# Hazus: Earthquake Global Risk Report

**Region Name:** M69SDTJshakeout

**Earthquake Scenario:** gllegacyshakeout_sdtj2015_hybridvs30_tj_

**Print Date:** June 27, 2024

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

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## General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 4 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 16,816.52 square miles and contains 1,907 census tracts. There are over 3,048 thousand households in the region which has a total population of 9,083,510 peopleF. The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 2,720 thousand buildings in the region with a total building replacement value (excluding contents) of 1,561,541 (millions of dollars). Approximately 90.00 % of the buildings (and 67.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 102,018 and 56,923 (millions of dollars) , respectively.

# Building and Lifeline Inventory

## Building Inventory

Hazus estimates that there are 2,720 thousand buildings in the region which have an aggregate total replacement value of 1,561,541 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 87% of the building inventory. The remaining percentage is distributed between the other general building types.

## Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 115 hospitals in the region with a total bed capacity of 20,557 beds. There are 2,719 schools, 525 fire stations, 155 police stations and 47 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes no hazardous material sites, no military installations and no nuclear power plants.

## Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 158,941.00 (millions of dollars). This inventory includes over 3,792.23 miles of highways, 4,364 bridges, 75,519.57 miles of pipes.

**Table 1: Transportation System Lifeline Inventory**

| System | Component | # Locations/ # Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Highway** | Bridges | 4,364 | 26784.6105 |
| | Segments | 2,960 | 41014.9473 |
| | Tunnels | 10 | 78.5550 |
| | | Subtotal | **67878.1128** |
| **Railways** | Bridges | 730 | 4153.7000 |
| | Facilities | 24 | 63.9120 |
| | Segments | 479 | 23797.8771 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **28015.4891** |
| **Light Rail** | Bridges | 23 | 7.1012 |
| | Facilities | 69 | 907.2800 |
| | Segments | 4 | 2569.3563 |
| | Tunnels | 0 | 0.0000 |
| | | Subtotal | **3483.7375** |
| **Bus** | Facilities | 10 | 21.6687 |
| | | Subtotal | **21.6687** |
| **Ferry** | Facilities | 7 | 9.3170 |
| | | Subtotal | **9.3170** |
| **Port** | Facilities | 116 | 442.1739 |
| | | Subtotal | **442.1739** |
| **Airport** | Facilities | 45 | 1536.7602 |
| | Runways | 61 | 630.8526 |
| | | Subtotal | **2167.6128** |
| | | Total | **102,018.10** |

**Table 2: Utility System Lifeline Inventory**

| System | Component | # Locations / Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Potable Water** | Distribution Lines | NA | 1506.2214 |
| | Facilities | 20 | 785.8800 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **2292.1014** |
| **Waste Water** | Distribution Lines | NA | 903.7328 |
| | Facilities | 66 | 11348.8188 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **12252.5516** |
| **Natural Gas** | Distribution Lines | NA | 602.4885 |
| | Facilities | 6 | 211.0413 |
| | Pipelines | 53 | 3662.7857 |
| | | Subtotal | **4476.3155** |
| **Oil Systems** | Facilities | 4 | 0.4720 |
| | Pipelines | 0 | 0.0000 |
| | | Subtotal | **0.4720** |
| **Electrical Power** | Facilities | 204 | 37887.4739 |
| | | Subtotal | **37887.4739** |
| **Communication** | Facilities | 120 | 14.1600 |
| | | Subtotal | **14.1600** |
| | | Total | **56,923.10** |

## Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

| | |
|---|---|
| **Scenario Name** | gllegacyshakeout_sdtj2015_hybridvs30_tj_ |
| **Type of Earthquake** | User-defined |
| **Fault Name** | NA |
| **Historical Epicenter ID #** | NA |
| **Probabilistic Return Period** | NA |
| **Longitude of Epicenter** | NA |
| **Latitude of Epicenter** | NA |
| **Earthquake Magnitude** | 6.90 |
| **Depth (km)** | NA |
| **Rupture Length (Km)** | NA |
| **Rupture Orientation (degrees)** | NA |
| **Attenuation Function** | NA |

# Direct Earthquake Damage

## Building Damage

Hazus estimates that about 78,850 buildings will be at least moderately damaged. This is over 3.00 % of the buildings in the region. There are an estimated 1,613 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

### Damage Categories by General Occupancy Type

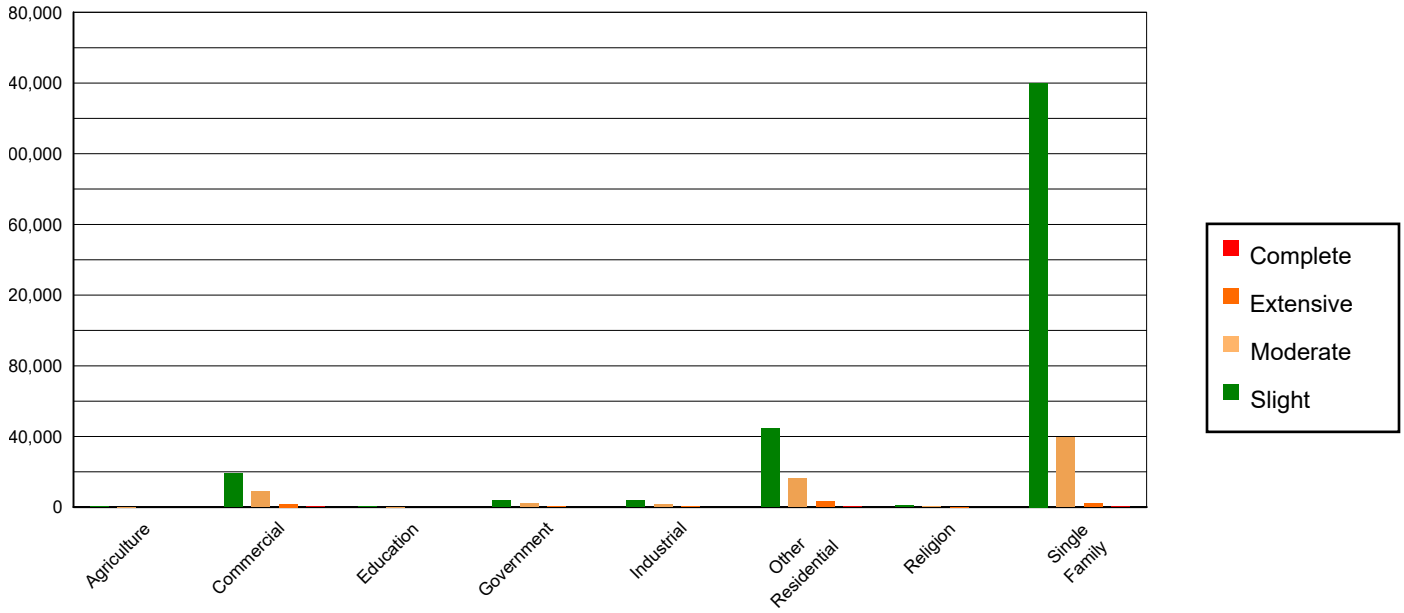



**Table 3: Expected Building Damage by Occupancy**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Agriculture** | 4683.15 | 0.20 | 362.96 | 0.12 | 109.43 | 0.16 | 16.80 | 0.21 | 3.65 | 0.23 |
| **Commercial** | 150589.22 | 6.47 | 19028.41 | 6.09 | 8803.72 | 12.75 | 1879.23 | 23.02 | 411.42 | 25.50 |
| **Education** | 4319.50 | 0.19 | 435.86 | 0.14 | 134.13 | 0.19 | 15.93 | 0.20 | 5.58 | 0.35 |
| **Government** | 22456.02 | 0.96 | 3731.35 | 1.19 | 2171.97 | 3.14 | 541.69 | 6.64 | 49.97 | 3.10 |
| **Industrial** | 34563.90 | 1.48 | 3716.18 | 1.19 | 1459.63 | 2.11 | 302.13 | 3.70 | 55.16 | 3.42 |
| **Other Residential** | 279198.12 | 11.99 | 44324.64 | 14.18 | 16404.10 | 23.75 | 3215.08 | 39.38 | 452.06 | 28.02 |
| **Religion** | 5246.74 | 0.23 | 814.97 | 0.26 | 521.99 | 0.76 | 131.22 | 1.61 | 19.08 | 1.18 |
| **Single Family** | 1827859.53 | 78.49 | 240085.99 | 76.83 | 39469.02 | 57.14 | 2061.28 | 25.25 | 616.18 | 38.20 |
| **Total** | **2,328,916** | | **312,500** | | **69,074** | | **8,163** | | **1,613** | |

**Table 4: Expected Building Damage by Building Type (All Design Levels)**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Wood** | 2030476.71 | 87.19 | 287415.35 | 91.97 | 47012.05 | 68.06 | 836.19 | 10.24 | 53.56 | 3.32 |
| **Steel** | 38574.81 | 1.66 | 3460.56 | 1.11 | 3974.89 | 5.75 | 1537.70 | 18.84 | 604.29 | 37.46 |
| **Concrete** | 38251.79 | 1.64 | 3309.25 | 1.06 | 2696.87 | 3.90 | 1015.61 | 12.44 | 312.07 | 19.35 |
| **Precast** | 21598.19 | 0.93 | 1199.31 | 0.38 | 1105.74 | 1.60 | 275.99 | 3.38 | 19.26 | 1.19 |
| **RM** | 88589.39 | 3.80 | 10408.49 | 3.33 | 8250.53 | 11.94 | 1908.94 | 23.38 | 61.62 | 3.82 |
| **URM** | 3011.87 | 0.13 | 80.95 | 0.03 | 92.21 | 0.13 | 173.81 | 2.13 | 254.70 | 15.79 |
| **MH** | 108413.43 | 4.66 | 6626.46 | 2.12 | 5941.69 | 8.60 | 2415.12 | 29.58 | 307.60 | 19.07 |
| **Total** | **2,328,916** | | **312,500** | | **69,074** | | **8,163** | | **1,613** | |

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

## Essential Facility Damage

Before the earthquake, the region had 20,557 hospital beds available for use. On the day of the earthquake, the model estimates that only 16,325 hospital beds (79.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 88.00% of the beds will be back in service. By 30 days, 97.00% will be operational.

