, in the coordination of an evacuation in an incorporated city. The San Diego Sheriff's Department Dispatch Center, in conjunction with the OA EOC and Joint Information Center (JIC), will utilize the AlertSanDiego system, social media, radio, television, IPAWS, etc. to direct evacuees to the established TEP or shelter. Local jurisdictions all have access to the same alert and warning tools as the OA and should follow their internal protocols for sharing information with the public.

TEPs will serve as temporary safe zones for evacuees, but they generally do not provide any services, such as food, water, restrooms, etc. Emergency shelters are opened when at least one overnight stay is necessary. Basic services are provided at emergency shelters, which includes meals, accessible shower facilities, dormitory management, health, and behavioral health services. Some temporary evacuation points may be suitable to be converted into an emergency shelter location, if necessary and available.

When overnight sheltering is required, Annex G: Care and Shelter Operations of the County of San Diego Operational Area Emergency Operations Plan (OA EOP) will be activated. [128]

5.3. VULNERABILITY ASSESSMENT

Vulnerability describes how exposed or susceptible to damage an asset is, and depends on an asset's construction, contents, and the economic value of its functions. This vulnerability analysis predicts the extent of injury and damage that may result from a hazard event of a given intensity in each area on the existing and future built environment. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. Indirect effects can be much more widespread and damaging than direct effects. For example, damage to a major utility line could result in significant inconveniences and business disruption that would far exceed the cost of repairing the utility line.

The vulnerability assessment for this plan was conducted by the County of San Diego Land Use and Environment Group's Geographic Information Systems staff (listed in Section 2).

All planning participants were requested by County OES to provide feedback on assessment data and attest to respective jurisdictional accuracy on November 10, 2021 via electronic communication.

[128] Ibid

5.3.1. ASSET INVENTORY

Hazards that occur in San Diego County can impact critical facilities located in the County. A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions.

The figure in the next subsection shows the critical facilities identified for the County. The critical facilities identified in San Diego County include:

- hospitals and other health care facilities
- emergency operations facilities
- fire stations
- police stations
- schools
- hazardous material sites
- transportation systems that include airport facilities, bridges, bus and rail facilities
- marinas and port facilities
- highways
- utility systems that include electric power facilities, natural gas facilities, crude and refined oil facilities, potable and wastewater facilities, and communications facilities and utilities
- dams
- government office/civic centers, jails, prisons, military facilities, religious facilities, and post offices.

GIS, HAZUS-MH, and other modeling tools were used to map the critical facilities in the county and to determine which would most likely be affected by each of the profiled hazards. San Diego County covers 4,261 square miles with several different climate patterns and types of terrain, which allows for several hazards to affect several different parts of the county and several jurisdictions at once or separately.[129] The hazards addressed are described in the previous section.

5.3.2. ESTIMATING POTENTIAL EXPOSURE & LOSSES AND FUTURE DEVELOPMENT TRENDS

GIS modeling was used to estimate exposure to population, critical facilities, infrastructure, and residential/commercial properties, from:

- Coastal storms/erosion
- Tsunami
- Wildfire/Structure fire
- Dam failure
- Landslide
- Human-caused hazards

[129] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

The specific methods and results of all analyses are presented below. The results are shown as potential exposure in thousands of dollars, and as the worst-case scenario.

For infrastructure, which has been identified as highways, railways and energy pipelines, the length of exposure/impact is given in kilometers. Exposure characterizes the value of structures within the hazard zone, and is shown as estimated exposure based on the overlay of the hazard on the critical facilities, infrastructure, and other structures, which are given an assumed cost of replacement for each type of structure exposed.

These replacement costs are estimated using a building square footage inventory purchased from Dun and Bradstreet. The square footage information was classified based on Standard Industrial Code (SIC) and provided at a 2002 census-tract resolution.

The loss or exposure value is then determined with the assumption that the given structure is totally destroyed (worst case scenario), which is not always the case in hazard events. This assumption was valuable in the planning process, so that the total potential damage value was identified when determining capabilities and mitigation measures for each jurisdiction.

The table below provides abbreviations and average replacement costs used for critical facilities and infrastructure listed in all subsequent exposure/loss tables. The table provides the total inventory and exposure estimates for the critical facilities and infrastructure by jurisdiction and shows the estimated exposure inventory for infrastructure by jurisdiction. The table also provides an inventory of the maximum population and building exposure by jurisdiction.

Loss was also estimated for earthquake and flood hazards in the County, in addition to exposure. Loss is that portion of the exposure that is expected to be lost to a hazard and is estimated by referencing frequency and severity of previous hazards. Hazard risk assessment methodologies embedded in HAZUS, FEMA's loss estimation software, were applied to earthquake and flood hazards in San Diego County. HAZUS (a loss estimation software) integrates with GIS to provide estimates for the potential impact of earthquake and flood hazards by using a common, systematic framework for evaluation.

This software contains economic and structural data on infrastructure and critical facilities, including replacement value costs with square footage and valuation parameters to use in loss estimation assumptions. This approach provides estimates for the potential impact by using a common, systematic framework for evaluation. The HAZUS risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g. ground shaking and building types) were modeled to determine the impact (damages and losses) on the built environment. The HAZUS-MH models were used to estimate losses from earthquake and flood hazards to critical facilities, infrastructure, and residential/commercial properties, as well as economic losses on several return period events and annualized levels. Loss estimates used available data, and the methodologies applied resulted in an approximation of risk.

The economic loss results are presented as the Annualized Loss (AL) for the earthquake hazard. AL addresses the two key components of risk: the probability of the hazard occurring in the study area and the consequences of the hazard, largely a function of building construction type and quality, and of the intensity of the hazard event. By annualizing estimated exposure values, the AL takes into account historic patterns of frequent smaller events with infrequent but larger events to provide a balanced presentation of the risk.

These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from

incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (such as incomplete inventories, demographics, or economic parameters).

TABLE 17: ABBREVIATIONS AND COSTS USED FOR CRITICAL FACILITIES AND INFRASTRUCTURE

Abr.	Name	Building Type (where applicable)	Average Replacement Cost
AIR	Airport facilities - large	s1l	$14,416,100
BRDG	Highway Bridges	n/a	$6,670,000
BUS	Bus facilities	c1l	$1,830,000
COM	Communication facilities	c1l	$4,000,000
ELEC	Electric Power facility	c1l	$875,000,000
EMER	Emergency Centers, Fire Stations and Police Stations	c1l	$3,048,000
GOVT	Government Office/Civic Center	c1l	$3,048,000
HOSP	Medical Care facilities	s1m	$16,629,250
INFR	Kilometers of Infrastructure. Includes:		
	Oil/Gas Pipelines (OG)	n/a	$683,000
	Railroad Tracks (RR)	n/a	$1,500,000
	Highway (HWY)	n/a	$6,668,000
PORT	Port facilities	c1l	20,000,000
POT	Potable and Wastewater facilities	c1l	$193,611,700
RAIL	Rail facilities	c1l	$3,000,000
SCH	Schools	rm1l	$74,400 / Student

TABLE 2: INVENTORY OF CRITICAL FACILITIES AND EXPOSURE VALUE BY JURISDICTION

Jurisdiction	Data (x1000)	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine FPD	Number	0	37	0	0	1	2	3	0	0	0	5	48
	Exposure	0	246,790	0	0	47,000	6,096	9,144	0	0	0	133,644	442,674
Carlsbad	Number	1	46	0	0	7	10	11	0	0	5	21	101
	Exposure	4,377,391	26,162,610	0	0	100,173,000	1,520,952	33,528	0	0	1,884,447	1,274,946	135,426,874
Chula Vista	Number	0	66	4	0	8	16	18	2	0	1	70	185
	Exposure	0	25,905,350	7,320	0	98,705,000	1,530,096	54,864	33,259	0	30,000	156,709,430	282,975,319
Coronado	Number	0	2	0	1	3	3	5	1	0	0	4	19
	Exposure	0	13,340	0	4,000	141,000	1,304,544	15,240	16,629	0	0	225,996	1,720,749
Del Mar	Number	0	6	0	0	0	3	4	0	0	0	0	13
	Exposure	0	25,484,190	0	0	0	234,696	12,192	0	0	0	0	25,731,078
El Cajon	Number	1	59	3	0	8	12	17	0	0	0	34	134
	Exposure	4,368,696	393,530	5,490	0	97,378,000	1,539,240	51,816	0	0	0	153,980,088	257,716,860
Encinitas	Number	0	17	0	0	1	7	10	1	0	1	12	49
	Exposure	0	25,068,750	0	0	47,000	1,298,448	30,480	16,629	0	163,612	579,494	27,204,413
Escondido	Number	0	78	0	1	11	12	17	1	0	2	35	157
	Exposure	0	24,980,140	0	4,000	96,004,000	1,539,240	51,816	16,629	0	2,151,670	2,129,942	126,877,437
Heartland Fire District	Number	1	118	5	0	11	20	28	1	0	0	53	237
	Exposure	263,077	784,210	9150	0	3,001,000	60,960	85,344	16,629	0	0	9,341,908	13,562,278
Imperial Beach	Number	0	0	0	0	0	2	5	0	0	0	5	12
	Exposure	0	0	0	0	0	1,252,728	15,240	0	0	0	289,784	1,557,752
La Mesa	Number	0	44	2	0	2	5	6	1	0	0	14	74
	Exposure	0	23,734,770	3,660	0	90,302,000	1,548,384	18,288	16,629	0	0	668,146	116,291,877
Lemon Grove	Number	0	15	0	0	1	3	5	0	0	0	5	29
	Exposure	0	23,460,350	0	0	47,000	1,548,384	15,240	0	0	0	208,236	25,279,210
National City	Number	0	65	0	0	6	5	7	1	0	0	15	99
	Exposure	0	23,407,010	0	0	282,000	1,548,384	21,336	16,629	0	0	919,450	26,194,809
Oceanside	Number	1	46	1	2	4	16	19	1	0	2	37	129
	Exposure	3,501,640	23,054,470	1,830	8,000	89,897,000	1,554,480	57,912	16,629	0	327,223	149,017,722	267,436,906
Otay Water District	Number	0	85	1	15	16	20	15	1	0	2	65	220
	Exposure	0	566,950	1,830	60,000	4,892,000	60,960	45,720	16,629	0	193,612	10,820,428	16,658,129
Poway	Number	0	51	0	0	4	4	4	1	0	8	10	82
	Exposure	0	340,170	0	0	188,000	1,219,200	12,192	16,629	0	1,290,000	666,962	3,733,153
Padre Dam Municipal Water District	Number	1	145	0	0	3	11	11	0	0	1	28	200
	Exposure	263,077	967,150	0	0	141,000	33,528	33,528	0	0	163,612	8,060,450	9,662,345
Port of San Diego	Number	1	3	0	0	3	7	4	0	1	0	0	19
	Exposure	300,604	19,060	0	0	969,000	21,336	12,192	0	719,793	0	0	2,041,985
Rainbow Municipal Water District	Number	0	43	0	1	3	4	2	0	0	2	4	59
	Exposure	0	286,810	0	4,000	1,797,000	12,192	6,096	0	0	60,000	150,590	2,316,688
Rancho Santa Fe FPD	Number	0	26	0	0	5	4	5	0	0	8	6	54
	Exposure	0	173,420	0	0	1,063,000	12,192	15,240	0	0	1,008,059	310,874	2,582,785

Jurisdiction	Data (x1000)	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Ramona Municipal Water District	Number	1	25	0	5	4	6	7	0	0	4	7	59
	Exposure	182,097	166,750	0	20,000	1,844,000	18,288	21,336	0	0	387,223	351,870	2,991,564
San Diego (City)	Number	3	625	12	34	82	108	150	9	2	9	309	1,343
	Exposure	4,330,939	20,479,000	21,960	716,000	83,721,000	1,767,840	457,200	149,663	726,492	5,579,457	150,957,410	268,906,961
San Diego County Water Authority	Number	6	1,592	24	70	182	285	346	18	2	52	722	3,299
	Exposure	1,540,729	10,541,690	43,920	280,000	44,986,000	868,680	1,054,608	299,327	726,493	4,900,293	92,015,670	157,257,409
San Marcos	Number	0	24	1	2	2	10	8	0	0	0	30	77
	Exposure	0	6,945,810	1,830	360,000	36,879,000	1,969,008	24,384	0	0	0	103,068,310	149,248,342
San Miguel FPD	Number	0	100	0	0	4	10	10	0	0	3	30	157
	Exposure	0	667,000	0	0	188,000	30,480	30,480	0	0	193,612	4,125,426	5,234,998
Santee	Number	0	50	0	1	1	3	7	0	0	1	11	74
	Exposure	0	333,500	0	4,000	47,000	914,400	21,336	0	0	163,612	682,576	2,166,424
Solana Beach	Number	0	4	0	0	0	1	4	0	0	0	4	13
	Exposure	0	26,680	0	0	0	3,048	12,192	0	0	0	113,146	155,066
Sweetwater Authority	Number	0	124	3	0	13	14	24	2	0	2	49	231
Sweetwater Authority	Exposure	0	816,630	5,490	0	2,267,000	42,672	73,152	33,259	0	60,000	2,687,162	5,985,365
Unincorpor-ated	Number	1	567	0	37	73	85	78	1	0	32	115	989
	Exposure	4,232,543	5,091,690	0	644,000	35,841,000	938,784	237,744	16,629	0	11,853,925	97,291,574	156,147,889
Vallectios Water District	Number	0	29	1	7	2	3	8	0	0	2	34	86
	Exposure	0	180,580	1,830	28000	922,000	9,144	24,384	0	0	193612	14,349,340	15,708,890
Vista	Number	0	15	1	0	2	13	9	0	0	0	22	62
	Exposure	0	1,285,990	1,830	0	94,000	2,054,352	27,432	0	0	0	1,124,726	4,588,330
Vista Irrigation District	Number	0	4	0	0	0	0	0	0	0	0	2	6
	Exposure	0	25,730	0	0	0	0	0	0	0	0	91,464	117,194
Total Number		**17**	**4,111**	**58**	**176**	**462**	**704**	**847**	**41**	**5**	**137**	**1,758**	**8,316**
Total Exposure (x $1,000)		**23,360,792**	**271,610,120**	**106,140**	**2,132,000**	**791,863,000**	**26,462,736**	**2,581,656**	**681,798**	**2,172,778**	**30,603,969**	**962,346,764**	**2,113,921,753**

TABLE 19: INVENTORY OF EXPOSURE FOR INFRASTRUCTURE

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	17	4	0	21
	Exposure (x$1,000)	113,472	2,733	0	116,205
Carlsbad	Total KMs	174	86	29	289
	Exposure (x$1,000)	1,163,163	58,835	43,115	1,265,113
Chula Vista	Number	317	51	33	401
	Exposure (x$1,000)	2,110,623	35,026	49,150,878	51,296,527
Coronado	Number	21	16	0	37
	Exposure (x$1,000)	137,016	10,978	0	147,994
Del Mar	Number	5	9	7	21
	Exposure (x$1,000)	30,511	6,004	10,641	47,156
El Cajon	Number	159	17	31	207
	Exposure (x$1,000)	1,057,030	11,600	46,337	1,114,967
Encinitas	Number	86	43	19	148
	Exposure (x$1,000)	571,714	29,244	28,656	629,614
Escondido	Number	180	28	11	219
	Exposure (x$1,000)	1,198,940	19,042	16,686	1,234,668
Heartland Fire District	Number	155	38	32	225
	Exposure (x$1,000)	1,031,748	25,885	47,214	1,104,847
Imperial Beach	Number	5	4	0	9
	Exposure (x$1,000)	32,259	2,743	0	35,002
La Mesa	Number	123	15	32	170
	Exposure (x$1,000)	817,200	10,472	48,176	875,848
Lemon Grove	Number	46	6	14	66
	Exposure (x$1,000)	303,500	3,813	20,338	327,651
National City	Number	125	12	52	189
	Exposure (x$1,000)	833,696	8,201	77,996	919,893
Oceanside	Number	182	48	43	273
	Exposure (x$1,000)	1,210,567	32,856	65,118	1,308,541
Otay Water District	Number	180	75	0	255
	Exposure (x$1,000)	1,197,512	50,910	0	1,248,422
Padre Dam Municipal Water Distrct	Number	89	36	2	127
	Exposure (x1000)	595,562	24,590	2,980	623,132
Port of San Diego	Number	17	10	23	50
	Exposure (x1000)	112,487	6,870	34,301	153,658
Poway	Number	58	9	0	67
	Exposure (x$1,000)	385,406	6,350	0	391,756
Rainbow Municipal Water District	Number	98	0	0	98
	Exposure (x1000)	653,187	0	0	653,187
	Number	48	0	0	48

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Ramona Municipal Water District	Exposure (x1000)	317,671	0	0	317,671
Rancho Santa Fe FPD	Number	10	0	0	10
	Exposure (x1000)	67,412	0	0	67,412
San Diego (City)	Number	1,388	352	336	2,076
	Exposure (x$1,000)	9,256,954	240,237	504,158	10,001,349
San Diego County Water Authority	Number	1,980	1,013	262	3,255
	Exposure (x1000)	13,205,512	691,636	392,470	14,289,618
San Marcos	Number	127	15	32	174
	Exposure (x$1,000)	845,959	10,039	47,874	903,872
San Miguel FPD	Number	64	40	0	104
	Exposure (x$1,000)	425,562	27,448	0	453,010
Santee	Number	101	14	2	117
	Exposure (x$1,000)	671,014	9,565	2,948	683,527
Solana Beach	Number	26	14	7	47
	Exposure (x$1,000)	175,461	9,854	9,903	195,218
Sweetwater Authority	Number	139	14	22	175
	Exposure (x$1,000)	924,810	9,817	33,488	968,115
Unincorporated	Number	1,895	269	197	2,361
	Exposure (x$1,000)	12,634,636	183,503	295,114	13,113,253
Vallecitos Water District	Number	74	15	12	101
	Exposure (x$1,000)	495,139	10,423	18,173	523,735
Vista	Number	91	23	18	132
	Exposure (x$1,000)	603,560	15,475	26,710	645,745
Vista Irrigation District	Number	9	3	1	13
	Exposure (x$1,000)	60,170	1,744	1,207	63,121
Total Number		**7,989**	**2,279**	**1,217**	**11,485**
Total Exposure (x $1,000)		**53,239,453**	**1,555,893**	**50,924,481**	**105,719,827**

TABLE 20: INVENTORY OF THE MAXIMUM POPULATION AND BUILDING EXPOSURE BY JURISDICTION

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine FPD	14,696	5,901	2,292,539	494	149,361
Carlsbad	114,253	46,289	17,983,277	3,486	1,053,992
Chula Vista	268,920	82,581	32,082,719	4,967	1,501,772
Coronado	23,639	8,832	3,431,232	857	259,114
Del Mar	4,331	2,561	994,949	546	165,083
El Cajon	103,186	35,721	13,877,609	3,122	943,937
Encinitas	62,780	26,199	10,178,312	3,254	983,847
Escondido	151,300	49,864	19,372,164	2,903	877,722
Heartland Fire District	317,266	70,423	27,359,336	5,776	1,746,374
Imperial Beach	27,315	9,677	3,759,515	421	127,289
La Mesa	59,556	25,248	9,808,848	2,048	619,213
Lemon Grove	26,802	9,454	3,672,879	606	183,224
National City	61,121	16,881	6,558,269	1,413	427,221
Oceanside	175,622	66,456	25,818,156	3,068	927,610
Otay Water District	226,413	67,755	26,322,818	2,841	858,976
Padre Dam Municipal Water District	103,846	38,130	14,813,505	2,830	855,651
Port of San Diego	22,191	8,297	3,223,385	485	146,640
Poway	49,701	16,881	6,558,269	1,590	480,737
Rainbow Municipal Water District	19,267	9,166	3,560,991	459	138,779
Ramona Municipal Water District	39,539	11,635	4,520,198	922	278,767
Rancho Santa Fe FPD	35,914	11,716	4,551,666	685	207,110
San Diego (city)	1,386,932	504,438	195,974,163	40,485	12,240,640
San Diego County Water Authority	3,201,964	1,123,341	436,417,979	84,686	25,604,812
San Marcos	95,355	29,930	11,627,805	1,869	565,092
San Miguel FPD	138,766	42,518	16,518,243	2,238	676,659
Santee	57,797	20,954	8,140,629	1,404	424,499
Solana Beach	13,356	6,196	2,407,146	1,229	371,588
Sweetwater Authority	194,873	58,293	22,646,831	5,263	1,591,268
Unincorporated	504,330	164,538	63,923,013	11,027	3,334,013
Vallecitos Water District	109,357	33,931	13,182,194	2,003	605,607
Vista	100,686	33,343	12,953,756	2,802	847,185
Vista Irrigation District	71,634	6,038	2,345,763	469	141,802
Total	**7,782,708**	**2,643,187**	**1,026,878,158**	**196,248**	**59,335,583**

5.3.3. COASTAL STORM/EROSION

FEMA FIRM flood hazard data compiled and digitized was used to profile the coastal storm/erosion hazard. Specifically, the FEMA FIRM VE zone was used in the hazard modeling process in HAZUS-MH. As discussed earlier, the VE Zone is defined by FEMA as the coastal area subject to a velocity hazard (wave action). The identified vulnerable assets were superimposed on the identified hazard areas, resulting in three risk/exposure estimates:

1. The aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies
2. Lifeline infrastructure
3. The critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction.

The table below provides a breakdown of potential coastal storm/coastal erosion exposure by jurisdiction. No losses to critical facilities and infrastructure are expected from these hazards.

Approximately 59,196 people may be at risk from coastal storm/coastal erosion hazards in San Diego County.

TABLE 21: POTENTIAL EXPOSURE FROM COASTAL STORM/EROSION HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Carlsbad	341	16	6,218	0	0
Chula Vista	0	0	0	0	0
Coronado	3,506	0	0	2	605
Del Mar	70	5	1,943	0	0
El Cajon	0	0	0	0	0
Encinitas	958	0	0	0	0
Escondido	0	0	0	0	0
Imperial Beach	1,570	50	19,430	1	302
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	10,038	0	0	0	0
Oceanside	662	5	1,943	2	605
Port of San Diego	7,667	0	0	1	302
Poway	0	0	0	0	0
San Diego (City)	9,322	4	1,554	3	907
San Diego County Water Authority	23,659	30	11,658	5	1,512
San Marcos	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	1,260	0	0	0	0
Unincorporated	143	0	0	0	0
Vista	0	0	0	0	0
Total	**59,196**	**110**	**42,746**	**14**	**4,233**

TABLE 22: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM COASTAL STORM/EROSION HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Alpine Union School District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Heartland Fire District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
	Number	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Rainbow Municipal Water District	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Ramona Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fed Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego (City)	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
San Diego County Water Authority	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	0	0	0	0	0	0	0	1	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	1	0	0	**0**
Unincorporated	Number	0	0	0	0	0	0	0	0	1	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	1	0	0	**0**
Vallecitos Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Valley Center Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	3
Total Exposure (x$1,000)		**0**	**$6,670**	**0**	**0**	**0**	**0**	**0**	**0**	**$1,439,586**	**0**	**0**	**$1,446,256**

TABLE 23: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM COASTAL STORM/EROSION HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	1	1	0	2
	Exposure (x$1,000)	4,860	22	0	4,882
Chula Vista	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Coronado	Total KMs	2	3	0	5
	Exposure (x$1,000)	11,014	1,948	0	12,962
Del Mar	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
El Cajon	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Encinitas	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Escondido	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Imperial Beach	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
La Mesa	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Lemon Grove	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
National City	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Oceanside	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Port of San Diego	Total KMs	1	0	1	2
	Exposure (x1000)	9,263	0	89	9,352
Poway	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
San Diego (City)	Total KMs	0	0	1	1
	Exposure (x$1,000)	0	0	89	89
San Diego County Water Authority	Total KMs	1	1	1	3
	Exposure (x1000)	4,860	22	89	4,971
San Marcos	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Santee	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Solana Beach	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Unincorporated	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Vista	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Total Number		**5**	**5**	**3**	**13**
Total Exposure (x $1,000)		**29,997**	**1,992**	**267**	**32,256**

5.3.4. SEA LEVEL RISE

TABLE 24: POTENTIAL EXPOSURE FROM SEA LEVEL RISE (COASTAL FLOODING) HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fire Protection District	0	0	0	0	0
Carlsbad	622	21	$8,161	4	$1,209
Chula Vista	116	0	0	0	0
Coronado	1,750	112	$43,523	6	$1,814
Del Mar	790	52	$20,207	9	$2,721
El Cajon	0	0	0	0	0
Encinitas	316	1	$389	3	$907
Escondido	0	0	0	0	0
Heartland Fire District	0	0	0	0	0
Imperial Beach	2,629	51	$19,819	11	$3,326
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	261	358	$139,119	51	$15,420
Otay Water District	0	0	0	0	0
Padre Dam Municipal Water District	0	0	0	0	0
Port of San Diego	2,207	0	0	8	$2,419
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Ramona Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fire Protection District	0	0	0	0	0
San Diego (City)	5,490	108	$41,969	85	$25,700
San Diego County Water Authority	9,452	540	$209,844	153	$46,260
San Marcos	0	0	0	0	0
San Miguel Fire Protection District	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	470	0	0	0	0
Unincorporated	0	0	0	1	302
Vallecitos Water District	0	0	0	0	0
Vista	0	0	0	0	0
Vista Irrigation District	0	0	0	0	0
Total	**24,103**	**1,243**	**$483,030**	**331**	**$100,078**

TABLE 253: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM SEA LEVEL RISE (COASTAL FLOODING) HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	10	0	0	0	0	0	0	0	0	0	**10**
	Exposure (x$1,000)	0	$63,850	0	0	0	0	0	0	0	0	0	**$63,850**
Chula Vista	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	$25,730	0	0	0	0	0	0	0	0	0	**$25,730**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Heartland Fire District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	7	0	0	1	0	0	0	0	0	0	**8**
	Exposure (x$1,000)	0	$43,840	0	0	$47,000	0	0	0	0	0	0	**$90,840**
Oceanside	Number	0	2	0	0	0	1	0	0	0	0	0	**3**
	Exposure (x$1,000)	0	$11,440	0	0	0	$3,048	0	0	0	0	0	**$14,488**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Ramona Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fed Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Diego (City)	Number	0	6	0	0	0	0	0	0	1	0	0	**7**
	Exposure (x$1,000)	0	$37,170	0	0	0	0	0	0	$719,793	0	0	**$756,963**
San Diego County Water Authority	Number	0	35	0	0	1	1	0	0	0	0	0	**37**
	Exposure (x$1,000)	0	$218,250	0	0	$47,000	$3,048	0	0	0	0	0	**$268,298**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	8	0	0	1	0	0	0	0	0	0	**9**
	Exposure (x$1,000)	0	$50,510	0	0	$47,000	0	0	0	0	0	0	**$97,510**
Unincorporated	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	$22,880	0	0	0	0	0	0	0	0	0	**$22,880**
Vallecitos Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number	**0**	**78**	**0**	**0**	**3**	**2**	**0**	**0**	**2**	**0**	**0**		**85**
Total Exposure (x$1,000)	**0**	**$487,010**	**0**	**0**	**$141,000**	**$6,096**	**0**	**0**	**$1,439,586**	**0**	**0**		**$2,073,692**

TABLE 26: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM SEA LEVEL RISE (COASTAL FLOODING)HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Carlsbad	Total KMs	14	3	1	**18**
	Exposure (x$1,000)	$94,146	$2,136	$832	**$97,114**
Chula Vista	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	$12,246	$314	0	**$12,560**
Coronado	Total KMs	16	2	0	**18**
	Exposure (x$1,000)	$107,332	$1,637	0	**$108,969**
Del Mar	Total KMs	3	2	1	**6**
	Exposure (x$1,000)	$16,696	$1,308	$1,635	**$19,639**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	6	3	1	**10**
	Exposure (x$1,000)	$37,359	$1,712	$690	**$39,761**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Heartland Fire District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	0	0.2	0	**0.2**
	Exposure (x$1,000)	0	$145	0	**$145**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	6	0.2	3	**9.2**
	Exposure (x$1,000)	$43,304	$143	$5,131	**$48,578**
Oceanside	Total KMs	2	1	1	**4**
	Exposure (x$1,000)	$12,316	$398	$1,650	**$14,184**
Otay Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Padre Dam Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Port of San Diego	Total KMs	4	0.4	4	**8.4**
	Exposure (x1000)	$23,476	$276	$6,670	**$30,422**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Ramona Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rancho Santa Fe Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego (City)	Total KMs	19	6	12	**37**
	Exposure (x$1,000)	$123,974	$3,786	$18,165	**$145,925**
	Total KMs	55	15	22	**92**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
San Diego County Water Authority	Exposure (x1000)	$365,016	$10,363	$32,501	**$407,880**
San Marcos	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Miguel Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	8	1	3	**12**
	Exposure (x$1,000)	$55,550	$457	$5,131	**$61,138**
Unincorporated	Total KMs	4	1	3	**8**
	Exposure (x$1,000)	$24,975	$565	$4,398	**$29,938**
Vallecitos Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista Irrigation District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**140**	**36**	**51**	**226**
Total Exposure (x $1,000)		**$916,390**	**$23,240**	**$76,854**	**$1,016,253**

TABLE 27: POTENTIAL EXPOSURE FROM SEA LEVEL RISE (MEAN HIGHER HIGH WATER) HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fire Protection District	0	0	0	0	0
Carlsbad	70	1	$389	0	0
Chula Vista	0	0	0	0	0
Coronado	0	0	0	1	$302
Del Mar	0	0	0	0	0
El Cajon	0	0	0	0	0
Encinitas	0	1	$389	0	0
Escondido	0	0	0	0	0
Heartland Fire District	0	0	0	0	0
Imperial Beach	0	0	0	1	$302
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	5,019	0	0	0	0
Oceanside	39	0	0	19	$5,745
Otay Water District	0	0	0	0	0
Padre Dam Municipal Water District	0	0	0	0	0
Port of San Diego	11,560	0	0	4	$1,209
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Ramona Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fire Protection District	0	0	0	0	0
San Diego (City)	6,565	414	$160,880	83	$25,095
San Diego County Water Authority	12,250	416	$161,658	102	$30,840
San Marcos	0	0	0	0	0
San Miguel Fire Protection District	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	0	0	0	0	0
Sweetwater Authority	0	0	0	0	0
Unincorporated	0	0	0	0	0
Vallecitos Water District	0	0	0	0	0
Vista	0	0	0	0	0
Vista Irrigation District	0	0	0	0	0
Total	**35,503**	**832**	**$323,316**	**210**	**$64,493**

TABLE 28: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM SEA LEVEL RISE (MEAN HIGHER HIGH WATER) HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	$24,780	0	0	0	0	0	0	0	0	0	**$24,780**
Chula Vista	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Heartland Fire District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	$31,450	0	0	0	0	0	0	0	0	0	**$31,450**
Oceanside	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$5,720	0	0	0	0	0	0	0	0	0	**$5,720**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Ramona Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fed Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego (City)	Number	0	13	0	0	0	0	0	0	1	0	0	**14**
	Exposure (x$1,000)	0	$82,910	0	0	0	0	0	0	$719,793	0	0	**$802,703**
San Diego County Water Authority	Number	0	26	0	0	0	0	0	0	0	0	0	**26**
	Exposure (x$1,000)	0	$162,970	0	0	0	0	0	0	0	0	0	**$162,970**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	6	0	0	0	0	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	$38,120	0	0	0	0	0	0	0	0	0	**$38,120**
Unincorporated	Number	0	2	0	0	0	0	0	0	0	0	0	**2**
	Exposure (x$1,000)	0	$11,440	0	0	0	0	0	0	0	0	0	**$11,440**
Vallecitos Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**58**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**60**
Total Exposure (x$1,000)		**0**	**$364,060**	**0**	**0**	**0**	**0**	**0**	**0**	**$1,439,586**	**0**	**0**	**$1,803,646**

TABLE 29: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM SEA LEVEL RISE (MEAN HIGHER HIGH WATER) HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine Fire Protection District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Carlsbad	Total KMs	1	2	0.1	3.1
	Exposure (x$1,000)	$5,223	$1,400	$161	$6,784
Chula Vista	Total KMs	1	0.2	0	1.2
	Exposure (x$1,000)	$5,230	$133	0	5,363
Coronado	Total KMs	4	0.4	0	4.4
	Exposure (x$1,000)	$29,021	$244	0	$29,265
Del Mar	Total KMs	0	0.9	0.05	1
	Exposure (x$1,000)	0	$581	$69	$650.00
El Cajon	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Encinitas	Total KMs	1	2	0.002	3
	Exposure (x$1,000)	$7,777	$1,171	$3	$8,951
Escondido	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Heartland Fire District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Imperial Beach	Total KMs	0	0.1	0	0.1
	Exposure (x$1,000)	0	$91	0	$91
La Mesa	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Lemon Grove	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
National City	Total KMs	2	0.2	0.6	3
	Exposure (x$1,000)	$12,791	$131	$993	$13,915
Oceanside	Total KMs	0.2	0.4	0.1	0.7
	Exposure (x$1,000)	$1,399	$246	$174	$1,819
Otay Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Padre Dam Municipal Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Port of San Diego	Total KMs	10	2	0.4	12.4
	Exposure (x1000)	$64,513	$1,277	$543	$66,333
Poway	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Rainbow Municipal Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Ramona Municipal Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Rancho Santa Fe Fire Protection District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
San Diego (City)	Total KMs	23	5	1.3	29.3
	Exposure (x$1,000)	$155,836	$3,744	$2,047	$161,627
San Diego County Water Authority	Total KMs	29	11	2.3	42.3
	Exposure (x1000)	$193,145	$7,495	$3,948	$204,588
San Marcos	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
San Miguel Fire Protection District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Santee	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Solana Beach	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Sweetwater Authority	Total KMs	3	0.4	0.7	4.1
	Exposure (x$1,000)	$18,021	$265	$993	$19,279
Unincorporated	Total KMs	0.7	0.1	0.3	1.1
	Exposure (x$1,000)	$4,890	$89	$503	$5,482
Vallecitos Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Vista	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Vista Irrigation District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Total Number		**75**	**25**	**6**	**106**
Total Exposure (x $1,000)		**$497,846**	**$16,867**	**$9,434**	**$524,147**

5.3.5. TSUNAMI

Tsunami maximum run-up projections (second-generation) were modeled for the entire San Diego County coastline by the University of Southern California, and distributed by the CA Office of Emergency Services in 2009. The model was a result of a combination of inundation modeling and onsite surveys to show maximum predicted inundation levels due to tsunami. This was a scenario model, which uses a given earthquake intensity and location to determine resulting tsunami effects. The identified vulnerable assets were superimposed on top of this information, resulting in three risk/exposure estimates:

1. The aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies
2. The aggregated population at risk at the census block level

3. The critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction.

The first table below provides a breakdown of potential exposure by jurisdiction, and the second table below provides a breakdown of potential exposure to infrastructure and critical facility by jurisdiction. It is important to note the California Geological Survey (CGS) and the California Governor's Office of Emergency Services (Cal OES) are in the process of generating the third generation of statewide tsunami inundation maps for evacuation planning.[130]

Approximately 169,606 people may be at risk from the tsunami hazard in San Diego County:

TABLE 30: POTENTIAL EXPOSURE FROM TSUNAMI HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Carlsbad	4,259	114	44,300	1	302
Chula Vista	228	0	0	0	0
Coronado	24,603	3,043	1,182,509	103	311,420
Del Mar	1,173	532	206,735	25	75,587
El Cajon	0	0	0	0	0
Encinitas	2,536	3	1,165	1	3,023
Escondido	0	0	0	0	0
Imperial Beach	8,019	2,068	803,624	94	284,209
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	10,156	0	0	0	0
Oceanside	3,599	1,401	544,428	53	160,245
Port of San Diego	13,917	0	0	3694	1,191,259
Poway	0	0	0	0	0
San Diego (City)	34,592	5,749	2,234,061	875	2,645,562
San Diego County Water Authority	58,040	7,799	3,030,691	956	2,890,466
San Marcos	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	1,411	0	0	0	0
Sweetwater Authority	5,078	0	0	0	0
Unincorporated	1965	0	0	1	3023
Vista	0	0	0		
Vista Irrigation District	0	0	0	0	0
Total	**169,606**	**20,709**	**8,047,517**	**2,503**	**7,567,820**

[130] https://www.conservation.ca.gov/cgs/Documents/Tsunami/Tsunami-inundation-map-methodology-2019.pdf

TABLE 31: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM TSUNAMI HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)		0										**0**
Carlsbad	Number	0	12	0	0	0	0	0	0	0	0	0	**12**
	Exposure (x$1,000)		77,190										**77,190**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	1	0	1	0	1	1	0	0	0	1	**5**
	Exposure (x$1,000)	0	6,670	0	2,000	0	3,048	3,048	0	0	0	26,640	**41,406**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	2	0	0	0	0	0	0	0	0	0	**2**
	Exposure (x$1,000)	0	12,390	0	0	0	0	0	0	0	0	0	**12,390**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Heartland Fire District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	6	0	0	0	0	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	38,120	0	0	0	0	0	0	0	0	0	**38,120**
Oceanside	Number	0	5	0	0	0	1	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	32,400	0	0	0	3,048	0	0	0	0	0	**35,448**
Otay Water Distrct	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water Distrct	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	1	0	1	0	0	**2**
	Exposure (x1000)	0	0	0	0	0	0	3,048	0	719,793	0	0	**722,841**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water Distrct	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Ramona Municipal Water Distrct	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fe FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego (City)	Number	0	12	0	0	0	0	0	0	1	0	0	**13**
	Exposure (x$1,000)	0	78,140	0	0	0	0	0	0	719,793	0	0	**797,933**
San Diego County Water Authority	Number	0	44	0	0	0	3	0	0	1			**48**
	Exposure (x1000)	0	280,180	0	0	0	9,144	0	0	719,793	0	0	**1,009,117**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	6	0	0	0	0	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	38120	0	0	0	0	0	0	0	0	0	**38,120**
Unincorporated	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	22,880	0	0	0	0	0	0	0	0	0	**22,880**
Vallecitos Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**95**	**0**	**1**	**0**	**7**	**2**	**0**	**3**	**0**	**1**	**109**
Total Exposure (x $1,000)		**0**	**605,150**	**0**	**2,000**	**0**	**21,336**	**6,096**	**0**	**2,159,379**	**0**	**26,640**	**2,782,481**

TABLE 32: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM TSUNAMI HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	8	3	1	**12**
	Exposure (x$1,000)	52,405	1,848	1,291	**55,544**
Chula Vista	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,324	0	0	**2,324**
Coronado	Total KMs	45	9	0	**54**
	Exposure (x$1,000)	298,630	6,325	0	**304,955**
Del Mar	Total KMs	3	2	1	**6**
	Exposure (x$1,000)	20,014	1,590	1,707	**23,311**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	6	2	1	**9**
	Exposure (x$1,000)	39,063	1,045	1,642	**41,750**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	7,824	424	0	**8,248**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	3	0	1	**4**
	Exposure (x$1,000)	18,753	0	435	**19,188**
Oceanside	Total KMs	2	1	1	**4**
	Exposure (x$1,000)	15,911	466	974	**17,351**
Port of San Diego	Total KMs	2	1	0	**3**
	Exposure (x1000)	9,759	322	0	**10,081**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego (City)	Total KMs	25	8	1	**34**
	Exposure (x$1,000)	165,169	5,570	1,237	**171,976**
San Diego County Water Authority	Total KMs	49	16	6	**71**
	Exposure (x1000)	326,623	10,685	9,859	**347,167**
San Marcos	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	1	**1**
	Exposure (x$1,000)	0	0	122	**122**
Sweetwater Water Authority	Total KMs	3	0	1	**4**
	Exposure (x$1,000)	21,077	0	435	**21,512**
Unincorporated	Total KMs	2	1	2	**5**
	Exposure (x$1,000)	12,983	165	2,452	**15,600**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**150**	**44**	**16**	**210**
Total Exposure (x $1,000)		**990,535**	**28,440**	**20,154**	**1,039,129**

5.3.6. DAM FAILURE

Dam inundation zones, compiled by FEMA or the National Inventory of Dams throughout San Diego County, and purchased through SanGIS, show areas that would be flooded if each dam failed. The identified vulnerable assets were superimposed on top of this information, resulting in three risk/exposure estimates:

1. The aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies
2. The aggregated population at risk at the census block level
3. The critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction.