**Table 5: Expected Damage to Essential Facilities**

| Classification | Total | # Facilities | | |
|---|---|---|---|---|
| | | At Least Moderate Damage > 50% | Complete Damage > 50% | With Functionality > 50% on day 1 |
| Hospitals | 115 | 16 | 0 | 90 |
| Schools | 2,719 | 177 | 2 | 2,342 |
| EOCs | 47 | 1 | 0 | 43 |
| PoliceStations | 155 | 9 | 1 | 138 |
| FireStations | 525 | 24 | 2 | 472 |

## Transportation Lifeline Damage

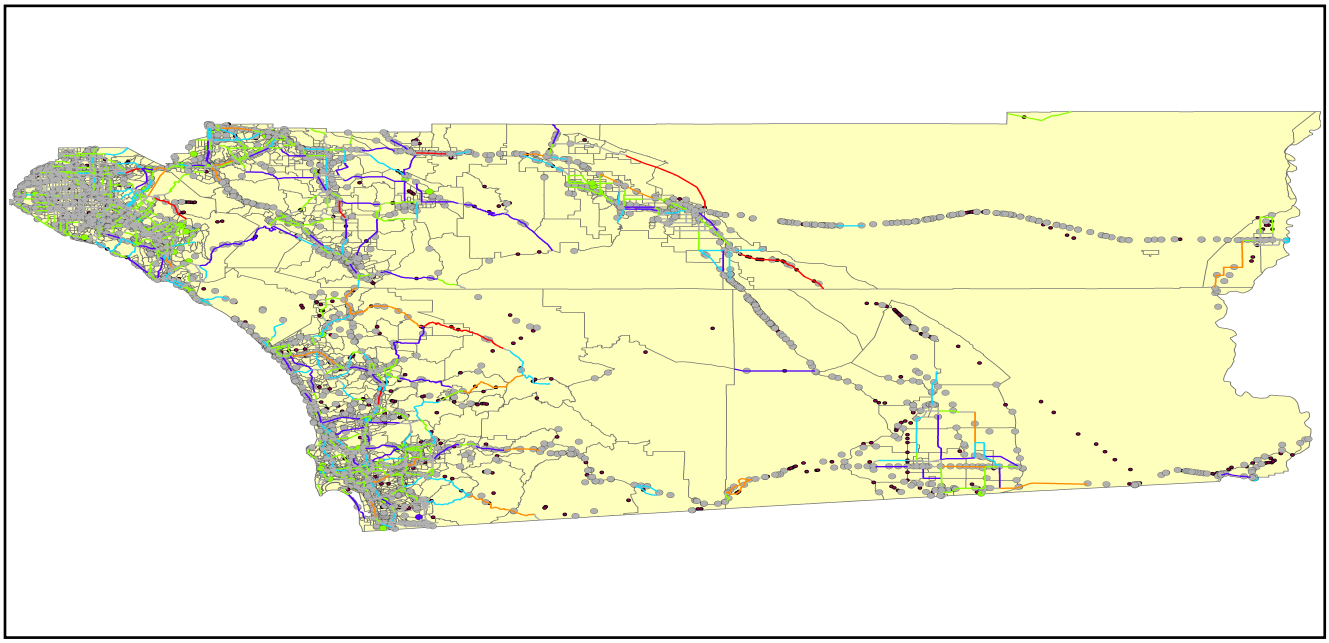


**Table 6: Expected Damage to the Transportation Systems**

| System | Component | Number of Locations | | | | |
|---|---|---|---|---|---|---|
| | | Locations/ Segments | With at Least Mod. Damage | With Complete Damage | With Functionality > 50 % | |
| | | | | | After Day 1 | After Day 7 |
| **Highway** | Segments | 2,960 | 0 | 0 | 2,960 | 2,960 |
| | Bridges | 4,364 | 55 | 3 | 4,301 | 4,341 |
| | Tunnels | 10 | 0 | 0 | 10 | 10 |
| **Railways** | Segments | 479 | 0 | 0 | 479 | 479 |
| | Bridges | 730 | 0 | 0 | 730 | 730 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 24 | 3 | 0 | 24 | 24 |
| **Light Rail** | Segments | 4 | 0 | 0 | 4 | 4 |
| | Bridges | 23 | 0 | 0 | 23 | 23 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 69 | 22 | 0 | 69 | 69 |
| **Bus** | Facilities | 10 | 0 | 0 | 10 | 10 |
| **Ferry** | Facilities | 7 | 3 | 0 | 7 | 7 |
| **Port** | Facilities | 116 | 59 | 0 | 116 | 116 |
| **Airport** | Facilities | 45 | 5 | 0 | 45 | 45 |
| | Runways | 61 | 0 | 0 | 61 | 61 |

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

| System | # of Locations | | | | |
|---|---|---|---|---|---|
| | Total # | With at Least Moderate Damage | With Complete Damage | with Functionality > 50 % | |
| | | | | After Day 1 | After Day 7 |
| Potable Water | 20 | 1 | 0 | 19 | 20 |
| Waste Water | 66 | 19 | 0 | 46 | 66 |
| Natural Gas | 6 | 0 | 0 | 6 | 6 |
| Oil Systems | 4 | 1 | 0 | 3 | 4 |
| Electrical Power | 204 | 29 | 0 | 180 | 198 |
| Communication | 120 | 21 | 0 | 105 | 120 |

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

| System | Total Pipelines Length (miles) | Number of Leaks | Number of Breaks |
|---|---|---|---|
| Potable Water | 46,796 | 3801 | 950 |
| Waste Water | 28,078 | 1909 | 477 |
| Natural Gas | 646 | 0 | 0 |
| Oil | 0 | 0 | 0 |

Table 9: Expected Potable Water and Electric Power System Performance

| | Total # of Households | Number of Households without Service | | | | |
|---|---|---|---|---|---|---|
| | | At Day 1 | At Day 3 | At Day 7 | At Day 30 | At Day 90 |
| Potable Water | 3,048,202 | 156,524 | 140,559 | 109,744 | 2,049 | 0 |
| Electric Power | | 342,690 | 223,492 | 94,861 | 9,266 | 453 |

# Induced Earthquake Damage

## Fire Following Earthquake

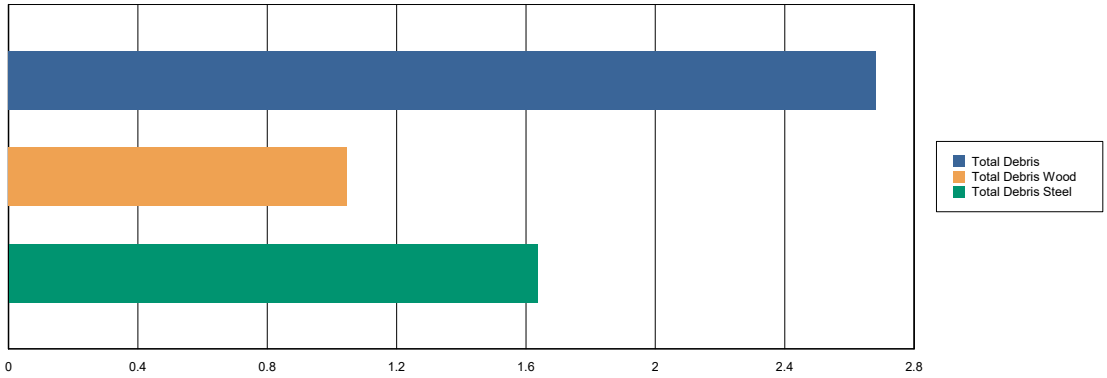
Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 45 ignitions that will burn about 0.40 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 3,888 people and burn about 424 (millions of dollars) of building value.

## Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,681,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 39.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 107,240 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

**Earthquake Debris (millions of tons)**



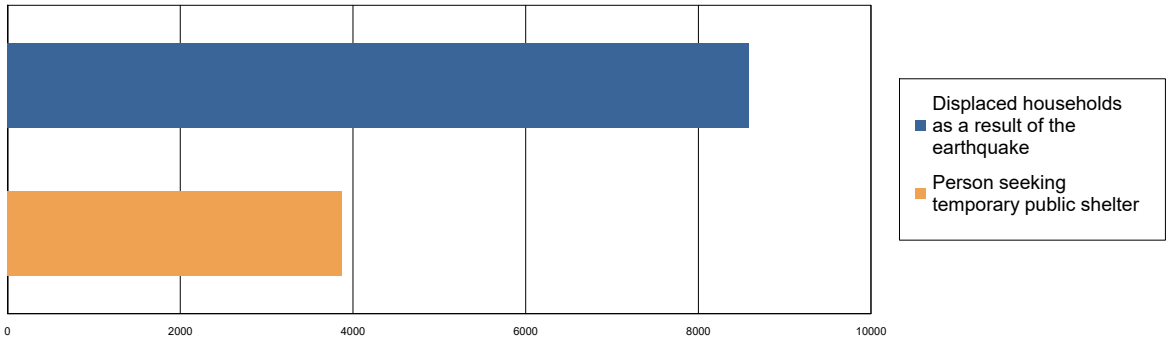

| Brick/ Wood | Reinforced Concrete/Steel | Total Debris | Truck Load |
|---|---|---|---|
| 1.05 | 1.64 | 2.68 | 107,240 (@25 tons/truck) |

# Social Impact

## Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 8,589 households to be displaced due to the earthquake. Of these, 3,874 people (out of a total population of 9,083,510) will seek temporary shelter in public shelters.

### Displaced Households/ Persons Seeking Short Term Public Shelter




| Displaced households as a result of the earthquake | Persons seeking temporary public shelter |
|---|---|
| 8,589 | 3,874 |

## Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

**Table 10: Casualty Estimates**

| | | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| **2 AM** | Commercial | 28.32 | 4.89 | 0.46 | 0.88 |
| | Commuting | 0.34 | 0.44 | 0.76 | 0.15 |
| | Educational | 0.00 | 0.00 | 0.00 | 0.00 |
| | Hotels | 3.36 | 0.62 | 0.05 | 0.10 |
| | Industrial | 22.60 | 3.99 | 0.37 | 0.70 |
| | Other-Residential | 781.02 | 103.26 | 7.41 | 14.11 |
| | Single Family | 681.66 | 54.89 | 3.37 | 6.53 |
| | **Total** | **1,517** | **168** | **12** | **22** |
| **2 PM** | Commercial | 1837.26 | 311.42 | 29.46 | 56.13 |
| | Commuting | 3.07 | 3.94 | 6.83 | 1.31 |
| | Educational | 638.59 | 97.56 | 9.02 | 17.28 |
| | Hotels | 0.64 | 0.12 | 0.01 | 0.02 |
| | Industrial | 165.39 | 29.27 | 2.74 | 5.15 |
| | Other-Residential | 249.95 | 34.34 | 2.67 | 4.85 |
| | Single Family | 210.56 | 18.08 | 1.15 | 2.14 |
| | **Total** | **3,105** | **495** | **52** | **87** |
| **5 PM** | Commercial | 1231.01 | 206.13 | 19.77 | 37.21 |
| | Commuting | 65.38 | 83.87 | 145.62 | 27.99 |
| | Educational | 181.28 | 26.00 | 2.13 | 4.05 |
| | Hotels | 1.01 | 0.19 | 0.02 | 0.03 |
| | Industrial | 103.37 | 18.29 | 1.71 | 3.22 |
| | Other-Residential | 292.86 | 39.48 | 3.02 | 5.49 |
| | Single Family | 251.94 | 21.00 | 1.35 | 2.52 |
| | **Total** | **2,127** | **395** | **174** | **81** |

## Economic Loss

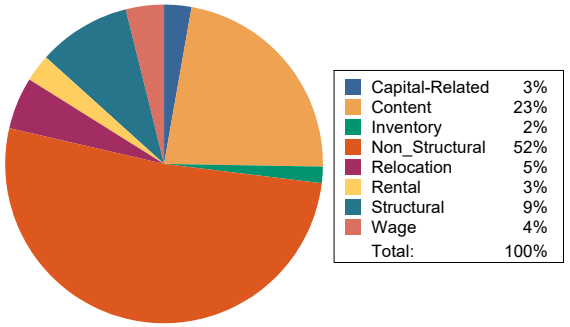
The total economic loss estimated for the earthquake is 30,215.87 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

## Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 26,397.09 (millions of dollars); 15 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 48 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type ($ millions)




Earthquake Losses by Occupancy Type ($ millions)

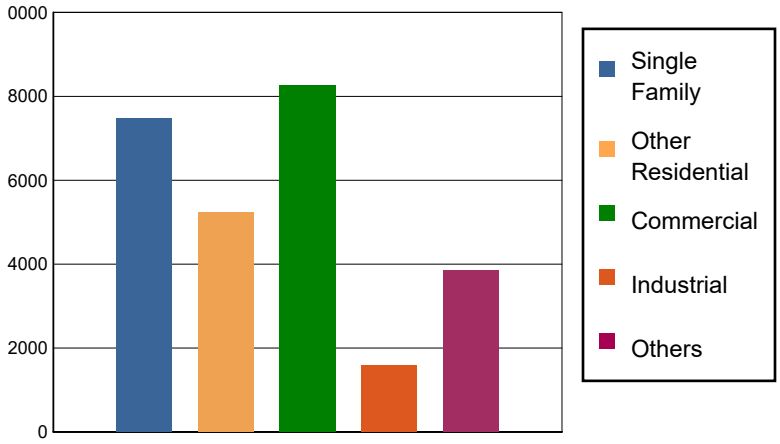



**Table 11: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|---|
| **Income Losses** | | | | | | | |
| | Wage | 0.0000 | 148.8540 | 719.5068 | 13.3921 | 143.0126 | 1,024.7655 |
| | Capital-Related | 0.0000 | 63.2359 | 605.6477 | 8.1517 | 27.9733 | 705.0086 |
| | Rental | 82.9762 | 298.0161 | 298.0693 | 7.3501 | 84.4752 | 770.8869 |
| | Relocation | 274.5281 | 161.1254 | 432.6425 | 37.0446 | 446.3989 | 1,351.7395 |
| | **Subtotal** | **357.5043** | **671.2314** | **2055.8663** | **65.9385** | **701.8600** | **3852.4005** |
| **Capital Stock Losses** | | | | | | | |
| | Structural | 787.5119 | 457.3089 | 757.7208 | 122.7139 | 341.1329 | 2,466.3884 |
| | Non_Structural | 4593.9218 | 3249.6722 | 3223.2008 | 752.8014 | 1823.6207 | 13,643.2169 |
| | Content | 1725.4772 | 856.6376 | 1895.0142 | 557.8521 | 966.0654 | 6,001.0465 |
| | Inventory | 0.0000 | 0.0000 | 336.3818 | 84.6063 | 13.0540 | 434.0421 |
| | **Subtotal** | **7106.9109** | **4563.6187** | **6212.3176** | **1517.9737** | **3143.8730** | **22544.6939** |
| | **Total** | **7464.42** | **5234.85** | **8268.18** | **1583.91** | **3845.73** | **26397.09** |

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

**Table 12: Transportation System Economic Losses**
(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| **Highway** | Segments | 41014.9473 | 0.0000 | 0.00 |
| | Bridges | 26784.6105 | 408.9064 | 1.53 |
| | Tunnels | 78.5550 | 1.3500 | 1.72 |
| | Subtotal | **67878.1128** | **410.2564** | |
| **Railways** | Segments | 23797.8771 | 0.0000 | 0.00 |
| | Bridges | 4153.7000 | 22.6554 | 0.55 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 63.9120 | 6.4551 | 10.10 |
| | Subtotal | **28015.4891** | **29.1105** | |
| **Light Rail** | Segments | 2569.3563 | 0.0000 | 0.00 |
| | Bridges | 7.1012 | 0.3735 | 5.26 |
| | Tunnels | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 907.2800 | 238.7906 | 26.32 |
| | Subtotal | **3483.7375** | **239.1641** | |
| **Bus** | Facilities | 21.6687 | 0.4907 | 2.26 |
| | Subtotal | **21.6687** | **0.4907** | |
| **Ferry** | Facilities | 9.3170 | 1.7631 | 18.92 |
| | Subtotal | **9.3170** | **1.7631** | |
| **Port** | Facilities | 442.1739 | 145.6492 | 32.94 |
| | Subtotal | **442.1739** | **145.6492** | |
| **Airport** | Facilities | 1536.7602 | 305.7973 | 19.90 |
| | Runways | 630.8526 | 0.0000 | 0.00 |
| | Subtotal | **2167.6128** | **305.7973** | |
| | **Total** | **102,018.11** | **1,132.23** | |

**Table 13: Utility System Economic Losses**

(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| **Potable Water** | Pipelines | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 785.8800 | 10.9204 | 1.39 |
| | Distribution Lines | 1506.2214 | 17.1035 | 1.14 |
| | **Subtotal** | **2292.1014** | **28.0239** | |
| **Waste Water** | Pipelines | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 11348.8188 | 903.2078 | 7.96 |
| | Distribution Lines | 903.7328 | 8.5915 | 0.95 |
| | **Subtotal** | **12252.5516** | **911.7993** | |
| **Natural Gas** | Pipelines | 3662.7857 | 0.0000 | 0.00 |
| | Facilities | 211.0413 | 0.6580 | 0.31 |
| | Distribution Lines | 602.4885 | 2.9434 | 0.49 |
| | **Subtotal** | **4476.3155** | **3.6014** | |
| **Oil Systems** | Pipelines | 0.0000 | 0.0000 | 0.00 |
| | Facilities | 0.4720 | 0.0288 | 6.10 |
| | **Subtotal** | **0.4720** | **0.0288** | |
| **Electrical Power** | Facilities | 37887.4739 | 1741.5889 | 4.60 |
| | **Subtotal** | **37887.4739** | **1741.5889** | |
| **Communication** | Facilities | 14.1600 | 1.4943 | 10.55 |
| | **Subtotal** | **14.1600** | **1.4943** | |
| | **Total** | **56,923.07** | **2,686.54** | |

## Appendix A: County Listing for the Region

Imperial,CA

Orange,CA

Riverside,CA

San Diego,CA

## Appendix B: Regional Population and Building Value Data

| State | County Name | Population | Building Value (millions of dollars) | | |
|---|---|---|---|---|---|
| | | | Residential | Non-Residential | Total |
| **California** | | | | | |
| | Imperial | 179,702 | 20,945 | 12,603 | 33,548 |
| | Orange | 3,186,989 | 363,381 | 176,806 | 540,188 |
| | Riverside | 2,418,185 | 281,482 | 137,249 | 418,731 |
| | San Diego | 3,298,634 | 375,834 | 193,238 | 569,072 |
| **Total Region** | | **9,083,510** | **1,041,642** | **519,896** | **1,561,539** |

# M 6.9 SD-TJ shakeout exercise scenario

## Building Inspection Tagging (Counts)

| Inspected | | Restricted | | Unsafe | |
|---|---|---|---|---|---|
| Residential | 55.9K | Residential | 5.28K | Residential | 1.07K |
| Commercial | 8.8K | Commercial | 1.88K | Commercial | 411 |
| Industrial | 1.46K | Industrial | 302 | Industrial | 55.2 |
| Agricultural | 109 | Agricultural | 16.8 | Agricultural | 3.65 |
| Educational | 134 | Educational | 15.9 | Educational | 5.58 |
| Government | 2.17K | Government | 542 | Government | 50 |
| Religious | 522 | Religious | 131 | Religious | 19.1 |

## Total Economic Loss

**Total:** $26.4B

| Top Counties | State | Total |
|---|---|---|
| San Diego | CA | $26.3B |
| Orange | CA | $53.9M |
| Riverside | CA | $11.2M |
| Imperial | CA | $79.5K |
| - | - | - |
| - | - | - |
| - | - | - |

## Injuries & Fatalities

**Total Day:** 3.74K
**Total Night:** 1.72K

| Top Counties | State | Injuries (day/night) | Fatalities (day/night) |
|---|---|---|---|
| San Diego | CA | 3.65K/1.7K | 86.9/22.5 |
| Orange | CA | 1.63/1.47 | 0.000232/0.00003 |
| Riverside | CA | 0.194/0.332 | 0/0.000001 |
| Imperial | CA | 0.000358/0.00074 | 0/0 |
| - | - | - | - |
| - | - | - | - |
| - | - | - | - |