The first table below provides a breakdown of potential exposure by jurisdiction, and the second table provides a breakdown of potential exposure to infrastructure and critical facility by jurisdiction.

Approximately 538,132 people are at risk from a dam failure hazard.

TABLE 33: POTENTIAL EXPOSURE FROM DAM FAILURE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine FPD	90	4	1,554	0	0
Carlsbad	1,258	523	203,238	24	7,256
Chula Vista	15,822	2,297	892,614	628	189,876
Coronado	2,275	392	152,331	5	1,512
Del mar	1,260	556	216,062	31	9,373
El Cajon	70	309	120,077	24	7,256
Encinitas	1,026	11,624	4,517,086	106	32,049
Escondido	34,783	7	2,720	969	292,977
Heartland Fire District	199	795	308,937	25	7,559
Imperial beach	4,341	7	2,720	24	7,256
La Mesa	129	275	106,865	1	302
Lemon Grove	0	8,449	3,283,281	0	0
National City	7,603	761	295,725	148	44,748
Oceanside	25,060	10,803	4,198,046	318	96,147
Otay Water District	3,839	7	2,720	173	52,307
Padre Dam Municipal Water District	28,878	827	321,372	1191	360,099
Port of San Diego	7,034	32	12,435	48	14,513
Poway	0	821	319,041	3	907
Rainbow Municipal Water District	2,418	32,128	12,484,941	46	13,908
Ramona Municipal Water District	49	76,679	29,797,459	0	0
Rancho Santa Fe FPD	2,988	119	46,243	82	24,793
San Diego	89,183	583	226,554	4597	1,389,903
San Diego County Water Authority	234,032	10,034	3,899,212	8983	2,716,010
San Marco	660	332	129,015	4	1,209
San Miguel FPD	1,590	3,350	1,301,810	149	45,050
Santee	24,193	33	12,824	1084	327,747
Solana Beach	206	10,189	3,959,445	13	3,931
Sweetwater Authority	9,995	143	55,570	993	300,234
Unincorporated	36,492	0	0	1076	325,329
Vallecitos Water District	2,626	0	0	7	2,116
Vista	0	0	0	0	0
Vista Irrigation District	33	0	0	0	0
Total	**538,132**	**172,079**	**66,869,897**	**20,752**	**6,274,367**

TABLE 34: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM DAM FAILURE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	4	0	0	0	1	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	26,680	0	0	0	3,048	0	0	0	0	0	**29,728**
Chula Vista	Number	0	20	0	0	3	0	1	0	0	1	0	**25**
	Exposure (x$1,000)	0	130,550	0	0	969,000	0	9,144	0	0	30,000	0	**1,138,694**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	1	8	0	0	0	1	0	0	0	0	0	**10**
	Exposure (x$1,000)	257,356	53,360	0	0	0	3,048	0	0	0	0	0	**313,764**
Encinitas	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	32,400	0	0	0	0	0	0	0	0	0	**32,400**
Escondido	Number	0	38	0	0	4	4	14	0	0	1	4	**65**
	Exposure (x$1,000)	0	251,560	0	0	1,016,000	12,192	42,672	0	0	163,612	302,882	**1,788,918**
Heartland Fire District	Number	1	9	0	0	0	1	0	0	0	0	0	**11**
	Exposure (x$1,000)	257,356	60,030	0	0	0	3,048	0	0	0	0	0	**320,434**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	39,220	**39,220**
La Mesa	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	41	0	0	0	0	3	0	0	0	1	**45**
	Exposure (x$1,000)	0	268,720	0	0	0	0	9,144	0	0	0	31,376	**309,240**
Oceanside	Number	1	13	0	0	0	4	2	0	0	1	4	**25**
	Exposure (x$1,000)	86,701	85,760	0	0	0	12,192	6,096	0	0	163,612	185,666	**540,027**
Otay Water District	Number	0	11	0	0	1	1	1	0	0	1	3	**18**
	Exposure (x$1,000)	0	73,370	0	0	47,000	3,048	3,048	0	0	163,612	355,200	**645,278**
Padre Dam Municipal Water District	Number	1	68	0	0	1	4	6	0	0	0	7	**87**
	Exposure (x$1,000)	257,356	453,560	0	0	47,000	12,192	18,288	0	0	0	440,004	**1,228,400**
Port of San Diego	Number	1	0	0	0	0	4	0	0	0	0	0	**5**
	Exposure (x$1,000)	281,772	0	0	0	0	12,192	0	0	0	0	0	**293,964**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	23	0	0	0	1	1	0	0	0	0	**25**
	Exposure (x$1,000)	0	153,410	0	0	0	3,048	3,048	0	0	0	0	**159,506**
Ramona Municipal Water District	Number	0	2	0	0	0	0	0	0	0	0	0	**2**
	Exposure (x$1,000)	0	13,340	0	0	0	0	0	0	0	0	0	**13,340**
Rancho Santa Fe FPD	Number	0	12	0	0	2	1	0	0	0	3	1	**19**
	Exposure (x$1,000)	0	80,040	0	0	922,000	3,048	0	0	0	550,835	22,496	**1,578,419**
San Diego (City)	Number	1	211	1	1	11	18	21	1	0	1	13	**279**
	Exposure (x$1,000)	271,772	1,394,070	1,830	2,000	1,345,000	54,864	64,008	16,629	0	163,612	682,650	**3,996,435**
San Diego County Water Authority	Number	2	483	1	4	24	41	57	1	0	11	41	**665**
	Exposure (x$1,000)	615,829	3,195,010	1,830	8,000	4,440,000	124,968	173,736	16,629	0	1,265,282	2,416,988	**12,258,272**
San Marcos	Number	0	0	0	0	1	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	47,000	0	0	0	0	0	0	**47,000**
San Miguel FPD	Number	0	6	0	0	0	1	0	0	0	1	0	**8**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
	Exposure (x$1,000)	0	40,020	0	0	0	3,048	0	0	0	163,612	0	**206,680**
Santee	Number	0	48	0	0	1	3	6	0	0	0	6	**64**
	Exposure (x$1,000)	0	320,160	0	0	47,000	9,144	18,288	0	0	0	392,718	**787,310**
Sweetwater Authority	Number	0	74	0	0	2	2	7	0	0	1	3	**89**
	Exposure (x$1,000)	0	472,640	0	0	922,000	6,096	21,336	0	0	30,000	96,866	**1,548,938**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	0	119	0	3	6	7	8	0	0	11	13	**167**
	Exposure (x$1,000)	0	792,780	0	6,000	1,938,000	21,336	24,384	0	0	864,447	821,696	**4,468,643**
Vallecitos Water District	Number	0	2	0	0	1	0	0	0	0	0	0	**3**
	Exposure (x$1,000)	0	13,340	0	0	47,000	0	0	0	0	0	0	**60,340**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**8**	**1,201**	**2**	**8**	**57**	**96**	**127**	**2**	**0**	**32**	**97**	**1,630**
Total Exposure (x $1,000)		**2,028,142**	**7,936,530**	**3,660**	**16,000**	**11,787,000**	**292,608**	**393,192**	**33,258**	**0**	**3,558,624**	**5,787,762**	**31,836,776**

TABLE 35: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM DAM FAILURE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	23	2	0	**25**
	Exposure (x$1,000)	156,286	1,172	0	**157,458**
Chula Vista	Total KMs	114	5	2	**121**
	Exposure (x$1,000)	760,393	3,343	2,916	**766,652**
Coronado	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	5,992	273	0	**6,265**
Del Mar	Total KMs	6	3	1	**10**
	Exposure (x$1,000)	36,707	1,861	2,057	**40,625**
El Cajon	Total KMs	3	1	3	**7**
	Exposure (x$1,000)	17,455	446	4,602	**22,503**
Encinitas	Total KMs	17	5	1	**23**
	Exposure (x$1,000)	113,082	3,596	1,677	**118,355**
Escondido	Total KMs	88	2	6	**96**
	Exposure (x$1,000)	589,607	1,548	9,310	**600,465**
Heartland Fire District	Total KMs	8	1	4	**13**
	Exposure (x$1,000)	54,231	594	5,693	**60,518**
Imperial Beach	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	5,498	861	0	**6,359**
La Mesa	Total KMs	6	1	1	**8**
	Exposure (x$1,000)	36,776	148	1,091	**38,015**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	76	1	7	**84**
	Exposure (x$1,000)	508,719	920	12,952	**522,591**
Oceanside	Total KMs	55	8	1	**64**
	Exposure (x$1,000)	365,206	5,322	328	**370,856**
Otay Water District	Total KMs	60	2	0	**62**
	Exposure (x1000)	400,397	1,311	0	**401,708**
Padre Dam Municipal Water District	Total KMs	131	13	5	**149**
	Exposure (x1000)	875,831	8,735	6,871	**891,437**
Port of San Diego	Total KMs	21	5	4	**30**
	Exposure (x1000)	138,956	3,467	5,662	**148,085**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	54	1	0	**55**
	Exposure (x$1,000)	359,258	183	0	**359,441**
Ramona Munipal Water District	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	4,577	0	0	**4,577**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Rancho Santa Fe FPD	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	13,612	293	0	**13,905**
San Diego (City)	Total KMs	821	61	51	**933**
	Exposure (x$1,000)	5,476,180	41,921	76,049	**5,594,150**
San Diego County Water Authority	Total KMs	1,511	115	77	**1,703**
	Exposure (x1000)	10,072,703	78,214	116,118	**10,267,035**
San Marcos	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	2,883	92	0	**2,975**
San Miguel FPD	Total KMs	32	1	0	**33**
	Exposure (x$1,000)	211,370	291	0	**211,661**
Santee	Total KMs	121	12	2	**135**
	Exposure (x$1,000)	810,110	8,192	2,269	**820,571**
Solana Beach	Total KMs	0	0	1	**1**
	Exposure (x$1,000)	0	0	311	**311**
Sweetwater Authority	Total KMs	188	8	11	**207**
	Exposure (x$1,000)	1,253,333	5,640	15,868	**1,274,841**
Unincorporated	Total KMs	239	16	2	**257**
	Exposure (x$1,000)	1,595,903	11,014	2,556	**1,609,473**
Vallecitos Water District	Total KMs	8	1	0	**9**
	Exposure (x$1,000)	53,550	233	0	**53,783**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**3,588**	**268**	**179**	**4,035**
Total Exposure (x $1,000)		**23,918,615**	**179,670**	**266,330**	**24,364,615**

The data used in the earthquake hazard assessment were: 100-, 250-, 500-, 750-, 1000-, 1500-, 2000-, and 2500- year return period USGS probabilistic hazards. Soil conditions for San Diego County as developed by USGS were also used, which allowed for a better reflection of amplification of ground shaking that may occur. The HAZUS software model, which was developed for FEMA by the National Institute of Building Services as a tool to determine earthquake loss estimates, was used to model earthquake and flood for this assessment.

This software program integrates with a GIS to facilitate the manipulation of data on building stock, population, and the regional economy with hazard models. PBS&J updated this model in 2003 to HAZUS-MH (Multiple Hazard), which can model earthquake and flood, along with collateral issues associated with each model, such as liquefaction and landslide with earthquakes. This software was not released prior to the beginning of the planning process; however, PBS&J performed vulnerability and loss estimation models for earthquakes and flood for this project using the newer model.

Additionally, the earthquake risk assessment explored the potential for collateral hazards such as liquefaction and earthquake-induced landslides. Three cases were examined, one case with shaking only, a second case with liquefaction potential, and a third with earthquake-induced landslides. Once the model was complete, the identified vulnerable assets were superimposed on top of this information, resulting in three risk/loss estimates:

1. The aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies
2. The aggregated population at risk at the census block level
3. The critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature).

These results were then aggregated and presented by hazard risk level per jurisdiction. Results for residential and commercial properties were generated as annualized losses, which average all eight of the modeled return periods (100-year through 2500-year events). For critical facility losses it was helpful to look at 100- and 500-year return periods to plan for an event that is more likely to occur in the near-term.

In the near term, a 500-year earthquake would cause increased shaking, liquefaction and landslide, which would be expected to increase loss numbers. Exposure for annualized earthquake included buildings and population in the entire county because a severe or worst-case scenario earthquake could affect any structure in the County.

Furthermore, the annualized earthquake loss table also shows potential collateral exposure and losses from liquefaction and landslide separately; this is the additional loss from earthquake due to liquefaction or landslide caused by earthquakes and should be added to the shaking-only loss values to get the correct value. (The collateral liquefaction and landslide loss results for critical facilities were included with earthquake in the tables below, to plan for an event that is more likely to occur in the near-term as discussed above).

The first table provides a breakdown of potential exposure and losses due to annualized earthquake events by jurisdiction. The second and third tables below provide a breakdown of infrastructure and critical facility losses from 100-year and 500-year earthquakes, respectively.

Approximately 81,590 people may be at risk from the annualized earthquake and earthquake-induced liquefaction hazards.

TABLE 36: POTENTIAL EXPOSURE AND LOSSES FROM ANNUALIZED EARTHQUAKE HAZARD BY JURISDICTION

		Residential Buildings at Risk					Commercial buildings at Risk				
Jurisdiction	Exposed Population	Building Count	Potential Loss from Shaking (x$1,000)	Potential Additional Loss from Liquefaction (x$1,000)	Potential Additional Loss from Landslide (x$1,000)	Potential Exposure (x$1,000)	Building Count	Potential Loss from Shaking (x$1,000)	Potential Additional Loss from Liquefaction (x$1,000)	Potential Additional Loss from Landslide (x$1,000)	Potential Exposure (x$1,000)
Alpine Fire Protection District	0	32	26	0	10	26,569	20	12	0	4	10,824
Carlsbad	1,067	6,314	1,535	0	78	3,079,694	377	51	0	119	165,506
Chula Vista	3,170	3,342	1,688	18	115	2,005,905	342	66	2	130	163,269
Coronado	1,275	2,419	281	47	33	1,079,930	201	16	39	14	81,574
Del Mar	471	351	185	0	10	212,056	104	17	0	8	39,064
El Cajon	216	528	889	93	101	625,750	391	52	4	97	164,599
Encinitas	854	378	77	0	25	186,434	237	32	0	39	93,124
Escondido	57	696	142	0	193	400,637	436	53	0	153	194,230
Heartland Fire District	711	996	166	93	168	552,998	652	89	4	130	264,647
Imperial Beach	1,458	198	28	57	38	124,830	148	13	7	32	60,410
La Mesa	211	243	49	0	48	132,056	163	29	0	20	64,189
Lemon Grove	284	224	29	0	20	105,992	98	8	0	13	35,859
National City	2,348	491	61	0	81	245,761	407	35	0	40	145,642
Oceanside	811	113	178	38	194	203,012	508	60	13	160	224,102
Otay Water District	1,443	259	183	0	56	193,636	94	54	0	94	73,199
Padre Dam Municipal Water District	183	268	129	53	91	210,007	318	74	2	161	167,714
Port Of San Diego	3,788	532	62	36	103	284,895	767	70	32	64	282,002
Poway	57	176	60	0	18	98,602	52	22	0	30	31,535
Rainbow Municipal Water District	39	421	86	27	32	219,737	156	22	1	80	78,248
Ramona Municipal Water District	3	731	238	137	17	436,135	56	14	14	23	32,412
Rancho Santa Fe Fpd	612	616	147	0	49	315,563	313	57	0	93	139,928
San Diego	20,362	4,394	797	393	797	2,478,831	3,163	416	32	429	1,221,524
San Diego County Water Authority	32,161	15,665	3,214	1,685	2,677	9,029,249	9,631	1,345	92	2,632	4,142,044
San Marcos	254	743	153	0	130	398,683	474	58	0	204	222,469
San Miguel Fpd	467	520	146	45	84	308,956	332	64	2	105	151,961
Santee	106	116	48	4	34	78,341	92	22	0	54	50,916
Solana Beach	353	136	19	0	9	63,607	109	12	0	8	38,852
Sweetwater Authority	4,987	984	193	18	196	540,326	719	84	2	156	290,468
Unincorporated	2,782	4,738	1,332	718	745	2,926,513	2,359	454	36	1,165	1,213,603
Vallecitos Water District	443	1,166	282	0	209	643,698	604	91	0	304	302,048
Vista	405	1,600	264	334	249	950,806	850	98	17	322	389,094
Vista Irrigation District	212	1,319	218	169	245	757,788	680	80	7	199	291,949
Total	**81,590**	**50,709**	**12,905**	**3,965**	**6,855**	**28,916,997**	**24,853**	**3,570**	**306**	**7,082**	**10,827,005**

TABLE 37: POTENTIAL EXPOSURE AND LOSSES TO CRITICAL FACILITIES FROM ANNUALIZED EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	0	0	0	1	1	0	0	0	3	1	**6**
	Exposure (x$1,000)	0	0	0	0	$87,500	$3,048	0	0	0	$62,722	$5,000	**158,270**
Chula Vista	Number	0	0	0	0	1	0	0	0	0	1	2	**4**
	Exposure (x$1,000)	0	0	0	0	$87,500	0	0	0	0	$33,904	$6,096	**127,500**
Coronado	Number	0	0	0	0	1	1	0	0	0	0	8	**10**
	Exposure (x$1,000)	0	0	0	0	$91,500	$10,048	0	0	0	0	$29,000	**130,548**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	2	1	0	0	0	2	0	**5**
	Exposure (x$1,000)	0	0	0	0	$175,000	$7,568	0	0	0	$10,048	0	**192,616**
Encinitas	Number	0	0	0	0	0	1	0	0	0	2	6	**9**
	Exposure (x$1,000)	0	0	0	0	0	$8,480	0	0	0	$36,504	$20,786	**65,770**
Escondido	Number	0	0	0	1	5	1	0	2	0	4	9	**22**
	Exposure (x$1,000)	0	0	0	$7,321	$437,500	$3,048	0	$40,297	0	65,445	$32,641	**586,252**
Heartland Fire District	Number	0	0	0	0	2	1	0	0	0	0	4	**7**
	Exposure (x$1,000)	0	0	0	0	$178,493	$3,285	0	0	0	0	$16,270	**198,048**
Imperial Beach	Number	0	0	0	0	0	1	0	0	0	0	7	**8**
	Exposure (x$1,000)	0	0	0	0	0	$13,924	0	0	0	0	$24,124	**38,048**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	7	**7**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	$35,000	**35,000**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	$5,000	**5,000**
National City	Number	0	0	0	0	1	1	0	1	0	0	8	**11**
	Exposure (x$1,000)	0	0	0	0	$90,250	$4,523	0	$24,662	0	0	$27,743	**147,178**
Oceanside	Number	0	0	0	2	2	0	0	1	0	2	3	**10**
	Exposure (x$1,000)	0	0	0	$8,764	$6,346	0	0	$17,191	0	$32,722	$9,424	**74,447**
Otay Water Distrct	Number	0	0	0	0	3	0	0	0	0	0	0	**3**
	Exposure (x$1,000)	0	0	0	0	$26,250	0	0	0	0	0	0	**26,250**
Padre Dam Municipal Water Distrct	Number	0	0	0	3	0	0	0	0	0	2	0	**5**
	Exposure (x$1,000)	0	0	0	$3,700	0	0	0	0	0	$5,572	0	**9,272**
Port of San Diego	Number	0	0	0	0	0	0	0	0	0	2	0	**2**
	Exposure (x1000)	0	0	0	0	0	0	0	0	0	$32,722	0	**32,722**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water Distrct	Number	0	0	0	1	1	0	0	0	0	0	4	**6**
	Exposure (x$1,000)	0	0	0	$5,517	$91,734	0	0	0	0	0	$12,249	**109,500**
Ramona Municipal Water Distrct	Number	0	0	0	1	0	1	0	0	0	0	1	**3**
	Exposure (x$1,000)	0	0	0	$4,000	0	$3,000	0	0	0	0	$3,048	**10,048**
Rancho Santa Fe FPD	Number	0	0	0	0	1	0	0	0	0	0	2	**3**
	Exposure (x$1,000)	0	0	0	0	$87,734	0	0	0	0	0	$9,766	**97,500**
San Diego (City)	Number	0	0	0	8	8	1	0	1	0	3	8	**29**
	Exposure (x$1,000)	0	0	0	$35,589	$193,456	$26,116	0	$31,132	0	$199,084	$24,384	**509,761**
San Diego County Water Authority	Number	0	0	0	8	6	7	0	8	0	12	19	**60**
	Exposure (x1000)	0	0	0	$37,420	$525,000	$26,676	0	$133,034	0	$293,199	$59,572	**1,074,901**
San Marcos	Number	0	0	0	1	0	3	0	1	0	0	3	**8**
	Exposure (x$1,000)	0	0	0	$4,000	0	$10,430	0	$16,629	0	0	$11,714	**42,773**
San Miguel FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	0	0	0	2	1	0	1	0	1	2	**7**
	Exposure (x$1,000)	0	0	0	0	$176,444	$3,048	0	$16,629	0	$32,460	$6,096	**234,677**
Unincorporated	Number	0	0	0	4	2	3	0	1	0	5	7	**22**
	Exposure (x$1,000)	0	0	0	$20,022	$205,054	$14,234	0	$21,639	0	$81,806	$21,336	**364,091**
Vallecitos Water District	Number	0	0	0	2	0	3	0	1	0	0	5	**11**
	Exposure (x$1,000)	0	0	0	$13,760	0	$10,596	0	$21,197	0	0	$19,220	**64,773**
Vista	Number	0	0	0	0	0	2	0	1	0	0	3	**6**
	Exposure (x$1,000)	0	0	0	0	0	$9,952	0	$16,629	0	0	$11,144	**37,725**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	$5,000	**5,000**
Total Number		**0**	**0**	**0**	**24**	**31**	**24**	**0**	**17**	**0**	**37**	**95**	**227**
Total Exposure (x $1,000)		**0**	**0**	**0**	**113,116**	**2,075,550**	**141,095**	**0**	**317,842**	**0**	**880,616**	**334,060**	**3,627,602**

TABLE 38: POTENTIAL INFRASTRUCTURE EXPOSURE AND LOSSES FROM ANNUALIZED EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	6,121	0	0	**6,121**
Carlsbad	Total KMs	3	0	0	**3**
	Exposure (x$1,000)	17,303	0	0	**17,303**
Chula Vista	Number	3	0	0	**3**
	Exposure (x$1,000)	21,124	0	0	**21,124**
Coronado	Number	11	0	0	**11**
	Exposure (x$1,000)	74,336	0	0	**74,336**
Del Mar	Number	1	0	0	**1**
	Exposure (x$1,000)	3,701	0	0	**3,701**
El Cajon	Number	2	0	0	**2**
	Exposure (x$1,000)	15,503	0	0	**15,503**
Encinitas	Number	1	0	0	**1**
	Exposure (x$1,000)	6,081	0	0	**6,081**
Escondido	Number	4	0	0	**4**
	Exposure (x$1,000)	25,252	0	0	**25,252**
Heartland Fire District	Number	10	0	0	**10**
	Exposure (x$1,000)	69,287	0	0	**69,287**
Imperial Beach	Number	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Number	5	0	0	**5**
	Exposure (x$1,000)	34,013	0	0	**34,013**
Lemon Grove	Number	3	0	0	**3**
	Exposure (x$1,000)	19,771	0	0	**19,771**
National City	Number	7	0	0	**7**
	Exposure (x$1,000)	43,409	0	0	**43,409**
Oceanside	Number	5	0	0	**5**
	Exposure (x$1,000)	33,950	0	0	**33,950**
Otay Water District	Number	6	0	0	**6**
	Exposure (x$1,000)	36,954	0	0	**36,954**
Padre Dam Municipal Water Distrct	Number	7	0	0	**7**
	Exposure (x1000)	44,309	0	0	**44,309**
Port of San Diego	Number	4	0	0	**4**
	Exposure (x1000)	29,618	0	0	**29,618**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Poway	Number	0	0	0	**0**
	Exposure (x$1,000)	2,447	0	0	**2,447**
Rainbow Municipal Water District	Number	12	0	0	**12**
	Exposure (x1000)	77,724	0	0	**77,724**
Ramona Municipal Water District	Number	6	0	0	**6**
	Exposure (x1000)	40,354	0	0	**40,354**
Rancho Santa Fe FPD	Number	1	0	0	**1**
	Exposure (x1000)	3,194	0	0	**3,194**
San Diego (City)	Number	73	0	0	**73**
	Exposure (x$1,000)	487,978	0	0	**487,978**
San Diego County Water Authority	Number	155	0	0	**155**
	Exposure (x1000)	1,031,356	0	0	**1,031,356**
San Marcos	Number	1	0	0	**1**
	Exposure (x$1,000)	6,875	0	0	**6,875**
San Miguel FPD	Number	3	0	0	**3**
	Exposure (x$1,000)	22,018	0	0	**22,018**
Santee	Number	5	0	0	**5**
	Exposure (x$1,000)	34,354	0	0	**34,354**
Solana Beach	Number	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Number	10	0	0	**10**
	Exposure (x$1,000)	64,360	0	0	**64,360**
Unincorporated	Number	113	0	5	**118**
	Exposure (x$1,000)	756,449	0	7,954	**764,403**
Vallecitos Water District	Number	1	0	0	**1**
	Exposure (x$1,000)	9,028	0	0	**9,028**
Vista	Number	1	0	0	**1**
	Exposure (x$1,000)	5,401	0	0	**5,401**
Vista Irrigation District	Number	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**454**	**0**	**5**	**459**
Total Exposure (x $1,000)		**3,022,270**	**0**	**7,954**	**3,030,224**

TABLE 39: POTENTIAL EXPOSURE AND LOSSES FROM 100-YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine Fire Protection District	0	0	0	0	0
Carlsbad	0	0	0	0	0
Chula Vista	0	0	0	0	0
Coronado	0	0	0	0	0
Del mar	0	0	0	0	0
El Cajon	0	0	0	0	0
Encinitas	0	0	0	0	0
Escondido	0	0	0	0	0
Heartland Fire District	0	0	0	0	0
Imperial beach	0	0	0	0	0
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	0	0	0	0	0
Otay Water District	0	0	0	0	0
Padre Dam Municipal Water District	0	0	0	0	0
Port of San Diego	0	0	0	0	0
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Ramona Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fire Protection District	0	0	0	0	0
San Diego	0	0	0	0	0
San Diego County Water Authority	0	0	0	0	0
San Marco	0	0	0	0	0
San Miguel Fire Protection District	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	0	0	0	0	0
Sweetwater Authority	0	0	0	0	0
Unincorporated	4,440	2,982	$1,158,507	77	$23,281
Vallecitos Water Distrcit	0	0	0	0	0
Vista	0	0	0	0	0
Vista Irrigation District	0	0	0	0	0
Total	**4,440**	**2,982**	**$1,158,507**	**77**	**$23,281**

TABLE 40: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 100-YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Heartland Fire District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Ramona Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fed Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego (City)	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego County Water Authority	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**

Unincorporated	Number	3	11	0	4	6	3	4	0	0	0	3	**34**
	Exposure (x$1,000)	$176,376	$62,920	0	$8,000	$1,938,000	$9,144	$12,192	0	0	0	$27,602	**$2,234,234**
Vallecitos Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Exposure (x $1,000)		**$176,376**	**$62,920**	**0**	**$8,000**	**$1,938,000**	**$9,144**	**$12,192**	**0**	**0**	**0**	**$27,602**	**$2,234,234**

TABLE 41: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 100- YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Carlsbad	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Chula Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Heartland Fire District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Otay Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Padre Dam Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Ramona Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Rancho Santa Fe Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego (City)	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego County Water Authority	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
San Marcos	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Miguel Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Unincorporated	Total KMs	183	0	29	**212**
	Exposure (x$1,000)	$43,215	0	$1,219,888	**$1,263,013**
Vallecitos Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista Irrigation District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**183**	**0**	**29**	**212**
Total Exposure (x $1,000)		**$43,215**	**0**	**$1,219,888**	**$1,263,013**

TABLE 42: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 500-YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	1	0	0	0	0	1	0	0	0	2	**4**
0	Exposure (x$1,000)	0	5,720	0	0	0	0	3,048	0	0	0	134,384	**143,152**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	22	0	0	3	2	11	1	0	1	17	**57**
0	Exposure (x$1,000)	0	146,740	0	0	969,000	6,096	33,528	16,629	0	30,000	996,780	**2,198,773**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	1	27	1	1	1	8	9	1	0	2	17	**68**
	Exposure (x$1,000)	86,701	175,340	1,830	2,000	47,000	30,480	27,432	16,629	0	327,223	775,594	**1,490,229**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	41	0	1	2	3	2	0	0	1	4	**54**
	Exposure (x$1,000)	0	273,470	0	2,000	1,797,000	9,144	6,096	0	0	0	0	**2,087,710**
San Diego (City)	Number	0	2	0	0	0	0	1	0	0	0	1	**4**
	Exposure (x$1,000)	0	13,340	0	0	0	0	3,048	0	0	0	41,736	**58,124**
San Diego County Water Authority	Number	2	159	3	2	20	45	47	3	0	11	83	**375**
	Exposure (x$1,000)	167,681	1,051,980	5,490	4,000	7,564,000	137,160	143,256	49,888	0	1,131,670	4,277,866	**14,532,991**
San Marcos	Number	0	16	1	0	1	5	6	0	0	0	11	**40**
	Exposure (x$1,000)	0	104,820	1,830	0	47,000	15,240	18,288	0	0	0	593,776	**780,954**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	3	211	0	7	35	43	42	1	0	13	40	**395**
	Exposure (x$1,000)	271,772	1,383,620	0	14,000	11,581,000	131,064	128,016	16,629	0	924,447	1,280,792	**15,731,340**
Vallecitos Water District	Number	0	16	1	0	1	5	6	0	0	0	13	**42**
	Exposure (x$1,000)	0	104,820	1,830	0	47,000	15,240	18,288	0	0	0	659,414	**846,592**
Vista	Number	0	8	1	0	1	8	3	0	0	0	15	**36**
	Exposure (x$1,000)	0	52,410	1,830	0	47,000	24,384	9,144	0	0	0	692,122	**826,890**
Vista Irrigation District	Number	0	1	0	0	0	0	0	0	0	0	1	**2**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	41,070	**47,740**
Total Number		**6**	**504**	**7**	**11**	**64**	**119**	**128**	**6**	**0**	**28**	**204**	**1,077**
Total Exposure (x $1,000)		**526,154**	**3,318,930**	**12,810**	**22,000**	**22,099,000**	**368,808**	**390,144**	**99,775**	**0**	**2,413,340**	**9,493,534**	**38,744,495**

TABLE 43: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 500- YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	42	3	2	**47**
	Exposure (x$1,000)	277,290	1,768	2,702	**281,760**
Chula Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	113	15	0	**128**
	Exposure (x$1,000)	751,643	9,996	0	**761,639**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	197	21	21	**239**
	Exposure (x$1,000)	1,315,268	14,640	32,248	**1,362,156**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	308	25	0	**333**
	Exposure (x$1,000)	2,053,961	16,929	0	**2,070,890**
San Diego (City)	Total KMs	8	0	0	**8**
	Exposure (x$1,000)	53,990	0	0	**53,990**
San Diego County Water Authority	Total KMs	1,251	129	44	**1,424**
	Exposure (x1000)	8,342,432	88,164	65,329	**8,495,925**
San Marcos	Total KMs	140	11	13	**164**
	Exposure (x$1,000)	933,731	16,937	8,600	**959,268**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Unincorporated	Total KMs	1,846	69	93	**2,008**
	Exposure (x$1,000)	12,306,924	46,921	139,012	**12,492,857**
Vallecitos Water District	Total KMs	156	13	11	**180**
	Exposure (x$1,000)	1,039,272	8,794	16,852	**1,064,918**
Vista	Total KMs	116	12	8	**136**
	Exposure (x$1,000)	772,613	8,252	12,359	**793,224**
Vista Irrigation District	Total KMs	7	1	1	**9**
	Exposure (x$1,000)	47,718	835	980	**49,533**
Total Number		**4,184**	**299**	**193**	**4,676**
Total Exposure (x $1,000)		**27,894,842**	**213,236**	**278,082**	**28,386,160**

TABLE 44: POTENTIAL EXPOSURE AND LOSSES FROM ROSE CANYON SCENARIO EARTHQUAKE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine Fpd	0	0	0	0	0
Carlsbad	114,187	36,605	14,221,043	3,474	1,050,364
Chula Vista	210,011	46,508	18,068,358	4,483	1,355,435
Coronado	19,375	7,211	2,801,474	857	259,114
Del Mar	3,965	2,001	777,389	546	165,083
El Cajon	0	0	0	0	0
Encinitas	59,322	19,547	7,594,010	3,192	965,101
Escondido	0	0	0	0	0
Heartland Fire District	61,683	11,995	4,660,058	1,198	362,215
Imperial Beach	27,161	5,698	2,213,673	421	127,289
La Mesa	25,203	5,473	2,126,261	604	182,619
Lemon Grove	26,480	6,522	2,533,797	594	179,596
National City	61,014	8,648	3,359,748	1,413	427,221
Oceanside	104,063	28,369	11,021,357	2,281	689,660
Otay Water District	126,387	28,869	11,215,607	1,267	383,077
Padre Dam Municipal Water District	0	0	0	0	0
Port Of San Diego	14,710	0	0	485	146,640
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Ramona Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fpd	19,844	4,259	1,654,622	329	99,473
San Diego	1,184,880	280,311	108,900,824	36,762	11,114,991
San Diego County Water Authority	1,926,720	454,167	176,443,880	55,724	16,848,151
San Marcos	378	117	45,455	5	1,512
San Miguel Fpd	29,048	5,303	2,060,216	416	125,778
Santee	0	0	0	0	0
Solana Beach	13,214	5,113	1,986,401	1,229	371,588
Sweetwater Authority	113,119	33,847	13,149,560	5,152	1,557,707
Unincorporated	94,666	13,228	5,139,078	945	285,721
Vallecitos Water District	8,475	2,267	880,730	48	14,513
Vista	8,730	0	0	202	61,075
Vista Irrigation District	0	1,804	700,854	0	0
Total	**4,252,635**	**1,007,862**	**391,554,387**	**121,627**	**36,773,923**