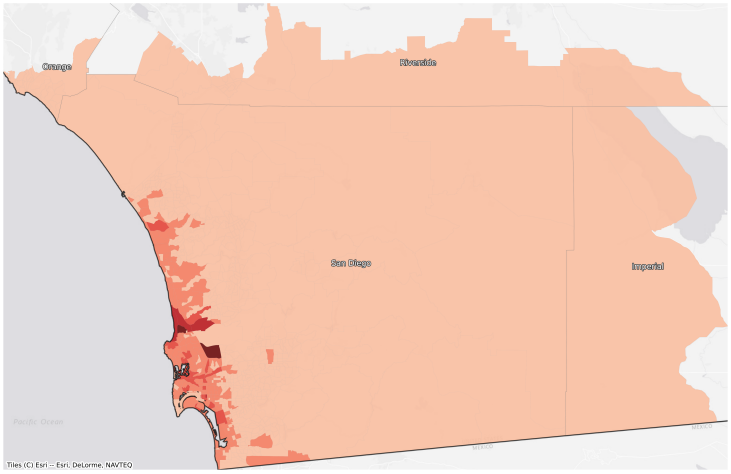
## Displaced Households & Short-Term Shelter Needs

**Total Displaced:** 8.59K
**Total Needing Shelter:** 3.87K

| Top Counties | State | Displaced | Needing Shelter |
|---|---|---|---|
| San Diego | CA | 8.59K | 3.87K |
| Orange | CA | 0.0698 | 0.0345 |
| Imperial | CA | 0 | 0 |
| Riverside | CA | 0 | 0 |
| - | - | - | - |
| - | - | - | - |
| - | - | - | - |

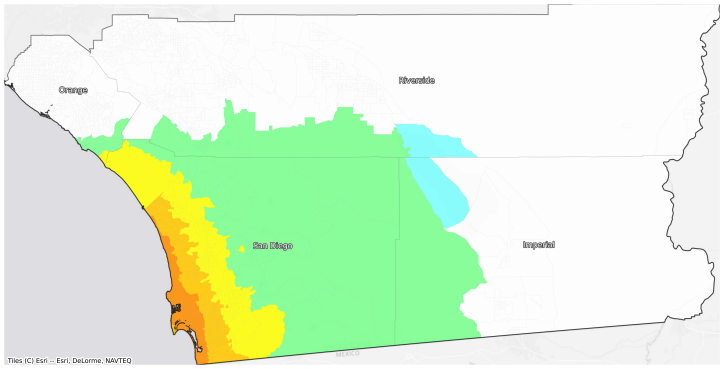
## Economic Impacts by Census Tract (787 Tracts with Losses)

$0-30.9M | $30.9M-123M | $123M-368M | $368M-814M




## Ground Shaking

Not Felt | Weak | Light | Moderate | Strong | Very Strong | Severe | Violent | Extreme




## Debris

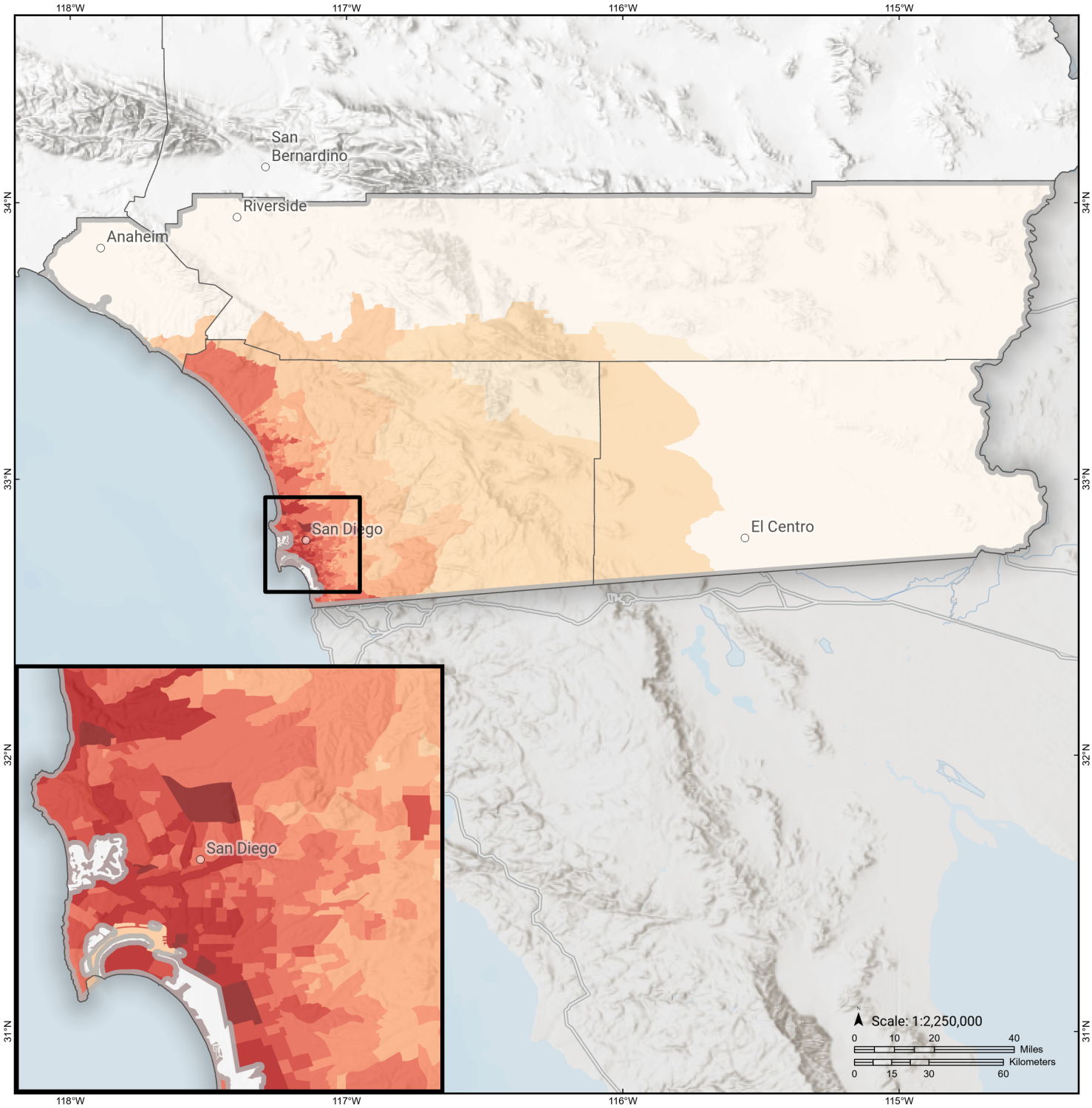
**Total Tons:** 2.68M
**Total Truckloads:** 107K

| Type | Tons |
|---|---|
| Brick, Wood, and Other | 1.05M |
| Concrete & Steel | 1.64M |

# M 6.9 SD-TJ Shakeout Exercise Scenario

## Debris Generated by Census Tract

California Department of Conservation
California Geological Survey




**Study Region:** M 6.9 SD-TJ Shakeout Exercise Scenario
**Scenario:** gllegacyshakeout_sdtj2015_hybridvs30_tj_se

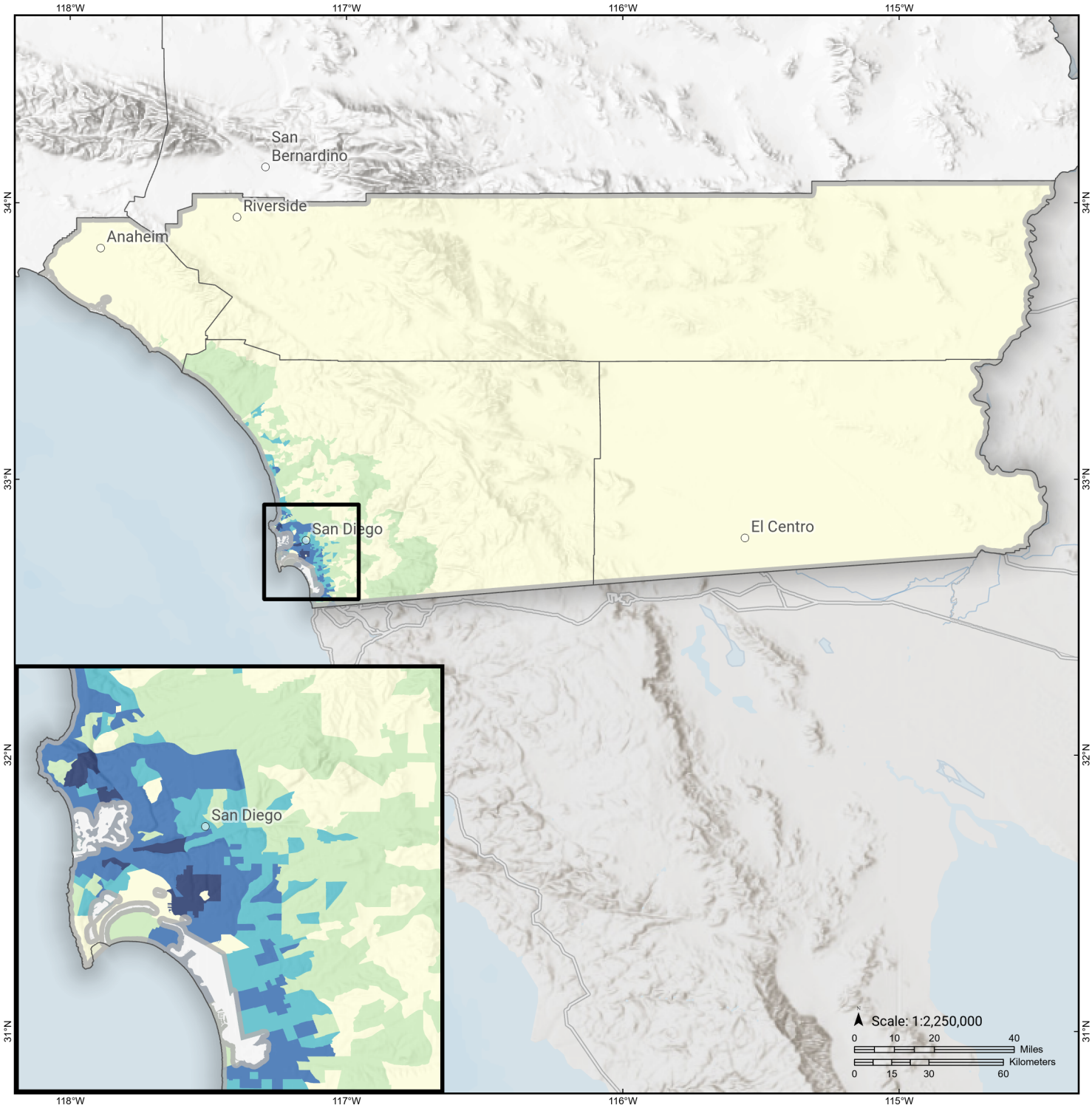

**Debris Generated** *(in tons)*

- 0
- >0 - 1
- >1 - 10
- >10 - 100
- >100 - 500
- >500 - 1,000
- >1,000 - 3,000
- >3,000 - 10,000
- >10,000 - 40,000
- >40,000 - 98,000

# M 6.9 SD-TJ Shakeout Exercise Scenario

## Displaced Households by Census Tract

California Department of Conservation
California Geological Survey




**Study Region:** M 6.9 SD-TJ Shakeout Exercise Scenario
**Scenario:** gllegacyshakeout_sdtj2015_hybridvs30_tj_se

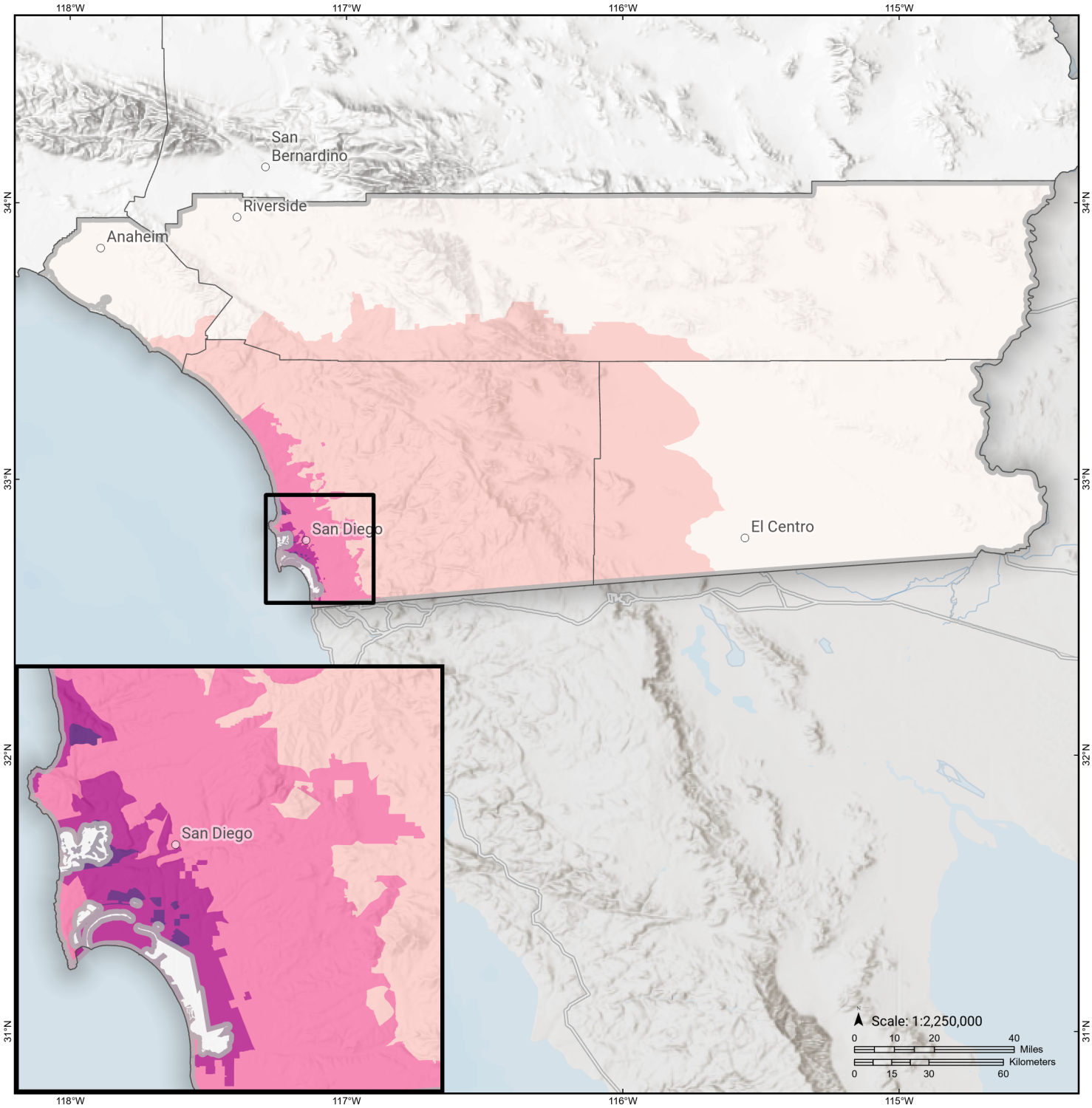

**Displaced Households**

- 0
- 1
- 2 - 10
- 11 - 100
- 101 - 450

# M 6.9 SD-TJ Shakeout Exercise Scenario

## Loss Ratio by Census Tract

California Department of Conservation
California Geological Survey




**Study Region:** M 6.9 SD-TJ Shakeout Exercise Scenario
**Scenario:** gllegacyshakeout_sdtj2015_hybridvs30_tj_se

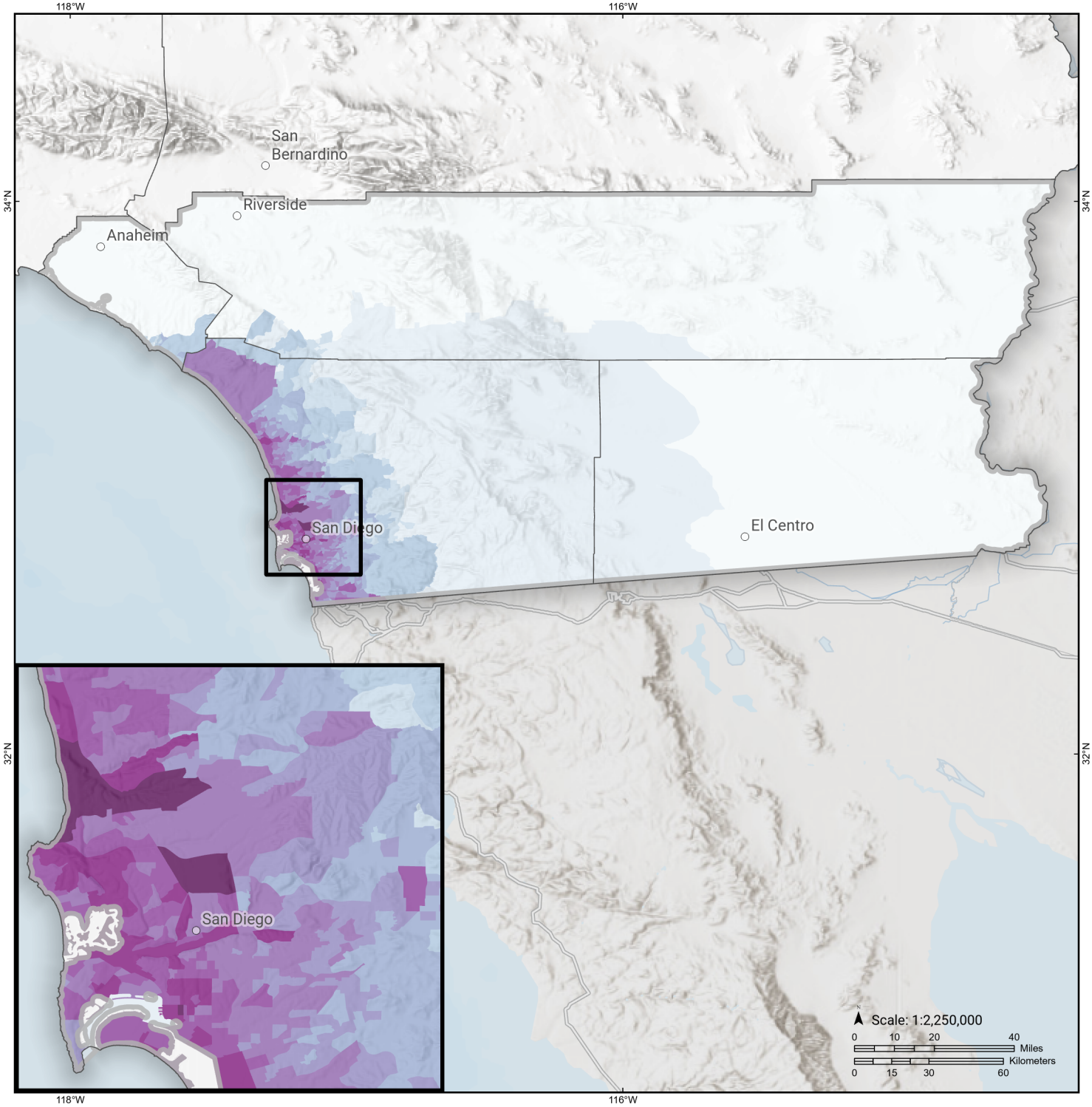

**Loss Ratio** *(ratio of building related economic loss to exposed value of buildings)*

- 0%
- >0 - 1%
- >1 - 10%
- >10 - 20%
- >20 - 37%

# M 6.9 SD-TJ Shakeout Exercise Scenario

## Total Building Related Economic Loss by Census Tract

California Department of Conservation
California Geological Survey




**Study Region:** M 6.9 SD-TJ Shakeout Exercise Scenario
**Scenario:** gllegacyshakeout_sdtj2015_hybridvs30_tj_se


**Economic Loss** *(in thousands of USD $)*

| | |
|---|---|
| 0 | >10,000 - 20,000 |
| >0 - 500 | >20,000 - 50,000 |
| >500 - 1,000 | >50,000 - 100,000 |
| >1,000 - 3,000 | >100,000 - 300,000 |
| >3,000 - 10,000 | >300,000 - 814,000 |