TABLE 45: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM ROSE CANYON SCENARIO EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	POT	SCH	TOTAL
Alpine FPD	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	1	44	0	0	7	10	11	0	5	20	**98**
	Exposure (x$1,000)	182,097	289,680	0	0	1,985,000	30,480	33,528	0	684,447	1,139,748	**4,344,980**
Chula Vista	Number	0	54	4	0	8	12	16	2	1	56	**153**
	Exposure (x$1,000)	0	356,380	7,320	0	2,032,000	36,576	48,768	33,259	30,000	6,077,768	**8,622,071**
Coronado	Number	0	1	0	1	3	3	5	1	0	4	**18**
	Exposure (x$1,000)	0	6,670	0	4,000	141,000	9,144	15,240	16,629	0	225,996	**418,679**
Del Mar	Number	0	6	0	0	0	3	4	0	0	0	**13**
	Exposure (x$1,000)	0	39,070	0	0	0	9,144	12,192	0	0	0	**60,406**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	15	0	0	1	6	9	1	1	12	**45**
	Exposure (x$1,000)	0	98,150	0	0	47,000	18,288	27,432	16,629	163,612	579,494	**950,605**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Heartland Fire District	Number	0	17	1	0	1	3	5	0	0	8	**35**
	Exposure (x$1,000)	0	111,490	1,830	0	47,000	9,144	15,240	0	0	325,674	**510,378**
Imperial Beach	Number	0	0	0	0	0	2	5	0	0	5	**12**
	Exposure (x$1,000)	0	0	0	0	0	6,096	15,240	0	0	289,784	**311,120**
La Mesa	Number	0	5	1	0	0	0	0	0	0	3	**9**
	Exposure (x$1,000)	0	32,400	1,830	0	0	0	0	0	0	117,438	**151,668**
Lemon Grove	Number	0	12	0	0	1	3	5	0	0	5	**26**
	Exposure (x$1,000)	0	79,090	0	0	47,000	9,144	15,240	0	0	208,236	**358,710**
National City	Number	0	65	0	0	6	5	7	1	0	15	**99**
	Exposure (x$1,000)	0	426,900	0	0	282,000	15,240	21,336	16,629	0	919,450	**1,681,555**
Oceanside	Number	1	37	0	1	3	12	18	1	1	20	**94**
	Exposure (x$1,000)	86,701	243,940	0	4,000	969,000	36,576	54,864	16,629	163,612	3,317,050	**4,892,372**
Otay Water District	Number	0	38	1	0	4	7	4	1	0	31	**86**
	Exposure (x$1,000)	0	253,460	1,830	0	1,844,000	21,336	12,192	16,629	0	4,623,446	**6,772,893**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	3	3	0	0	3	7	4	0	0	0	**20**
	Exposure (x$1,000)	300,604	19,060	0	0	969,000	21,336	12,192	0	0	0	**1,322,192**
Poway	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Ramona Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fe FPD	Number	0	15	0	0	1	2	4	0	4	3	**29**
	Exposure (x$1,000)	0	100,050	0	0	47,000	6,096	12,192	0	520,835	64,010	**750,183**
San Diego (City)	Number	3	550	11	32	65	94	138	9	5	263	**1,170**
	Exposure (x$1,000)	745,778	3,637,150	20,130	128,000	13,819,000	286,512	420,624	149,663	684,447	28,292,272	**48,183,576**
San Diego County Water Authority	Number	4	859	16	33	96	154	220	14	17	410	**1,823**
	Exposure (x$1,000)	1,014,575	5,676,330	29,280	132,000	21,072,000	469,392	670,560	232,809	2,246,952	41,331,960	**72,875,858**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel FPD	Number	0	36	0	0	0	2	1	0	1	6	**46**
	Exposure (x$1,000)	0	240,120	0	0	0	6,096	3,048	0	30,000	284,752	**564,016**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	POT	SCH	TOTAL
Santee	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	4	0	0	0	1	4	0	0	4	**13**
	Exposure (x$1,000)	0	26,680	0	0	0	3,048	12,192	0	0	113,146	**155,066**
Sweetwater Authority	Number	0	119	3	0	13	14	23	2	2	48	**224**
	Exposure (x$1,000)	0	783,280	5,490	0	2,267,000	42,672	70,104	33,259	60,000	2,654,158	**5,915,963**
Unincorporated	Number	0	79	0	0	4	7	8	0	5	11	**114**
	Exposure (x$1,000)	0	526,930	0	0	1,844,000	21,336	24,384	0	550,835	414,252	**3,381,737**
Vallecitos Water District	Number	0	0	0	0	0	0	0	0	1	1	**2**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	163,612	63,196	**226,808**
Vista	Number	0	1	0	0	1	1	0	0	0	1	**4**
	Exposure (x$1,000)	0	6,670	0	0	47,000	3,048	0	0	0	163,106	**219,824**
Vist Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**9**	**1,940**	**36**	**67**	**213**	**338**	**482**	**32**	**43**	**918**	**4,078**
Total Exposure (x $1,000)		**2,029,150**	**12,822,950**	**65,880**	**268,000**	**46,443,000**	**1,030,224**	**1,469,136**	**532,135**	**5,298,352**	**90,879,262**	**160,838,089**

TABLE 46: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM ROSE CANYON SCENARIO EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Carlsbad	Total KMs	175	86	19	**280**
	Exposure (x$1,000)	1,166,948	58,397	29,139	**1,254,484**
Chula Vista	Total KMs	313	43	16	**372**
	Exposure (x$1,000)	2,088,358	29,225	23,583	**2,141,166**
Coronado	Total KMs	17	16	0	**33**
	Exposure (x$1,000)	115,663	10,875	0	**126,538**
Del Mar	Total KMs	3	8	6	**17**
	Exposure (x$1,000)	20,658	5,734	8,561	**34,953**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	84	43	12	**139**
	Exposure (x$1,000)	560,387	29,238	18,293	**607,918**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Heartland Fire District	Total KMs	137	8	13	**158**
	Exposure (x$1,000)	916,796	5,588	19,450	**941,834**
Imperial Beach	Total KMs	3	4	0	**7**
	Exposure (x$1,000)	16,720	2,743	0	**19,463**
La Mesa	Total KMs	57	3	4	**64**
	Exposure (x$1,000)	379,149	1,806	6,699	**387,654**
Lemon Grove	Total KMs	41	6	9	**56**
	Exposure (x$1,000)	270,926	3,781	12,751	**287,458**
National City	Total KMs	105	12	28	**145**
	Exposure (x$1,000)	703,183	8,240	42,451	**753,874**
Oceanside	Total KMs	183	39	22	**244**
	Exposure (x$1,000)	1,221,266	26,798	32,077	**1,280,141**
Otay Water District	Total KMs	139	22	0	**161**
	Exposure (x1000)	930,061	15,258	0	**945,319**
Padre Dam Municipal Water District	Total KMs	0	0	0	**45**
	Exposure (x1000)	0	0	0	**139,152**
Port of San Diego	Total KMs	15	9	21	**45**
	Exposure (x1000)	101,430	6,267	31,455	**139,152**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Ramona Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Rancho Santa Fe FPD	Total KMs	3	5	0	**8**
	Exposure (x$1,000)	19,405	3,355	0	**22,760**
San Diego (City)	Total KMs	1,145	303	213	**1,661**
	Exposure (x$1,000)	7,633,100	207,096	319,623	**8,159,819**
San Diego County Water Authority	Total KMs	1,233	580	257	**2,070**
	Exposure (x1000)	8,222,970	396,449	386,060	**9,005,479**
San Marcos	Total KMs	3	0	0	**3**
	Exposure (x$1,000)	17,139	0	0	**17,139**
San Miguel FPD	Total KMs	49	9	0	**58**
	Exposure (x$1,000)	327,067	6,148	0	**333,215**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	22	14	5	**41**
	Exposure (x$1,000)	149,284	9,776	6,752	**165,812**
Sweetwater Authority	Total KMs	80	5	38	**123**
	Exposure (x$1,000)	531,071	3,375	57,035	**591,481**
Unincorporated	Total KMs	153	22	1	**176**
	Exposure (x$1,000)	1,019,835	15,237	130	**1,035,202**
Vallecitos Water District	Total KMs	18	1	0	**19**
	Exposure (x$1,000)	123,112	461	0	**123,573**
Vista	Total KMs	22	1	0	**23**
	Exposure (x$1,000)	143,694	908	0	**144,602**
Vista Irrigation District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**4,000**	**1,239**	**664**	**5,903**
Total Exposure (x $1,000)		**26,678,222**	**846,755**	**994,059**	**28,519,036**

5.3.7. FLOOD

Digitized 100-year and 500-year flood maps with base flood elevation (BFE) from the FEMA FIRM program for most of the areas were used for this project. Census blocks with non-zero population and non-zero dollar exposure that intersect with these polygons were used in the analysis. For the areas that did not include BFE information, a base flood elevation was estimated for the final purpose of computing the flood depth at different locations of the region as follows:

- Transect lines across the flood polygon (perpendicular to the flow direction) were created using an approximation method for Zone A flood polygons. Zone A is the FEMA FIRM Zone that is defined as the 100-year base flood.
- A point file was extracted from the line (Begin node, End node and center point). The Zonal operation in the GIS tool Spatial Analyst (with the point file and a digital elevation model [DEM]) was used to estimate the ground elevation in the intersection of the line with the flood polygon borders. The average value of the End and Begin point of the line was calculated. This value was assumed as the base flood elevation for each transect.

A surface model (triangulated irregular network, or TIN) was derived from the original transect with the derived BFE value and the flood polygon. This TIN file approximated a continuous and variable flood elevation along the flood polygon. A grid file was then derived from the TIN file with the same extent and pixel resolution of the DEM (30-meter resolution). The difference of the flood elevation grid file and the DEM was calculated to produce an approximate flood depth for the whole study area. HAZUS-MH based damage functions, in a raster format, were created for each of the occupancies present in the census blocks.

A customized Visual Basic (VBA) script was written to assign the ratio of damage expected (function of computed flood depth) for each type of occupancy based on the HAZUS-MH damage functions. HAZUS-MH exposure values ($) in raster format were created using Spatial Analyst. Since not all areas in the census blocks are completely within the flood area, the exposure at risk was weighted and estimated accordingly based on the number of pixels in flood area. Losses were then estimated through multiplication of damage ratio with the exposure at risk for each block. Losses were then approximated based on 100- and 500-year losses (high and low hazards).

The first table below provides a breakdown of potential exposure and losses by jurisdiction for 100-year flood, and the second table provides a breakdown of infrastructure and critical facility losses for 100-year flood by jurisdiction. The third table provides a breakdown of potential exposure and losses by jurisdiction from 500-year flood, and the fourth table provides a breakdown of potential infrastructure and critical facility losses by jurisdiction. The loss tables also provide a breakdown of loss ratios for commercial and residential properties by jurisdiction.

These loss ratios are determined by dividing the loss values by the exposure values for each jurisdiction, and give a perspective of the potential losses for each jurisdiction for this hazard. For example, a loss ratio value of 0.4 in El Cajon would mean that 40% of the exposed buildings in El Cajon would be lost due to a 100- or 500-year flood.

Approximately 270,263 people may be at risk from the 100-year flood hazard.

Approximately 585,882 people are at risk from the 500-year flood hazard.

TABLE 47: POTENTIAL EXPOSURE AND LOSSES FROM 100-YEAR FLOOD HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine Fire Protection District	268	23	$8,938	1	$302
Carlsbad	2,497	619	$240,543	15	$4,535
Chula Vista	1,741	633	$245,984	169	$51,097
Coronado	4,022	0	$0	2	$605
Del Mar	1,123	384	$149,222	29	$8,768
El Cajon	5,427	80	$31,088	30	$9,071
Encinitas	661	32	$12,435	6	$1,814
Escondido	7,380	1,625	$631,475	209	$63,191
Heartland Fire District	5,500	84	$32,642	37	$11,187
Imperial Beach	2,702	55	$21,373	1	$302
La Mesa	73	1	$389	3	$907
Lemon Grove	0	3	$1,166	4	$1,209
National City	10,693	149	$57,901	139	$42,027
Oceanside	13,323	4,540	$1,764,244	448	$135,453
Otay Water District	2,623	51	$19,819	16	$4,838
Padre Dam Municipal Water District	5,330	613	$238,212	75	$22,676
Port of San Diego	17,614	0	$0	2	$605
Poway	656	343	$133,290	64	$19,350
Rainbow Municipal Water District	1,124	105	$40,803	25	$7,559
Ramona Municipal Water District	900	257	$99,870	22	$6,652
Rancho Santa Fe Fire Protection District	1,252	23	$8,938	7	$2,116
San Diego (City)	35,523	4,976	$1,933,674	733	$221,623
San Diego County Water Authority	101,369	16,590	$6,446,874	2,397	$724,733
San Marcos	4,150	279	$108,419	106	$32,049
San Miguel Fire Protection District	3,575	524	$203,626	59	$17,839
Santee	1,279	40	$15,544	13	$3,931
Solana Beach	656	313	$121,632	11	$3,326
Sweetwater Authority	13,338	1,195	$464,377	486	$146,942
Unincorporated:	17,979	4,151	$1,613,079	530	$160,246
Vallecitos Water District	6,115	290	$112,694	117	$35,375
Vista	889	455	$176,813	38	$11,489
Vista Irrigation District	481	35	$13,601	7	$2,116
Total	**270,263**	**38,468**	**14,948,665**	**5,801**	**1,753,933**

TABLE 48: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 100-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	19	0	0	0	0	0	0	0	0	0	**19**
	Exposure (x$1,000)	0	123,880	0	0	0	0	0	0	0	0	0	**123,880**
Chula Vista	Number	0	14	0	0	2	1	1	0	0	0	0	**16**
	Exposure (x$1,000)	0	91,480	0	0	922,000	3,048	3,048	0	0	0	0	**1,019,576**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	0	3	0	0	0	0	0	0	0	0	2	**5**
	Exposure (x$1,000)	0	20,010	0	0	0	0	0	0	0	0	230,806	**250,816**
Encinitas	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	32,400	0	0	0	0	0	0	0	0	0	**32,400**
Escondido	Number	0	8	0	0	0	1	2	0	0	0	3	**14**
	Exposure (x$1,000)	0	53,360	0	0	0	3,048	6,096	0	0	0	200,836	**263,340**
Heartland Fire District	Number	0	3	0	0	0	0	0	0	0	0	2	**5**
	Exposure (x$1,000)	0	20,010	0	0	0	0	0	0	0	0	230,806	**250,816**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	10	0	0	0	0	0	0	0	0	0	**10**
	Exposure (x$1,000)	0	64,800	0	0	0	0	0	0	0	0	0	**64,800**
Oceanside	Number	1	21	0	0	0	3	4	0	0	0	2	**31**
	Exposure (x$1,000)	86,701	134,370	0	0	0	9,144	12,192	0	0	0	88,356	**330,763**
Otay Water District	Number	0	15	0	0	0	0	0	0	0	0	0	**15**
	Exposure (x$1,000)	0	100,050	0	0	0	0	0	0	0	0	0	**100,050**
Padre Dam Municipal Water District	Number	31	0	0	0	0	0	0	0	0	0	0	**31**
	Exposure (x$1,000)	206,770	0	0	0	0	0	0	0	0	0	0	**206,770**
Port of San Diego	Number	1	0	0	0	0	0	0	0	1	0	0	**2**
	Exposure (x$1,000)	6,670	0	0	0	0	0	0	0	719,793	0	0	**726,463**
Poway	Number	0	12	0	0	0	1	0	0	0	0	0	**13**
	Exposure (x$1,000)	0	80,040	0	0	0	3,048	0	0	0	0	0	**83,088**
Rainbow Municipal Water District	Number	0	17	0	0	0	1	0	0	0	0	1	**19**
	Exposure (x$1,000)	0	113,390	0	0	0	3,048	0	0	0	0	14,430	**130,868**
Ramona Municipal Water District	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	33,350	0	0	0	0	0	0	0	0	0	**33,350**
Rancho Santa Fe FPD	Number	0	8	0	0	0	0	0	0	0	1	0	**9**
	Exposure (x$1,000)	0	53,360	0	0	0	0	0	0	0	163,612	0	**216,972**
San Diego (City)	Number	0	138	0	3	2	2	2	0	1	0	1	**149**
	Exposure (x$1,000)	0	903,360	0	6,000	94,000	6,096	6,096	0	719,793	0	43,068	**1,778,413**
San Diego County Water Authority	Number	1	360	0	6	4	11	11	0	1	1	11	**406**
	Exposure (x$1,000)	86,701	2,364,150	0	12,000	1,016,000	33,528	33,528	0	719,793	163,612	364,476	**4,793,788**
San Marcos	Number	0	10	0	0	0	0	0	0	0	0	0	**10**
	Exposure (x$1,000)	0	63,850	0	0	0	0	0	0	0	0	0	**63,850**
San Miguel FPD	Number	0	25	0	0	0	0	0	0	0	0	0	**25**
	Exposure (x$1,000)	0	166,750	0	0	0	0	0	0	0	0	0	**166,750**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Santee	Number	0	12	0	0	0	0	0	0	0	0	0	**12**
	Exposure (x$1,000)	0	80,040	0	0	0	0	0	0	0	0	0	**80,040**
Solana Beach	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Sweetwater Authority	Number	0	24	0	0	2	1	2	0	0	0	1	**30**
	Exposure (x$1,000)	0	156,280	0	0	922,000	3,048	6,096	0	0	0	22,126	**1,109,550**
Unincorporated	Number	1	124	0	7	4	4	4	0	0	2	6	**152**
	Exposure (x$1,000)	80,980	824,230	0	14,000	1,844,000	12,192	12,192	0	0	193,612	99,012	**3,080,218**
Vallecitos Water District	Number	0	13	0	0	0	0	0	0	0	0	0	**13**
	Exposure (x$1,000)	0	83,860	0	0	0	0	0	0	0	0	0	**83,860**
Vista	Number	0	3	0	0	0	0	1	0	0	0	0	**4**
	Exposure (x$1,000)	0	19,060	0	0	0	0	3,048	0	0	0	0	**22,108**
Vista Irrigation District	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	5,720	0	0	0	0	0	0	0	0	0	**5,720**
Total Number		**35**	**855**	**0**	**16**	**14**	**27**	**27**	**0**	**3**	**4**	**29**	**1,008**
Total Exposure (x $1,000)		**467,822**	**5,620,200**	**0**	**32,000**	**4,798,000**	**82,296**	**82,296**	**0**	**2,159,379**	**520,836**	**1,293,916**	**15,056,745**

TABLE 49: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 100-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	13	7	1	**21**
	Exposure (x$1,000)	83,715	4,631	342	**88,688**
Chula Vista	Total KMs	32	3	1	**36**
	Exposure (x$1,000)	210,783	2,373	194	**213,350**
Coronado	Total KMs	2	3	0	**5**
	Exposure (x$1,000)	11,014	1,984	0	**12,998**
Del Mar	Total KMs	6	3	2	**11**
	Exposure (x$1,000)	37,125	1,804	2,515	**41,444**
El Cajon	Total KMs	3	1	1	**5**
	Exposure (x$1,000)	17,924	84	98	**18,106**
Encinitas	Total KMs	5	4	1	**10**
	Exposure (x$1,000)	32,741	2,541	119	**35,401**
Escondido	Total KMs	26	2	0	**28**
	Exposure (x$1,000)	172,723	1,651	0	**174,374**
Heartland Fire District	Total KMs	3	1	1	**5**
	Exposure (x$1,000)	21,083	310	277	**21,670**
Imperial Beach	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	543	0	**543**
La Mesa	Total KMs	1	1	1	**3**
	Exposure (x$1,000)	3,158	225	180	**3,563**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	14	1	1	**16**
	Exposure (x$1,000)	95,654	233	384	**96,271**
Oceanside	Total KMs	54	10	10	**74**
	Exposure (x$1,000)	362,336	6,755	14,077	**383,168**
Otay Water District	Total KMs	26	3	0	**29**
	Exposure (x1000)	170,295	2,057	0	**172,352**
Padre Dam Municipal Water District	Total KMs	7	2	1	**10**
	Exposure (x1000)	48,638	1,591	98	**50,327**
Port of San Diego	Total KMs	5	2	6	**13**
	Exposure (x1000)	31,645	1,210	8,353	**41,208**
Poway	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	11,352	114	0	**11,466**
Rainbow Municipal Water District	Total KMs	22	1	0	**23**
	Exposure (x$1,000)	147,114	844	0	**147,958**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Ramona Municipal Water District	Total KMs	6	0	0	**6**
	Exposure (x$1,000)	42,426	0	0	**42,426**
San Diego (City)	Total KMs	141	22	38	**201**
	Exposure (x$1,000)	1,141,289	15,261	57,503	**1,214,053**
San Diego County Water Authority	Total KMs	426	63	53	**542**
	Exposure (x1000)	2,842,718	43,267	79,247	**2,965,232**
San Marcos	Total KMs	19	2	2	**23**
	Exposure (x$1,000)	128,671	1,238	2,565	**132,474**
San Miguel FPD	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	14,886	704	0	**15,590**
Santee	Total KMs	5	2	0	**7**
	Exposure (x$1,000)	35,785	1,394	0	**37,179**
Solana Beach	Total KMs				**0**
	Exposure (x$1,000)				**0**
Sweetwater Authority	Total KMs	47	3	1	**51**
	Exposure (x$1,000)	310,550	2,059	577	**313,186**
Unincorporated	Total KMs	104	8	1	**113**
	Exposure (x$1,000)	694,666	5,505	1,032	**701,203**
Vallecitos Water District	Total KMs	24	2	2	**28**
	Exposure (x$1,000)	157,073	1,238	2,612	**160,923**
Vista	Total KMs	9	1	1	**11**
	Exposure (x$1,000)	57,799	369	928	**59,096**
Vista Irrigation District	Total KMs	2	0	1	**3**
	Exposure (x$1,000)	13,618	0	37	**13,655**
Total Number		**1,006**	**150**	**125**	**1,281**
Total Exposure (x $1,000)		**6,896,781**	**99,985**	**171,138**	**7,167,904**

TABLE 50: POTENTIAL EXPOSURE AND LOSSES FROM 500-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine Fpd	268	23	8,938	1	302
Carlsbad	2,497	619	240,543	15	4,535
Chula Vista	14,651	3,628	1,409,841	556	168,107
Coronado	4,022	0	0	2	605
Del Mar	1,228	475	184,585	36	10,885
El Cajon	20,560	6,231	2,421,367	867	262,137
Encinitas	681	44	17,098	10	3,024
Escondido	31,005	10,048	3,904,653	545	164,781
Heartland Fire District	20,665	6,235	2,422,921	874	264,254
Imperial Beach	2,702	55	21,373	3	907
La Mesa	105	1	389	3	907
Lemon Grove	0	3	1,166	4	1,209
National City	12,868	909	353,237	200	60,470
Oceanside	33,750	12,611	4,900,635	659	199,249
Otay Water District	4,976	632	245,595	116	35,073
Padre Dam Municipal Water District	7,573	1,447	562,304	298	90,100
Port Of San Diego	17,736	0	0	18	5,442
Poway	3,107	1,090	423,574	134	40,515
Rainbow Municipal Water District	3,137	773	300,388	45	13,606
Ramona Municipal Water District	2,470	809	314,377	37	11,187
Rancho Santa Fe Fpd	1,262	36	13,990	7	2,116
San Diego	68,368	14,269	5,544,933	1,706	515,809
San Diego County Water Authority	221,421	56,606	21,997,092	5,880	1,777,818
San Marcos	4,230	503	195,466	178	53,818
San Miguel Fpd	5,417	700	272,020	86	26,002
Santee	2,846	751	291,839	217	65,610
Solana Beach	1,022	509	197,797	57	17,234
Sweetwater Authority	30,746	4,378	1,701,291	857	259,114
Unincorporated	26,802	5,967	2,318,776	618	186,852
Vallecitos Water District	6,515	606	235,492	198	59,865
Vista	3,135	1,096	425,906	230	69,541
Vista Irrigation District	818	48	18,653	14	4,233
Total	**585,882**	**132,147**	**51,352,324**	**14,534**	**4,394,355**

TABLE 51: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 500-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	19	0	0	0	0	0	0	0	0	0	**19**
	Exposure (x$1,000)	0	123,880	0	0	0	0	0	0	0	0	0	**123,880**
Chula Vista	Number	0	19	1	0	4	2	1	0	0	0	1	**28**
	Exposure (x$1,000)	0	124,830	1,830	0	1,844,000	6,096	3,048	0	0	0	119,880	**2,099,684**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	0	25	1	0	0	2	2	0	0	0	5	**35**
	Exposure (x$1,000)	0	166,750	1,830	0	0	6,096	6,096	0	0	0	368,594	**549,366**
Encinitas	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	32,400	0	0	0	0	0	0	0	0	0	**32,400**
Escondido	Number	0	34	0	0	3	3	9	0	0	1	8	**58**
	Exposure (x$1,000)	0	224,880	0	0	969,000	9,144	27,432	0	0	163,612	420,246	**1,814,314**
Heartland Fire District	Number	0	25	1	0	0	2	2	0	0	0	5	**35**
	Exposure (x$1,000)	0	166,750	1,830	0	0	6,096	6,096	0	0	0	368,594	**549,366**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	12	0	0	0	0	2	0	0	0	0	**14**
	Exposure (x$1,000)	0	78,140	0	0	0	0	6,096	0	0	0	0	**84,236**
Oceanside	Number	1	23	0	1	0	6	6	0	0	0	5	**42**
	Exposure (x$1,000)	20,137	147,710	0	2,000	0	18,288	18,288	0	0	0	199,578	**406,001**
Otay Water District	Number	0	16	0	0	0	0	0	0	0	1	0	**17**
	Exposure (x$1,000)	0	106,720	0	0	0	0	0	0	0	163,612	0	**270,332**
Padre Dam Municipal Water District	Number	0	43	0	0	0	1	1	0	0	0	0	**45**
	Exposure (x$1,000)	0	286,810	0	0	0	3,048	3,048	0	0	0	0	**292,906**
Port of San Diego	Number	0	1	0	0	2	1	0	0	1	0	0	**5**
	Exposure (x$1,000)	0	6,670	0	0	922,000	3,048	0	0	719,793	0	0	**1,651,511**
Poway	Number	0	18	0	0	0	1	0	0	0	0	0	**19**
	Exposure (x$1,000)	0	120,060	0	0	0	3,048	0	0	0	0	0	**123,108**
Rainbow Municipal Water District	Number	0	19	0	0	0	1	0	0	0	0	1	**21**
	Exposure (x$1,000)	0	126,730	0	0	0	3,048	0	0	0	0	14,430	**144,208**
Ramona Municipal Water District	Number	0	6	0	0	0	0	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	40,020	0	0	0	0	0	0	0	0	0	**40,020**
Rancho Santa Fe FPD	Number	0	8	0	0	0	0	0	0	0	1	0	**9**
	Exposure (x$1,000)	0	53,360	0	0	0	0	0	0	0	163,612	0	**216,972**
San Diego (City)	Number	0	184	1	3	4	4	8	0	1	1	3	**209**
	Exposure (x$1,000)	0	1,208,280	5,490	6,000	1,016,000	12,192	24,384	0	719,793	163,612	138,602	**3,294,353**
San Diego County Water Authority	Number	1	486	6	7	11	24	34	0	1	4	29	**603**
	Exposure (x$1,000)	20,137	3,200,770	10,980	14,000	3,829,000	73,152	103,632	0	719,793	654,447	1,395,270	**10,021,181**
San Marcos	Number	0	13	1	0	0	0	1	0	0	0	2	**17**
	Exposure (x$1,000)	0	83,860	1,830	0	0	0	3,048	0	0	0	13,912	**102,650**
San Miguel FPD	Number	0	25	0	0	0	0	0	0	0	1	0	**26**
	Exposure (x$1,000)	0	166,750	0	0	0	0	0	0	0	163,612	0	**330,362**
Santee	Number	0	17	0	0	0	0	1	0	0	0	0	**18**
	Exposure (x$1,000)	0	113,390	0	0	0	0	3,048	0	0	0	0	**116,438**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Solana Beach	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Sweetwater Authority	Number	0	30	1	0	4	2	4	0	0	0	2	**43**
	Exposure (x$1,000)	0	196,300	1,830	0	1,844,000	6,096	12,192	0	0	0	142,006	**2,202,424**
Unincorporated	Number	1	133	0	7	4	4	5	0	0	3	7	**164**
	Exposure (x$1,000)	14,416	884,260	0	14,000	1,844,000	12,192	15,240	0	0	357,223	114,626	**3,255,957**
Vallecitos Water District	Number	0	16	1	0	0	0	1	0	0	0	2	**20**
	Exposure (x$1,000)	0	103,870	1,830	0	0	0	3,048	0	0	0	13,912	**122,660**
Vista	Number	0	5	0	0	0	3	3	0	0	0	2	**13**
	Exposure (x$1,000)	0	32,400	0	0	0	9,144	9,144	0	0	0	63,048	**113,736**
Vista Irrigation District	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	25,730	0	0	0	0	0	0	0	0	0	**25,730**
Total Number		**3**	**1,191**	**13**	**18**	**32**	**58**	**80**	**0**	**3**	**12**	**72**	**1,482**
Total Exposure (x $1,000)		**54,690**	**7,853,720**	**27,450**	**36,000**	**12,268,000**	**176,784**	**243,840**	**0**	**2,159,379**	**1,829,730**	**3,372,698**	**28,022,291**

TABLE 52: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 500-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	13	7	1	**21**
	Exposure (x$1,000)	83,915	4,681	342	**88,938**
Chula Vista	Total KMs	68	8	5	**81**
	Exposure (x$1,000)	454,289	5,173	7,439	**466,901**
Coronado	Total KMs	2	3	0	**5**
	Exposure (x$1,000)	11,014	1,984	0	**12,998**
Del Mar	Total KMs	6	3	2	**11**
	Exposure (x$1,000)	38,837	1,972	2,965	**43,774**
El Cajon	Total KMs	49	3	4	**56**
	Exposure (x$1,000)	326,126	2,043	5,268	**333,437**
Encinitas	Total KMs	5	4	0	**9**
	Exposure (x$1,000)	32,741	2,620	0	**35,361**
Escondido	Total KMs	65	6	1	**72**
	Exposure (x$1,000)	431,452	4,162	752	**436,366**
Heartland Fire District	Total KMs	49	3	4	**56**
	Exposure (x$1,000)	329,284	2,323	5,448	**337,055**
Imperial Beach	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	1,097	543	0	**1,640**
La Mesa	Total KMs	1	1	1	**3**
	Exposure (x$1,000)	3,158	281	180	**3,619**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	28	1	1	**30**
	Exposure (x$1,000)	188,912	405	414	**189,731**
Oceanside	Total KMs	94	12	11	**117**
	Exposure (x$1,000)	624,041	8,133	16,729	**648,903**
Otay Water District	Total KMs	38	4	0	**42**
	Exposure (x1000)	256,525	2,418	0	**258,943**
Padre Dam Municipal Water District	Total KMs	28	4	3	**35**
	Exposure (x1000)	184,247	2,915	5,218	**192,380**
Port of San Diego	Total KMs	9	2	9	**20**
	Exposure (x1000)	28,995	1,211	13,073	**43,279**
Poway	Total KMs	4	1	0	**5**
	Exposure (x$1,000)	23,390	198	0	**23,588**
Rainbow Municipal Water District	Total KMs	32	1	0	**33**
	Exposure (x$1,000)	212,499	844	0	**213,343**
Ramona Municipal Water District	Total KMs	11	0	0	**11**
	Exposure (x$1,000)	70,665	0	0	**70,665**
San Diego (City)	Total KMs	367	3	67	**437**
	Exposure (x$1,000)	2,448,289	22,199	100,606	**2,571,094**
San Diego County Water Authority	Total KMs	859	89	94	**1,042**
	Exposure (x1000)	5,730,566	61,124	140,601	**5,932,291**
San Marcos	Total KMs	26	2	2	**30**
	Exposure (x$1,000)	172,749	1,393	3,617	**177,759**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
San Miguel FPD	Total KMs	4	1	0	**5**
	Exposure (x$1,000)	24,494	759	0	**25,253**
Santee	Total KMs	25	4	1	**30**
	Exposure (x$1,000)	166,448	2,574	303	**169,325**
Solana Beach	Total KMs				**0**
	Exposure (x$1,000)				**0**
Sweetwater Authority	Total KMs	86	7	5	**98**
	Exposure (x$1,000)	574,882	4,765	7,853	**587,500**
Unincorporated	Total KMs	124	9	1	**134**
	Exposure (x$1,000)	823,809	5,942	1,070	**830,821**
Vallecitos Water District	Total KMs	30	2	3	**35**
	Exposure (x$1,000)	201,150	1,393	3,683	**206,226**
Vista	Total KMs	25	1	1	**27**
	Exposure (x$1,000)	167,522	560	1,486	**169,568**
Vista Irrigation District	Total KMs	3	0	0	**3**
	Exposure (x$1,000)	20,253	0	0	**20,253**
Total Number		**2,052**	**182**	**216**	**2,450**
Total Exposure (x $1,000)		**13,631,349**	**142,615**	**317,047**	**14,091,011**

5.3.8. RAIN-INDUCED LANDSLIDE

Steep slope and soils data from SANDAG, as well as data from the State of California, U.S. Geological Survey and HAZUS for all of San Diego County were combined and modeled to determine areas susceptible to rain-induced landslides. Soils that are prone to movement were determined from the database, and combined with areas that have greater than 25% slope, which are prone to sliding. The combination of these two factors gives a general idea of landslide susceptibility.

Localized hard copy maps developed by TAN were also reviewed. The TAN landslide susceptibility modeling takes into account more information, such as past landslides, landslide-prone formations, and steep slope. The identified vulnerable assets were superimposed on top of this information, resulting in three risk/exposure estimates:

1. The aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies
2. The aggregated population at risk at the census block leve
3. The critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature).

These results were then aggregated and presented by hazard risk level per jurisdiction.

The first table below provides a breakdown of potential exposure for high-risk rain-induced landslide hazard by jurisdiction, and the second table below provides a breakdown of infrastructure and critical facility exposure for high risk. The third table provides a breakdown of potential exposure for moderate risk rain-induced landslide by jurisdiction, and the fourth table below provides a breakdown of potential infrastructure and critical facility exposure for moderate risk.

Approximately 181,501 people may be at risk from a rain-induced landslide hazard.