## Building Damage by Count by General Occupancy

RiskMAP
Increasing Resilience Together

*June 27, 2024*

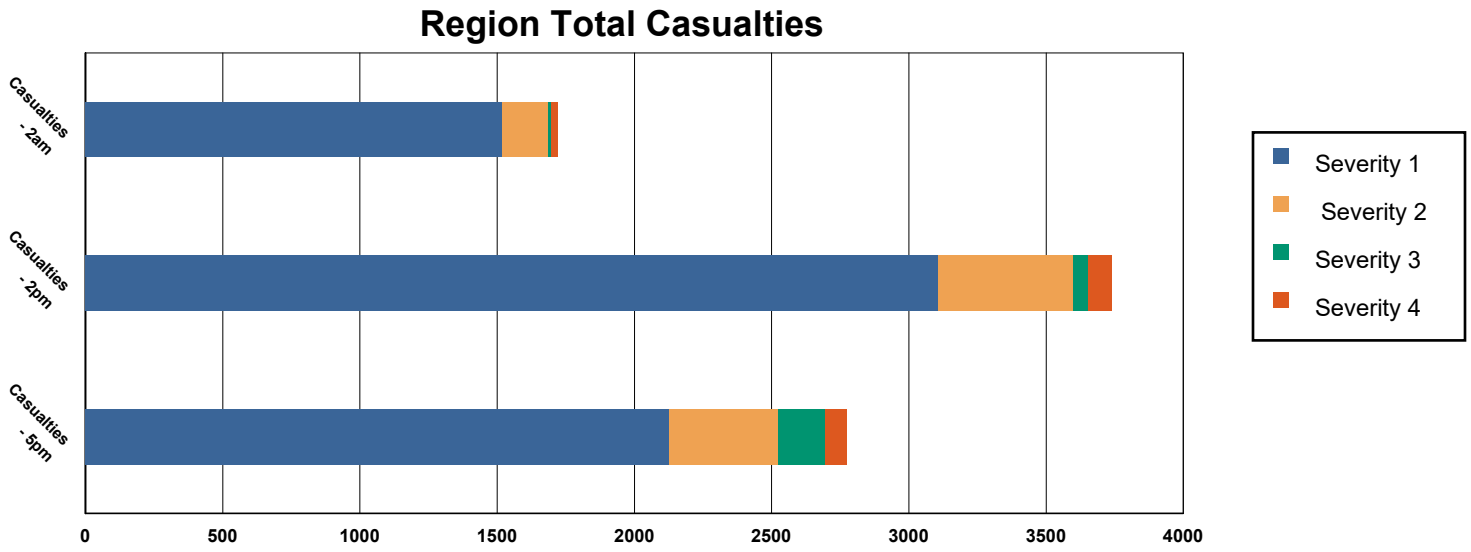
| | # of Buildings | | | | | |
|---|---|---|---|---|---|---|
| | None | Slight | Moderate | Extensive | Complete | Total |
| **California** | | | | | | |
| **Imperial** | | | | | | |
| *Agriculture* | 138 | 0 | 0 | 0 | 0 | 138 |
| *Commercial* | 3,646 | 0 | 0 | 0 | 0 | 3,646 |
| *Education* | 99 | 0 | 0 | 0 | 0 | 99 |
| *Government* | 202 | 0 | 0 | 0 | 0 | 202 |
| *Industrial* | 580 | 0 | 0 | 0 | 0 | 580 |
| *Religion* | 295 | 0 | 0 | 0 | 0 | 295 |
| *Other Residential* | 7,517 | 1 | 0 | 0 | 0 | 7,518 |
| *Single Family* | 35,405 | 0 | 0 | 0 | 0 | 35,405 |
| **Orange** | | | | | | |
| *Agriculture* | 1,132 | 3 | 0 | 0 | 0 | 1,135 |
| *Commercial* | 68,214 | 117 | 9 | 0 | 0 | 68,340 |
| *Education* | 1,889 | 1 | 0 | 0 | 0 | 1,890 |
| *Government* | 649 | 1 | 0 | 0 | 0 | 650 |
| *Industrial* | 18,755 | 36 | 3 | 0 | 0 | 18,795 |
| *Religion* | 2,054 | 3 | 0 | 0 | 0 | 2,057 |
| *Other Residential* | 85,504 | 198 | 16 | 0 | 0 | 85,718 |
| *Single Family* | 705,495 | 716 | 1 | 0 | 0 | 706,212 |
| **Riverside** | | | | | | |

| | # of Buildings | | | | | |
|---|---|---|---|---|---|---|
| | None | Slight | Moderate | Extensive | Complete | Total |
| *Agriculture* | *1,713* | *0* | *0* | *0* | *0* | *1,713* |
| *Commercial* | *46,349* | *7* | *0* | *0* | *0* | *46,357* |
| *Education* | *990* | *0* | *0* | *0* | *0* | *990* |
| *Government* | *7,175* | *0* | *0* | *0* | *0* | *7,175* |
| *Industrial* | *6,408* | *1* | *0* | *0* | *0* | *6,409* |
| *Religion* | *1,319* | *0* | *0* | *0* | *0* | *1,319* |
| *Other Residential* | *122,714* | *79* | *5* | *0* | *0* | *122,799* |
| *Single Family* | *605,316* | *139* | *0* | *0* | *0* | *605,455* |
| **San Diego** | | | | | | |
| *Agriculture* | *1,700* | *360* | *109* | *17* | *4* | *2,190* |
| *Commercial* | *32,380* | *18,904* | *8,794* | *1,879* | *411* | *62,369* |
| *Education* | *1,341* | *435* | *134* | *16* | *6* | *1,932* |
| *Government* | *14,430* | *3,730* | *2,172* | *542* | *50* | *20,924* |
| *Industrial* | *8,821* | *3,678* | *1,456* | *302* | *55* | *14,313* |
| *Religion* | *1,579* | *812* | *522* | *131* | *19* | *3,063* |
| *Other Residential* | *63,463* | *44,046* | *16,383* | *3,215* | *452* | *127,559* |
| *Single Family* | *481,644* | *239,231* | *39,468* | *2,061* | *616* | *763,020* |
| **Total** | **2,328,916** | **312,500** | **69,074** | **8,163** | **1,613** | **2,720,267** |
| **Region Total** | **2,328,916** | **312,500** | **69,074** | **8,163** | **1,613** | **2,720,267** |

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*

## Casualties Summary Report

*June 27, 2024*




| | Injury Severity Level | | | | |
|---|---|---|---|---|---|
| | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Total |
| **California** | | | | | |
| **Imperial** | | | | | |
| **Casualties - 2am** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 0 | 0 | 0 | 0 | 0 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |
| **Total Casualties - 2am** | **0** | **0** | **0** | **0** | **0** |
| **Casualties - 2pm** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 0 | 0 | 0 | 0 | 0 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |

| | Injury Severity Level | | | | |
|---|---|---|---|---|---|
| | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Total |
| **California** | | | | | |
| **Imperial** | | | | | |
| **Total Casualties - 2pm** | **0** | **0** | **0** | **0** | **0** |
| **Casualties - 5pm** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 0 | 0 | 0 | 0 | 0 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |
| **Total Casualties - 5pm** | **0** | **0** | **0** | **0** | **0** |
| **Orange** | | | | | |
| **Casualties - 2am** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 0 | 0 | 0 | 0 | 0 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 1 | 0 | 0 | 0 | 1 |
| **Total Casualties - 2am** | **1** | **0** | **0** | **0** | **1** |
| **Casualties - 2pm** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 1 | 0 | 0 | 0 | 1 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |
| **Total Casualties - 2pm** | **2** | **0** | **0** | **0** | **2** |
| **Casualties - 5pm** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 1 | 0 | 0 | 0 | 1 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |
| **Total Casualties - 5pm** | **1** | **0** | **0** | **0** | **1** |
| **Riverside** | | | | | |
| **Casualties - 2am** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |

| | Injury Severity Level | | | | |
|---|---|---|---|---|---|
| | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Total |
| **California** | | | | | |
| **Riverside** | | | | | |
| **Casualties - 2am** | | | | | |
| *Commercial* | 0 | 0 | 0 | 0 | 0 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |
| **Total Casualties - 2am** | **0** | **0** | **0** | **0** | **0** |
| **Casualties - 2pm** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 0 | 0 | 0 | 0 | 0 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |
| **Total Casualties - 2pm** | **0** | **0** | **0** | **0** | **0** |
| **Casualties - 5pm** | | | | | |
| *Commuting* | 0 | 0 | 0 | 0 | 0 |
| *Commercial* | 0 | 0 | 0 | 0 | 0 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 0 | 0 | 0 | 0 | 0 |
| *Industrial* | 0 | 0 | 0 | 0 | 0 |
| *Other-Residential* | 0 | 0 | 0 | 0 | 0 |
| *Single Family* | 0 | 0 | 0 | 0 | 0 |
| **Total Casualties - 5pm** | **0** | **0** | **0** | **0** | **0** |
| **San Diego** | | | | | |
| **Casualties - 2am** | | | | | |
| *Commuting* | 0 | 0 | 1 | 0 | 2 |
| *Commercial* | 28 | 5 | 0 | 1 | 35 |
| *Educational* | 0 | 0 | 0 | 0 | 0 |
| *Hotels* | 3 | 1 | 0 | 0 | 4 |
| *Industrial* | 23 | 4 | 0 | 1 | 28 |
| *Other-Residential* | 780 | 103 | 7 | 14 | 905 |
| *Single Family* | 680 | 55 | 3 | 7 | 745 |
| **Total Casualties - 2am** | **1,516** | **168** | **12** | **22** | **1,718** |
| **Casualties - 2pm** | | | | | |
| *Commuting* | 3 | 4 | 7 | 1 | 15 |
| *Commercial* | 1,836 | 311 | 29 | 56 | 2,233 |
| *Educational* | 638 | 98 | 9 | 17 | 762 |
| *Hotels* | 1 | 0 | 0 | 0 | 1 |
| *Industrial* | 165 | 29 | 3 | 5 | 202 |

| | Injury Severity Level | | | | |
|---|---|---|---|---|---|
| | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Total |
| **California** | | | | | |
| **San Diego** | | | | | |
| **Casualties - 2pm** | | | | | |
| *Other-Residential* | 250 | 34 | 3 | 5 | 292 |
| *Single Family* | 210 | 18 | 1 | 2 | 232 |
| **Total Casualties - 2pm** | **3,104** | **495** | **52** | **87** | **3,737** |
| **Casualties - 5pm** | | | | | |
| *Commuting* | 65 | 84 | 146 | 28 | 323 |
| *Commercial* | 1,230 | 206 | 20 | 37 | 1,493 |
| *Educational* | 181 | 26 | 2 | 4 | 213 |
| *Hotels* | 1 | 0 | 0 | 0 | 1 |
| *Industrial* | 103 | 18 | 2 | 3 | 126 |
| *Other-Residential* | 293 | 39 | 3 | 5 | 341 |
| *Single Family* | 252 | 21 | 1 | 3 | 276 |
| **Total Casualties - 5pm** | **2,126** | **395** | **174** | **81** | **2,775** |
| **Region Total** | NA | NA | NA | NA | NA |