TABLE 53: POTENTIAL EXPOSURE FROM RAIN-INDUCED LANDSLIDE HAZARD (HIGH RISK) BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fpd	292	2	777,000	0	0
Carlsbad	2,163	24	9,324,000	1	302,350
Chula Vista	865	0	0	0	0
Coronado	0	0	0	0	0
Del Mar	0	0	0	0	0
El Cajon	1,337	11	4,273,500	0	0
Encinitas	158	4	1,554,000	0	0
Escondido	4,372	76	29,526,000	3	907,050
Heartland Fire District	1,337	11	4,273,500	0	0
Imperial Beach	0	0	0	0	0
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	0	0	0	0	0
Otay Water District	5,522	32	12,432,000	0	0
Padre Dam Municipal Water District	846	30	11,655,000	0	0
Port Of San Diego	0	0	0	0	0
Poway	574	0	0	0	0
Rainbow Municipal Water District	1,968	84	32,634,000	8	2,418,800
Ramona Municipal Water District	314	8	3,108,000	0	0
Rancho Santa Fe Fpd	10,853	3,285	1,276,222,500	226	68,331,100
San Diego	1,222	9	3,496,500	0	0
San Diego County Water Authority	68,465	5,076	1,972,026,000	270	81,634,500
San Marcos	8,693	943	366,355,500	12	3,628,200
San Miguel Fpd	1,773	48	18,648,000	0	0
Santee	8	11	4,273,500	1	302,350
Solana Beach	0	0	0		0
Sweetwater Authority	2,592	89	34,576,500	2	604,700
Unincorporated	51,594	4,300	1,670,550,000	259	78,308,650
Vallecitos Water District	12,038	1,076	418,026,000	15	4,535,250
Vista	2,782	21	8,158,500	1	302,350
Vista Irrigation District	1,733	68	26,418,000	2	604,700
Total	**181,501**	**15,208**	**5,908,308,000**	**800**	**241,880,000**

TABLE 54: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM RAIN-INDUCED LANDSLIDE HAZARD (HIGH RISK) BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	RAIL	SCH	TOTAL
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	47,000	0	0	0	0	0	0	0	0	**47,000**
Padre Dam Municipal Water District	Number	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	2,000	0	0	0	0	0	0	0	0	0	**2,000**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fe FPD	Number	0	2	0	0	2	1	4	0	0	0	1	0	4	**14**
	Exposure (x$1,000)	0	13,340	0	0	94,000	3,048	12,192	0	0	0	163,612	0	218,078	**504,270**
San Diego County Water Authority	Number	0	2	0	4	3	2	4	0	0	0	1	0	4	**20**
	Exposure (x$1,000)	0	13,340	0	8,000	141,000	6,096	12,192	0	0	0	163,612	0	218,078	**562,318**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Santee	Number	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	2,000	0	0	0	0	0	0	0	0	0	**2,000**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	0	2	0	3	3	1	4	0	0	0	1	0	4	**18**
	Exposure (x$1,000)	0	13,340	0	6,000	141,000	3,048	12,192	0	0	0	163,612	0	218,078	**557,270**
Vallecitos Water District	Number	0	0	0	3	0	1	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	0	0	6,000	0	3,048	0	0	0	0	0	0	0	**9,048**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**6**	**0**	**12**	**9**	**5**	**12**	**0**	**0**	**0**	**3**	**0**	**12**	**59**
Total Exposure (x $1,000)		**0**	**40,020**	**0**	**24,000**	**423,000**	**15,240**	**36,576**	**0**	**0**	**0**	**490,836**	**0**	**654,234**	**1,683,906**

TABLE 55: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM RAIN-INDUCED LANDSLIDE HAZARD (HIGH RISK) BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Chula Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	246	0	**246**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Otay Water District	Total KMs	3	1	0	**4**
	Exposure (x$1,000)	17,437	635	0	**18,072**
Oceanside	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Padre Dam Municipal Water District	Total KMs		1		**1**
	Exposure (x1000)		726		**726**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	14,962	887	0	**15,849**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Rancho Santa Fe FPD	Total KMs	15	1	0	**16**
	Exposure (x$1,000)	98,127	742	0	**98,869**
San Diego (City)	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,823	0	0	**2,823**
San Diego County Water Authority	Total KMs	37	6	0	**43**
	Exposure (x1000)	248,125	4,231	0	**252,356**
San Marcos	Total KMs	8	0	0	**8**
	Exposure (x$1,000)	55,696	0	0	**55,696**
San Miguel FPD	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	600	0	**600**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	139	0	**139**
Unincorporated	Total KMs	47	6	2	**55**
	Exposure (x$1,000)	311,472	3,962	2,442	**317,876**
Vallecitos Water District	Total KMs	8	0	0	**8**
	Exposure (x$1,000)	55,696	0	0	**55,696**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista Irrigation District	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,020	0	0	**2,020**
Total Number		**122**	**19**	**2**	**143**
Total Exposure (x $1,000)		**806,358**	**12,168**	**2,442**	**820,968**

TABLE 56: POTENTIAL EXPOSURE TO RAIN-INDUCED LANDSLIDE HAZARD (MODERATE RISK) BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine Fpd	0	0	0	0	0
Carlsbad	0	0	0	0	0
Chula Vista	0	0	0	0	0
Coronado	0	0	0	0	0
Del Mar	0	0	0	0	0
El Cajon	177	57	22,145	2	605
Encinitas	60	4	1,554	0	0
Escondido	558	494	191,919	26	7,861
Heartland Fire District	177	59	22,922	2	605
Imperial Beach	0	0	0	0	0
La Mesa	0	2	777	0	0
Lemon Grove	0	0	0	0	0
National City	0	64	24,864	1	302
Oceanside	0	0	0	0	0
Otay Water District	9,569	20,175	7,837,988	1,071	323,817
Padre Dam Municipal Water District	3,972	6,051	2,350,814	427	129,103
Port Of San Diego	0	0	0	0	0
Poway	0	0	0	0	0
Rainbow Municipal Water District	2,837	1,351	524,864	57	17,234
Ramona Municipal Water District	1,049	282	109,557	23	6,954
Rancho Santa Fe Fpd	16,246	11,707	4,548,170	684	206,807
San Diego	560	4	1,554	0	0
San Diego County Water Authority	115,920	103,190	40,089,315	6,267	1,894,827
San Marcos	258	150	58,275	5	1,512
San Miguel Fpd	23,999	41,324	16,054,374	2,186	660,937
Santee	0	0	0	0	0
Solana Beach	0	0	0	0	0
Sweetwater Authority	4,265	5,316	2,065,266	301	91,007
Unincorporated	115,732	102,862	39,961,887	6,279	1,898,456
Vallecitos Water District	4,043	3,907	1,517,870	154	46,562
Vista	0	66	25,641	2	605
Vista Irrigation District	4,182	5,802	2,254,077	454	137,267
Total	**303,604**	**302,867**	**117,663,830**	**17,941**	**5,424,461**

TABLE 57: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM RAIN-INDUCED LANDSLIDE HAZARD (MODERATE RISK) BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	41	0	15	9	9	9	0	0	2	19	**104**
	Exposure (x$1,000)	0	273,470	0	30,000	2,907,000	27,432	27,432	0	0	193,612	3,621,338	**7,080,284**
Padre Dam Municipal Water District	Number	0	34	0	0	0	0	0	0	0	0	2	**36**
	Exposure (x$1,000)	0	226,780	0	0	0	0	0	0	0	0	114,552	**341,332**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	3	0	0	1	1	0	0	0	1	0	**6**
	Exposure (x$1,000)	0	20,010	0	0	875,000	3,048	0	0	0	30,000	0	**928,058**
Ramona Municipal Water District	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Rancho Santa Fe FPD	Number	0	26	0	0	5	4	5	0	0	7	6	**53**
	Exposure (x$1,000)	0	173,420	0	0	1,063,000	12,192	15,240	0	0	878,059	370,874	**2,512,785**
San Diego (City)	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego County Water Authority	Number	0	245	0	21	28	31	28	0	0	14	56	**423**
	Exposure (x$1,000)	0	1,629,400	0	42,000	8,768,000	94,488	85,344	0	0	1,355,282	5,323,190	**17,297,704**
San Marcos	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel FPD	Number	0	97	0	0	4	9	9	0	0	3	29	**151**
	Exposure (x$1,000)	0	646,990	0	0	188,000	27,432	27,432	0	0	223,612	4,117,656	**5,231,122**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	32	0	0	1	1	3	0	0	1	3	**41**
	Exposure (x$1,000)	0	213,440	0	0	47,000	3,048	9,144	0	0	30,000	98,494	**401,126**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Unincorporated	Number	0	250	0	21	30	31	28	0	0	15	56	**431**
	Exposure (x$1,000)	0	1,662,750	0	42,000	9,690,000	94,488	85,344	0	0	1,385,282	5,323,190	**18,283,054**
Vallecitos Water District	Number	0	7	0	2	1	1	0	0	0	1	1	**13**
	Exposure (x$1,000)	0	46,690	0	4,000	875,000	3,048	0	0	0	30,000	8,954	**967,692**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	4	0	0	0	0	0	0	0	0	2	**6**
	Exposure (x$1,000)	0	25,730	0	0	0	0	0	0	0	0	91,464	**117,194**
Total Number		**0**	**741**	**0**	**59**	**79**	**87**	**82**	**0**	**0**	**44**	**174**	**1,266**
Total Exposure (x $1,000)		**0**	**4,932,020**	**0**	**118,000**	**24,413,000**	**265,176**	**249,936**	**0**	**0**	**4,125,847**	**19,069,712**	**53,173,691**

TABLE 58: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM RAIN-INDUCED LANDSLIDE HAZARD (MODERATE RISK) BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Chula Vista	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,941	0	0	**2,941**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	11,578	95	0	**11,673**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Heartland Fire District	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	11,621	96	0	**11,717**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	23	0	0	**23**
	Exposure (x$1,000)	155,397	0	0	**155,397**
Oceanside	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Otay Water District	Total KMs	166	41	0	**207**
	Exposure (x$1,000)	1,309,054	28,206	0	**1,337,260**
Padre Dam Municipal Water District	Total KMs	26	3	0	**29**
	Exposure (x1000)	171,195	2,376	0	**173,571**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Rainbow Municipal Water District	Total KMs	52	2	0	**54**
	Exposure (x$1,000)	346,138	1,174	0	**347,312**
Ramona Municipal Water District	Total KMs	3	0	0	**3**
	Exposure (x$1,000)	19,607	0	0	**19,607**
Rancho Santa Fe FPD	Total KMs	43	5	0	**48**
	Exposure (x1000)	288,347	3,352	0	**291,699**
San Diego (City)	Total KMs	6	0	2	**8**
	Exposure (x$1,000)	40,763	0	2,312	**43,075**
San Diego County Water Authority	Total KMs	1,033	179	58	**1,270**
	Exposure (x1000)	6,888,284	122,442	87,479	**7,098,205**
San Marcos	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	13,026	306	0	**13,332**
San Miguel FPD	Total KMs	215	49	0	**264**
	Exposure (x$1,000)	1,430,630	33,517	0	**1,464,147**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	94	7	0	**101**
	Exposure (x$1,000)	629,031	4,909	0	**633,940**
Unincorporated	Total KMs	1,113	180	58	**1,351**
	Exposure (x$1,000)	7,424,405	122,740	87,336	**7,634,481**
Vallecitos Water District	Total KMs	88	2	1	**91**
	Exposure (x$1,000)	555,646	1,125	102	**556,873**
Vista	Total KMs	1	0	1	**2**
	Exposure (x$1,000)	5,205	0	272	**5,477**
Vista Irrigation District	Total KMs	40	2	3	**45**
	Exposure (x$1,000)	268,108	1,566	4,609	**274,283**
Total Number		**2,910**	**473**	**123**	**3,506**
Total Exposure (x $1,000)		**19,570,976**	**321,904**	**182,110**	**20,074,990**

5.3.9. WILDFIRE/STRUCTURE FIRE

CDF-FRAP (California Department of Forestry and Fire Protection's Fire and Resource Assessment Program) modeled wildland fire threat for the state of California in 2002. This model was used in GIS to profile the fire hazard throughout the County and is described in detail below in the Vulnerability Assessment portion of this document. This data was updated as requested by the Encinitas jurisdiction and is reflected in the hazard modeling process and subsequent mapping.

It should be noted that the hazard level depicted within current data boundaries will change after the CDF re-evaluates burned areas. After this re-evaluation is complete, it is expected that the CDF-FRAP will remodel the fire risk and provide updated risk maps. These updated maps should be included in future revisions of this plan. In the model, fire threat is a combination of factors including:

1. Historical fire regime and fire regime condition class
2. Existing vegetation
3. Topography.

These factors were combined to create five fire regime classes ranging from little or no threat to extreme. The regime classes are:

Fire Regime I - 0-35 year frequency and low to mixed severity

Fire Regime II - 0-35 year frequency and high severity

Fire regime III - 35-100+ year frequency and mixed severity

Fire Regime IV - 35-100 + year frequency and high severity

Fire Regime V - 200+ year frequency and high severity

Wildfire loss estimates were determined using the CDF-FRAP Wildfire Hazard Severity Zones data. CDF-FRAP modeled wildland fire threat for the state of California in 2008. This model was used in GIS to profile the fire hazard throughout the County, then used in overlays to determine the loss estimates. In the model, fire threat is a combination of two factors: 1) fire rotation, or the likelihood of a given area burning, and 2) potential fire behavior (fuel rank). These two factors were combined to create five threat classes ranging from little or no threat to very high. The fuel ranking methodology assigned ranks based on expected fire behavior for unique combinations of topography and vegetative fuels under a given severe weather condition (wind speed, humidity, temperature, and fuel moisture).

The procedure made an initial assessment of rank based on as assigned fuel model and slope, then potentially increases ranks based on the amount of ladder and/or crown fuel present to arrive at a final fuel rank. Fire rotation class intervals were calculated from fifty years of fire history on land areas grouped into “strata” based on fire environment conditions. These strata are defined by climate, vegetation, and land ownership. The fire rotation interval is the number of years it would take for past fires to burn an area equivalent to the area of a given stratum. Fire rotation interval for a given stratum is calculated by dividing the annual number of acres burned into the total area of the stratum. Finally, fire rotation values were grouped into classes. The larger fire rotation values correspond to less frequent burning. CDF calculated a numerical index of fire threat based on the combination of fuel rank and fire rotation.

A 1-3 ranking of fuel rank was summed with the 1-3 ranking from rotation class to develop a threat index ranging from 2 to 6. This threat index was then grouped into four threat classes. Areas that do not support wildland fuels (e.g., open water, agriculture lands, etc.) were omitted from the calculation, however areas of very large urban centers (i.e., concrete jungles) were left in but received a moderate threat value. This data was updated as requested by the City of Encinitas to more accurately reflect their fire risks, and is reflected in the hazard modeling process and subsequent mapping.

The identified vulnerable assets were superimposed on top of this information, resulting in four risk/exposure estimates: 1) the aggregated exposure and building count at the parcel level for residential and commercial occupancies, 2) the aggregated population at risk at the census block level, 3) the critical facilities at risk (schools, hospitals, airports, bridges, and other facilities of a critical nature), and 4) the critical infrastructure (major roadways, railways, and oil/gas pipelines) at risk. These results were then aggregated and presented by hazard risk level per jurisdiction.

Wildfire can create a multi-hazard effect, where areas that are burned by wildfire suddenly have greater flooding risks because the vegetation that prevented erosion is now gone. Watershed from streams and rivers will change and floodplain mapping may need to be updated. Also, air quality issues during a large-scale fire would cause further economic losses than only the structural losses described below. Road closures and business closures due to large-scale fires would also increase the economic losses shown below.

The tables below provide a breakdown of potential greatest exposures to the San Diego region.

TABLE 59: POTENTIAL EXPOSURE FROM VERY HIGH WILDFIRE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine FPD	14,696	4,961	1,927,845	84	25,397
Carlsbad	19,479	5,075	1,972,145	561	169,618
Chula Vista	15,354	2,583	1,003,754	64	19,350
Coronado	0	0	0	0	0
Del Mar	3,555	340	132,124	249	75,285
El Cajon	13,057	1,523	591,838	7	2,116
*Encinitas	11,633	3,801	1,476,689	179	54,121
Escondido	33,762	4,639	1,802,715	148	44,748
Heartland Fire District	13,163	1,523	591,838	7	2,116
Imperial Beach	0	0	0	0	0
La Mesa	106	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	14,768	1,823	708,418	128	38,701
Otay Water District	25,962	6,989	2,715,925	383	115,800
Padre Dam Municipal Water District	68,029	14,780	5,743,508	802	242,485
Port Of San Diego	0	0	0	0	0
Poway	25,892	5,326	2,069,684	569	172,037
Rainbow Municipal Water District	11,651	4,168	1,619,685	0	0
Ramona Municipal Water District	15,886	5,809	2,257,377	60	18,141
Rancho Santa Fe Fpd	27,114	3,586	1,393,520	362	109,451
San Diego	341,251	123,699	48,069,431	173	52,307
San Diego County Water Authority	791,081	203,245	78,981,007	3,517	1,063,365
San Marcos	41,364	7,043	2,736,910	8,821	2,667,029
San Miguel Fpd	21,741	4,418	1,716,835	355	107,334
Santee	17,792	4,673	1,815,928	157	47,469
Solana Beach	2,538	579	224,999	115	34,770
Sweetwater Authority	734	0	0	25	7,559
Unincorporated	322,758	52,594	20,438,028	376	113,684
Vallecitos Water District	62,918	10,426	4,051,544	3,708	1,121,114
Vista	21,628	1,680	652,848	96	29,026
Vista Irrigation District	20,066	1,497	581,734	279	84,356
Total	**1,953,526**	**475,195**	**184,660,777**	**54**	**16,327**

* Wildfire dataset provided by the City of Encinitas for Very High Fire Hazard Severity Zones

TABLE 60: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM VERY HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine PFD	Number	0	34	0	0	1	0	3	0	0	0	4	**42**
	Exposure (x$1,000)	0	226,780	0	0	47,000	0	9,144	0	0	0	114,922	**397,846**
Carlsbad	Number	0	7	0	0	1	4	2	0	0	1	2	**17**
	Exposure (x$1,000)	0	46,690	0	0	47,000	12,192	6,096	0	0	163,612	108,188	**383,778**
Chula Vista	Number	0	0	0	0	1	1	0	0	0	0	0	**2**
	Exposure (x$1,000)	0	0	0	0	47,000	3,048	0	0	0	0	0	**50,048**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	2	0	0	0	1	0	0	0	0	6	**9**
	Exposure (x$1,000)	0	13,340	0	0	0	3,048	0	0	0	0	6,997,070	**7,013,458**
*Encinitas	Number	0	4	0	0	0	0	0	0	0	0	1	**5**
	Exposure (x$1,000)	0	22,880	0	0	0	0	0	0	0	0	51,948	**78,628**
Escondido	Number	0	11	0	0	0	0	0	0	0	1	1	**13**
	Exposure (x$1,000)	0	73,370	0	0	0	0	0	0	0	30,000	42,106	**145,476**
Heartland Fire District	Number	0	2	0	0	0	1	0	0	0	0	6	**9**
	Exposure (x$1,000)	0	13,340	0	0	0	3,048	0	0	0	0	6,997,070	**7,013,458**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	1	1	0	0	0	1	1	0	0	0	1	**5**
	Exposure (x$1,000)	86,701	6,670	0	0	0	3,048	3,048	0	0	0	37,518	**136,985**
Otay Water District	Number	0	16	0	15	11	4	6	0	0	2	8	**62**
	Exposure (x$1,000)	0	106,720	0	30,000	3,001,000	12,192	18,288	0	0	193,612	474,192	**3,836,004**
Padre Dam Municipal Water District	Number	0	47	0	0	1	4	4	0	0	1	16	**73**
	Exposure (x$1,000)	0	313,490	0	0	47,000	12,192	12,192	0	0	163,612	7,396,966	**7,945,452**
Poway	Number	0	32	0	0	3	1	1	0	0	6	3	**46**
	Exposure (x$1,000)	0	213,440	0	0	141,000	3,048	3,048	0	0	180,000	155,918	**696,454**
Rainbow Municipal Water District	Number	0	33	0	1	2	2	1	0	0	0	1	**40**
	Exposure (x$1,000)	0	220,110	0	2,000	922,000	6,096	3,048	0	0	0	14,430	**1,167,684**
Ramona Municipal Water District	Number	0	13	0	5	3	3	0	0	0	3	0	**27**
	Exposure (x$1,000)	0	86,710	0	10,000	969,000	9,144	0	0	0	193,612	0	**1,268,466**
Rancho Santa Fe FPD	Number	0	8	0	0	4	0	0	0	0	3	0	**15**
	Exposure (x$1,000)	0	53,360	0	0	1,016,000	0	0	0	0	193,612	0	**1,262,972**
San Diego (City)	Number	1	260	2	21	34	18	14	1	0	4	70	**425**
	Exposure (x$1,000)	20,137	1,716,150	3,660	42,000	8,222,000	54,864	42,672	16,629	0	387,223	15,821,496	**26,326,831**
San Diego County Water Authority	Number	1	457	2	53	59	49	33	4	0	26	119	**803**
	Exposure (x$1,000)	106,837	3,026,340	3,660	106,000	13,537,000	149,352	100,584	33,259	0	1,982,505	37,210,012	**56,255,550**
San Marcos	Number	0	1	0	2	1	1	0	0	0	0	12	**17**
	Exposure (x$1,000)	0	6,670	0	4,000	857,000	3,048	0	0	0	0	12,941,120	**13,811,838**
San Miguel FPD	Number	0	2	0	0	2	1	3	0	0	2	3	**13**
	Exposure (x$1,000)	0	13,340	0	0	94,000	3,048	9,144	0	0	193,612	71,780	**384,924**
Santee	Number	0	2	0	0	0	0	1	0	0	1	2	**6**
	Exposure (x$1,000)	0	13,340	0	0	0	0	3,048	0	0	163,612	152,366	**332,366**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	0	258	0	33	37	44	33	0	0	15	34	**454**
	Exposure (x$1,000)	0	1,701,860	0	66,000	6,707,000	131,064	100,584	0	0	1,118,059	1,029,784	**10,854,351**
Vallecitos Water District	Number	0	8	0	7	0	2	0	0	0	1	13	**31**
	Exposure (x$1,000)	0	53,360	0	14,000	0	6,096	0	0	0	163,612	12,764,112	**13,001,180**
Vista	Number	0	2	0	0	0	1	0	0	0	0	0	**3**
	Exposure (x$1,000)	0	13,340	0	0	0	3,048	0	0	0	0	0	**16,388**
Total Number		**3**	**1,200**	**4**	**137**	**160**	**138**	**102**	**5**	**0**	**66**	**302**	**2,117**
Total Exposure (x $1,000)		**213,675**	**7,945,100**	**7,320**	**274,000**	**35,654,000**	**417,576**	**310,896**	**49,888**	**0**	**5,126,683**	**102,380,998**	**152,380,135**

* Wildfire dataset provided by the City of Encinitas for Very High Fire Hazard Severity Zones

TABLE 61: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM VERY HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	65	3	0	**68**
	Exposure (x$1,000)	434,832	2,268	0	**437,100**
Carlsbad	Total KMs	61	13	0	**74**
	Exposure (x$1,000)	407,897	8,578	0	**416,475**
Chula Vista	Total KMs	41	4	0	**45**
	Exposure (x$1,000)	273,960	2,566	0	**276,526**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	652	0	**652**
El Cajon	Total KMs	16	2	0	**18**
	Exposure (x$1,000)	107,171	1,079	0	**108,250**
Encinitas	Total KMs	21	10	0	**24**
	Exposure (x$1,000)	65,575	6,717	0	**140,769**
Escondido	Total KMs	40	9	0	**49**
	Exposure (x$1,000)	267,984	6,149	0	**274,133**
Heartland Fire District	Total KMs	16	2	0	**18**
	Exposure (x$1,000)	107,171	1,079	0	**108,250**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	14	3	0	**17**
	Exposure (x$1,000)	90,850	2,180	0	**93,030**
Otay Water District	Total KMs	216	24	0	**240**
	Exposure (x1000)	1,438,065	16,706	0	**1,454,771**
Padre Dam Municipal Water District	Total KMs	137	22	0	**159**
	Exposure (x1000)	911,453	14,984	0	**926,437**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Poway	Total KMs	58	4	0	**62**
	Exposure (x$1,000)	388,142	2,414	0	**390,556**
Rainbow Municipal Water District	Total KMs	262	11	0	**273**
	Exposure (x1000)	1,744,280	7,763	0	**1,752,043**
Ramona Municipal Water District	Total KMs	94	0	0	**94**
	Exposure (x1000)	625,765	0	0	**625,765**
Rancho Santa Fe FPD	Total KMs	14	2	0	**16**
	Exposure (x$1,000)	93,346	1,630	0	**94,976**
San Diego (City)	Total KMs	1,934	126	56	**2,116**
	Exposure (x$1,000)	12,894,842	85,728	83,589	**13,064,159**
San Diego County Water Authority	Total KMs	3,316	292	89	**3,697**
	Exposure (x1000)	22,108,904	199,668	133,388	**22,441,960**
San Marcos	Total KMs	40	2	1	**43**
	Exposure (x$1,000)	266,929	1,183	1,642	**269,754**
San Miguel FPD	Total KMs	51	21	0	**72**
	Exposure (x$1,000)	338,443	14,334	0	**352,777**
Santee	Total KMs	33	2	0	**35**
	Exposure (x$1,000)	223,061	1,448	0	**224,509**
Solana Beach	Total KMs	9	3	1	**13**
	Exposure (x$1,000)	61,678	1,776	254	**63,708**
Unincorporated	Total KMs	2,185	123	90	**2,398**
	Exposure (x$1,000)	14,569,105	83,698	134,264	**14,787,067**
Vallecitos Water District	Total KMs	119	3	1	**123**
	Exposure (x$1,000)	796,465	1,945	1,748	**800,158**
Vista	Total KMs	13	3	0	**16**
	Exposure (x$1,000)	87,845	1,723	0	**89,568**
Vista Irrigation District	Total KMs	12	0	1	**13**
	Exposure (x$1,000)	79,247	0	535	**79,782**
Total Number		**8,767**	**678**	**238**	**9,683**
Total Exposure (x $1,000)		**58,456,149**	**461,606**	**355,420**	**59,273,175**

TABLE 62: POTENTIAL EXPOSURE FROM HIGH WILDFIRE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine Fpd	991	788	306,138	138	41,724
Carlsbad	24,365	8,513	3,307,301	238	71,959
Chula Vista	8,464	2,863	1,112,276	57	17,234
Coronado	0	0	0	0	0
Del Mar	940	255	99,068	8	2,419
El Cajon	1,131	168	65,268	20	6,047
Escondido	9,189	1,629	632,867	76	22,979
Heartland Fire District	1,131	168	65,268	20	6,047
Imperial Beach	0	6	2,331	0	0
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	18,152	5,128	1,992,228	144	43,538
Otay Water District	15,736	4,372	1,698,522	355	107,334
Padre Dam Municipal Water District	11,393	3,746	1,455,321	284	85,867
Port Of San Diego	0	0	0	0	0
Poway	7,010	1,974	766,899	202	61,075
Rainbow Municipal Water District	4,867	2,021	785,159	63	19,048
Ramona Municipal Water District	3,834	1,282	498,057	88	26,607
Rancho Santa Fe Fpd	11,976	2,456	954,156	103	31,142
San Diego	30,619	9,281	3,605,669	1,427	431,453
San Diego County Water Authority	224,927	55,177	21,436,265	3,591	1,085,739
San Marcos	11,262	5,276	2,049,726	124	37,491
San Miguel Fpd	5,147	1,672	649,572	263	79,518
Santee	7,644	2,047	795,260	75	22,676
Solana Beach	954	505	196,193	15	4,535
Sweetwater Authority	491	472	183,372	21	6,349
Unincorporated	98,697	16,146	6,272,721	1,157	349,819
Vallecitos Water District	17,895	6,131	2,381,894	130	39,306
Vista	15,117	999	388,112	88	26,607
Vista Irrigation District	8,960	674	261,849	36	10,885
Total	**540,892**	**133,749**	**51,961,487**	**8,723**	**2,637,399**

TABLE 63: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine FPD	Number	0	3	0	0	0	2	0	0	0	0	1	**6**
	Exposure (x$1,000)	0	20,010	0	0	0	6,096	0	0	0	0	18,722	**44,828**
Carlsbad	Number	0	9	0	0	0	0	2	0	0	1	7	**19**
	Exposure (x$1,000)	0	60,030	0	0	0	0	6,096	0	0	163,612	452,436	**682,174**
Chula Vista	Number	0	3	1	0	0	0	1	0	0	0	1	**6**
	Exposure (x$1,000)	0	20,010	1,830	0	0	0	3,048	0	0	0	42,550	**67,438**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	0	0	1	2	0	0	0	0	1	3	**7**
	Exposure (x$1,000)	0	0	0	2,000	1,750,000	0	0	0	0	163,612	98,346	**2,013,958**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	0	7	0	0	1	2	1	0	0	1	3	**15**
	Exposure (x$1,000)	0	46,690	0	0	47,000	6,096	3,048	0	0	163,612	125,060	**391,506**
Otay Water District	Number	0	8	1	0	2	3	1	0	0	0	2	**17**
	Exposure (x$1,000)	0	53,360	1,830	0	922,000	9,144	3,048	0	0	0	201,428	**1,190,810**
Padre Dam Municipal Water District	Number	0	12	0	0	0	2	1	0	0	0	2	**17**
	Exposure (x$1,000)	0	80,040	0	0	0	6,096	3,048	0	0	0	72,372	**161,556**
Poway	Number	0	7	0	0	1	0	0	0	0	2	0	**10**
	Exposure (x$1,000)	0	46,690	0	0	47,000	0	0	0	0	60,000	0	**153,690**
Rainbow Municipal Water District	Number	0	7	0	0	0	0	0	0	0	0	0	**7**
	Exposure (x$1,000)	0	46,690	0	0	0	0	0	0	0	0	0	**46,690**
Ramona Municipal Water District	Number	1	3	0	0	1	1	0	0	0	1	4	**11**
	Exposure (x$1,000)	182,097	20,010	0	0	875,000	3,048	0	0	0	163,612	145,558	**1,389,325**
Rancho Santa Fe FPD	Number	0	6	0	0	0	2	0	0	0	0	3	**11**
	Exposure (x$1,000)	0	40,020	0	0	0	6,096	0	0	0	0	246,864	**292,980**
San Diego (City)	Number	2	14	0	0	0	1	1	0	0	0	2	**20**
	Exposure (x$1,000)	161,960	93,380	0	0	0	3,048	3,048	0	0	0	221,852	**483,288**
San Diego County Water Authority	Number	1	94	1	1	12	12	11	0	0	7	35	**174**
	Exposure (x$1,000)	344,057	622,230	1,830	2,000	3,876,000	36,576	33,528	0	0	878,059	2,012,874	**7,807,154**
San Marcos	Number	0	2	0	0	0	0	1	0	0	0	3	**6**
	Exposure (x$1,000)	0	13,340	0	0	0	0	3,048	0	0	0	264,624	**281,012**
San Miguel FPD	Number	0	7	0	0	1	1	1	0	0	0	1	**11**
	Exposure (x$1,000)	0	46,690	0	0	47,000	3,048	3,048	0	0	0	158,878	**258,664**
Santee	Number	0	2	0	0	0	0	0	0	0	0	1	**3**
	Exposure (x$1,000)	0	13,340	0	0	0	0	0	0	0	0	53,650	**66,990**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	24,864	**24,864**
Sweetwater Authority	Number	0	6	0	0	0	0	1	0	0	0	1	**8**
	Exposure (x$1,000)	0	40,020	0	0	0	0	3,048	0	0	0	33,004	**76,072**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Unincorporated	Number	1	79	0	0	12	10	6	0	0	2	16	**126**
	Exposure (x$1,000)	196,513	517,430	0	0	2,220,000	30,480	18,288	0	0	327,223	727,346	**4,037,280**
Vallecitos Water District	Number	0	2	0	0	0	0	1	0	0	0	3	**6**
	Exposure (x$1,000)	0	13,340	0	0	0	0	3,048	0	0	0	264,624	**281,012**
Vista	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	48,396	**48,396**
Total Number		**5**	**272**	**3**	**2**	**32**	**36**	**26**	**0**	**0**	**15**	**90**	**483**
Total Exposure (x $1,000)		**884,626**	**1,799,990**	**5,490**	**4,000**	**9,784,000**	**109,728**	**85,344**	**0**	**0**	**1,919,730**	**5,213,448**	**19,806,356**

TABLE 64: POTENTIAL EXPOSURE TO INFRASTRUCTURES FROM HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	6	1	0	**7**
	Exposure (x$1,000)	38,043	595	0	**38,638**
Carlsbad	Total KMs	129	24	0	**153**
	Exposure (x$1,000)	861,708	16,189	0	**877,897**
Chula Vista	Total KMs	33	2	0	**35**
	Exposure (x$1,000)	218,981	1,024	0	**220,005**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	1	2	1	**4**
	Exposure (x$1,000)	2,219	1,200	257	**3,676**
El Cajon	Total KMs	3	1	0	**4**
	Exposure (x$1,000)	23,274	438	0	**23,712**
Escondido	Total KMs	20	2	0	**22**
	Exposure (x$1,000)	135,087	1,550	0	**136,637**
Heartland Fire District	Total KMs	3	1	0	**4**
	Exposure (x$1,000)	23,274	438	0	**23,712**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	50	4	0	**54**
	Exposure (x$1,000)	330,311	2,580	0	**332,891**
Otay Water District	Total KMs	84	10	0	**94**
	Exposure (x1000)	559,789	6,922	0	**566,711**
Padre Dam Municipal Water District	Total KMs	24	3	0	**27**
	Exposure (x1000)	161,849	2,232	0	**164,081**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	14	1	0	**15**
	Exposure (x$1,000)	96,648	227	0	**96,875**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Rainbow Municipal Water District	Total KMs	35	2	0	**37**
	Exposure (x1000)	235,403	1,607	0	**237,010**
Ramona Municipal Water District	Total KMs	30	0	0	**30**
	Exposure (x1000)	200,279	0	0	**200,279**
Rancho Santa Fe FPD	Total KMs	14	1	0	**15**
	Exposure (x$1,000)	95,745	432	0	**96,177**
San Diego (City)	Total KMs	130	6	2	**138**
	Exposure (x$1,000)	864,555	4,184	2,817	**871,556**
San Diego County Water Authority	Total KMs	683	119	19	**821**
	Exposure (x1000)	4,553,847	81,510	28,331	**4,663,688**
San Marcos	Total KMs	40	1	3	**44**
	Exposure (x$1,000)	267,402	843	5,094	**273,339**
San Miguel FPD	Total KMs	24	2	0	**26**
	Exposure (x$1,000)	163,233	1,433	0	**164,666**
Santee	Total KMs	13	2	0	**15**
	Exposure (x$1,000)	87,222	1,340	0	**88,562**
Solana Beach	Total KMs	1	2	1	**4**
	Exposure (x$1,000)	1,572	1,282	701	**3,555**
Sweetwater Authority	Total KMs	1	3	0	**4**
	Exposure (x$1,000)	6,227	2,058	0	**8,285**
Unincorporated	Total KMs	420	71	32	**523**
	Exposure (x$1,000)	2,798,149	48,323	47,473	**2,893,945**
Vallecitos Water District	Total KMs	46	2	3	**51**
	Exposure (x$1,000)	303,208	1,072	5,094	**309,374**
Vista	Total KMs	12	2	0	**14**
	Exposure (x$1,000)	83,218	1,463	0	**84,681**
Vista Irrigation District	Total KMs	2	0	0	**2**
	Exposure (x$1,000)	14,101	0	0	**14,101**
Total Number		**1,818**	**264**	**61**	**2,143**
Total Exposure (x $1,000)		**12,125,344**	**178,942**	**89,767**	**12,394,053**

5.3.10. HUMAN-CAUSED HAZARDS

The vulnerability assessment information for human-caused hazards is considered sensitive homeland security information and is provided in a separate, confidential document (Attachment A).

5.3.11. CLIMATE CHANGE

The following paragraphs provide an assessment summary of Climate Change impacts and threats to people and property in the San Diego region, provided by planning partners from Scripps Institution of Oceanography (more sources are listed in this plan's appendices):[131]

Scripps Institution of Oceanography Assessment Summary

Community adaptations to climate change should best be conducted with an awareness of the existing local climate, along with spatially specific climate projections. This section summarizes and updates findings of the San Diego Region Report (Kalansky et al., 2018) and the San Diego County Ecosystems Report (Jennings et al., 2018) which have recently synthesized the current state of the science and understanding of the impacts from climate variability and future climate change in the region. The section will be organized by key climate-related phenomena: temperature, precipitation, Santa Ana winds and wildfires, coastal low clouds, and sea level. The section concludes by discussing compounding extreme events.

Warming Temperature

As has been projected across California (Pierce et al., 2018), models indicate that temperature in San Diego will warm progressively through the 21st Century. By the end of the 21st Century, the projected warming ranges from 4˚F to 9˚F, with magnitude depending greatly upon global greenhouse gas emissions. Warming is projected to be greater in late summer and early fall than in other months of the year, and this monthly difference is more pronounced for minimum daily temperatures and under a non-mitigated greenhouse gas emission scenario (RCP 8.5). Because the oceans warm more slowly than land masses, temperature increases along the coast are projected to be about 1˚F less than other locations throughout the region.

The most severe impacts of rising temperature will likely result during occurrences of weather patterns that cause extreme heat. Heat waves have impacts on human health, ecosystems, agriculture, energy demand, and infrastructure. By the end of the century, similar to the average temperature change, the hottest day of the year is projected to increase by 4-9˚F depending on the greenhouse gas emission scenario. The frequency, or the probability of a heat wave occurrence, does not necessarily follow background warming however (Guirguis et al., 2018). For example, under 6˚F of warming, nighttime frequency of heat waves is projected to increase by approximately 51% in the coastal zone, while that of daytime heat waves is only projected to increase by 23% (Jennings et al., 2018). Unlike the coasts, the local mountains, such as Cuyamaca have a similar increase (~30%) in the probability of nighttime and daytime heat waves.

This contrast is a result of differences in the number of days of extreme temperature (long warm tails). Relative to background warming, which is projected to be stronger inland than at

[131] Higbee, Melissa, Daniel Cayan, Sam Iacobellis, Mary Tyree (2014). Report from San Diego Hazard Mitigation Plan Update Training Workshop #1: Climate Change and Hazards in San Diego. ICLEI-Local Governments for Sustainability. Accessed July 7, 2014. http://www.icleiusa.org/library/documents/training-workshop-report/view

the coast, scientists (Gershunov & Guirguis, 2012) have projected more intense future heat waves along the coast compared to inland areas. In San Diego, as in the rest of California, coastal low clouds modulate temperatures by providing a cooling effect (Iacobellis & Cayan, 2013) while their absence can boost heat waves relative to normal temperatures (Clemesha et al., 2018). This relationship has an impact on projections of heatwaves; however, the sensitivity of coastal low clouds to climate change is complicated and is an area of active research at present. Moreover, winter Santa Ana wind-driven coastal heat wave activity is on the rise (Gershunov et al. 2021) and these events are known to carry a health burden (Schwarz et al. 2020).

The San Diego Region Report highlighted that the most vulnerable populations to health impacts from extreme events, such as heatwaves, are those who lack resources or are uninsured, are socially isolated, or whose health is already compromised. For example, cardiovascular and respiratory illnesses are exacerbated by heat and air pollution (Analitis et al., 2014) and psychiatric illness has been shown to triple the risk of death from extreme heat (Bouchama et al., 2007). Heatwaves increase morbidity and mortality as was seen with the July 2006 heat wave in California, which exhibited unprecedented magnitude and unusually high humidity levels (Gershunov et al., 2009). The 2006 extreme heat wave resulted in over 600 excess deaths (Ostro et al., 2009), over 1200 excess hospitalizations for cardiovascular and other diseases (Guirguis et al., 2014), and over 16,000 excess emergency-department visits (Knowlton et al., 2009).

In addition, recent research since the San Diego report has shown heat waves in the week prior can cause preterm birth (Ilango et al., 2020) and significant increases in renal hospital admissions for urinary tract infection, septicemia (blood poisoning), urinary stones, and composite kidney disease (Malig et al., 2019).

Throughout California and in San Diego, the effect of high apparent temperature, a combination of hot temperatures and high humidity, can have a greater impact in mortality (heat-related deaths) in coastal areas than inland areas (Basu, 2009). Guirguis et al, (2018, 2014) found that higher daily rates of heat wave-related hospitalization in coastal areas was caused by a lack of air conditioning, while residents in inland areas more often did have air conditioning. Building on this, McElroy et al. (McElroy et al., 2020), examined heat wave definitions (length, threshold percentiles and nighttime versus daytime temperature) and found that residents in climatologically warmer inland and desert climate zones in San Diego had more hospitalizations during heatwaves that had high nighttime warming, as compared to residents in the coastal zone. Both studies underscore the need for heat warning systems that account for differences in the climate zones throughout San Diego.

In Southern California, high temperatures also have great impacts on energy and transportation. A study of Los Angeles, which examined vulnerabilities of energy infrastructure at the neighborhood level, estimated losses up to 20% of peak demand safe operating electrical system capacity during projected extreme temperatures at the end of the century. High temperatures in neighboring San Diego County are expected to have similar impacts. Possible adaptations identified for the Los Angeles case, including higher density housing and reduction of sunlight absorbed (increasing albedo) are relevant for the San Diego region (Burillo et al., 2018, 2019). Data relating to temperature impacts on transportation in Southern California is limited, but studies elsewhere indicate that high temperatures must be included as design criteria in order to avoid damage to roads and rail lines (Sias-Daniel et al., 2014).

Research is advancing on effective adaptations to help combat the impact of heat. As Guirguis et al. (2018) showed, access to air conditioning can help prevent hospitalizations

during extreme heat events. People living in hotter areas within cities have suffered an overall 6% higher risk of mortality/ morbidity compared to those in cooler areas, and those living in less vegetated areas had 5% higher risk compared to those living in more vegetated areas (Schinasi et al., 2018). In Los Angeles, increases in roof albedo, through light-colored reflecting roof surface treatments, reduces near-surface air temperature (Mohegh et al., 2018). With respect to infrastructure, the increase of solar energy generation in San Diego will help to offset increased electricity demand during hot sunny days, although this local source of energy will not help to satisfy nighttime energy needs for air conditioning on hot nights, and will be less effective during, cloudy, hot and often humid days. The addition of batteries can extend solar power's ability to provide energy during nighttime and on cloudy days.

Highly Volatile Precipitation

Precipitation in Southern California has the highest year-to-year variability of any place in the continental U.S (Dettinger et al., 2011). In the San Diego region this variability is exemplified by the unusually wet water years of 2005, 2011, and 2017 and the droughts of 2001-2004, 2007-2010 and 2012-2016. As is the case for Northern California (Dettinger & Cayan, 2014), the high year-to-year variability in San Diego County is driven by extreme precipitation events, wherein days with precipitation at or exceeding the 95th percentile account for 80% of the year-to-year variability in annual total precipitation (Jennings et al., 2018). The heaviest events mostly occur in winter, although the region occasionally experiences high rainfall events from tropical storms or convective rainfall patterns during late summer and early fall. Large spatial variability adds to the complexity of the climate regime in the region. Mean annual precipitation ranges widely in San Diego County, between approximately 8-36 inches with most differences resulting from topographic influences - most precipitation on the west and south facing slopes and least in the rain shadow of the local mountains.

Model projections indicate that precipitation in California will become even more variable in future decades. While days with measurable precipitation become less frequent in Southern California (Pierce et al., 2013; Polade et al., 2014), extreme precipitation events will intensify (Polade et al., 2017). By the end of the century, the average wettest day every five years is projected to increase by 10-30%. Driving the precipitation regime change are atmospheric rivers, which are transports of moisture from the tropics over the Pacific Ocean in long, thin streams of moisture, like rivers in the sky. Precipitation from atmospheric rivers is projected to increase in the future, while precipitation from other forms of precipitation is projected to decrease. This tendency is particularly evident for the most extreme events — model projections suggest the strongest increases in the wettest 1 % of days, nearly all of which are found to be atmospheric rivers (Gershunov et al., 2019).

Atmospheric rivers are projected to be associated with floods, annual maximum flow events, 8% more often in the end of the century as compared to 1950-2000 (Cao et al., 2020). Historically atmospheric rivers have caused the greatest flood damages to property in California and elsewhere along the West Coast as compared to other types of storms (Corringham et al., 2019). Also, coastal runoff created by atmospheric rivers has been shown to result in fecal pollution in coastal waters (Aguilera et al., 2019). In future decades, projected increases in precipitation from atmospheric rivers will likely increase both the flood damages and water pollution as a result of the extreme precipitation.

The average of several climate models project that Southern California will be drier in the future. However, the models project a range of changes in annual precipitation, due to differences in the representation of atmospheric circulation changes across different global climate models, and to the highly variable nature of the San Diego precipitation (Gershunov

et al., 2019). Drought, both interannual and annual, impacts ecosystems and enhances wildfire risk. The recent 2012-2016 drought may be an early form of future droughts in California, not only having diminished annual precipitation amounts, but also featuring temperatures exceeding historical levels.

This combination of warming and drying results in greater evaporative demand from plants and the land surface, which exacerbates the drought (McEvoy et al., 2020; Williams et al., 2015). While reductions of annual precipitation are somewhat uncertain, the increase in temperature is baked into the future because of greenhouse gas accumulation in the atmosphere. The strong likelihood of warming continuing through future decades would indicate that enhanced evapotranspiration and landscape drying are quite certain. Because of this, future projections of drought that incorporate the evapotranspiration as well as precipitation project more multi-year droughts relative to projections of drought that only include precipitation (Kalansky et al. 2018; McEvoy et al., 2020).

Ecosystems have adapted to the high variability of San Diego's hydroclimate, but this variability is projected to increase. The recent 2012-2016 drought showed that certain species were more susceptible to multi-year droughts than others (Venturas et al., 2016). Meanwhile, recurrent drying, along with persistent warming since 1999 has pushed the Southwest toward "mega drought" (Williams et al., 2020). Extreme drought has the potential to intensify and change community composition and structure of ecosystems. Drought has severe consequences because it operates at spatial scales larger than other disturbances such as fire (Jennings et al., 2018).

Adding to impacts caused by interannual drought, the seasonal drought that is characteristic of the Mediterranean climate is projected to become longer with reduced precipitation in the shoulder seasons, spring, and fall. Such a shift toward a narrower precipitation season would stress some plant communities because spring features the largest increases in biomass for many plants due to the availability of moisture as well as the longer daylight hours (Parker et al., 2016). Thus, the projected spring drying has the potential to limit the growth of plants during their primary growing season. The largest impact of fall drying might likely be the increased occurrence of dry live and dry fuels during the season when Santa Ana winds occur, which would intensify the fall wildfire season.

Growing Threats of Wildfire from Warmer Climate and Santa Ana Winds

Santa Ana conditions erase the presence of the North Pacific air mass that usually blankets San Diego County. Santa Ana events typically last a few days and often carry strong and gusty winds from east or northeast directions that produce extreme dryness. Santa Ana Winds bring some of the highest winds experienced by many parts of San Diego County. Peaking in early winter, Santa Ana winds originate in the elevated Great Basin as cool air masses and are pushed southwestward by a synoptic pressure gradient creating offshore winds throughout San Diego (Hughes & Hall, 2010).

Clear skies are typically associated with Santa Ana wind events as the offshore winds blow air pollution offshore (Aguilera et al., 2020a). Some Santa Anas are quite cool, owing to their origins from cold dry Great Basin air masses, but the majority of Santa Anas are warm. In fact, hot, dry Santa wind events have accounted for many of the extremely warm (99th percentile) days within the September through May period: 90% of the warm extremes in winter, 30% in fall and 40% in spring. These non-summer heatwaves increase hospitalizations for dehydration, renal failure and stroke (McElroy et al., 2020).

San Diego's highest wildfire risk occurs during Santa Ana winds. In recent years, the region suffered some of California's largest conflagrations, including the September 1970 Laguna

fire (175,425 acres burned), the October 2003 Cedar fire (273,246 acres burned) and the October 2007 Witch (197,990 acres burned) and Harris (90,440 acres burned) fires, all fanned by Santa Ana winds. The Santa Ana season typically commences in October, when vegetation is driest. An ignition of parched vegetation under this strong, gusty, dry wind causes wildfires that are extremely difficult if not impossible to control. This explains the timing of the peak of the traditional southern California wildfire season — October — when the Santa Ana season starts and before the first rainstorms of winter. During fires under Santa Ana conditions, air pollution (particulate matter under 2.5 microns - PM2.5) increases throughout San Diego and PM2.5 from wildfire is up to 10 times more harmful than air pollution from other sources (Aguilera et al., 2020b).

In addition to the personal safety, infrastructure and public health hazards posed by wildfires, San Diego ecosystems are also sensitive to too frequent fires. A growing risk in a warmer, fire-prone climate is the conversion of woody chaparral and coastal sage shrublands to grasses and other weedy herbaceous vegetation (Syphard et al., 2018), or the conversion from native coniferous forests to shrublands or exotic grasslands (Franklin, 2010).

Climate model projections of Santa Ana winds indicate that their activity could decrease in the warmer future. In the second half of the century under a non-reduction of greenhouse gas emission scenario (RCP 8.5). Santa Ana wind frequency is projected to decrease by between 8-20% and winds speeds between 5-10% relative to a historical period of 1950-1999. Further, the Santa Ana activity is projected to decrease mainly in the shoulder seasons, fall and spring, relative to winter (Guzman-Morales & Gershunov, 2019). The decrease in Santa Ana wind activity in the fall may help mitigate future wildfire risk resulting from drier autumns and more frequent multi-year droughts.

On the other hand, projected delays in the wet season (Pierce et al., 2013) would extend the presence of dry vegetation into the December peak of Santa Ana wind activity (Guzman-Morales et al., 2016) which will always see more frequent Santa Ana winds than October ever did (Guzman-Morales & Gershunov, 2019).

December fires could occasionally be fanned by back-to-back Santa Ana wind events and have the potential to grow to unprecedented proportions. These were the antecedent conditions that led to the Lilac Fire in San Diego and one of the largest fires in California history, the Thomas Fire, which burned in Ventura and Santa Barbara. The Thomas Fire continued to burn throughout most of December 2017 and into January 2018, when its smoldering remains were finally put out by the first significant rain of the season — an atmospheric river, which caused deadly debris flows.

A later start of the wet season is already apparent in the observations, while a decrease in Santa Ana wind activity has not yet emerged from the natural variability (Williams et al., 2019). Moreover, there are hot and cold flavors of the Santa Ana (Gershunov et al. 2021), of which the hot SAWs spread the largest wildfires. Research yet needs to be carried out to understand the possibly differential impact of climate change on the two flavors of SAWs.

Variable Marine Layer Clouds

Coastal low stratus clouds, also referred to by scientists as Marine Layer Clouds (MLC) or by locals in Southern California as “May gray” and “June gloom,” are a defining and highly variable aspect of coastal California summer climate. MLC in San Diego are common in late spring and early summer when cool moist air near the ocean surface and sinking warm air above cause a temperature inversion which traps low level moisture and creates optimal conditions for these blanketlike stratiform clouds. When present, MLC shield the coast from summertime heat and are an important weather pattern to the coastal ecosystems in San

Diego (Jennings et al., 2018) and as important modulators of coastal expressions of summertime heat waves (Clemesha et al., 2018).

The stability of the lower atmosphere and ocean temperatures are important in the development of MLC, but there are additional drivers that interact on various spatial and temporal scales (Clemesha et al., 2016, 2017; Schwartz, 2015). Because global climate models are coarse-grid calculations and only poorly resolve the high gradient atmosphere-ocean structure along the California coast, and because the controls that govern the presence of coastal stratus are a balance of competing large and smaller scale processes, MLC appear to be poorly predicted. These factors and interactions need to be better understood to provide credible predictions of any future changes in MLC along San Diego County's coastal zone under future climate change.

Sea-Level Rise and Coastal Storms

The coast is an important part of San Diego's landscape, culture, and economy. It is also one of the more vulnerable landscapes in San Diego as many of its beaches, cliffs, and estuaries are already experiencing erosion and flooding, and these hazards are expected to accelerate in frequency and intensity with climate change.

Over the last century sea level has risen about 0.6 ft over much of the Central and Southern California coast. Global sea level provides an important indicator of the state of the warming climate, but regional sea-level rise varies across coastal communities because processes that cause sea-level rise interact differently and vary across coastal regions (Hamlington et al., 2020). Between 1980 and 2000, sea level along San Diego was relatively stable, even decreasing slightly as stronger wind stress gradients over the eastern Pacific suppressed the global rise along North America.

Since 2000, sea level has been increasing as the wind systems relaxed once again (Bromirski et al., 2011, 2012; Hamlington et al., 2016). For the San Diego region, sea-level rise models project similar ranges in elevated sea-levels until 2050 (approximately 0.6 to 1.3 feet). In the second half of the century, sea-level rise is expected to accelerate significantly, but there is greater uncertainty as to how extreme this rise will be at the end of the century (0.9 to 4 feet) with the possibility that it is much higher (Griggs et al., 2017). This is related to unknown global greenhouse gas emission reductions and uncertainties about how rapid ocean warming will impact ice sheet melting (Griggs et al., 2017; Kalansky et al., 2018)

Given the increased rate of sea level rise, in the near term the greatest impacts from sea level rise are mostly likely to occur during events that combine high tides, El Nino and both locally and distantly generated wind-driven waves. For example, the generally elevated sea levels along the California coast during the super El Nino of 1982-83 were heightened by large winter storms and high waves during high tide periods, causing enormous coastal damage along the San Diego County shoreline (Flick, 1998).

The next period of unusually high tides will occur in 2021 from 16.8 and 4.4-year lunar tidal cycles, and will produce peak monthly tides about 0.5 ft higher than years in between cycle peaks (Cayan et al., 2008; Zetler & Flick, 1985). Hazardous coastal storm events are expected to become more severe as global sea level rises. San Diego's long history of coastal monitoring and research are now being used more to advance our understanding of how extreme events as repetitive stressors are increasing San Diego's coastal vulnerabilities. Recent improvements in coastal wave forecasting (Crosby et al., 2016, 2017) coupled with enhanced wave runup modeling are improving coastal flood forecasting capabilities for San Diego communities by defining the incident wave conditions and tide levels that result in site-specific flooding (Fiedler et al., 2018, 2020).

A long history of coastal monitoring and analysis by San Diego researchers (Ludka et al., 2019) has led to improved wave forecasts, improved understanding of sediment processes, including beach nourishment (addition of sand to the beaches) and cliff erosion, and improved understanding of local estuarine dynamics and ecosystems. Beach processes and sediment budgets are typically characterized within a particular littoral cell, a series of sand sources (such as rivers, streams, and eroding coastal bluffs) that provide sand to the shoreline, sand sinks (such as coastal dunes and submarine canyons) where sand is lost from the shoreline, and alongshore transport that moves sand along the shoreline.

Over the years, human activity, such as damming rivers, has limited the amount of sand that enters the littoral cell. For example, 60% (40% dammed and 20% urbanized and not dammed) of the Oceanside Littoral Cell watershed no longer generates beach sand (Young et al., 2010). Beach sand levels and waves have been monitored at selected San Diego beaches for as long as 17 years (Torrey Pines, Imperial beach, Solana beach, and Cardiff beach) including two energetic El Nino winters that showed significant beach degradation (Ludka et al., 2019). These observations have led to a better understanding of seasonal beach sand level changes, areas of chronic erosion (Doria et al., 2016; Yates et al., 2009, 2011) and coastal impacts associated with El Niño events (Barnard et al., 2017; Doria et al., 2016; Ludka et al., 2015, 2016, 2018; Young, 2018).

Cliff erosion is a natural coastal process for much of northern San Diego County. In San Diego, between 1998 and 2009 the mean cliff top retreat was 0.46 ft/yr (Young, 2018). San Onofre State Beach is a cliff erosion hot spot in San Diego County due to extensive deep-seated landslide (Adam P Young, 2015). Other areas in north San Diego County, such as Encinitas and Del Mar, have also experienced a number of significant cliff failures in recent years. Researchers are advancing understanding of how wave-cliff impacts and rainfall contribute to both upper and lower coastal cliff erosion providing insight into how increasing sea levels, and storm driven waves and rainfall may further accelerate this erosion (Young et al., 2021)

Additionally, beach nourishment, or the addition of sand, is an important part of the sediment supply to beaches throughout the San Diego region, beginning at the end of World War II. SANDAG spent $44 million in 2001 and 2012 on non-opportunistic nourishment by placing 3.5 million cubic yards of sand on beaches throughout the County and north San Diego County has developed a 50-year, $160 million plan for beach nourishment (Diehl, 2015). The impacts of beach nourishment are complex as there are several physical processes that interact to determine the impacts on flooding, erosion, and ecosystems. Successive beach monitoring during the nourishments provides insight into how site-specific sediment transport processes, sand grain size, timing of the nourishment and the intensity and frequency of storm-driven wave energy can affect the success of a nourishment (Ludka et al., 2016, 2018, 2019).

Compounding Extreme Events

One concern, both historically and in the future is a sequence of hazards, or “compounding extreme events.” For example, the largest fire in California history, the Thomas Fire, and subsequent Montecito debris flows, unleashed from the barren landscape that was burned off by the Thomas Fire, is an example of a devastating sequence of climate related events. The December 2017 Thomas fire burned 281,893 acres occurred several months after a very wet winter (more than 22 inches November through May as an average over the South Coast Climate Division) and immediately following an extremely dry September through November that delivered only about 0.3 inches of precipitation.

When a strong Santa Ana wind event occurred in early December, the dry landscape provided the fuel for a devastating wildfire that was fanned by strong and back-to-back Santa Ana Wind events common in December. The conditions allowed the Thomas fire to grow to the largest wildfire in Southern California's modern history. The first measurable rainfall occurred on January 8. During the storm, high intensity rainfall resulted in devastating post-fire debris flows in Montecito and Carpinteria resulting in 23 deaths, 246 structures destroyed, and 167 damaged. This sequence of devastating events has the potential to become more frequent given the projections of a drier fall, extending the annual seasonal drought into the main Santa Ana season, increasing the likelihood that a strong Santa Ana wind event occurs over a dry landscape that can provide fuel for the fire. Further extreme precipitation is projected to become more extreme, leading to the increased possibility of post-fire debris flows.

Other relevant compound co-occurring extremes for the San Diego area include public health impact form heat waves wildfire as well as coastal and inland flooding, A frequent compounder of wildfire and smoke impacts on public health (Aguilera et al. 2020, 2021a, 2021b) is the coastal heat that is often produced by Santa Ana winds (Gershunov et al. 2021), also known to impact health in the fall, winter, and spring (Schwarz et al. 2020). Another possible compounding event that could heighten the potential for increased frequency and severity of impacts in the future is the combination of a storm causing both terrestrial and coastal flooding. As sea level rises, and extreme precipitation becomes more extreme, the combination of coastal and storm water flooding has the potential to have devastating impacts on property, infrastructure, and water quality.

SECTION SIX: Develop a Mitigation Strategy

Decorative Image

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CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

6. SECTION SIX: DEVELOP A MITIGATION STRATEGY

After each participating jurisdiction reviewed the Risk Assessment (Section 5), jurisdictional leads met with their individual Local Planning Groups (LPG) to identify appropriate jurisdictional-level goals, objectives, and mitigation action items. This section of the Plan incorporates:

1. Mitigation goals and objectives
2. Mitigation actions/priorities
3. An action plan/implementation strategy

The mitigation strategy serves as the long-term blueprint for reducing potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process.

The mitigation strategy is made up of three main required components: mitigation goals, mitigation actions, and an action plan for implementation. These provide the framework to identify, prioritize, and implement actions to reduce risk to hazards.

Mitigation goals are general guidelines that explain what the community wants to achieve with the plan They are usually broad policy-type statements that are long-term, and they represent visions for reducing or avoiding losses from the identified hazards

Mitigation actions are specific projects and activities that help achieve the goals.

The action plan describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered, and incorporated into the community's existing planning mechanisms. In a multi-jurisdictional plan, each jurisdiction must have an action plan specific to that jurisdiction and its vulnerabilities.

Although not required, some communities choose to develop **objectives** to help define or organize mitigation actions. Objectives are broader than specific actions, but are measurable, unlike goals. Objectives connect goals with the actual mitigation actions.

Each jurisdiction reviewed hazard profile and loss estimation information presented in Section 5 and used this as a basis for developing mitigation goals and objectives. Other important inputs to the development of jurisdiction-level goals and objectives include performing reviews of existing local plans, policy documents, and regulations for consistency and complementary goals, as well as soliciting input from the public.

6.1. MITIGATION ACTION EVALUATION

Mitigation actions that address the goals and objectives developed in the previous step were identified, evaluated, and prioritized. These actions form the core of the mitigation plan. Jurisdictions conducted a capabilities assessment, reviewing existing local plans, policies, and regulations for any other capabilities relevant to hazard mitigation planning.

An analysis of their capability to carry out these implementation measures regarding hazard and loss prevention was conducted. The capabilities assessment required an inventory of each jurisdiction's legal, administrative, fiscal, and technical capacities to support hazard mitigation planning.

After completion of the capabilities assessment, each jurisdiction evaluated and prioritized their proposed mitigations. As part of this process, each jurisdiction reviewed the actions detailed in the 2018 plan to see if they were completed, had been dropped due to issues such as lack of political support or lack of funding, or were on-going and should be continued in the new plan. The status of each jurisdiction's action items is detailed in Section 7 of this Plan and jurisdiction-specific Annexes, if applicable. In all cases, the mitigation actions selected are prioritized based on the benefit of the action compared to the cost (in terms of funding, staff time, time to complete) of conducting that action.

Also considered were cost-benefit reviews, changes in development, safe growth audits, mitigation efforts, mitigation potential improvement, and current/updated priorities. Each participant used their local planning group to evaluate alternative mitigation actions by considering the implications of each action item. One potential method available to the cities to accomplish this was the STAPLEE method. The STAPLEE criteria is a tool used to assist communities in deciding which actions to include in their implementation strategy.

The table below shows the evaluation and prioritization of each mitigation action being considered by the Planning Team. For each action, evaluate the potential benefits and/or likelihood of successful implementation for the criteria defined below.

Rank each of the criteria with a -1, 0 or 1 using the following scale:

- 1 = Highly effective or feasible
- 0 = Neutral
- -1 = Ineffective or not feasible

STAPLEE Evaluation Criteria:

- **Life Safety** – How effective will the action be at protecting lives and preventing injuries?
- **Property Protection** – How significant will the action be at eliminating or reducing damage to structures and infrastructure?
- **Technical** – Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
- **Political** – Is there overall public support for the mitigation action? Is there the political will to support it?
- **Legal** – Does the community have the authority to implement the action?
- **Environmental** – What are the potential environmental impacts of the action? Will it comply with environmental regulations?
- **Social** – Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
- **Administrative** – Does the community have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary?
- **Local Champion** – Is there a strong advocate for the action or project among local departments and agencies that will support the action's implementation?
- **Other Community Objectives** – Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive plan?

Letters preceding Mitigation Action titles correspond with Section 6.2's "Prioritized Actions" sections.

TABLE 65: MITIGATION ACTIONS

Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
Local Plans and Regulations											
D. Climate Change Planning	-	-	-	-	-	-	-	-	-	-	Not rated
G. Building Codes	-	-	-	-	-	-	-	-	-	-	Not rated
H. Hazard Mitigation Action Adoption	1	1	1	1	1	1	1	1	1	1	10
I. MSCP Open Space Acquisitions Efforts	1	1	1	1	1	1	1	1	1	1	10
K. Agricultural/Livestock Pass Program:	-	-	-	-	-	-	-	-	-	-	Not rated
L. Operational Area Emergency Operations Plan (OA EOP)/Associated Annexes, Regional Emergency Plans, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), Emergency Operations Center (EOC) Planning/Training, Work Plans and Charters	-	-	-	-	-	-	-	-	-	-	Not rated
M. Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation	1	-	-	-	-	-	-	-	-	-	1
N. Regional Planning Efforts	-	-	-	-	-	-	-	-	-	-	Not rated
Structure and Infrastructure Projects											
A. Limit Development in Floodplains and Other Hazardous Areas	1	1	1	1	1	1	1	1	1	1	10
E. Expansion of Automatic Local Evaluation in Real-Time (ALERT) to Vulnerable and Underserved Communities:	-	-	-	-	-	-	-	-	-	-	Not rated

F. Community Rating System (CRS) Implementation and Improvement	-	-	-	-	-	-	-	-	-	-	Not rated
Natural Systems Protection											
B. Forest Management	1	1	1	1	1	1	1	1	1	1	10
C. Invasive and Noxious Weed Control (Vegetation Management)	-	-	-	-	-	-	-	-	-	-	Not rated
J. Wetland Protection and Restoration Efforts	1	1	1	1	1	1	1	1	1	1	10
Education and Awareness Programs											
M. Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation:	1	-	-	-	-	-	-	-	-	-	1
O. Training and Exercises	-	-	-	-	-	-	-	-	-	-	Not rated
P. Public Education and Outreach Programs:	-	-	-	-	-	-	-	-	-	-	Not rated
Q. Sustainable Department Goals	1	1	1	1	1	1	1	1	1	1	10
R. Three-Day Preparedness Kits	-	-	-	-	-	-	-	-	-	-	Not rated
S. San Diego County Fire Community Emergency Response Team's Community Emergency Preparedness Outreach Program	-	-	-	-	-	-	-	-	-	-	Not rated
T. Free Residential Knox Box Program	-	-	-	-	-	-	-	-	-	-	Not rated
U. Free Wildland Urban Interface (WUI) Classes/Training for Communities	-	-	-	-	-	-	-	-	-	-	Not rated
V. The California Wildfire Mitigation Program - Home-Hardening Initiative	-	-	-	-	-	-	-	-	-	-	Not rated
W. Support Symposiums	-	-	-	-	-	-	-	-	-	-	Not rated

Mitigation Actions marked as "Not rated" in the table above are often considered existing County/Department priorities.

6.2. MITIGATION GOALS, OBJECTIVES, AND ACTIONS IMPLEMENTATION

Local Mitigation Planning Groups (LMPGs) are comprised of individuals from various departments bringing their experience and knowledge of the region, the jurisdiction, and local constraints to assist in the evaluation of the hazards and the development of mitigations strategies, goals, objectives, and actions. Individual local planning group membership and decisions are discussed in each jurisdictions' annex.

There were four goals established by the County of San Diego's LMPG. They are listed in order of importance and do not differ significantly from 2018 goals. Instead, these updated goals reflect consolidated versions of 2018 repetitive sentences and were rewritten to use FEMA and existing County/Regional plans' terminology. Once developed, County staff submitted the plan to Governor's Office of Emergency Services and FEMA for approval. Once approved, the Plan will be submitted to the Unified Disaster Council, then to the San Diego County Board of Supervisors for adoption.

Decorative Image

Photo by County OES

The goals and objectives were developed by considering the risk assessment findings, localized hazard identification and loss/exposure estimates, and an analysis of the jurisdiction's current capabilities assessment. These preliminary goals, objectives, and actions were developed to represent a vision of long-term hazard reduction or enhancement of capabilities.

To help further development of these goals and objectives, the LMPG compiled and reviewed current jurisdictional sources including the County's planning documents, codes, and ordinances. In addition, County representatives met with County OES to specifically discuss these hazard-related goals, objectives, and actions as they related to the plan.

For each goal, one or more objectives were identified that provide strategies to attain the goal. Where appropriate, the County has identified a range of specific actions to achieve the objective and goal. A mitigation action is a specific action, project, activity, or process taken to

reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals. The actions to reduce vulnerability to threats and hazards form the core of the plan and are a key outcome of the planning process.

Mitigation actions that will provide the most benefits in the least amount of time with available resources were selected as the highest priorities. This does not mean other actions are not considered important. It merely indicates that the LMPG set out to complete actions with current resources. The other actions will be completed as additional resources become available.

Below are the County of San Diego's hazard-related goals, objectives, and actions as prepared by the LMPG, in conjunction with the Hazard Mitigation Planning Group (HMPG), locally elected officials, and residents:

GOAL 1 FOSTER SAFE, SUSTAINABLE, AND THRIVING ENVIRONMENTS.

Objective 1	*Promote hazard-resistant future developments and enhance operational resources.*

GOAL 2 REDUCE THE POSSIBILITY OF DAMAGES AND LOSSES TO EXISTING ASSETS (SUCH AS PEOPLE, CRITICAL FACILITIES/INFRASTRUCTURES, AND COUNTY-OWNED FACILITIES).

Objective 2	*Develop and/or enhance comprehensive all hazard mitigation policies, plans, technologies, and services.*

GOAL 3 ENHANCE LOCAL CAPACITY AND COMMITMENT TO BECOME LESS VULNERABLE TO ALL HAZARDS.

Objective 3	*Strengthen all hazard mitigation coordination and communication with local, state, tribal and federal governments/partners.*

GOAL 4 PROMOTE REGIONAL CULTURE OF HAZARD UNDERSTANDING, SUPPORT, AND PREPAREDNESS.

Objective 4	*Provide accessible and inclusive education, training, and resources to prepare the whole community for natural and human-caused hazards.*

The County of San Diego developed the following broad list of objectives and actions to assist in the implementation and achieving of the four identified hazard mitigation goals. For each objective, specific actions were developed that would foster implementation. A discussion of the prioritization and implementation of the action items is provided in Section 6.1.:

TABLE 66: HAZARD MITIGATION GOALS

Goal 1: Foster safe, sustainable, and thriving environments.	
Objective 1	**Promote hazard-resistant future developments and enhance operational resources.**
Action 1. A.	Facilitate the review, development, adoption, updating, and consistent enforcement of general plans, zoning ordinances and building codes by: • Strengthening existing development regulations to discourage land uses and activities that create or worsen hazards • planning and zoning for open space, recreational agricultural or other low intensity uses within floodway fringes • reviewing and revising, as necessary, sediment and erosion control regulations • ensuring newly constructed and existing critical facilities are designed to function after a major earthquake • updating building codes to reflect current earthquake standards • updating the County Consolidated Fire Code as necessary • updating the General Plan and zoning regulations to reflect hazardous areas using development patterns that should respect environmental characteristics and are harmonious with existing topography • developing model Weed Abatement and Fuel Modification ordinances • continuing to protect and restore wetlands by revising development ordinances, incorporating, and maintaining valuable wetlands in open space preservation programs to mitigate effects of development on wetland areas • staffing enforcement personnel to ensure compliance • supporting coordinated permitting activities processes through developing and coordinating permits for all agencies, developing notification procedures for all permits that support affected agencies, continuing to streamline policies to eliminate conflicts and duplication of efforts and continuing to exchange resources and work with local/regional partners • continuing to utilize multi-agency permitting and enforcement team • continuing to enforce trespassing regulations in high-risk areas • continuing forest and open space management efforts
Action 1. B.	Protect existing assets and limit future development in hazardous areas by: • continuing to identify high hazard areas, identify hazard-prone structures/assets, inventory wildlife vegetative communities by type and vegetation age class, and develop/update data sets necessary to test hazard scenarios and mitigation tools using GIS (Geographic Information Systems) • managing wildland vegetative communities to promote less hazardous conditions through defining target class ranges, developing partnerships within communities to fix age class ranges, and promoting cooperative vegetation management programs that incorporate hazard mitigation • continuing to construct barriers around hazard-prone structures • continuing to assess countywide utility infrastructures with regard to earthquake risk • continuing to review and compare existing flood control standards, zoning and building requirements • acquiring properties, when feasible, on floodway to prevent development • encouraging and conducting structural retrofitting to strengthen resistance to damage • encouraging clustering • continuing to gain public acceptance for avoidance policies in high-hazard areas • adopting policies that discourage growth in flood-prone areas • assuring adequate funding to restore damaged facilities to 100-year flood design • updating storm water system plans and improving storm water facilities in high-risk areas • limiting development in areas of known geologic hazards • creating demand for hazard-resistant construction and site planning • increasing public understanding, support, and demand for new developments' hazard mitigation • supporting transfer of development rights in hazard-prone areas. To protect lives and property, development in floodplains shall be appropriate and limited, and high fire hazard areas shall have adequate access for emergency vehicles.

Responsible Department(s)	• Fire • Land Use & Environment Group • Department of Public Works • Planning & Development Services • Parks & Recreation • Office of Emergency Services • Department of Agriculture, Weights & Measures
Prioritized Actions	A. Limit Development in Floodplains and Other Hazardous Areas: County Department of Parks & Recreation will continue to limit development of park structures and facilities in floodplains and other hazardous areas. B. Forest Management: County Parks & Recreation will continue to conduct brush and vegetation management in preserves to reduce fire and flooding risks. C. Invasive and Noxious Weed Control (Vegetation Management): The County Department of Agriculture, Weights & Measures will continue to promote cooperative vegetation management programs that promote hazard mitigation will be critical in continue to mitigate wildfire risks from vegetation. D. Climate Change Planning: The County Department of Public Works' Flood Control District will lead efforts related to downscale modeling, stress testing Flood Control facilities during higher flows, updating County Special Drainage Area (SDA) Master Plans, update of County Hydrology Manual and Hydraulic Design Manual to account for climate change impacts. E. Expansion of Automatic Local Evaluation in Real-Time (ALERT) to Vulnerable and Underserved Communities: The County Department of Public Works' Flood Control District will lead these efforts. F. Community Rating System (CRS) Implementation and Improvement: The County Department of Public Works' Flood Control District will lead these efforts. G. Building Codes: County Planning & Development Services (PDS: Building Division) will review building codes to reflect current earthquake, fire, and wind standards annually and update as necessary. County staff will attend conferences and industry meetings to better understand changes to codes and after event support efforts. H. Hazard Mitigation Action Adoption: County Planning & Development Services (PDS), County Fire, County Technology Office (CTO), County Communications Office (CCO) and County Office of Emergency Services (OES) will publicize and encourage the adoption of appropriate hazard mitigation actions throughout the region. I. MSCP Open Space Acquisitions Efforts: County Department of Parks & Recreation will continue open space acquisition efforts, such as purchasing land that could be preserved/protect natural resources and undeveloped land in high hazard areas. J. Wetland Protection and Restoration Efforts: The County Department of Parks & Recreation will continue wetland protection and restoration efforts. K. Agricultural/Livestock Pass Program: The County Department of Agriculture, Weights & Measures will help the County of San Diego establish a county-based program that grants agriculturalists special access to their farms or ranches during disaster.
Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 – January 2028

Goal 2: Reduce the possibility of damages and losses to existing assets (such as people, critical facilities/infrastructures and County-owned facilities).	
Objective 2	**Develop and/or enhance comprehensive all hazard mitigation policies, plans, technologies, and services.**
Action 2.A.	Protect existing assets with the highest relative vulnerability to hazard effects by: • protecting vulnerable populations from the effects of hazards • identifying projects related to all hazards for pre-disaster mitigation funding • including safety considerations in the planning and decision-making process by establishing policies related to future development that will minimize the risk of personal injury, loss of life, property damage, and environmental damage associated with natural and human-caused hazards.