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*

## Debris Summary Report

*June 27, 2024*

*All values are in thousands of tons.*

| | Brick, Wood & Others | Concrete & Steel | Total |
|---|---|---|---|
| **California** | | | |
| Riverside | 0 | 0 | 0 |
| Imperial | 0 | 0 | 0 |
| Orange | 2 | 1 | 2 |
| San Diego | 1,043 | 1,635 | 2,678 |
| **Total** | **1,045** | **1,636** | **2,681** |
| **Region Total** | **1,045** | **1,636** | **2,681** |

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*

**Study Region : M69SDTJshakeout**

**Scenario : gllegacyshakeout_sdtj2015_hybridvs30_tj_**

## Direct Economic Losses For Buildings

*June 27, 2024*

*All values are in thousands of dollars*

| | Capital Stock Losses | | | | | Income Losses | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cost Structural Damage | Cost Non-struct. Damage | Cost Contents Damage | Inventory Loss | Loss Ratio % | Relocation Loss | Capital Related Loss | Wages Losses | Rental Income Loss | Total Loss |
| **California** | | | | | | | | | | |
| **Imperial** | 1 | 38 | 25 | 16 | 0.00 | 0 | 0 | 0 | 0 | 79 |
| **Riverside** | 510 | 7,183 | 3,177 | 181 | 0.00 | 18 | 15 | 13 | 56 | 11,153 |
| **Orange** | 2,965 | 32,978 | 15,354 | 1,093 | 0.01 | 290 | 385 | 378 | 492 | 53,935 |
| **San Diego** | 2,462,913 | 13,603,018 | 5,982,490 | 432,753 | 2.82 | 1,351,433 | 704,608 | 1,024,374 | 770,340 | 26,331,930 |
| **Total** | **2,466,389** | **13,643,217** | **6,001,047** | **434,042** | **0.71** | **1,351,740** | **705,009** | **1,024,766** | **770,887** | **26,397,096** |
| **Region Total** | **2,466,389** | **13,643,217** | **6,001,047** | **434,042** | **0.71** | **1,351,740** | **705,009** | **1,024,766** | **770,887** | **26,397,096** |

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*

**Study Region : M69SDTJshakeout**

**Scenario : gllegacyshakeout_sdtj2015_hybridvs30_tj_**

## Direct Economic Loss For Transportation

*June 27, 2024*

*All values are in thousands of dollars*

| | Highway | Railway | Light Rail | Bus Facility | Ports | Ferries | Airport | Total |
|---|---|---|---|---|---|---|---|---|
| **California** | | | | | | | | |
| **Imperial** | | | | | | | | |
| *Segments* | 0 | 0 | 0 | | | | | 0 |
| *Bridges* | 0 | 0 | 0 | | | | | 0 |
| *Tunnels* | 0 | 0 | 0 | | | | | 0 |
| *Facilities* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Orange** | | | | | | | | |
| *Segments* | 0 | 0 | 0 | | | | | 0 |
| *Bridges* | 50 | 0 | 0 | | | | | 50 |
| *Tunnels* | 0 | 0 | 0 | | | | | 0 |
| *Facilities* | | 201 | 0 | 0 | 156 | 55 | 0 | 412 |
| **Total** | **50** | **201** | **0** | **0** | **156** | **55** | **0** | **462** |
| **Riverside** | | | | | | | | |
| *Segments* | 0 | 0 | 0 | | | | | 0 |
| *Bridges* | 1 | 0 | 0 | | | | | 1 |
| *Tunnels* | 0 | 0 | 0 | | | | | 0 |
| *Facilities* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | Highway | Railway | Light Rail | Bus Facility | Ports | Ferries | Airport | Total |
|---|---|---|---|---|---|---|---|---|
| **Total** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **1** |
| **San Diego** | | | | | | | | |
| *Segments* | 0 | 0 | 0 | | | | | 0 |
| *Bridges* | 408,855 | 22,655 | 374 | | | | | 431,884 |
| *Tunnels* | 1,350 | 0 | 0 | | | | | 1,350 |
| *Facilities* | | 6,254 | 238,791 | 491 | 145,493 | 1,709 | 305,797 | 698,534 |
| **Total** | **410,205** | **28,909** | **239,164** | **491** | **145,493** | **1,709** | **305,797** | **1,131,768** |
| **Total** | **410,256** | **29,110** | **239,164** | **491** | **145,649** | **1,763** | **305,797** | **1,132,231** |
| **Region Total** | **410,256** | **29,110** | **239,164** | **491** | **145,649** | **1,763** | **305,797** | **1,132,231** |

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*

## Direct Economic Loss For Utilities

*June 27, 2024*

*All values are in thousands of dollars*

| | Potable Water | Waste Water | Oil Systems | Natural Gas | Electric Power | Communication | Total |
|---|---|---|---|---|---|---|---|
| **California** | | | | | | | |
| **Imperial** | | | | | | | |
| *Facilities* | 0 | 0 | 0 | 0 | 2,944 | 0 | 2,944 |
| *Pipelines* | 14 | 7 | 0 | 0 | | | 21 |
| **Total** | 14 | 7 | 0 | 0 | 2,944 | 0 | 2,964 |
| **Orange** | | | | | | | |
| *Facilities* | 0 | 4,573 | 0 | 0 | 0 | 0 | 4,573 |
| *Pipelines* | 59 | 30 | 0 | 0 | | | 89 |
| **Total** | 59 | 4,603 | 0 | 0 | 0 | 0 | 4,662 |
| **Riverside** | | | | | | | |
| *Facilities* | 0 | 0 | 0 | 0 | 0 | 7 | 7 |
| *Pipelines* | 47 | 24 | 0 | 0 | | | 70 |
| **Total** | 47 | 24 | 0 | 0 | 0 | 7 | 78 |
| **San Diego** | | | | | | | |
| *Facilities* | 10,920 | 898,635 | 29 | 658 | 1,738,645 | 1,487 | 2,650,374 |

| | Potable Water | Waste Water | Oil Systems | Natural Gas | Electric Power | Communication | Total |
|---|---|---|---|---|---|---|---|
| *Pipelines* | 16,984 | 8,532 | 0 | 0 | | | 25,516 |
| **Total** | 27,904 | 907,166 | 29 | 658 | 1,738,645 | 1,487 | 2,675,890 |
| **Total** | **28,024** | **911,799** | **29** | **658** | **1,741,589** | **1,494** | **2,683,593** |
| **Region Total** | **28,024** | **911,799** | **29** | **658** | **1,741,589** | **1,494** | **2,683,593** |

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*

# Hazus Quick Assessment Report

## Estimated Economic Loss ($ Billions)

| Category | Description | Range |
|---|---|---|
| General Building Stock | Building Damage | 8.10 - 32.20 |
| | Building Contents | 0.80 - 3.00 |
| | Business Interruption | 1.90 - 7.70 |
| Infrastructure | Lifelines Damage | |
| | Total | 13.20 - 52.80 |

### Preliminary Damage Assessment (PDA) Estimates

| Description | Residential | Commercial | Other | Total |
|---|---|---|---|---|
| Affected | 284,400 | 19,000 | 8,800 | 312,200 |
| Minor | 55,900 | 8,800 | 4,300 | 69,000 |
| Major | 5,300 | 1,900 | 1,000 | 8,200 |
| Destroyed | 1,100 | 410 | 130 | 1,640 |
| Total | 346,700 | 30,110 | 14,230 | 391,040 |

### Estimated Casualties : Night Time

| Severity Level | Description | # Persons |
|---|---|---|
| Level 1 | Medical Aid | 800 - 3,000 |
| Level 2 | Hospital Care | 80 - 300 |
| Level 3 | Life-threatening | 10 - 20 |
| Level 4 | Fatalities | 10 - 40 |

### Estimated Shelter Needs

| Type | Households | People |
|---|---|---|
| Displaced Households | 4,000 - 17,000 | 10,000 - 42,500 |
| Public Shelter | 1,550 | 3,870 |

**Comments :**

**Hazus damage estimates are presented using FEMA Preliminary Damage Assessment (PDA) categories. These estimates should be used for planning purposes and may not reflect actual observed damages from the PDA process.*

***Disclaimer:***

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, goetechnical, and observed ground motion data.*

### *Earthquake Information*

**Location :**

**Origin Time:**

**Magnitude :** 6.90

**Epicenter Latitude/Longitude :**

/

**Depth & Type :** /U

**Name :**
NA

**Ground Motion /Attenuation :**

**Maximum PGA:** 1.00

**Information Sources:**

**Comments :**

**Population and Building Exposure**

**Population:** 9,083,510

**Building Exposure : ($ Millions)**

| | |
|---|---|
| Residential | 1,041,643 |
| Commercial | 301,469 |
| Other | 218,427 |
| Total | 1,561,539 |

**Counties :**
- Imperial,CA
- Orange,CA
- Riverside,CA
- San Diego,CA

**Major Metro Area :**

Time of report: June 27, 2024 1:19 pm

# Hazus Quick Assessment Report

## Estimated Economic Loss ($ Billions)

| Category | Description | Range |
|---|---|---|
| General Building Stock | Building Damage | 8.10 - 32.20 |
| | Building Contents | 0.80 - 3.00 |
| | Business Interruption | 1.90 - 7.70 |
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| | Total | 13.20 - 52.80 |

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| Minor | 55,900 | 8,800 | 4,300 | 69,000 |
| Major | 5,300 | 1,900 | 1,000 | 8,200 |
| Destroyed | 1,100 | 410 | 130 | 1,640 |
| Total | 346,700 | 30,110 | 14,230 | 391,040 |

### Estimated Casualties : Day Time

| Severity Level | Description | # Persons |
|---|---|---|
| Level 1 | Medical Aid | 1,600 - 6,000 |
| Level 2 | Hospital Care | 200 - 1,000 |
| Level 3 | Life-threatening | 30 - 100 |
| Level 4 | Fatalities | 40 - 170 |