Action 2.B.	Create, update and/or improve existing hazard/hazard mitigation policies, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), plans, projects, technologies, and services with partners related, but not limited, to:
	• Avalanche
	• Dam Failure
	  ○ by updating dam inundation plans every ten years, at minimum
	  ○ by coordinating with partners and supporting existing efforts to mitigate dam failures (e.g., U.S. Army Corps of Engineers, U.S. Bureau of Reclamation and California Department of Water Resources)
	• Drought
	  ○ by encouraging residents to adopt drought tolerant landscaping or xeriscape practices
	  ○ by promoting use of reclaimed water for all landscaping efforts, where available and feasible.
	  ○ support groundwater recycling efforts
	• Earthquake
	  ○ by continuing to study ground motion, landslide ad liquefaction
	  ○ by continuing to implement an ongoing seismic risk assessment program
	  ○ by developing and implementing an incentive program for seismic retrofits
	  ○ by studying ground motion, landslide and liquefaction
	• Erosion
	  ○ by continuing to coordinate with coastal cities to develop comprehensive plans
	• Expansive Soils
	• Extreme Cold
	• Extreme Heat
	  ○ by supporting regional efforts to prepare for excessive heat events, participating in "Excessive Heat Emergency Awareness" events and exercising heat emergency plans as established by the County Health & Human Services Agency (HHSA), Aging & Independence Services (AIS), Emergency Medical Services (EMS) and Public Health Services (PHS)
	  ○ by continuing to provide "Cool Zones" during excessive heat events
	• Flood
	  ○ by developing a flood control strategy that ensures coordination with local, state, and federal agencies/partners
	  ○ by minimize repetitive losses caused by flooding
	  ○ by increasing participation and improving compliance with the National Flood Insurance Program (NFIP)
	• Hail
	• Hurricane
	• Landslide
	  ○ by studying and improving storm drains for landslide-prone areas
	• Lightning
	• Sea Level Rise

	• Severe Wind
	• Severe Winter Weather
	• Storm Surge
	• Subsidence
	• Tornado
	• Tsunami
	  ○ by continuing to coordinate with coastal cities to develop comprehensive plans
	• Wildfire/Structure Fire
	  ○ by coordinating and supporting existing and new efforts to mitigate structural and vegetation fires
	  ○ by continuing to develop partnerships for a countywide vegetation management program
	  ○ by enforcing Defensible Space Clearance distances
	  ○ by working with community-based groups to pilot chipping programs
	  ○ by continuing to research options to provide low-cost insurance to cover landowners who allow prescribed burning on their lands
	  ○ by establishing and continuing wildland fire technical working group
	  ○ by continuing to develop partnerships for a countywide vegetation management program
	  ○ by reporting annually to the Board of Supervisors on the progress of fire mitigation strategies
	• Climate Change
	• Terrorism / Cyber Terrorism
	  ○ Attachment A contains Terrorism/Cyber Terrorism Goals, Objectives, and Actions, is categorized as For Official Use Only, and is only available to official partners.
	• Chemical, Biological, Radiological, Nuclear, Explosion (CBRNE) Threats
	  ○ Attachment A contains Chemical, Biological, Radiological, Nuclear, Explosion (CBRNE) threats' goals, objectives, and actions, is categorized as For Official Use Only, and is only available to official partners.
	• Pandemic Disease

Responsible Department(s)	• Sheriff's Department • Fire • Public Safety Group • Office of Emergency Services • Department of Public Works • Planning & Development Services • Land Use and Environmental Group/GIS • Health & Human Services Agency • Emergency Medical Services • Public Health Preparedness & Response • Public Health Services • Department of Environmental Health & Quality/ Hazardous Incident Response Team
Prioritized Actions	L. Operational Area Emergency Operations Plan (OA EOP)/Associated Annexes, Regional Emergency Plans, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), Emergency Operations Center (EOC) Planning/Training, Work Plans and Charters, and Safety Element (of the County General Plan): The County Office of Emergency Services (OES) will work with the eighteen incorporated cities and participating county departments, special districts and partners to revise, update and complete these plans, projects, technologies and services annually and/or as needed. M. Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation: The County of San Diego, Public Health Services and the Health & Human Services Agency are undertaking initiatives over the next several years to raise awareness around excessive heat and climate change.
Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 - January 2028

Goal 3: Enhance local capacity and commitment to become less vulnerable to all hazards.	
Objective 3	**Strengthen all hazard mitigation coordination and communication with local, state, tribal and federal governments/partners.**
Action 3.A.	Increase awareness and knowledge of hazard mitigation principles and practice among partners by: • continuously demonstrating the importance of pre-disaster mitigation planning to the Board of Supervisors and other public officials • conducting meetings with key elected officials to determine local issues and concerns • leveraging the County Communications Office/County News Center and the Partner Relay to promote mitigation actions
Action 3.B.	Encourage other partners/organizations to incorporate hazard mitigation activities by: • continuing to streamline policies to eliminate conflicts and duplication of efforts • continuing to encourage tribal governments to become part of the Hazardous Incident Response Team (HIRT) Joint Powers Agreement (JPA).
Action 3.C.	Establish, maintain, and improve close and lasting working relationships with partners by: • supporting the County Fire Safe Council • continuing and maintaining multi-jurisdictional/multi-functional training and exercises to enhance hazard mitigation • leveraging resources and expertise that will further hazard mitigation efforts • inviting/encouraging participation of tribal governments and special districts in Multi-Jurisdictional Hazard Mitigation Plan updates.
Action 3.D.	Improve the County's capability and efficiency at administering pre- and post-disaster mitigation by: • collaborating with partners to identify, prioritize and implement mitigation actions • continuing to establish a requirement that all hazard mitigation projects submitted to the State must be reviewed by the County • continuing to improve coordination with the State Hazard Mitigation Department about local issues • maintaining consistency with the State in administering recovery programs • coordinating recovery activities while restoring and maintaining public services through maintenance of two damage assessment teams and their activation/reporting procedures.
Responsible Department(s)	• Fire • Office of Emergency Services • Public Safety Group • Department of Environmental Health & Quality/Hazardous Incident Response Team
Prioritized Actions	N. Regional Planning Efforts: The County Office of Emergency Services (OES) and participating County departments will streamline policies to eliminate conflicts and duplication of efforts in regional planning efforts (i.e. Hazard Mitigation Plan updates, etc.) by coordinating emergency management activities with regional stakeholders and facilitating meetings on a regular basis with regional emergency managers/the eighteen incorporated cities, healthcare agencies, campus emergency managers, Department of Defense (DOD)/local military partners, Voluntary Organizations Active in Disaster (VOAD) and faith-based partners. O. Training and Exercises: The County Office of Emergency Services (OES) and participating county departments will collaborate with the eighteen incorporated cities and private sector agencies to maintain multi-jurisdictional/multi-functional training and annual exercises.
Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 - January 2028

Goal 4: Promote regional culture of hazard understanding, support, and preparedness.	
Objective 4	**Provide accessible and inclusive education, training, and resources to prepare the whole community for natural and human-caused hazards.**
Action 4.A.	Improve the County's ability to manage pre- and post-disaster scenarios and respond effectively during an event by: • attracting, recruiting, and retaining qualified, professional, and experienced staff • training staff for appropriate positions/assignments within the Operational Area Emergency Operations Center (OA EOC).
Action 4.B.	Increase and improve public education and awareness of hazards and mitigation action opportunities using a whole community approach by: • continuing to identify hazard-specific issues and needs and identifying communities that have recurring losses • publicizing and encouraging the adoption of appropriate hazard mitigation actions • providing hazard information on County websites and leveraging the County Communications Office/County News Center • continuing to encourage the public to prepare and maintain a three-day preparedness kit for home and work • promoting the County's "Know Your Hazards" and "SD Emergency" applications. • coordinating production of brochures, informational packets, and other handouts • delivering presentations as requested/needed • implementing hazard awareness program • improving hazard warnings and response planning • implementing public education program to address fire dangers and corrective measures • continuing to develop, plan and publish evacuation procedures to the public • continuing to participate in community awareness meetings • continuing to collaborate with local, state and federal agencies' on mapping efforts • continuing to support public and private sector symposiums • developing and maintaining hazard mitigation partnerships with the media.
Action 4.C.	Monitor and publicize the effectiveness of hazard mitigation actions implemented countywide by: • continuing to use County websites to publicize mitigation actions • continuing to establish budgets and identifying funding resources for mitigation outreach • continuing to determine mitigation messages to convey and create marketing campaigns • continuing to develop and distribute hazard brochures, CDs and other publications.
Action 4.D.	Promote hazard mitigation in the business community by: • increasing knowledge and awareness of hazard mitigation principles and practices • encouraging and empowering businesses to identify and address hazard-specific issues and needs • encouraging businesses to develop and implement hazard mitigation actions.
Responsible Department(s)	• Office of Emergency Services • Public Safety Group • Fire
Prioritized Actions	P. Public Education and Outreach Programs: The County Office of Emergency Services (OES) and County Communication Office (CCO) will develop and maintain hazard mitigation-related public education and outreach programs (i.e. annual defensible space education/outreach, terrorism prevention, erosion control, etc.)

	Q. Sustainable Department Goals: The County Office of Emergency Services (OES) will continue to research ways to sustainably retain a trained workforce, particularly related to Emergency Operations Center positions. County OES will also continue to research economically sustainable efforts, technologies, equipment, vehicles, and other necessities to reduce the department's carbon footprint. R. Three-Day Preparedness Kits: The County Office of Emergency Services (OES), County Communications Office (CCO), and the County Technology Office (CTO) will encourage the public to prepare and maintain a three-day preparedness kit for home and work through outreach events, social media, paid media and earned media. S. San Diego County Fire Community Emergency Response Team's Community Emergency Preparedness Outreach Program: Utilize County Fire's Community Emergency Response Team (trained and background checked volunteers) to conduct in-person outreach training, events and activities bringing emergency preparedness information to the underserved residents in their rural communities. T. Free Residential Knox Box Program: County Fire will integrate the Knox Box Program through outreach efforts with CAL FIRE, participating County departments, Fire Safe Council of San Diego County, and other various stakeholders. U. Free Wildland Urban Interface (WUI) Classes/Training for Communities: County Fire can integrate with partner agencies to offer the WUI course throughout San Diego County. Participating agencies could include CAL FIRE, Bureau of Land Management, US Forest Service, and local Fire Safe Councils. V. The California Wildfire Mitigation Program - Home-Hardening Initiative: County Fire is currently working with the California Governor's Office of Emergency Services to pilot the California Wildfire Mitigation Program (CWMP) Home-Hardening Initiative. The CWMP Home Hardening Initiative aims to perform defensible space and retrofit measures on existing residential homesites to mitigate against wildfire losses. This program targets high social-vulnerability communities and provides financial assistance to qualifying low-and moderate-income (LMI) households. This pilot program will be implemented in three high-risk areas within San Diego County: Dulzura, Potrero, and Campo. W. Support Symposiums: The County Office of Emergency Services (OES) and participating county departments will collaborate with the eighteen incorporated cities and the private sector to support public and private sector hazard mitigation planning symposiums.
Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 - January 2028

Once the comprehensive list of jurisdictional goals, objectives, and action items listed above was developed, the proposed mitigation actions were prioritized using STAPLEE criteria. This step resulted in a list of acceptable and realistic actions that address the hazards identified in each jurisdiction. This prioritized list of action items was formed by the LPG.

The prioritized actions below reflect progress in local mitigation efforts as well as changes in development. The Disaster Mitigation Action of 2000 (at 44 CFR Parts 201 and 206) requires the development of an action plan that not only includes prioritized actions but one that includes information on how the prioritized actions will be implemented. Implementation consists of identifying who is responsible for which action, what kind of funding mechanisms and other resources are available or will be pursued, and when the action will be completed.

The top 23 prioritized mitigation actions, as well as an implementation strategy for each (i.e., will need a progress report during the next plan update cycle, according to current FEMA requirements), are:

A. **Prioritized Action:** Limit Development in Floodplains and Other Hazardous Areas
   - **Coordinating Individual/Department:** County Department of Parks & Recreation
   - **Potential Funding Source:** General Fund, grants, Park Land Dedication Ordinance Funds

- **Implementation Timeline:** Current- 2028

B. **Prioritized Action:** Forest Management
   - **Coordinating Individual/Department:** County Department of Parks & Recreation
   - **Potential Funding Source:** General Fund and grants
   - **Implementation Timeline:** Current- 2028

C. **Prioritized Action:** Invasive and Noxious Weed Control (Vegetation Management)
   - **Coordinating Individual/Department:** County Department of Agriculture, Weights & Measures
   - **Potential Funding Source:** Current cost is funded with California Department of Food and Agriculture invasive weed grants, and internal agreements with DPR and DPW
   - **Implementation Timeline:** Current- 2028

D. **Prioritized Action:** Climate Change Planning
   - **Coordinating Individual/Department:** County Department of Public Works' Flood Control District
   - **Potential Funding Source:** Grants and local funds
   - **Implementation Timeline:** 2023-2028

E. **Prioritized Action:** Expansion of Automatic Local Evaluation in Real-Time (ALERT) to Vulnerable and Underserved Communities
   - **Coordinating Individual/Department:** County Department of Public Works' Flood Control District
   - **Potential Funding Source:** Grants and local funds
   - **Implementation Timeline:** 2023-2028

F. **Prioritized Action:** Community Rating System (CRS) Implementation and Improvement
   - **Coordinating Individual/Department:** County Department of Public Works' Flood Control District
   - **Potential Funding Source:** Grants and local funds
   - **Implementation Timeline:** 2023-2028

G. **Prioritized Action:** Building Codes
   - **Coordinating Individual/Department:** County Planning & Development Services (Building Division)
   - **Potential Funding Source:** Unknown, potential future grants
   - **Implementation Timeline:** Annually

H. **Prioritized Action:** Hazard Mitigation Action Adoption
   - **Coordinating Individual/Department:** County Planning & Development Services (PDS), County Fire, County Technology Office (CTO), County Communications Office (CCO) and County Office of Emergency Services (OES)
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028

I. **Prioritized Action:** MSCP Open Space Acquisitions Efforts

- **Coordinating Individual/Department:** County Department of Parks & Recreation
- **Potential Funding Source:** General Fund, grants, endowments, etc**.**
- **Implementation Timeline:** Each Fiscal Year

J. **Prioritized Action:** Wetland Protection and Restoration Efforts
   - **Coordinating Individual/Department:** County Department of Parks & Recreation
   - **Potential Funding Source:** General Fund and grants
   - **Implementation Timeline:** Current-2028

K. **Prioritized Action:** Agricultural/Livestock Pass Program
   - **Coordinating Individual/Department:** County Department of Agriculture, Weights & Measures
   - **Potential Funding Source:** General Fund, Potential future grants
   - **Implementation Timeline:** Feasibility Analysis 3/2022-6/2022, Program Development 7/2022-12/2022, and Program Implementation 1/2023

L. **Prioritized Action:** Operational Area Emergency Operations Plan (OA EOP)/Associated Annexes, Regional Emergency Plans, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), Emergency Operations Center (EOC) Planning/Training, Work Plans and Charters, and Safety Element (of the County General Plan):
   - **Coordinating Individual/Department:** County Office of Emergency Services and Planning & Development Services (for the Safety Element of the County General Plan)
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028

M. **Prioritized Action:** Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation
   - **Coordinating Individual/Department:** County of San Diego, Public Health Services, and the Health & Human Services Agency
   - **Potential Funding Source:** To be determined
   - **Implementation Timeline:** 2-5 years based on timeline for implementation

N. **Prioritized Action:** Regional Planning Efforts
   - **Coordinating Individual/Department:** County Office of Emergency Services and participating County departments
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028

O. **Prioritized Action:** Training and Exercises
   - **Coordinating Individual/Department:** The County Office of Emergency Services and participating county departments
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028

P. **Prioritized Action:** Public Education and Outreach Programs
   - **Coordinating Individual/Department:** County Office of Emergency Services and County Communication Office

- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028

Q. **Prioritized Action:** Sustainable Department Goals
- **Coordinating Individual/Department:** County Office of Emergency Services
- **Potential Funding Source:** General fund as grants as available
- **Implementation Timeline:** 2023-2028

R. **Prioritized Action:** Three-Day Preparedness Kits
- **Coordinating Individual/Department:** County Office of Emergency Services, County Communications Office, and the County Technology Office
- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028

S. **Prioritized Action:** San Diego County Fire Community Emergency Response Team's Community Emergency Preparedness Outreach Program
- **Coordinating Individual/Department:** County Fire
- **Potential Funding Source:** Grant funds available to Community Emergency Response Teams through San Diego Gas and Electric, the Governor's California Office of Emergency Services and other one-time grant opportunities.
- **Implementation Timeline:** 2023-2028 and annual Community Emergency Preparedness Outreach.

T. **Prioritized Action:** Free Residential Knox Box Program
- **Coordinating Individual/Department:** County Fire
- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028

U. **Prioritized Action:** Free Wildland Urban Interface (WUI) Classes/Training for Communities
- **Coordinating Individual/Department:** County Fire
- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028

V. **Prioritized Action:** The California Wildfire Mitigation Program - Home-Hardening Initiative
- **Coordinating Individual/Department:** County Fire
- **Potential Funding Source:** Federal and state grants
- **Implementation Timeline:** 3-year program (2022-2025); potentially longer subject to the availability of additional funding.

W. **Prioritized Action:** Support Symposiums
- **Coordinating Individual/Department:** The County Office of Emergency Services
- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028

See respective annexes for other jurisdictions' hazard mitigation goals, objectives, actions/priorities, and implementation strategies.

SECTION SEVEN: Keep the Plan Current

Decorative Image

Photo by County OES

San Diego County, California

2023

7. SECTION SEVEN: KEEP THE PLAN CURRENT

Hazard Mitigation Plan updates provide the opportunity to consider how well the procedures established in the previously approved plan worked and revise them as needed. This plan was last updated in 2018.

This section of the 2023 Plan describes the formal process that will ensure The Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the jurisdiction will integrate public participation throughout the plan maintenance process.

7.1. MITIGATION ACTION PROGRESS

This version of the Multi-Jurisdictional Hazard Mitigation Plan was revised to reflect changes in development, progress in local mitigation efforts, and changes in priorities.

Below are progress reports for the eleven priority mitigation actions listed in the 2018 Plan:

1. **Action/Project Title:** Update Operational Area Emergency Operational Plan (OA EOP) and associated Annexes

   Progress Report Period: January 2019 to January 2020

   Responsible Agency: The County Office of Emergency Services (County OES) worked with the 18 incorporated cities and participating special districts to revise and update the OA EOP/Annexes.

   Project Status: Project delayed

   Explain: Project was delayed due to COVID-19 Pandemic needs/priorities and OES staff/Project Manager turnover.

   Summary: During the reporting period, the previous County OES project manager(s) conducted meetings to discuss the OA EOP Basic Plan and annex revision suggestions/updates with county departments and partners from the eighteen incorporated cities and special districts. The project is a priority for County OES, but is a large project requiring many staff hours, and collaboration is contingent on the availability of participating project partners.

   This project was managed, at minimum, by three different County OES staff members who left the department, so staff turnover caused deadline obstacles and time delays. Furthermore, County OES was initially responsible for coordinating response and resources for the COVID-19 Pandemic once County OES' Emergency Operations Center was activated. Therefore, this project, and many others, could no longer be considered a departmental priority, as County OES instead needed to focus on ensuring the safety and well-being of San Diego County residents.

   This project is still considered relevant, and revision/update is ongoing. The mention of this project within the updated Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) will be revised to reflect elements eligible for hazard mitigation grant funding, such as (but not limited to), incorporation of passed legislation, cohesive integration with the MJHMP and other existing county/department plans, Emergency

Operations Center training, equipment, etc. This project is estimated to be complete by June 30, 2022.

2. **Action/Project Title:** Develop and maintain public education and outreach programs related to actions residents can take to mitigate hazards they may face. (Annual defensible space education/outreach; terrorism prevention; erosion control, etc.)

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES) and County Communications Office (CCO)

   Project Status: Completed and Ongoing (but delayed)

   Explain: Action/Project has been completed and is also an ongoing effort/action. Project delayed because priorities shifted due to COVID-19 pandemic. There were also staffing changes.

   Summary: There have been staffing changes which limit the ability to report on the full scope of accomplishments for the reporting period. Awareness of accomplishments during this period include developing and posting protective actions residents can take to prepare themselves for emergencies and natural disasters from 2018 and thereon on County OES social media platforms in English and in Spanish, the dissemination of the updated Personal Disaster Plans translated into 12 languages, printing of flyers AlertSanDiego, and the SD Emergency app disseminating these flyers at community events and presentations.

   Residents have been encouraged to take appropriate hazard mitigation actions through alert and warning postings and press releases posted to the Ready San Diego website, AlertSanDiego, the SD Emergency app, County News Center articles. Campaigns were also conducted to increase the number of residents registered for AlertSanDiego Lyft (2018). Hazard mitigation messages have been developed, written, and promoted through television interviews in English and Spanish. These messages have also been provided to the Partner Relay network (a group with over 700 individuals) which is made of trusted community organizations who serve residents San Diego's diverse, underserved communities, as well as residents with limited English proficiency through emails and trainings provided to the organizations. They can share these messages with the clients they serve. Numerous of these messages have also been translated into Spanish. The goal is to continue these efforts for the next few months leading through 2023.

   The project is typically a priority for County OES, but is a large project requiring many staff hours, and collaboration is contingent on the outreach resources, implemented contracts, translation staff/resources, and funding. This project was managed, at minimum, by two different County OES staff members. One staff member left the department, so staff turnover caused deadline obstacles and time delays.

   Furthermore, County OES was initially responsible for coordinating response and resources for the COVID-19 Pandemic once County OES' Emergency Operations Center was activated. Therefore, this project, and many others, could no longer be considered a departmental priority, as County OES instead needed to focus on ensuring the safety and well-being of San Diego County residents.

Public education, information, outreach and community engagement efforts will continue through January 2023 and include attending presentations on preparedness, supporting staff with documentation and writing of internal documents, materials design & inventory, communications, review of current and past communications messages, draft updated templates with preparedness/hazard mitigation messages, post preparedness messages on social media platforms, preparedness interviews on television, create a Partner Relay capacity plan, Partner Relay Content Creation, Partner Relay train EOC liaisons, conduct countywide preparedness survey, outreach campaigns including on AlertSanDiego, SD Emergency app, and translations of documents from English to Spanish.

3. **Action/Project Title:** Review the County Consolidated Fire Code annually and update as necessary

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Planning & Development Services and County Fire

   Project Status: Completed

   Summary: The County of San Diego Consolidated Fire Code has been updated twice during the reporting period, with the most recent update taking place in March 2020. This is an ongoing project that is still relevant for inclusion in the San Diego County Hazard Mitigation Plan. San Diego County Fire, in coordination with the County Planning & Development Services Department, will continue reviewing the Consolidated Fire Code on an annual basis and will make updates to the code as needed, or at minimum, will update it once every three years.

4. **Action/Project Title:** Streamline policies to eliminate conflicts and duplication of effort in regional planning efforts by coordinating emergency management activities with regional stakeholders by facilitating meetings on a regular basis with regional emergency managers, campus emergency managers, DOD partners, Voluntary Agencies Active in Disaster, and faith-based partners.

   Progress Report Period: January 2019 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Departments, local military, healthcare agencies and the 18 incorporated cities

   Project Status: Ongoing

   Summary: The County OES' Volunteer Coordinator, participates in the San Diego VOAD (Volunteer Organizations Active in Disasters) General Meeting on a monthly basis. There, each organization, including the County OES' representative, give updates on efforts provided within the Operational Area. There are also talks surrounding coordination for efforts needed. Participants of this meeting are made up of local, state, and federal organizations, as well as non-governmental organizations, to include faithed based partners.

   The County OES' Volunteer Coordinator also holds a meeting with non-governmental organizations that make up the County's Feeding Taskforce every two months. This meeting is designed to discuss organizations' roles, resources, and capabilities as it pertains to ensuring food security within the region, should the American Red Cross' feeding operations become overwhelmed.

The County OES Ops Coordinator hosts bimonthly Emergency Managers' meetings to leverage access to, planning with, and partnership development with the 18 cities, special districts, and other key Emergency Managers.

The County OES Ops Coordinator is managing the deployment of the regional Full Scale Exercise project that will occur in January 2023. Monthly planning meetings started in February 2022, and meetings have attracted and leveraged access to more than 85 key stakeholders at all levels of government and nonprofit agencies working together for a common goal.

The COVID-19 Pandemic caused a lapse in the meetings of these groups, and it has been challenging to gain traction with these meetings. However, this project is still relevant and ongoing. Interactions with these groups play a vital role in County OES' operations during an Emergency Operations Center (EOC) activation.

5. **Action/Project Title:** Publicize and encourage the adoption of appropriate hazard mitigation actions throughout the region

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Planning & Development Services, County Fire, County Communications Office, County Technology Office

   Project Status: Delayed and Ongoing

   Explain: Priorities shifted due to COVID-19 pandemic. There were also staffing changes.

   Summary: There have been staffing changes, which limit the ability to report on the full scope of accomplishments for the reporting period. Awareness of accomplishments during this period include developing and posting protective actions residents can take to prepare themselves for emergencies and natural disasters from 2018 and thereon on County OES social media platforms in English and in Spanish, the dissemination of the updated Personal Disaster Plans translated into 12 languages, printing of flyers AlertSanDiego, and the SD Emergency app disseminating these flyers at community events and presentations.

   Residents have been encouraged to take appropriate hazard mitigation actions through alert and warning postings and press releases posted to the Ready San Diego website, AlertSanDiego, the SD Emergency app, county news center articles. Campaigns were also conducted to increase the number of residents registered for AlertSanDiego Lyft (2018). Hazard mitigation messages have been developed, written, and promoted through television interviews in English and Spanish.

   These messages have also been provided to the Partner Relay network (a group with over 700 individuals) which is made of trusted community organizations who serve residents from San Diego's diverse and underserved neighborhood as well as residents with limited English proficiency, through emails and trainings provided to the organizations. They can share these messages with the clients they serve. Numerous of these messages have also been translated into Spanish. The goal is to continue these efforts for the next few months leading through 2023.

   Obstacles, problems, or delays include shift in priorities due to COVID-19 pandemic, staffing changes/staff turnover, completing trainings, the learning curve, competing

priority projects, project also requires many staff hours, and collaboration is in part contingent on resources, others, invitations, creating opportunities to share the information with others and potentially funding for incentives to create additional opportunities to share the information with the public.

The project is still relevant and ongoing since the County is still at risk for emergencies and natural disasters and not all residents are informed on the County's resources, nor on what actions to take to prepare for emergencies and natural disasters before, during and after they occur. Public education, information, outreach and community engagement efforts will continue through January, 2023 and include attending presentations on preparedness, supporting staff with documentation and writing of internal documents, materials design & inventory, communications, review of current and past communications messages, draft updated templates with preparedness/hazard mitigation messages, post preparedness messages on social media platforms, preparedness interviews on television, create a Partner Relay capacity plan, Partner Relay Content Creation, Partner Relay train EOC liaisons, conduct countywide preparedness survey, outreach campaigns including on AlertSanDiego, SD Emergency app, and translations of documents from English to Spanish.

6. **Action/Project Title:** Building Codes
   Progress Report Period: January 1, 2020 to March 30, 2022

   Responsible Agency: County of San Diego, County Planning & Development Services (Building Division), and County Fire

   Project Status: Completed

   Summary: Building codes were reviewed to reflect current earthquake standards annually and update as necessary. County Staff attended jurisdictional conferences related code changes or updates related to seismic and other natural disasters. Groups included International Code Counsel, County Building Officials Association of California (CBOAC), California Building Officials (Calbo).

   This is an ongoing effort, and project is still relevant. Department suggests adding a review of fire and wind standards annually to include the most relevant natural disasters that effect our community.

7. **Action/Project Title:** Support public and private sector symposiums that emphasize hazard mitigation planning
   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Departments, Cities, and private sector partners

   Project Status: Completed and Ongoing

   Summary: County OES maintains a support posture of public and private sector symposiums with an emphasis on hazard mitigation. In September 2021, County OES participated with the Air Protection Control District (APCD) and the California Air Resource Board in a symposium tailored around air-quality. County OES also participates quarterly with San Diego Gas & Electric's (SDG&E's) Access and Functional Needs team to discuss ways the public can be best prepared for Public Safety Power Shutoffs.

Obstacles, problems, or delays include shift in priorities due to COVID-19 pandemic and staffing changes/staff turnover. The department suggests this project should outline key deliverables and note specifically what is to be accomplished through supporting symposiums.

8. **Action/Project Title:** Maintain multi-jurisdictional/multi-functional training and annual exercises to enhance hazard mitigation

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Departments, All 18 Cities/appropriate Private Sector Agencies

   Project Status: Ongoing

   Summary: From Fall 2017 to Summer 2018, County OES staff planned and deployed a San Diego Regional Tabletop Exercise (TTX) conducted on June 18, 2018, completing the process with a published AAR/IP (After Action Report / Improvement Plan.) This was the result of a UASI grant proposal from OES.

   From Spring 2019 to October 2019, County OES' team planned a November 6, 2019 San Diego Regional Full Scale Exercise (FSE) across regional agencies at all levels of government and the private sector, in response to priorities of the San Diego MyTEP (Multi-Year Training and Exercise Plan – San Diego Urban Area, 2019-2022. They completed the process with a published AAR/IP. This was the result of a UASI grant proposal from OES.

   From Fall 2020 to July 2021, County OES' staff also planned a July 27, 2021 San Diego Regional TTX for government and nonprofit agencies across San Diego, with AAR After Action Report improvements in response to priorities of the San Diego MyTEP (Multi-Year Training and Exercise Plan – San Diego Urban Area, 2019-2022. They completed the process with a published AAR/IP. This was the result of a UASI grant proposal from County OES.

   To meet the priorities of San Diego MyTEPs for 2019-2022 and 2022-2025, OES's team kicked off planning for a January2023 regional FSE (Full Scale Exercise) in December 2021 and are currently hosting monthly planning meetings with large regional stakeholder groups, attracting approximately 85 stakeholder agency members. A FSE planning team of about 30 members is now meeting, including all 18 City Emergency managers, and a variety of special districts such as water agencies, airport and ports, USAR (Urban Search and Rescue) team, as well as public safety partners. This exercise prioritizes testing core capabilities testing identified in the MyTEPs and testing regional response plans such as OA EOP, local EOPs and response plans.

   The OA and local agency EOC response will be tested for a catastrophic natural and human caused hazard scenario. This FSE will also testing Emergency Public Information through a regional JIC response, EOC activation and response procedures across agencies and jurisdictions, recovery operations and Initial Damage Assessment, alert and warning, regional coordination and communication, terrorism response and infrastructure systems, such as water agency response in emergencies.

County OES staff from 2021 to April 2022, OES planned, developed, and deployed a 6-month long training program for new and existing OES Staffs for the all-hazards response Staff Duty Officer (SDO) program; with subsequent Qualification Board testing for all SDO Under Instruction candidates in April 2022, to certify and deploy them as SDOs for emergency response. Staff had a 100% pass rate through this intensive oral Qual Board and practical hands-on technical test.

From November 2021 to present, the County OES training officer promoted UASI and CSTI training courses to County OES staff, EOC responders and EOC partner agencies, to bolster training for local important courses such as EOC positions Specific training – Planning, management, operations and Finance/Admin, Public Information Officer course, Mass Care courses and Recovery Operations, among others and booked a local EOC Operations and Planning course in the San Diego IA EOC for November 2022.

On April 10, 2022, The County OES Ops Coordinator completed a County OES training program needs assessment to identify areas for improvement, as presented to County OES leadership, and plans are underway to continue to expand training in FY 2022-23.

To meet the priorities of the San Diego MyTEP (Multi-Year Training and Exercise Plan) – San Diego Urban Area, 2019-2022 and 2022-2025, County OES staff planned and conducted the following EOC exercises:

- Hot Wash on Two Coastal Incidents – Tongan Tsunami and Orange / San Diego County Oil Spill and generated After Action Lessons Learned for approximately 25 regional agencies at all levels of government.
- EOC Planning P, EOC Action Plan, Battle Rhythm and EOC Planning TTX 2/23/22
- EOC Operations functional training exercise 3/2/22
- Tongan Tsunami Advisory for San Diego FSE 1/18/22

Projects obstacles, problems and delays Coordinators were hired October 2021; departure of key staffs that managed projects, causing significant delays in initiatives, including Training & Exercises Lead departing.

Obstacles can arise any time such as when County OES staffs the EOC in emergencies and the two-year long COVID emergency activation caused competing priorities. The COVID emergency activation also delayed access to many training and exercise opportunities nationwide 2020 to 2022, due to social distancing health safety considerations. Other significant EOC activations that also tapped out staffs and changed priorities - wildfire season response, west coast oil spill, west coast tsunami advisory and other emergency EOC activations.

Regional FSE is an Ops Plan goal for fiscal include extensive staff turnover at County OES – five new Emergency Services year 2022, July 1, 2022 – June 30, 2023. Training and Exercise Planning remains a high priority for County OES.

9. **Action/Project Title:** Review and update annually regional emergency plans, Concept of Operation plans, protocols, and standard operating procedures

   Progress Report Period: January 2018 to January 2023

Responsible Agency: County Office of Emergency Services (County OES), appropriate county Departments, and all 18 Cities/Special Districts

Project Status: Delayed and Ongoing

Explain: Project was delayed due to OES staff turnover.

Summary: County OES created a Plan Revision Schedule which includes an annual cycle where Standard Operating Procedures (SOPs), Concept of Operations (ConOps), Continuity of Operations Plan (COOP), Site Evacuation Plan (SEP), Emergency Operations Plan (EOP), and Checklists are reviewed, updated, tested, validated, approved, and trained.

This project is a priority for County OES and is contingent on collaboration with County OES staff members. County OES staff turnover caused deadline obstacles and time delays. This project is still considered relevant, and revisions/updates to regional emergency plans, ConOps, protocols, and SOPs are ongoing. County OES is updating the SOP Library document to include a revision, training, and testing schedule; review and approval process; review checklist; version control measures and storage location; handling confidential information process; and training, testing and validation process.

10. **Action/Project Title:** Encourage the public to prepare and maintain a 3-day preparedness kit for home and work through outreach events, social media, paid media and earned media.

    Progress Report Period: January 2018 to January 2023

    Responsible Agency: County Office of Emergency Services (County OES), County Communications Office, and County Technology Office

    Project Status: Delayed and Ongoing

    Explain: The department is not aware of what would constitute the project as complete. The project could be considered ongoing. Since the potential for emergencies and natural disasters continues, the project still has relevancy. The project could stay the same or potentially be modified to recommend residents ideally prepare a kit with food, water to last at least three days, but three days could also be a challenge with current inflation and perhaps that should be considered as well.

    Summary: There have been staffing changes which limit the ability to report on the full scope of accomplishments for the reporting period. Awareness of accomplishments during this period include the vast number of files, emails, PowerPoint presentations, and documents left from the previous Public Outreach Specialist would indicate a high-level work ethic to achieve the Office of Emergency Services vision and the essential functions of the position. It should also be noted PowerPoint presentations created prior to the recent staffing changes indicate a recommendation to build a kit to last for 3 to 5 days.

    Efforts to achieve this goal are visible in the recently updated Personal Disaster Plans. Page 40 of the plan encourages readers to prepare a home kit to service for at least three days without water or electricity. Additionally, these plans were made to consider individuals with access and functional needs. These disaster plans were translated and available in 12 languages. They are available for free to download

from the OES website and are also regularly mailed out to residents who request a hard copy. The PowerPoint was used for a presentation at La Jolla Country Day on November 18, 2021, where the recommendation was made for those in attendance to build a preparedness kit to last 3-5 days. This project could be considered ongoing and be included in current and future public education, information, outreach, and community engagement efforts (These messages can continue to be shared with the public and included in future outreach programming through January 2023).

Obstacles, problems, or delays include shift in priorities due to COVID-19 pandemic, staffing changes/staff turnover, completing trainings, the learning curve, competing priority projects, project also requires many staff hours, and collaboration is in part contingent on resources, others, invitations, creating opportunities to share the information with others and potentially funding for incentives to create additional opportunities to share the information with the public.

11. **Action/Project Title:** Develop a Climate Action Plan

    Progress Report Period: January 2018 to January 2023

    Responsible Agency: Land Use & Environment Group and County Office of Emergency Services (County OES)

    Project Status: Completed

    Summary: For further details, please visit the County's Climate Action Plan website.[132]

[132] https://www.sandiegocounty.gov/content/sdc/sustainability/cap.html#:~:text=The%20County%20of%20San%20Diego,over%20the%20next%2030%20years.

7.2. PLAN UPDATE EVALUATION

TABLE 67: PLANNING AND MITIGATION EVALUATION

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	All jurisdictions within San Diego County are welcome to participate and will continue to be invited to participate in future plan updates.
	Have any internal or external agencies been invaluable to the mitigation strategy?	All internal and external planning partners are invaluable to our mitigation strategy. Internal partners assisted most with updating the hazard assessment, mitigation actions, strategies and providing progress reports. External partner assistance was most helpful related to climate change incorporation into hazards and updating the hazard assessment.
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	County OES recommends allotting more time for all planning partners to complete FEMA Handbook Tasks 5, 6 and 7 since these sections require greater amounts of time and effort to collaborate with additional team members, plan/document in-depth goals/objectives/actions and provide supporting documentation for previous plan accomplishments.
	Has the Planning Team undertaken any public outreach activities?	The Planning Team conducted public outreach activities outlined in Section 3 of this plan. Some future public outreach activities are outlined in Section 6 of this plan, but are not inclusive of all public outreach activities.
	How can public participation be improved?	Public participation may be improved with continued partner outreach, seminars, surveys, public education opportunities/presentations and other methods (both virtual and in-person) outlined in Section 6 of this plan.
	Have there been any changes in public support and/or decision- maker priorities related to hazard mitigation?	Public feedback details are provided in Section 3 of this plan. Updated priorities and reasoning are covered in Section 6 and 7 of this plan.
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	Jurisdiction-specific adoptions/incorporations are covered in individual annexes to this plan.
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	Not currently. The Planning Team will continue to monitor.
	Are there different or new education and outreach programs and resources available for mitigation activities?	The Planning Team will continue to monitor and seek opportunities to facilitate new education and outreach programs/resources, especially for priority actions outlined in Section 6 of this plan.
	Has NFIP participation changed in the participating jurisdictions?	For NFIP participation, see Sections 1 and 7 of this plan for the County of San Diego and associated plan annexes for all other participating jurisdictions.
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	Disasters, such as, but not limited to, pandemic disease and wildfires, have occurred during the planning stages of this plan.
	Should the list of hazards addressed in the plan be modified?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Do any new critical facilities or infrastructure need to be added to the asset lists?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Have any changes in development trends occurred that could create additional risks?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Are there repetitive losses and/or severe repetitive losses to document?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.

Plan Section	Considerations	Explanation
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	The mitigation strategy experienced delayed implementation due to some staff/project manager turnover and decreased time available to plan and implement. Emergency Operations Center activation for the 2020 COVID-19 Pandemic affected timeline estimates.
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Are there new funding sources to consider?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Have elements of the plan been incorporated into other planning mechanisms?	Yes, e.g., the Emergency Operations Plan and other County emergency plans.
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	The plan was monitored and evaluated as anticipated. However, it would have been more helpful to the Planning Team to have more time to complete Sections 5-7 of this plan, which will be accounted for in the next planning cycle.
	What are needed improvements to the procedures?	None currently. The Planning Team will continue to monitor, assess, and update as needed.

7.3. PLAN MAINTENANCE, MONITORING, EVALUATION, & UPDATES

Hazard Mitigation Plan maintenance is the process the Planning Team establishes to track the plan's implementation progress and to inform the plan update. The plan must include a description of the method and schedule for monitoring, evaluating, and updating it within a 5-year cycle. These procedures help to:

- Ensure that the mitigation strategy is implemented according to the plan.
- Provide the foundation for an ongoing mitigation program in your community.
- Standardize long-term monitoring of hazard-related activities.
- Integrate mitigation principles into community officials' daily job responsibilities and department roles.
- Maintain momentum through continued engagement and accountability in the plan's progress.

7.3.1 PLAN MONITORING

Plan monitoring means tracking the implementation of the plan over time. The plan must identify how, when, and by whom the plan will be monitored.

The Hazard Mitigation Planning Group (HMPG) participants listed in Section 2 of this plan will be responsible for monitoring the plan annually for updates to jurisdictional goals, objectives, and action items. If needed, these participants will coordinate through the County Office of Emergency Services (County OES) to integrate these updates into the Plan. County OES will be responsible for monitoring the Plan for updates on an annual basis.

7.3.2. PLAN EVALUATION

The Plan is evaluated by the County Office of Emergency Services (County OES) and by each participating jurisdiction 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 by Hazard Mitigation Planning Group (HMPG) leads (or their select jurisdictional representative) based upon the initial STAPPLEE criteria used to draft goals, objectives, and action items for each jurisdiction. County OES and city representatives also review the goals and action items to determine their relevance to changing situations in the county, as well as changes in State or Federal regulations and policy.

County OES and jurisdictional representatives review the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The coordinating organizations responsible for the various action items will 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 will be forwarded to County OES for inclusion in further updates to the Plan. The HMPG and each Local Mitigation Planning Team meet annually to discuss the status of the Plan.

7.3.3. PLAN UPDATES

Since the Plan's original adoption in 2005 the Hazard Mitigation Planning Group (HMPG) has participated in an annual review. This process was continued after the adoption of the 2010 plan. The review details all mitigation actions that were deferred, begun, continued, or completed during that calendar year. In the past five years, there has been considerable progress made with the successful completion of most action items developed by the participating jurisdictions. Section 7.1 details the status of the action items from the 2018 plan.

This review process has been effective in identifying gaps and shortfalls in funding, support, and other resources. It has also allowed for the re-prioritization of specific actions as circumstances change. It allows each participating jurisdiction to maintain the plan as a living document. This review process has enabled the HMPG to improve the document by eliminating actions that have been completed, adding new actions that have been identified since the plan's adoption and reprioritizing other actions to reflect new priorities and/or constraints. The negative side of this review process is that it is time consuming, pulling staff away from their day-to-day responsibilities.

The County Office of Emergency Services (County OES) will continue to be the responsible agency for updates to the Plan. All HMPG participants will continue to be responsible to provide County OES with jurisdictional-level updates to the Plan annually or when/if necessary, as described above. Every five years the plan will be updated and submitted to existing authorities outlined in Section 1 of this plan and Cal OES and FEMA for review.

7.3.4. IMPLEMENTATION THROUGH EXISTING PROGRAMS AND OTHER PLANNING MECHANISMS

County and local jurisdictions have implemented many of the recommended action items through existing programs and procedures. Participants use the Plan as a baseline of information on the natural hazards impacting their jurisdictions. They have also been able to refer to existing institutions, plans, policies, and ordinances defined for each jurisdiction in

Section 5 of the Plan (e.g., General Plan, Comprehensive Plan). Participants are incorporating the Hazard Mitigation Plan into their General Plans and/or Comprehensive Plans as those plans come up for review and revision.

7.3.5. RESPONSE PLANS

Several other operational or functional response plans are also influenced by information contained in this plan. These plans include but are not limited to:

General Plan, Safety Element and Emergency Operations Plan, Annex Q – Evacuation: A review of the vulnerability and estimated losses detailed in the hazard profiles can help identify evacuation routes and locations, and their capacity, safety, and viability in different emergency scenarios.

This review can also help evaluate the impacts of multiple or cascading hazards, so that evacuees are not relocated into an area that puts them at risk from other hazards.

7.3.6. CONTINUED PUBLIC INVOLVEMENT

The 2018 plan was posted on the Hazard Mitigation page of the San Diego County Office of Emergency Services (County OES) webpage, and the public has always been encouraged to comment on the plan online. Once approved, this revised plan will be posted on the Hazard Mitigation webpage of the County OES website and participating jurisdictions will have links to the Plan on their websites.

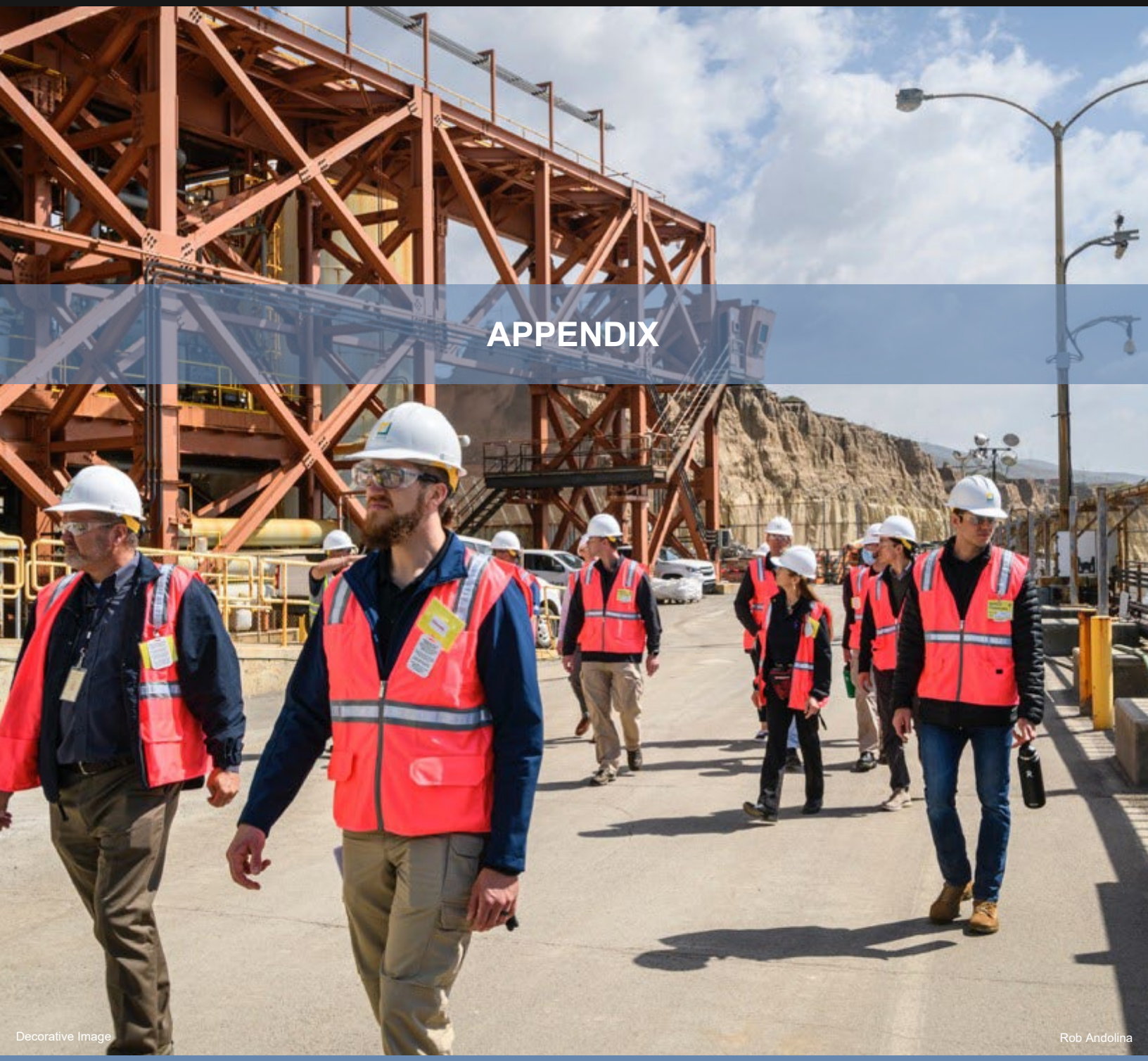
The participating jurisdictions and special districts continue to be dedicated to involving the public directly in the review process and updates of the Plan. A maintenance committee made up of a representative from County OES and a representative from each participating jurisdiction is responsible for monitoring, evaluating, and updating the Plan as described above. During all phases of plan maintenance, the public will have the opportunity to provide feedback.

In addition, hard copies of the plan are catalogued and kept by the appropriate agencies in the county. The existence and location of these copies are also posted on the county website. To facilitate public comments, the County OES Hazard Mitigation webpage contains an email address for the public's use, which is monitored daily by County OES staff. Any questions or comments received on this website are forwarded to the appropriate member(s) of the HMPG for their review and response. County OES also tracks public comments on this plan.

A press release requesting public comments is also issued for each update, and after each evaluation. County OES also uses social media (Facebook, Twitter, etc.) to notify the public of any changes they should be aware of. These notifications direct people to the Hazard Mitigation webpage, where the public can review proposed changes.

Coupled with the dedicated email address for comments, this provides the public a simple, easily accessible manner to express concerns, opinions, or ideas about any updates/changes that are proposed to the Plan.

County OES will continue to be responsible for publicizing any changes to the Plan and maintaining public involvement.



APPENDIX

San Diego County, California

2023

APPENDIX 1. BASE DATA SOURCES 2021

TYPE	SECTION	SOURCES	CREDITS	HAZUS CLASSIFICATIONS	EXCLUSIONS	NOTES/ASSUMPTIONS
INFRASTRUCTURE	OIL/GAS PIPELINES	Homeland Infrastructure Foundation-Level Data (HIFLD) - NG PIPELINES	National Geospatial Intelligence Agency (NGA)	Buried Pipelines		
		Homeland Infrastructure Foundation-Level Data (HIFLD) - PETROLEUM PIPELINES	National Geospatial Intelligence Agency (NGA)	Pipelines		
	RAILROAD TRACKS	SDE.SANGIS.RAILROAD - RAIL_TYPE = 'TRAIN'	San Diego Association of Governments (SANDAG)	Railway Tracks	Excluded defunct freight lines	
		SDE.SANGIS.RAILROAD - RAIL_TYPE = 'TROLLEY'	San Diego Association of Governments (SANDAG)	Light Rail Tracks		
	HIGHWAY	California Department of Transportation	California Department of Transportation	Highway Roads (Major Roads + Urban Roads)		
CRITICAL FACILITIES	AIRPORT FACILITIES	SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.	Control Towers + Terminal Buildings + Parking Structures + Fuel Facilities + Maint/Hangar Facilities + Runways + Other	Excluded military and private facilities	Terminals-Large
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Terminals-Small
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Control Towers
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Runways: Asphalt -- includes major taxi-ways
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Strips: Dirt, gravel, etc.
	BRIDGES	Homeland Infrastructure Foundation-Level Data (HIFLD) - Railroad Bridges	National Geospatial Intelligence Agency (NGA)	By material/design/length and by light rail/railroad/highway	Excluded any on military bases, and on reservations if not major road or greater	Added some highway bridges from imagery/NBI/SDE. No rail bridges were added as the data showed no new ones
		Homeland Infrastructure Foundation-Level Data (HIFLD) - National Bridge Inventory	National Geospatial Intelligence Agency (NGA)			
		SDE.SANGIS.BRIDGES	SanGIS			
	BUS FACILITIES	Homeland Infrastructure Foundation-Level Data (HIFLD) - Amtrak Stations	National Geospatial Intelligence Agency (NGA)	Urban Station + Fuel Facility + Dispatch Facility + Maintenance Facility		
		HAZUS + web	Federal Emergency Management Agency (FEMA) + Google, etc.			
		SDE.SANGIS.TRAN_STOPS_SG + web	SanGIS + Google, etc.			
	COMMUNICATION FACILITIES/ UTILITIES	Homeland Infrastructure Foundation-Level Data (HIFLD) - AM Antennas + HAZUS	National Geospatial Intelligence Agency (NGA)	Central Offices + Stations/Transmitters (AM or FM, TV stations, Weather stations, Other)		AM Antennas from previous analysis matched current HSIP/HAZUS data
		Homeland Infrastructure Foundation-Level Data (HIFLD) - FM Antennas + HAZUS	National Geospatial Intelligence Agency (NGA)			FM Antennas from previous analysis matched current HSIP/HAZUS data (two stations on reservation land were excluded as well)
		Homeland Infrastructure Foundation-Level Data (HIFLD) - TV Digital Transmitters + HAZUS	National Geospatial Intelligence Agency (NGA)			Added one digital TV transmitter up near San Marcos from HAZUS data- looked it up on FCC website and is active
		Homeland Infrastructure Foundation-Level Data (HIFLD) - Broadband Transmitters	National Geospatial Intelligence Agency (NGA)			Analog transmitters are no longer in use as of July 2021
						No changes
		Homeland Infrastructure Foundation-Level Data (HIFLD)- Weather Stations	National Geospatial Intelligence Agency (NGA)			Added for 2021- only 1 station
	ELECTRIC POWER FACILITIES	CEC - PP_SD	California Energy Commission	Transmission Substations + Distribution Circuits + Generation Plants	Excluded private facilities	Power plants
		CEC - Substation_SD	California Energy Commission		Substations on reservations NOT excluded (Campo)	Substations

TYPE	SECTION	SOURCES	CREDITS	HAZUS CLASSIFICATIONS	EXCLUSIONS	NOTES/ASSUMPTIONS
CRITICAL FACILITIES, continued	(EMERGENCY RESPONSE) EMERGENCY CENTERS, FIRE STATIONS, POLICE STATIONS	Homeland Infrastructure Foundation-Level Data (HIFLD) - Local_EmergencyOperations Centers +SDE.SANGIS.FACILITY_CRITICAL	National Geospatial Intelligence Agency (NGA) + SanGIS	Emergency Operation Center		Includes 4 alternate locations
		SDE.SANGIS.FIRE_STATION	SanGIS	Fire Station	Excluded military and reservation facilities	
		SDE.SANGIS.FACILITY_CRITICAL + SDE.SANGIS.PLACES + web + SDE.SANGIS.LAW_FACILITY	SanGIS	Police Station	Excluded military and reservation facilities	Included Customs + Border Patrol
	GOVERNMENT OFFICE/CIVIC CENTER	SDE.SANGIS.FACILITY_CRITICAL + SDE.SANGIS.PLACES + visual/web analysis	SanGIS + Google, etc.	HAZUS: From General Building Stock - GOV1I (General Services) - not GOV2I (Emergency Response)	Excluded military and reservation facilities, and any facilities already covered by Emergency Response group	
	HOSPITALS/ CARE FACILITIES	SDE.SANGIS.FACILITY_CRITICAL + SDE.SANGIS.PLACES + visual/web analysis	SanGIS + Google, etc.	Hospitals (Small/Medium/Large) + Medical Clinics (Clinics, Labs, Blood Banks)	Excluded hospitals without ER facilities	
	PORT FACILITIES	Homeland Infrastructure Foundation-Level Data (HIFLD) - Ports	National Geospatial Intelligence Agency (NGA)	Waterfront Structures + Cranes/Cargo Handling Equipment + Warehouses + Fuel Facilities	Excluded private facilities/marinas	NAV_UNIT_N = '32ND ST. NAVAL BASE' OR NAV_UNIT_N = 'SAN DIEGO UNIFIED PORT DISTRICT, BROADWAY PIER' -- used central port locations, not separate wharf/pier locations
	POTABLE WATER FACILITIES	HAZUS + web	Federal Emergency Management Agency (FEMA) + local governments + Google, etc.	Pumping Plants + Wells + Water Storage Tanks (0.5MGD to 2MGD) + Water Treatment Plants (Large/Med/Small)		Treatment Plants - included Carlsbad desalination facility (near complete)
		SDE.SANGIS.HYD_LAKE	SanGIS			Reservoirs (without adjacent plants)
	WASTE WATER FACILITIES	HAZUS + web	Federal Emergency Management Agency (FEMA) + local governments + Google, etc.	Treatment Plants (Large/Med/Small) + Lift Stations (Large/Med/Small)		Treatment Plants
	RAIL FACILITIES	Homeland Infrastructure Foundation-Level Data (HIFLD) - Intermodal Terminal Facilities	National Geospatial Intelligence Agency (NGA)	Railway: Urban Station + Fuel Facility+ Dispatch Facility + Maintenance Facility Light Rail: DC Substation + Dispatch Facility + Maintenance Facility		Terminal Facilities
		Homeland Infrastructure Foundation-Level Data (HIFLD) - Amtrak Stations	National Geospatial Intelligence Agency (NGA)			Amtrak Stations
		Homeland Infrastructure Foundation-Level Data (HIFLD) - Railroad Yards + web	National Geospatial Intelligence Agency (NGA) + Google, etc.			Yard Facilities
		SDE.SANGIS.TRAN_STOPS_SG + web	San Diego Association of Governments (SANDAG) + Google, etc.			Sprinter Stations
		Homeland Infrastructure Foundation-Level Data (HIFLD) - Fixed-Guideway Transit Stations + SDE.SANGIS.TRAN_STOPS_SG + web	National Geospatial Intelligence Agency (NGA) + San Diego Association of Governments (SANDAG) + Google, etc.			Transit Centers
	SCHOOLS	SDE.SANGIS.PARCELS_ALL	SanGIS	Grade Schools + Colleges/Universities (HAZUS data for SD is only grade schools -- not colleges/universities)	Excluded any on military bases and reservation land Excluded SOCtypes: Alternative Schools of Choice, Continuation High Schools, County	removed any that had closed- used CA dept of ed GIS to get updated schools and enrollments
		Community Analyst	Dun & Bradstreet, via Esri		Excluded private facilities and trade schools	Homeland Infrastructure Foundation- Level Data (HIFLD)- Type 1 universities/jr colleges only

TYPE	SECTION	SOURCES	CREDITS	HAZUS CLASSIFICATIONS	EXCLUSIONS	NOTES/ASSUMPTIONS
POPULATION + BUILDINGS	**POPULATION**	2019 Census	U.S. Census Bureau	Buried Pipelines		
	RESIDENTIAL BUILDINGS	SDE.SANGIS.PARCELS_ALL	SanGIS		Used an overlay of LANDUSE_SG to find residential parcels as ASR field is deprecated	
	COMMERCIAL BUILDINGS	Community Analyst	Dun & Bradstreet, via Esri			

APPENDIX 2. HAZARD DATA SOURCES 2021

NAME	SOURCES	QUERY (IF ANY)	NOTES (INCL. CREDITS)
Coastal Storm/Erosion	HYD_FLOODPL	FLD_ZONE = 'VE'	Federal Emergency Management Agency (FEMA)
Dam Failure	HYD_DAM_INUNDATION_DSOD		California Office of Emergency Services, County of San Diego, Division of Safety of Dams
100-Year Earthquake	HAZUS, USGS		Federal Emergency Management Agency (FEMA; HAZUS); soil from U.S. Geological Survey VS30 data - http://earthquake.usgs.gov/hazards/apps/vs30/custom.php
500-Year Earthquake	HAZUS, USGS		Federal Emergency Management Agency (FEMA; HAZUS); soil from U.S. Geological Survey VS30 data - http://earthquake.usgs.gov/hazards/apps/vs30/custom.php
Probabilistic Annualized Earthquake	HAZUS, USGS		Federal Emergency Management Agency (FEMA; HAZUS); soil from U.S. Geological Survey VS30 data - http://earthquake.usgs.gov/hazards/apps/vs30/custom.php
Rose Canyon M6.9 Scenario	HAZUS, USGS		U.S. Geological Survey- ShakeMaps
100-Year Flood	HYD_FLOODPL	FLOOD_PLAI = 'FP100' OR FLOOD_PLAI = 'FW100'	Federal Emergency Management Agency (FEMA)
500-Year Flood	HYD_FLOODPL	FLOOD_PLAI = 'FP500'	Federal Emergency Management Agency (FEMA)
Rain-Induced Landslide (High Risk)	GEO_LANDSLIDE_CN	soil_slip_risk = 'High' OR state_landslide_cat = 'Most Susceptible' OR GABRO_SLOPE = 'YES'	State of California, U.S. Geological Survey, Federal Emergency Management Agency (FEMA; HAZUS) and County of San Diego
Rain-Induced Landslide (Moderate Risk)	GEO_LANDSLIDE_CN	(soil_slip_risk = 'Moderate' OR state_landslide_cat = 'Marginally Susceptible') AND GABRO_SLOPE = ''	State of California, U.S. Geological Survey, Federal Emergency Management Agency (FEMA; HAZUS) and County of San Diego
Wildfire Hazard Severity Zones	FIRE_HAZARD_SEVERITY_ZONES	Definition qeuried to only show high and very high fire zones	Used composite version provided directly from CAL FIRE Fire Resource Assessment Program (FRAP) Team
Sea Level Rise (Coastal Flooding)	Areas inundated by unimpeded Pacific coastal flooding under a scenario of 1.4-meter (55-inch) sea-level rise		Pacific Institute -- http://www2.pacinst.org/
Sea Level Rise (MHHW)	Area inundated by mean higher high water (MHHW) under 1.4-meter (55-inch) sea-level rise scenario		Pacific Institute -- http://www2.pacinst.org/
Tsunami	HYD_TSUNAMI_INUNDATION_AREA		California Emergency Management Agency (CalEMA), University of Southern California (USC) and California Geological Survey (CGS)

Used composite version provided directly from CAL FIRE Fire Resource Assessment Program (FRAP) Team

APPENDIX 3. OTHER SOURCES/REFERENCES

ABAG Dam Failure Inundation Hazards Guide, http://www.abag.ca.gov/bayarea/eqmaps/damfailure/dfguide.html

Bainbridge, David 1997. The Flood Next Time. The San Diego Earth Times Web Page: http://www.sdearthtimes.com/et1097/et1097s1.html

California Department of Boating and Waterways and SANDAG, 1994. Shoreline Erosion Assessment and Atlas of the San Diego Region, Volumes I and II. Edited by Reinhard E. Flick, PhD.

California Earthquake History 1769-Present Earthquake.usgs.gov/regional/sca/ca_eqs.php

City of Fort Collins Dam Failure Webpage, http://www.ci.fort-collins.co.us/oem/dam-failure.php

California Coastal Commission Draft Sea Level Rise Policy Guidance (2013) http://www.coastal.ca.gov/climate/slr/guidance/CCC_Draft_SLR_Guidance_PR_10142013.pdf

California Department of Conservation, Division of Mines and Geology 1990. Planning Scenario for a Major Earthquake, San Diego-Tijuana Metropolitan Area. Special Publication 100.

California Department of Water Resources, Dam Safety,

http://www.water.ca.gov/damsaefty/docs/fault.pdf

California Environmental Protection Agency and Office of Environmental Health Hazard Assessment, 2013. "Indicators of Climate Change in California."

Climate Education Partners, 2014. "San Diego, 2050 Is Calling. How Will We Answer?"

County of San Diego, Department of Sanitation and Flood Control. Storms in San Diego County.

FEMA 2002. State and Local Mitigation Planning How-to Guide. September 2002, FEMA 386-1.

FEMA 1999. HAZUS 99 Earthquake Loss Estimation Methodology User Manual-ArcView. Developed by FEMA through arrangements with National Institute of Building Sciences.

Frankel, Arthur, Mueller, Charles, Barnhard, Theodore, Perkins, David, Leyendecker, E.V., Dickman, Nancy, Hanson, Stanley, and Hopper, Margaret, 1997, Seismic-hazard maps for the conterminous United States, Map C - Horizontal Peak Acceleration with 2% probability of exceedance in 50 years, U.S. Geological Survey Open-File Report 97-131-C.

http://geohazards.cr.usgs.gov/eq/html/data.html

Garfin, G., G. Franco, H. Blanco, A. Comrie, P. Gonzalez, T. Piechota, R. Smyth, and R. Waskom, 2014: Ch. 20: Southwest. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 462-486. doi:10.7930/J08G8HMN.

Governor's Office of Emergency Services 2003. Interim Hazard Mitigation Planning Guidance for California Local Governments. Prepared for the DRC April 21-23, 2003.

Hawk, R.N., and Christiansen, T.P., 1991, City of San Diego Ordinances and Regulations with Respect to Geotechnical and Geological Hazards, in Environmental Perils, San Diego Region, Abbott, P.L., and Elliott, W.J., editors, San Diego Association of Geologists

Higbee, Melissa, Daniel Cayan, Sam Iacobellis, Mary Tyree (2014). Report from San Diego Hazard Mitigation Plan Update Training Workshop #1: Climate Change and Hazards in San Diego. ICLEI-Local Governments for Sustainability. Accessed July 7, 2014.

http://www.icleiusa.org/library/documents/training-workshop-report/view

Institute for Business and Life Safety, Tampa FL, July 2008 Mega Fires: The Case for Mitigation, The Witch Creek Fire, October 21-31, 2007

IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Leighton & Associates, 1983, Seismic Safety Study for the City of San Diego, City of San Diego General Plan

Journal of San Diego History 2002. Dry Rivers, Dammed Rivers and Floods: An Early History of the Struggle Between Droughts and Floods in San Diego. Winter 2002, Volume 48, Number 1. http://www.sandiegohistory.org/journal/2002-1/hill.htm

National Association of Counties April 2009. “A Snapshot of the Impact of the Recession on Large, Urban Counties”.

Office of Emergency Services 2014. Unified San Diego County Emergency Services Organization Operational Area Emergency Plan.

San Diego’s Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation

San Diego Natural History Museum Web Page 2003. Faults and Earthquakes in San Diego County. Thomas A. Demere, Ph.D: Curator of Paleontology. http://www.sdnhm.org/research/paleontology/sdfaults.html

Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future (2012). http://www.nap.edu/catalog.php?record_id=13389

South Carolina Emergency Management Division. South Carolina Emergency Operations Plan Appendix 4 South Carolina Dam Failure and Preparedness Plan. February 2009

Stroh, Robert C. editor., 2001: Coastal processes and Engineering Geology of San Diego, California, San Diego Association of Geologists, Sunbelt Publications

U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration 1993. Tsunamis affecting the West Coast of the United States 1806-1992. KGRD 29.

Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Ch. 2: Our Changing Climate. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67. doi:10.7930/J0KW5CXT.

APPENDIX 4. SCRIPPS INSTITUTES OF OCEANOGRAPHY REFERENCES, UNIVERSITY OF SAN DIEGO

Aguilera, R., Gershunov, A., & Benmarhnia, T. (2019). Atmospheric rivers impact California's coastal water quality via extreme precipitation. Science of The Total Environment, 671, 488–494. https://doi.org/https://doi.org/10.1016/j.scitotenv.2019.03.318

Aguilera, R., Gershunov, A., Ilango, S. D., Guzman-Morales, J., & Benmarhnia, T. (2020a). Santa Ana Winds of Southern California Impact PM2.5 With and Without Smoke From Wildfires. GeoHealth, 4(1), e2019GH000225. https://doi.org/https://doi.org/10.1029/2019GH000225

Aguilera, R., Hansen, K., Gershunov, A., Ilango, S., Sheridan, P., and Benmarhnia, T. (2020). Respiratory Hospitalizations and Wildfire Smoke: A spatio-temporal analysis of an extreme firestorm in San Diego County, California. Environmental Epidemiology, 4, doi: 10.1097/EE9.0000000000000114.

Aguilera, R., Corringham, T., Gershunov A., and Benmarhnia, T., (2021). Wildfire smoke impacts respiratory health much more than fine particles from other sources: observational evidence from Southern California. Nature Communications.

12:1493, https://doi.org/10.1038/s41467-021-21708.

Aguilera, R., Corringham, T., Gershunov, A., Leibel S., and Benmarhnia, T. (2021). Fine Particles in Wildfire Smoke and Pediatric Respiratory Health in California. Pediatrics. 147(4):e2020027128.

Analitis, A., Michelozzi, P., D'Ippoliti, D., de'Donato, F., Menne, B., Matthies, F., Atkinson, R. W., Iñiguez, C.,

Basagaña, X., Schneider, A., Lefranc, A., Paldy, A., Bisanti, L., & Katsouyanni, K. (2014). Effects of Heat Waves on Mortality: Effect Modification and Confounding by Air Pollutants. Epidemiology, 25(1), 15–22. http://www.jstor.org/stable/24759018

Barnard, P. L., Hoover, D., Hubbard, D. M., Snyder, A., Ludka, B. C., Allan, J., Kaminsky, G. M., Ruggiero, P., Gallien, T. W., Gabel, L., McCandless, D., Weiner, H. M., Cohn, N., Anderson, D. L., & Serafin, K. A. (2017). Extreme oceanographic forcing and coastal response due to the 2015–2016 El Niño. Nature Communications, 8, 14365. http://dx.doi.org/10.1038/ncomms14365

Basu, R. (2009). High ambient temperature and mortality: a review of epidemiologic studies from 2001 to 2008. Environmental Health, 8(1), 40. https://doi.org/10.1186/1476-069X-8-40

Bouchama, A., Dehbi, M., Mohamed, G., Matthies, F., Shoukri, M., & Menne, B. (2007). Prognostic Factors in Heat Wave–Related Deaths: A Meta-analysis. Archives of Internal Medicine, 167(20), 2170–2176. https://doi.org/10.1001/archinte.167.20.ira70009

Bromirski, P. D., Miller, A. J., & Flick, R. E. (2012). Understanding North Pacific sea level trends. Eos, Transactions American Geophysical Union, 93(27), 249–251. https://doi.org/doi:10.1029/2012EO270001

Bromirski, P. D., Miller, A. J., Flick, R. E., & Auad, G. (2011). Dynamical suppression of sea level rise along the Pacific coast of North America: Indications for imminent acceleration. Journal of Geophysical Research: Oceans, 116(C7). https://doi.org/https://doi.org/10.1029/2010JC006759

Burillo, D., Chester, M., Pincetl, S., Fournier, E., Reich, K., & Hall., A. (2018). Climate Change in Los Angeles County: Grid Vulnerability to Extreme Heat. In California's Fourth Climate Change Assessment.

Burillo, D., Chester, M. v, Pincetl, S., Fournier, E. D., & Reyna, J. (2019). Forecasting peak electricity demand for Los Angeles considering higher air temperatures due to climate change. Applied Energy, 236, 1–9. https://doi.org/https://doi.org/10.1016/j.apenergy.2018.11.039

Cao, Q., Gershunov, A., Shulgina, T., Ralph, F. M., Sun, N., & Lettenmaier, D. P. (2020). Floods due to Atmospheric Rivers along the U.S. West Coast: The Role of Antecedent Soil Moisture in a Warming Climate. Journal of Hydrometeorology, 21(8), 1827– 1845. https://doi.org/10.1175/JHM-D-19-0242.1

Cayan, D. R., Bromirski, P. D., Hayhoe, K., Tyree, M., Dettinger, M. D., & Flick, R. E. (2008). Climate change projections of sea level extremes along the California coast. Climatic Change, 87, S57–S73. https://doi.org/10.1007/s10584-007-9376-7

Clemesha, R. E. S., Guirguis, K., Gershunov, A., Small, I. J., & Tardy, A. (2018a). California heat waves: their spatial evolution, variation, and coastal modulation by low clouds. Climate Dynamics, 50(11), 4285–4301. https://doi.org/10.1007/s00382-017- 3875-7

Clemesha, R. E. S., Gershunov, A., Iacobellis, S. F., & Cayan, D. R. (2017). Daily variability of California coastal low cloudiness: A balancing act between stability and subsidence. Geophysical Research Letters. https://doi.org/10.1002/2017GL073075

Clemesha, R. E. S., Gershunov, A., Iacobellis, S. F., Williams, A., & Cayan, D. R. (2016). The northward March of summer low cloudiness along the California coast. Geophysical Research Letters, 43(3), 1287–1295. https://doi.org/10.1002/2015GL067081

Corringham, T. W., Ralph, F. M., Gershunov, A., Cayan, D. R., & Talbot, C. A. (2019). Atmospheric rivers drive flood damages in the western United States. Science Advances, 5(12), eaax4631. https://doi.org/10.1126/sciadv.aax4631

Crosby, S. C., Cornuelle, B. D., O'Reilly, W. C., & Guza, R. T. (2017). Assimilating Global Wave Model Predictions and Deep- Water Wave Observations in Nearshore Swell Predictions. Journal of Atmospheric and Oceanic Technology, 34(8), 1823–1836. https://doi.org/10.1175/JTECH-D-17-0003.1

Crosby, S. C., O'Reilly, W. C., & Guza, R. T. (2016). Modeling Long-Period Swell in Southern California: Practical Boundary Conditions from Buoy Observations and Global Wave Model Predictions. Journal of Atmospheric and Oceanic Technology, 33(8), 1673–1690. https://doi.org/10.1175/JTECH-D-16-0038.1

Dettinger, M., & Cayan, D. (2014). Drought and the California Delta—A Matter of Extremes. San Francisco Estuary and Watershed Science, 12(2), 6p. https://doi.org/10.15447/sfews.2014v12iss2art4

Dettinger, M. D., Ralph, F. M., Das, T., Neiman, P. J., & Cayan, D. R. (2011). Atmospheric Rivers, Floods and the Water Resources of California. Water, 3(4), 445–478. https://doi.org/10.3390/w3020445

Diehl, P. (2015, October 15). Solana Beach, Encinitas OK sand replenishment. San Diego Union Tribune. http://www.sandiegouniontribune.com/news/environment/sdut-solana-beach-encinitas-ok-sand-replenishment-2015oct15- story.html

Doria, A., Guza, R. T., O'Reilly, W. C., & Yates, M. L. (2016). Observations and modeling of San Diego beaches during El Niño.

Continental Shelf Research, 124, 153–164. https://doi.org/https://doi.org/10.1016/j.csr.2016.05.008

Fiedler, J. W., Smit, P. B., Brodie, K. L., McNinch, J., & Guza, R. T. (2018). Numerical modeling of wave runup on steep and mildly sloping natural beaches. Coastal Engineering, 131, 106–113. https://doi.org/https://doi.org/10.1016/j.coastaleng.2017.09.004

Fiedler, J. W., Young, A. P., Ludka, B. C., O'Reilly, W. C., Henderson, C., Merrifield, M. A., & Guza, R. T. (2020). Predicting site- specific storm wave run-up. Natural Hazards, 104(1), 493–517. https://doi.org/10.1007/s11069-020-04178-3

Flick, R. E. (1998). Comparison of California Tides, Storm Surges, and Sea Level During the El Niño Winters of 1982-83 and 1997-

98. Shore and Beach, 66(3), 7–11.

Franklin, J. (2010). Vegetation dynamics and exotic plant invasion following high severity crown fire in a southern California conifer forest. Plant Ecology, 207(2), 281–295. https://doi.org/10.1007/s11258-009-9672-6

Gershunov, A., Cayan, D. R., & Iacobellis, S. F. (2009). The Great 2006 Heat Wave over California and Nevada: Signal of an Increasing Trend. Journal of Climate, 22(23), 6181–6203. https://doi.org/10.1175/2009JCLI2465.1

Gershunov, A., & Guirguis, K. (2012). California heat waves in the present and future. Geophysical Research Letters, 39(18). https://doi.org/https://doi.org/10.1029/2012GL052979

Gershunov, A., Shulgina, T., Clemesha, R. E. S., Guirguis, K., Pierce, D. W., Dettinger, M. D., Lavers, D. A., Cayan, D. R., Polade,

S. D., Kalansky, J., & Ralph, F. M. (2019). Precipitation regime change in Western North America: The role of Atmospheric Rivers. Scientific Reports, 9(1), 9944. https://doi.org/10.1038/s41598-019-46169-w

Gershunov, A., J. Guzman Morales, B. Hatchett, R. Aguilera, T. Shulgina, K. Guirguis, J. Abatzoglou, D. Cayan, D. Pierce, P. Williams, I. Small, R. Clemesha, L. Schwarz, T. Benmarhnia, A. Tardy, 2021: Hot and cold flavors of southern California's Santa Ana winds: Their causes, trends, and links with wildfire. Climate Dynamics. DOI: 10.1007/s00382-021-05802-z.

Griggs, G., Árvai, J., Cayan, D., DeConto, R., Fox, J., Fricker, H., Kopp, R., Tebaldi, C., & Whiteman, E. (2017). Rising Seas in California, An Update on Seal _level Rise Science.

Guirguis, K., Basu, R., Al-Delaimy, W. K., Benmarhnia, T., Clemesha, R. E. S., Corcos, I., Guzman-Morales, J., Hailey, B., Small, I., Tardy, A., Vashishtha, D., Zivin, J. G., & Gershunov, A. (2018). Heat, disparities, and health outcomes in San Diego County's diverse climate zones. GeoHealth, 2. https://doi.org/10.1029/ 2017GH000127

Guirguis, Kristen, Gershunov, A., Cayan, D. R., & Pierce, D. W. (2018). Heat wave probability in the changing climate of the Southwest US. Climate Dynamics, 50(9–10), 3853–3864. https://doi.org/10.1007/s00382-017-3850-3

Guirguis, Kristen, Gershunov, A., Tardy, A., & Basu, R. (2014). The Impact of Recent Heat Waves on Human Health in California.