### Estimated Shelter Needs

| Type | Households | People |
|---|---|---|
| Displaced Households | 4,000 - 17,000 | 10,000 - 42,500 |
| Public Shelter | 1,550 | 3,870 |

**Comments :**

**Hazus damage estimates are presented using FEMA Preliminary Damage Assessment (PDA) categories. These estimates should be used for planning purposes and may not reflect actual observed damages from the PDA process.*

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**Magnitude :** 6.90

**Epicenter Latitude/Longitude :**

/

**Depth & Type :** /U

**Name :**
NA

**Ground Motion /Attenuation :**

**Maximum PGA:** 1.00

**Information Sources:**

**Comments :**

**Population and Building Exposure**

**Population:** 9,083,510

**Building Exposure : ($ Millions)**

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|---|---|
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- Imperial,CA
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Time of report: June 27, 2024 1:19 pm

# Hazus Quick Assessment Report

## Estimated Economic Loss ($ Billions)

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| Minor | 55,900 | 8,800 | 4,300 | 69,000 |
| Major | 5,300 | 1,900 | 1,000 | 8,200 |
| Destroyed | 1,100 | 410 | 130 | 1,640 |
| Total | 346,700 | 30,110 | 14,230 | 391,040 |

### Estimated Casualties : Commute Time

| Severity Level | Description | # Persons |
|---|---|---|
| Level 1 | Medical Aid | 1,100 - 4,000 |
| Level 2 | Hospital Care | 200 - 800 |
| Level 3 | Life-threatening | 90 - 300 |
| Level 4 | Fatalities | 40 - 160 |

### Estimated Shelter Needs

| Type | Households | People |
|---|---|---|
| Displaced Households | 4,000 - 17,000 | 10,000 - 42,500 |
| Public Shelter | 1,550 | 3,870 |

**Comments :**

**Hazus damage estimates are presented using FEMA Preliminary Damage Assessment (PDA) categories. These estimates should be used for planning purposes and may not reflect actual observed damages from the PDA process.*

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### *Earthquake Information*

**Location :**

**Origin Time:**

**Magnitude :** 6.90

**Epicenter Latitude/Longitude :**

/

**Depth & Type :** /U

**Name :**
NA

**Ground Motion /Attenuation :**

**Maximum PGA:** 1.00

**Information Sources:**

**Comments :**

**Population and Building Exposure**

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**Building Exposure : ($ Millions)**

| | |
|---|---|
| Residential | 1,041,643 |
| Commercial | 301,469 |
| Other | 218,427 |
| Total | 1,561,539 |

**Counties :**
- Imperial,CA
- Orange,CA
- Riverside,CA
- San Diego,CA

**Major Metro Area :**

Time of report: June 27, 2024 1:19 pm

HAZUS™

FEMA

RiskMAP
Increasing Resilience Together

## Shelter Summary Report

*June 27, 2024*

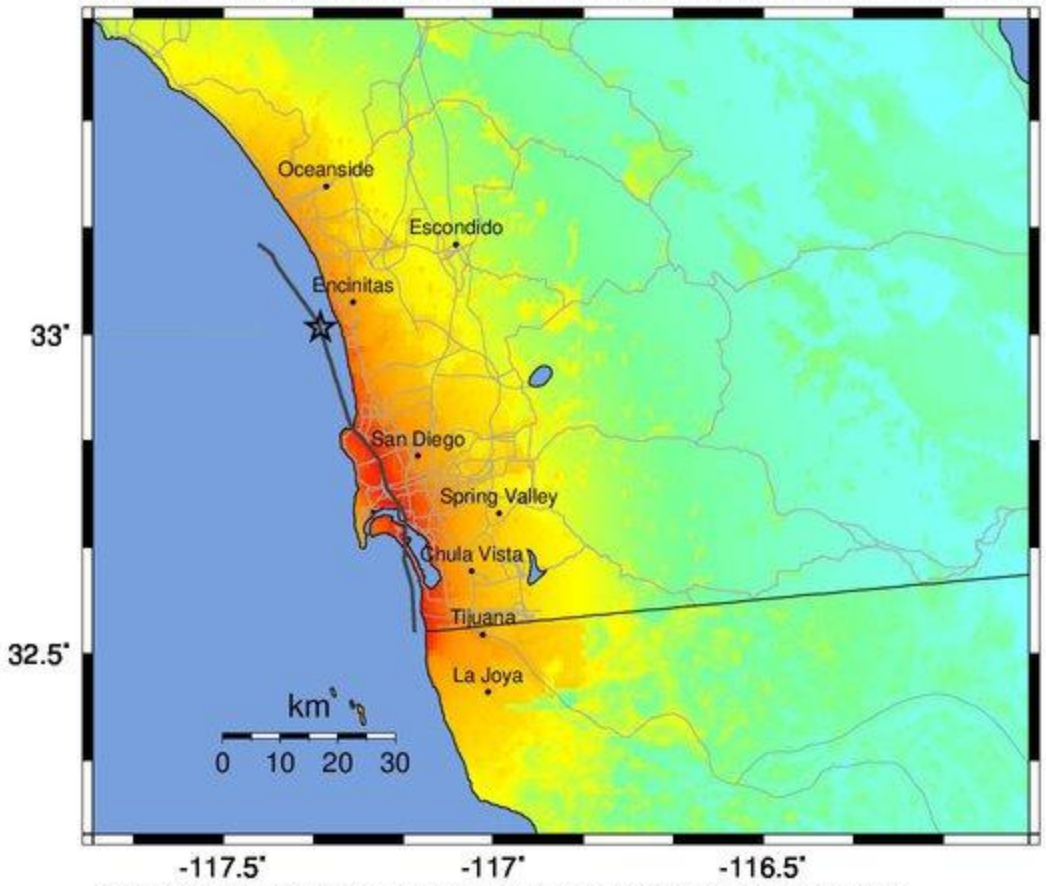
| | # of Displaced Households | # of People Needing Short Term Shelter |
|---|---|---|
| **California** | | |
| Riverside | 0 | 0 |
| Imperial | 0 | 0 |
| Orange | 0 | 0 |
| San Diego | 8,589 | 3,874 |
| **Total** | **8,589** | **3,874** |
| **Region Total** | **8,589** | **3,874** |

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.*

-- Earthquake Planning Scenario --

ShakeMap for Shakeout SD-TJ - Southern Directivity Scenario

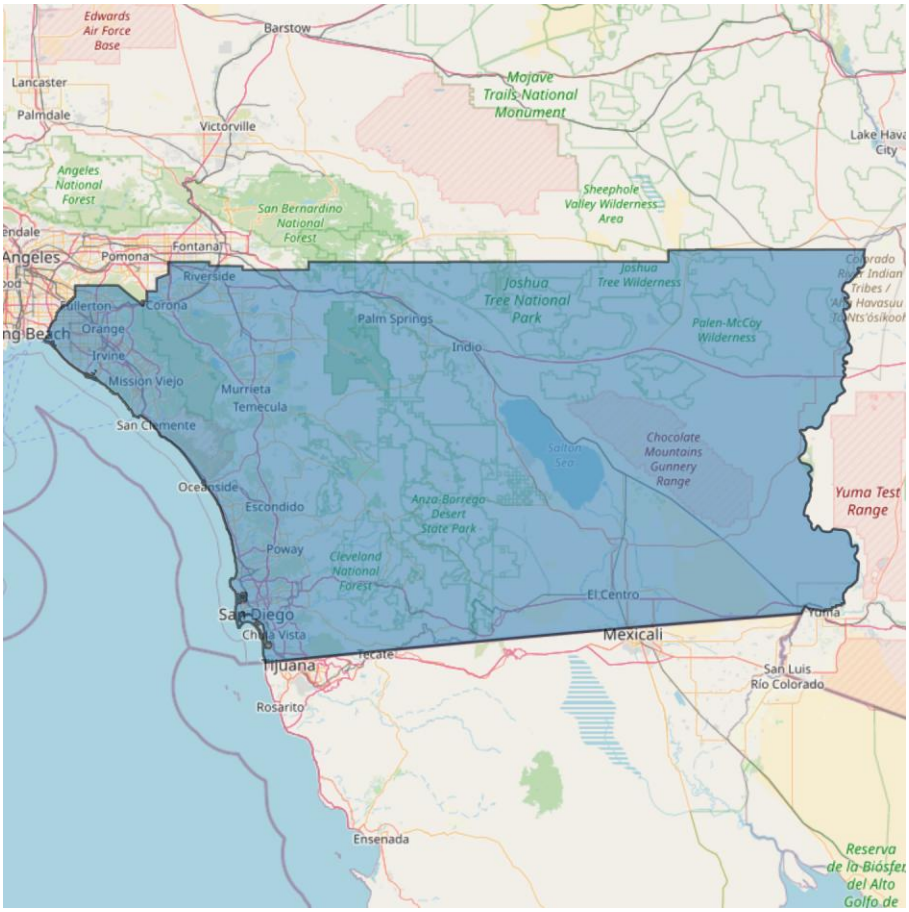
Scenario Date: May 25, 2017 04:00:00 AM MDT M 6.9 N33.01 W117.32 Depth: 7.7km




PLANNING SCENARIO ONLY -- Map Version 1 Processed 2017-05-25 01:13:25 PM MDT

| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|---|---|---|---|---|---|---|---|---|---|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 12 | 22 | 40 | 75 | >139 |
| PEAK VEL.(cm/s) | *<0.02* | *0.1* | *1.4* | *4.7* | *9.6* | *20* | *41* | *86* | *>178* |
| INSTRUMENTAL INTENSITY | I | II-III | IV | V | VI | VII | VIII | IX | X+ |

Scale based upon Worden et al. (2012)


Edwards Air Force Base
Barstow
Lancaster
Palmdale
Victorville
Mojave Trails National Monument
Angeles National Forest
San Bernardino National Forest
Sheephole Valley Wilderness Area
Pomona
Fontana
Riverside
Joshua Tree National Park
Joshua Tree Wilderness
Corona
Palm Springs
Palen-McCoy Wilderness
Orange
Irvine
Indio
Mission Viejo
Murrieta
Temecula
San Clemente
Chocolate Mountains Gunnery Range
Salton Sea
Oceanside
Escondido
Anza-Borrego Desert State Park
Yuma Test Range
Poway
Cleveland National Forest
El Centro
San Diego
Chula Vista
Mexicali
Yuma
Tijuana
Tecate
San Luis Río Colorado
Rosarito
Ensenada