Journal of Applied Meteorology and Climatology, 53(1), 3–19. https://doi.org/10.1175/JAMC-D-13-0130.1

Guzman-Morales, J., & Gershunov, A. (2019). Climate Change Suppresses Santa Ana Winds of Southern California and Sharpens Their Seasonality. Geophysical Research Letters, 46(5), 2772–2780. https://doi.org/https://doi.org/10.1029/2018GL080261

Guzman-Morales, J., Gershunov, A., Theiss, J., Li, H., & Cayan, D. (2016). Santa Ana Winds of Southern California: Their climatology, extremes, and behavior spanning six and a half decades. Geophysical Research Letters, 43(6), 2827–2834. https://doi.org/10.1002/2016GL067887

Hamlington, B D, Cheon, S. H., Thompson, P. R., Merrifield, M. A., Nerem, R. S., Leben, R. R., & Kim, K. -Y. (2016). An ongoing shift in Pacific Ocean sea level. Journal of Geophysical Research: Oceans, 121(7), 5084–5097. https://doi.org/10.1002/2016JC011815

Hamlington, Benjamin D, Piecuch, C. G., Reager, J. T., Chandanpurkar, H., Frederikse, T., Nerem, R. S., Fasullo, J. T., & Cheon, S.-

H. (2020). Origin of interannual variability in global mean sea level. Proceedings of the National Academy of Sciences, 117(25), 13983. https://doi.org/10.1073/pnas.1922190117

Hughes, M., & Hall, A. (2010). Local and synoptic mechanisms causing Southern California's Santa Ana winds. Climate Dynamics, 34(6), 847–857. https://doi.org/10.1007/s00382-009-0650-4

Iacobellis, S. F., & Cayan, D. R. (2013). The variability of California summertime marine stratus: Impacts on surface air temperatures. Journal of Geophysical Research: Atmospheres, 118(16), 9105–9122. https://doi.org/https://doi.org/10.1002/jgrd.50652

Ilango, S. D., Weaver, M., Sheridan, P., Schwarz, L., Clemesha, R. E. S., Bruckner, T., Basu, R., Gershunov, A., & Benmarhnia, T. (2020). Extreme heat episodes and risk of preterm birth in California, 2005–2013. Environment International, 137, 105541. https://doi.org/https://doi.org/10.1016/j.envint.2020.105541

Jennings, M. K., Cayan, D., Kalansky, J., Pairis, A. D., Lawson, D. M., Syphard, A. D., Abeysekera, U., Clemesha, R. E. S., Gershunov, A., Guirguis, K., Randall, J. M., Stein, E. D., & Vanderplank, S. (2018). San Diego County Ecosystems: Ecological Impacts Of Climate Change On A Biodiversity Hotspot. In California's Fourth Climate Change Assessment, California Energy Commission. California Energy Commission.

Kalansky, J., Cayan, D., Barba, K., Walsh, L., Brouwer, K., & Boudreau, D. (2018). San Diego Summary Report. California's Fourth Climate Change Assessment, Publication number: SUM-CCCA4-2018-009.

Knowlton, K., Rotkin-Ellman, M., King, G., Margolis, H. G., Smith, D., Solomon, G., Trent, R., & English, P. (2009). The 2006 California Heat Wave: Impacts on Hospitalizations and Emergency Department Visits. Environmental Health Perspectives, 117(1). https://doi.org/10.1289/ehp.11594

Ludka, B. C., Gallien, T. W., Crosby, S. C., & Guza, R. T. (2016). Mid-El Niño erosion at nourished and unnourished Southern California beaches. Geophysical Research Letters, 43(9), 4510–4516. https://doi.org/doi:10.1002/2016GL068612

Ludka, B. C., Guza, R. T., & O'Reilly, W. C. (2018). Nourishment evolution and impacts at four southern California beaches: A sand volume analysis. Coastal Engineering, 136, 96–105. https://doi.org/https://doi.org/10.1016/j.coastaleng.2018.02.003

Ludka, B. C., Guza, R. T., O'Reilly, W. C., Merrifield, M. A., Flick, R. E., Bak, A. S., Hesser, T., Bucciarelli, R., Olfe, C., Woodward, B., Boyd, W., Smith, K., Okihiro, M., Grenzeback, R., Parry, L., & Boyd, G. (2019). Sixteen years of bathymetry and waves at San Diego beaches. Scientific Data, 6(1), 161. https://doi.org/10.1038/s41597-019-0167-6

Ludka, B. C., Guza, R. T., O'Reilly, W. C., & Yates, M. L. (2015). Field evidence of beach profile evolution toward equilibrium.

Journal of Geophysical Research: Oceans, 120(11), 7574–7597. https://doi.org/https://doi.org/10.1002/2015JC010893 Malig, B. J., Wu, X. (May), Guirguis, K., Gershunov, A., & Basu, R. (2019). Associations between ambient temperature and

hepatobiliary and renal hospitalizations in California, 1999 to 2009. Environmental Research, 177, 108566. https://doi.org/https://doi.org/10.1016/j.envres.2019.108566

McElroy, S., Schwarz, L., Green, H., Corcos, I., Guirguis, K., Gershunov, A., & Benmarhnia, T. (2020). Defining heat waves and extreme heat events using sub-regional meteorological data to maximize benefits of early warning systems to population health. Science of The Total Environment, 721, 137678. https://doi.org/https://doi.org/10.1016/j.scitotenv.2020.137678

McEvoy, D., Pierce, D., Kalansky, J., Cayan, D., & Abatzoglou, J. (2020). Projected Changes in Reference Evapotranspiration in California and Nevada: Implications for Drought and Wildland Fire Danger. Earth's Future.

Mohegh, A., Levinson, R., Taha, H., Gilbert, H., Zhang, J., Li, Y., Tang, T., & Ban-Weiss, G. (2018). Observational Evidence of Neighborhood Scale Reductions in Air Temperature Associated with Increases in Roof Albedo. Climate, 6(4). https://doi.org/10.3390/cli6040098

Ostro, B. D., Roth, L. A., Green, R. S., & Basu, R. (2009). Estimating the mortality effect of the July 2006 California heat wave.

Environmental Research, 109(5), 614–619. https://doi.org/https://doi.org/10.1016/j.envres.2009.03.010

Parker, V. T., Pratt, R. B., & Keeley, J. E. (2016). Chaparral editors. Ecosystems of California. . In H. Mooney & E. Zavaleta (Eds.), Ecosystems of California (Chaparral, pp. 479–507). University of California Press.

Pierce, D. W., Cayan, D. R., Das, T., Maurer, E. P., Miller, N. L., Bao, Y., Kanamitsu, M., Yoshimura, K., Snyder, M. A., Sloan, L. C., Franco, G., & Tyree, M. (2013). The Key Role of Heavy Precipitation Events in Climate Model Disagreements of Future Annual Precipitation Changes in California. Journal of Climate, 26(16), 5879–5896. https://doi.org/10.1175/JCLI-D-12-00766.1

Pierce, D. W., Kalansky, J. F., & Cayan, D. (2018). Climate, Drought, and Sea Level Rise Scenarios for the Fourth California Climate Assessment.

Polade, S. D., Gershunov, A., Cayan, D. R., Dettinger, M. D., & Pierce, D. W. (2017). Precipitation in a warming world: Assessing projected hydro-climate changes in California and other Mediterranean climate regions. Scientific Reports, 7(1), 1–10. https://doi.org/10.1038/s41598-017-11285-y

Polade, S. D., Pierce, D. W., Cayan, D. R., Gershunov, A., & Dettinger, M. D. (2014). The key role of dry days in changing regional climate and precipitation regimes. Scientific Reports, 4, 4364. http://dx.doi.org/10.1038/srep04364

Schinasi, L. H., Benmarhnia, T., & de Roos, A. J. (2018). Modification of the association between high ambient temperature and health by urban microclimate indicators: A systematic review and meta-analysis. Environ Res, 161, 168–180. https://doi.org/10.1016/j.envres.2017.11.004

Schwartz, R. (2015). California coastal low clouds: Variability and influences across climate to weather and continental to local scales. University of California, San Diego.

Schwarz L., Malig, B.J., Guzman-Morales, J., Guirguis, K., Ilango, S.D., Sheridan, P., Gershunov, A., Basu, R., and Benmarhnia, T. (2020) The health burden of fall, winter and spring heat waves in Southern California and contribution of Santa Ana Winds. Environ Res Letters. 15, 054017.

Sias-Daniel, J., Jacobs, J. M., Douglas, E., Mallick, R. B., & Hayhoe, K. (2014, May 3). Impact of Climate Change on Pavement Performance: Preliminary Lessons Learned through the Infrastructure and Climate Network (ICNet). Climatic Effects on Pavement and Geotech.

Syphard, A. D., Brennan, T. J., & Keeley, J. E. (2018). Chaparral Landscape Conversion in Southern California. In E. C. Underwood,

H. D. Safford, N. A. Molinari, & J. E. Keeley (Eds.), Valuing Chaparral: Ecological, Socio-Economic, and Management Perspectives (pp. 323–346). Springer International Publishing. https://doi.org/10.1007/978-3-319-68303-4_12

Venturas, M. D., MacKinnon, E. D., Dario, H. L., Jacobsen, A. L., Pratt, R. B., & Davis, S. D. (2016). Chaparral shrub hydraulic traits, size, and life history types relate to species mortality during California's historic drought of 2014. PLoS ONE, 11(7), 1–22. https://doi.org/10.1371/journal.pone.0159145

Williams, A. P., Abatzoglou, J. T., Gershunov, A., Guzman-Morales, J., Bishop, D. A., Balch, J. K., & Lettenmaier, D. P. (2019).

Observed Impacts of Anthropogenic Climate Change on Wildfire in California. Earth's Future, 7(8), 892–910. https://doi.org/https://doi.org/10.1029/2019EF001210

Williams, A. P., Cook, E. R., Smerdon, J. E., Cook, B. I., Abatzoglou, J. T., Bolles, K., Baek, S. H., Badger, A. M., & Livneh, B. (2020). Large contribution from anthropogenic warming to an emerging North American megadrought. Science, 368(6488), 314. https://doi.org/10.1126/science.aaz9600

Williams, A. P., Seager, R., Abatzoglou, J. T., Cook, B. I., Smerdon, J. E., & Cook, E. R. (2015). Contribution of anthropogenic warming to California drought during 2012–2014. Geophysical Research Letters, 42(16), 6819–6828. https://doi.org/10.1002/2015GL064924

Yates, M. L., Guza, R. T., & O'Reilly, W. C. (2009). Equilibrium shoreline response: Observations and modeling. Journal of Geophysical Research: Oceans, 114(C9). https://doi.org/https://doi.org/10.1029/2009JC005359

Yates, M. L., Guza, R. T., O'Reilly, W. C., Hansen, J. E., & Barnard, P. L. (2011). Equilibrium shoreline response of a high wave energy beach. Journal of Geophysical Research: Oceans, 116(C4). https://doi.org/https://doi.org/10.1029/2010JC006681

Young, A P, Guza, R. T., Matsumoto, H., Merrifield, M. A., O'Reilly, W. C., & Swirad, Z. M. (2021). Three years of weekly observations of coastal cliff erosion by waves and rainfall. Geomorphology, 375, 107545. https://doi.org/https://doi.org/10.1016/j.geomorph.2020.107545

Young, A.P. (2015). Recent deep-seated coastal landsliding at San Onofre State Beach, California. Geomorphology, 228, 200–212. https://doi.org/https://doi.org/10.1016/j.geomorph.2014.08.005

Young, A. P. (2018). Decadal-scale coastal cliff retreat in southern and central California. Geomorphology, 300, 164–175. https://doi.org/https://doi.org/10.1016/j.geomorph.2017.10.010

Young, A. P, Raymond, J. H., Sorenson, J., Johnstone, E. A., Driscoll, N. W., Flick, R. E., & Guza, R. T. (2010). Coarse Sediment Yields from Seacliff Erosion in the Oceanside Littoral Cell. Journal of Coastal Research, 580–585. https://doi.org/10.2112/08- 1179.1

Zetler, B. D., & Flick, R. E. (1985). Predicted Extreme High Tides for Mixed-Tide Regimes. Journal of Physical Oceanography, 15(3), 357–359. https://doi.org/10.1175/1520-0485(1985)015<0357:pehtfm>2.0.co;2

APPENDIX 5. SURVEY RESULTS FOR SD MULTIJURISDICTIONAL HAZARD MITIGATION PLAN REVISION

There were 500 respondents for this anonymous survey. Of those respondents:

- 182 provided their e-mail address

QUESTION 1

All the 500 Respondents provided the cities or communities in which they live and work. Although there were respondents from all areas of the county:

- 11% of respondents claimed East County residency
- 59% of respondents claimed North County residency
- 30% of respondents claimed Central and Western County residency

QUESTION 2

Would you prefer emergency messages in a language other than English?

- 7% - Yes
- 93% - No

QUESTION 3

If ordered to evacuate, how much time would you require?

- 23% - 30 minutes or less
- 39% - 30 minutes to one hour
- 27% - one hour to two hours
- 11% - greater than two hours

QUESTION 4

Have you developed a personal disaster plan?

- 17% - Yes, for myself
- 35% - Yes, for myself and others
- 48% - No

QUESTION 5

Have you ever experienced or been impacted by a disaster?

- 45% - Yes
- 55% - No

QUESTION 6

If yes [to Question 5], please explain.

- 226 Responses

QUESTION 7

Have you taken any actions to make your home, business, or neighborhood more resistant to hazards?

- 54% - Yes
- 46% - No

QUESTION 8

If yes [to Question 7], please explain.

- 257 Responses

QUESTION 9

Have you accessed the online “Know Your Hazards” tool to determine what types of disasters are most likely to occur in your community?

- 24% - Yes
- 76% - No

QUESTION 10

Please select one hazard you think is the highest threat to your neighborhood.

- 49.49% - Structure/Wild Land Fires
- 23.34% - Earthquake
- 4.62% - Drought
- 5.63% - Climate change
- 2.21% - Coastal Storms/Erosion
- 0.20% - Tsunami
- 4.02% - Extreme heat
- 1.40% - Pandemic
- 0.20% - Landslide
- 0.60% - Severe Winter Storm
- 0.20% - Terrorism
- 1.40% - Extreme Wind
- 0.60% - Nuclear accident
- 0.20% - Hazardous Materials Incident
- 0.60% - Dam Failure

- 0.80% - Flood
- 0.60% - Oil or Gas line failure
- 0.40% - Liquefaction.
- 3.21% - Other

QUESTION 11

Please select one hazard you think is the second highest threat to your neighborhood.

- 16.22% - Structure/Wild Land Fires
- 30.22% - Earthquake
- 11.56% - Drought
- 11.56% - Climate change
- 1.41% - Coastal Storms/Erosion
- 1.21% - Tsunami
- 4.26% - Extreme heat
- 3.04% - Pandemic
- 2.23% - Landslide
- 1.62% - Severe Winter Storm
- 1.62% - Terrorism
- 4.05% - Extreme Wind
- 1.41% - Nuclear accident
- 0.81% - Hazardous Materials Incident
- 0.20% - Dam Failure
- 1.62% - Flood
- 2.43% - Oil or Gas line failure
- 0.00% - Liquefaction.
- 2.83% - Other

QUESTION 12

What is the most effective way for you to receive information about how to make your home, business, or neighborhood more resistant to hazards?

- 0.08% - Newspaper
- 44.64% - Email
- 4.24% - Television
- 3.43% - Public Workshops/Meetings
- 1.01% - Radio
- 20.40% - Internet
- 7.27% - Mail
- 11.31% - Social Media
- 6.86% - Other

QUESTION 13

Have you hardened your home against flying embers?

- 31% - Yes
- 69% - No

QUESTION 14

Have you created defensible space around your home?

- 54% - Yes
- 25% - No
- 20% - N/A

QUESTION 15

Have you designated an emergency contact outside of your home if the family should become separated?

- 57% - Yes
- 43% - No

QUESTION 16

Have you been trained in First Aid and CPR?

- 60% - Yes, both First Aid and CPR
- 4% - Yes, just First Aid
- 11% - Yes, just CPR
- 25% - No

QUESTION 17

Do you keep extra prescription drugs on hand in the case of an emergency?

- 57% - Yes
- 43% - No

QUESTION 18

Do you know how to protect yourself and others from being exposed to a virus?

- 96% - Yes
- 4% - No

QUESTION 19

Are you familiar with the services offered at a Family Assistance Center following a mass casualty incident?

- 21% - Yes
- 79% - No

QUESTION 20

How likely are you to stay in an emergency shelter following a disaster?

- 4% - Definitely
- 9% - Very Probably
- 22% - Probably
- 59% - Probably Not
- 6% - Definitely Not

QUESTION 21

Are you aware of how to safely dispose of household hazardous waste in your home? (i.e., used oil, old batteries, expired pesticides)

- 82% - Yes
- 18% - No

QUESTION 22

Has a Wireless Emergency Alert on your mobile phone ever made you take an emergency action?

- 38% - Yes
- 62% - No

QUESTION 23

Have you ever contacted 9-1-1?

- 68% - Yes, by phone
- <1% - Yes, by text
- 1% - Yes, by phone and text
- 31% - No

QUESTION 24

Do you know how to shut off the gas, electricity, and water to your home following an earthquake?

- 68% - Yes
- 32% - No

QUESTION 25

Do you have an emergency go-kit?

- 51% - Yes
- 49% - No

QUESTION 26

Do you have enough supplies to shelter in place at home for three days without functioning utilities?

- 80% - Yes
- 20% - No

QUESTION 27

Have you downloaded SD Emergency, the County's disaster preparedness mobile application?

- 49% - Yes
- 51% - No

QUESTION 28

Have you registered your mobile phone and email for AlertSanDiego, the County's regional mass notification system?

- 73% - Yes
- 27% - No

QUESTION 29

Do you feel prepared to cope with the aftermath of disasters?

- 59% - Yes
- 41% - No

QUESTION 30

Do you have an emergency action plan which includes details for handling pets, large animals, and livestock?

- 36% - Yes, just for pets
- 5% - Yes, for pets, large animals, and livestock
- 1% - No, for large animals and livestock
- 21% - No
- 37% - I do not have animals

QUESTION 31

Have you located two places where you can send or safely evacuate your pets?

- 37% - Yes
- 63% - No

QUESTION 32

Have you identified at least two places to meet in the event of an emergency: near the home and outside the immediate area?

- 38% - Yes
- 62% - No

QUESTION 33

Do you know the difference between an “Evacuation Warning” and an “Evacuation Order”?

- 90% - Yes
- 10% - No

QUESTION 34

How likely are you to evacuate if you receive an “Evacuation Waring” which directs you to prepare to evacuate and to evacuate early?

- 22% - Definitely
- 31% - Very Probably
- 29% - Probably
- 16% - Probably Not
- 2% - Definitely Not

QUESTION 35

How likely are you to evacuate if you receive an “Evacuation Order” which directs you to evacuate immediately?

- 75% - Definitely
- 17% - Very Probably
- 6% - Probably
- 2% - Probably Not
- <1% - Definitely Not

QUESTION 36

In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages?

- 284 Respondents

QUESTION 37

Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

- 188 Respondents

QUESTION 38

If you are interested in receiving an invitation to a public meeting to review the results of this survey, please provide you email below?

- 188 Respondents

MEETING 1. HAZARD MITIGATION PLAN ORIENTATION MEETING

September 2019 / Time / Location

1. Introductions / Welcome
2. Overview of the Mitigation Plan
3. Review of Planning Process
   a. Current Scheduled Meetings
   b. Due Dates
4. Overview of new Mitigation Tools
   a. SurveyMonkey FEMA Worksheets
   b. Action Plan Assessments
   c. Hazard Mitigation Action Tracker
5. City / Jurisdiction Specific Planning
6. County Resilience Program
7. Changes to be Instituted
8. Questions / Comments
9. Adjourn

MEETING 2.

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Johnson, Donna	EMS	[redacted]	X
Nissen, Dave	SD County Fire Authority		
Prus, Lisa	SDCWA		X
Millstein, Mel	LUEG		
Efird, Robert	PDS		
Nicoletti, Vince	PDS		
George, Richard	Sheriff's EPD		
Willis, Cleve	Sheriff's EPD		
Files, Shannon	Sheriff's EPD		
Batchelor, Jason	PDS		
Dawes, Ian	PDS		
Burton, Todd	HIRT		X
Agahi, Sara	DPW (Flood Control)		X
Isabel Corcos	PHS		X
Rob Sills	PHPR		X
Audrey Hamiliton	PDS		
Craig Shaffer	SD County Fire Authority		

MEETING 3. MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE 2014 WORKING GROUP MEETING # 4

NAME	JURISDICTION/ AGENCY	TELEPHONE	EMAIL
Ryan DeHart	San Diego OES	[redacted]	[redacted]
Walter Amadee	National City		
Marlon King	Chula Vista		
Susy Turnbull	Poway		
Jamie Mott	Vista		
Andy McKellar	Heartland Fire - El Cajon, La Mesa, Lemon Grove		
Corina Jimenez	Encinitas, Del Mar, Solana Beach		
Sarah Gordon	SD County Communications Office		
Dave Pender	San Marcos		
David Harrison	Carlsbad		
John Garlow	Santee		
Jeff Pack	San Diego		
Perry Peake	Coronado		
Jeff Murdock	Escondido		
John French	Imperial Beach		
Neil Anderson	Oceanside		
Yvette LaDuke	Tsunami		
Alex Tardy	Storm / Tsunami / Wildfire		

MEETING 4.

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Walter Amadee	National City	[redacted]	
Marlon King	Chula Vista		
Susy Turnbull	Poway		X
Jamie Smith	Vista		
Andy McKellar	Heartland Fire - El Cajon, La Mesa, Lemon Grove		
Corina Jimenez	Encinitas, Del Mar, Solana Beach		X
Patricia Letts	Encinitas, Del Mar, Solana Beach		X
Lois Yum	Encinitas, Del Mar, Solana Beach		X
Clem Brown	Encinitas, Del Mar, Solana Beach		X
Rimga Viskanta	Encinitas, Del Mar, Solana Beach		X
Dave Pender	San Marcos		
Don Rawson	Carlsbad		X
David Harrison	Carlsbad		
Justin Matsushita	Santee		
DeVerna Rogers	Santee		
Hannah Chasteene	San Diego		X
Eugene Ruzzini	San Diego		
Jeffrey Twewillger	Coronado		

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Jeff Murdock	Escondido	[redacted]	X
John French	Imperial Beach		X
David Parsons	Oceanside		
Pete Lawrence	Oceanside		
Brown, Matt	Port of San Diego		X
Croucher, Gary	San Miguel FPD		
Fred Cox	Rancho Santa FE FPD		
McBroom, Jason	Alpine FPD		X
Villarreal, Leonard	San Miguel FPD		
Larry Costello	Padre Dam MWD		X
Dambach, Dan	Vista Irrigation District		
Levion, Diana	Padre Dam MWD		
Del Bosque, Erick	Sweetwater Authority		
Olson, Gabriela	Valley Center MWD		
Prus. Lisa	SDCWA		
Sorce, Lisa	Padre Dam MWD		
Williams, Dennis	Valley Center MWD		
Woolslayer, Trisha	Vallecitos WD		
Pedrazzi, Ed	Vallecitos WD		
Newman, Richard	Alpine Union School District		

MEETING 7. 1/11/2021

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Ponce, Cruz	CalOES	[redacted]	X
McCready-Hoover, Karen	CalOES		X
LaMar-Haas, Victoria	CalOES		
Landry, Carly	CalOES		
Sutkus, Adam	CalOES		
Riley Kelly	CalOES		
Flores, Salvador	Imperial County		
Brown, Ethan	Orange County		
Phelps, Nikki	DHS		X
Mielish, Robert	DHS		X
Liu, Xing	FEMA Region 9		
Tardy, Alex	NWS / NOAA		
Anna Lowe	SANDAG		X
Ian Clampett	Scripps Oceanography		

MEETING 11.

Full Name	User Action	Timestamp
DeHart, Ryan	Joined	4/12/2021, 12:55:26 PM
Files, Shannon	Joined	4/12/2021, 12:56:21 PM
Khalili, Mehdi	Joined	4/12/2021, 12:56:31 PM
Johnson, Donna L	Joined	4/12/2021, 12:58:15 PM
Schmid, Matthew	Joined	4/12/2021, 12:58:36 PM
Burton, Todd	Joined	4/12/2021, 12:58:50 PM
Schaffer, Craig	Joined	4/12/2021, 12:59:19 PM
Agahi, Sara	Joined	4/12/2021, 1:00:35 PM
Madrid, Michael	Joined	4/12/2021, 1:01:02 PM
Prus, Lisa	Joined	4/12/2021, 1:09:21 PM
Julien, Jo Ann	Joined	4/12/2021, 1:09:36 PM

MEETING 12. 4/26/2021

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Walter Amadee	National City	[redacted]	
Marlon King	Chula Vista		
Susy Turnbull	Poway		
Jamie Smith	Vista		
Andy McKellar	Heartland Fire - El Cajon, La Mesa, Lemon Grove		
Corina Jimenez	Encinitas, Del Mar, Solana Beach		X
Patricia Letts	Encinitas, Del Mar, Solana Beach		X
Lois Yum	Encinitas, Del Mar, Solana Beach		X
Clem Brown	Encinitas, Del Mar, Solana Beach		X
Rimga Viskanta	Encinitas, Del Mar, Solana Beach		X
Dave Pender	San Marcos		X
Don Rawson	Carlsbad		X
David Harrison	Carlsbad		
Justin Matsushita	Santee		
DeVerna Rogers	Santee		
Hannah Chasteene	San Diego		X
Eugene Ruzzini	San Diego		
Jeffrey Twewillger	Coronado		
Jeff Murdock	Escondido		
John French	Imperial Beach		X
Russ Cunningham	Oceanside		
David Parsons	Oceanside		
Pete Lawrence	Oceanside		
David Foster	Port of San Diego		X
Tesoro, Cid	Port of San Diego		
Croucher, Gary	San Miguel FPD		
Fred Cox	Rancho Santa FE FPD		
McBroom, Jason	Alpine FPD		X
Villarreal, Leonard	San Miguel FPD		
Larry Costello	Padre Dam MWD		X
Dambach, Dan	Vista Irrigation District		
Levion, Diana	Padre Dam MWD		
Del Bosque, Erick	Sweetwater Authority		
Olson, Gabriela	Valley Center MWD		
Prus. Lisa	SDCWA		
Sorce, Lisa	Padre Dam MWD		
Williams, Dennis	Valley Center MWD		
Woolslayer, Trisha	Vallecitos WD		
Pedrazzi, Ed	Vallecitos WD		
Newman, Richard	Alpine Union School District		
Seifts, Rena	Ramona School District		

MEETING 15. CMP #7 AGENDA: 10/20/2021 @ 10 AM

1. **Introduction**
2. **HAZUS Data**
3. **FEMA Work Sheet 5.1**
4. **County of SD HazMit Tracker**
5. **FEMA Local Plan Review Tool**
6. **Public Feedback**
7. **Updated Deadlines**
8. **Questions**
9. **Assignment Recap**

HAZUS DATA

- The LUEG GIS Team created an excel file showing the counts of different types of critical facilities that fall within the boundaries of each jurisdiction:
  <<Preliminary_Critical_Facilities_Counts_By_Jurisdiction_10192021.xlsx>>

- The LUEG GIS Team also created a web map that shows all the participating jurisdictions and hazards across the county. It includes layers for:
  - Wildfire
  - Earthquakes
  - Floods
  - Coastal Erosion
  - Tsunamis
  - Dam Failures
  - Landslides and
  - Soil Liquefaction

The web map can be accessed via this link- Multi-Jurisdictional Hazard Mitigation Map:

https://gis-portal.sandiegocounty.gov/arcgis/home/webmap/viewer.html?webmap=44d3eaf08e9d4413832a685b721f26cc.

- Current top 5 hazards listed in the 2018 HazMit Plan are:
  1. Fire
  2. Hazardous Materials Release
  3. Flood
  4. Earthquake
  5. Manmade Hazards (Human Caused Hazards)

Assignment: Send me your input for top 5 County-wide Hazard rankings before our next County planning meeting (will be scheduled for the beginning of January 2022).

FEMA WORK SHEET 5.1

- Worksheet 5.1 SD County.docx

COUNTY OF SD HAZMIT TRACKER

- This tool mirrors the Goals, Objectives and Actions listed in Section 5 of the current Plan, and will enable us to efficiently update the Plan as a Team
- These goals are needed to get our plan approved by Cal OES and FEMA
- Assignment:
  - Review the “Objectives” and determine whether your department is responsible for an "Action"
  - Then, type your name or the responsible party's name and organization in the "Lead/Support" section. Multiple names/departments can be listed, just please to be sure to associate the person's name with their department. This will make it easy for OES, Cal OES or FEMA to contact someone directly if there is a question or clarification needed during the Plan's approval or revision process.
  - Last, determine then type whether the "Action" is new to the 2023 plan, existing from the 2018 plan or can be consolidated with another "Objective" or "Action"
  - Please complete this assignment by our next meeting date in January

FEMA LOCAL PLAN REVIEW TOOL

- Demonstrates how our Hazard Mitigation Plan meets regulations and enables Cal OES and FEMA to provide us with detailed feedback
- This tool also has HazMit Training, Guidance and Resources.
- Assignment: Please review this document and get familiar with the elements by our next meeting

PUBLIC FEEDBACK

- New format and scheduled date/time is pending.

UPDATED DEADLINES

- Planning Meeting #4 with jurisdictions is **next Tuesday, 10/26 @ 9AM-10 PM.**
- County Planning Meeting #8 is tentative for **early January**.
- Cal OES HazMit Funding Training tentative for **April 11th**.
- Our goal is to submit the Hazmit plan for Cal OES and FEMA approval by **early June 2022.**

QUESTIONS

- Any final questions?

ASSIGNMENT RECAP

- Dominique will send an email after this meeting with this agenda, attachments and other documents we discussed so you have all the information and tentative deadlines available.

MEETING 16.

Full Name	User Action	Timestamp
Fonseca, Dominique	Joined	10/26/2021, 8:58:20 AM
Ackerman, Shannon (DPLU)	Joined before	10/26/2021, 8:58:20 AM
Ackerman, Shannon (DPLU)	Left	10/26/2021, 9:22:59 AM
Jamie Smith	Joined before	10/26/2021, 8:58:20 AM
Jamie Smith	Left	10/26/2021, 9:23:06 AM
Katelynn Rise (Guest)	Joined before	10/26/2021, 8:58:20 AM
Katelynn Rise (Guest)	Left	10/26/2021, 9:22:55 AM
Corina Jimenez	Joined	10/26/2021, 8:58:23 AM
Corina Jimenez	Left	10/26/2021, 9:22:55 AM
Susy Turnbull	Joined	10/26/2021, 8:58:50 AM
Susy Turnbull	Left	10/26/2021, 9:20:56 AM
Zubel, Nicholas	Joined	10/26/2021, 8:59:02 AM
Zubel, Nicholas	Left	10/26/2021, 9:22:56 AM
Don Rawson	Joined	10/26/2021, 8:59:05 AM
Don Rawson	Left	10/26/2021, 9:22:52 AM
Allen, Tiffany	Joined	10/26/2021, 8:59:26 AM
Allen, Tiffany	Left	10/26/2021, 9:20:57 AM
David Foster	Joined	10/26/2021, 8:59:27 AM
David Foster	Left	10/26/2021, 9:22:58 AM
Jeff Murdock - Escondido (Guest)	Joined	10/26/2021, 8:59:51 AM
Jeff Murdock - Escondido (Guest)	Left	10/26/2021, 9:22:55 AM
Castellanos, Marielena	Joined	10/26/2021, 8:59:57 AM
Castellanos, Marielena	Left	10/26/2021, 9:22:55 AM
Clement Brown	Joined	10/26/2021, 9:00:33 AM
Clement Brown	Left	10/26/2021, 9:22:52 AM
Pender, David	Joined	10/26/2021, 9:00:57 AM
Andolina, Robert	Joined	10/26/2021, 9:01:04 AM
Andolina, Robert	Left	10/26/2021, 9:04:49 AM
Andolina, Robert	Joined	10/26/2021, 9:21:43 AM
Andolina, Robert	Left	10/26/2021, 9:22:55 AM
Walter Amedee (National City) (Guest)	Joined	10/26/2021, 9:01:09 AM
Walter Amedee (National City) (Guest)	Left	10/26/2021, 9:23:04 AM
Russ Cunningham (Guest)	Joined	10/26/2021, 9:01:15 AM
Andy McKellar (Guest)	Joined	10/26/2021, 9:02:11 AM
Andy McKellar (Guest)	Left	10/26/2021, 9:22:55 AM
Anna Lowe	Joined	10/26/2021, 9:02:17 AM
Anna Lowe	Left	10/26/2021, 9:20:20 AM
Cid Tesoro	Joined	10/26/2021, 9:02:45 AM
Cid Tesoro	Left	10/26/2021, 9:22:55 AM
Dawes, Ian	Joined	10/26/2021, 9:02:47 AM
Dawes, Ian	Left	10/26/2021, 9:22:55 AM

Full Name	User Action	Timestamp
Robles, Michael	Joined	10/26/2021, 9:02:48 AM
Robles, Michael	Left	10/26/2021, 9:22:59 AM
Batchelor, Jason	Joined	10/26/2021, 9:02:52 AM
Batchelor, Jason	Left	10/26/2021, 9:22:55 AM
Ponce, Cruz@Caloes	Joined	10/26/2021, 9:02:52 AM
Ponce, Cruz@Caloes	Left	10/26/2021, 9:22:55 AM
Prus, Lisa	Joined	10/26/2021, 9:03:35 AM
Prus, Lisa	Left	10/26/2021, 9:22:56 AM
+1 714-330-1026	Joined	10/26/2021, 9:03:56 AM
+1 714-330-1026	Left	10/26/2021, 9:22:56 AM
Thomlison, Nicholas	Joined	10/26/2021, 9:04:40 AM
Thomlison, Nicholas	Left	10/26/2021, 9:20:57 AM
Rimga Viskanta	Joined	10/26/2021, 9:06:07 AM
Rimga Viskanta	Left	10/26/2021, 9:22:51 AM
Larry Costello	Joined	10/26/2021, 9:06:33 AM
Larry Costello	Left	10/26/2021, 9:22:55 AM
Lois Yum	Joined	10/26/2021, 9:07:46 AM
Lois Yum	Left	10/26/2021, 9:22:55 AM
Marie Jones-Kirk	Joined	10/26/2021, 9:13:54 AM
Marie Jones-Kirk	Left	10/26/2021, 9:21:05 AM

MEETING 19. SAN DIEGO COUNTY PLANNING MEETING #8

January 19, 2022 • 2:00 PM – 3:00 PM

AGENDA

1. **Welcome and Introductions**
2. **Survey Details**
    a. Current Translation Status
    b. Timeline and Document Location
3. **Assignments**
    a. SD County OES Worksheet 6.1/6.2 Guidance
    b. Deadlines and Worksheet Submission
4. **Funding Opportunities**
    a. NOI Deadlines
    b. BRIC Technical Assistance Application
5. **Action Items, Follow-Up Meetings, and Schedule**
    a. HAZMIT Planning Team Meeting Timeline
    b. County OES Actions/Deadlines

6. **Round Table/Questions**
7. **Adjourn**

MEETING 20. SAN DIEGO COUNTY PLANNING MEETING #8

February 1, 2022 • 3:00 PM – 4:00 PM

AGENDA

1. **Welcome**
2. **Public Feedback Survey/Advertisement Update**
3. **Assignments**
    a. FEMA Worksheet 6.1/6.2 Wrap-up
    b. Start Task 7: FEMA Work Sheets 7.1/7.2
4. **Funding and Training Opportunities**
    a. NOI Deadline
    b. BRIC Technical Assistance Application
    c. PrepCA State Initiative
    d. Cal OES Sub-Application Development Series: Advanced Assistance Webinar Dates
5. **Action Items, Follow-Up Meetings, and Schedule**
    a. Deadlines
    b. Next Meeting Release
6. **Round Table/Questions**
7. **Adjourn**

MEETING 21. SAN DIEGO COUNTY PLANNING MEETING #9

February 11, 2022 • 10:00 AM – 11:00 AM

AGENDA

1. **Welcome**
2. **Public Feedback Survey/Advertisement Update**
3. **Assignments**
    a. FEMA Worksheet 6.1/6.2 Wrap-up
    b. Start Task 7: FEMA Work Sheets 7.1/7.2
4. **Funding and Training Opportunities**
    a. NOI Deadline
    b. BRIC Technical Assistance Application

c. PrepCA State Initiative
d. Cal OES Sub-Application Development Series: Advanced Assistance Webinar Dates

5. **Action Items, Follow-Up Meetings, and Schedule**
    a. Deadlines
    b. Next Meeting Release
6. **Round Table/Questions**
7. **Adjourn**

MEETING 23. SAN DIEGO OA PLANNING MEETING #6

March 7, 2022 • 1:00 PM – 2:00 PM

AGENDA

1. **Welcome**
2. **Public Feedback Survey Results**
3. **Assignments**
    a. FEMA Work Sheets 7.1/7.2 Wrap-up/Final Questions
    b. Start final FEMA Work Sheet (8.1)
    c. Finalize Updated Multi-Jurisdictional Hazard Mitigation Draft and all Annex edits
4. **Funding and Training Opportunities**
    a. PrepCA State Initiative
    b. Cal OES Sub-Application Development Series: Advanced Assistance Webinars
5. **Action Items, Follow-Up Meetings, and Schedule**
    a. Deadlines
    b. Next Meeting
    c. Next Steps
6. **Round Table/Questions**
7. **Adjourn**