

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 12



SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

| COMMUNITY NAME | NUMBER | COMMUNITY NAME | NUMBER |
|-------------------------|--------|---|--------|
| CARLSBAD, CITY OF | 060285 | NATIONAL CITY, CITY OF | 060293 |
| CHULA VISTA, CITY OF | 065021 | OCEANSIDE, CITY OF | 060294 |
| CORONADO, CITY OF | 060287 | POWAY, CITY OF | 060702 |
| DEL MAR, CITY OF | 060288 | SAN DIEGO, CITY OF | 060295 |
| EL CAJON, CITY OF | 060289 | SAN DIEGO COUNTY, UNINCORPORATED AREAS | 060284 |
| ENCINITAS, CITY OF | 060726 | SAN MARCOS, CITY OF | 060296 |
| ESCONDIDO, CITY OF | 060290 | SANTEE, CITY OF | 060703 |
| IMPERIAL BEACH, CITY OF | 060291 | SOLANA BEACH, CITY OF | 060725 |
| LA MESA, CITY OF | 060292 | VISTA, CITY OF | 060297 |
| LEMON GROVE, CITY OF | 060723 | | |

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FEMA

TABLE OF CONTENTS

Volume 1

| | <u>Page</u> |
|---|-------------|
| SECTION 1.0 – INTRODUCTION | 1 |
| 1.1 The National Flood Insurance Program | 1 |
| 1.2 Purpose of this Flood Insurance Study Report | 2 |
| 1.3 Jurisdictions Included in the Flood Insurance Study Project | 2 |
| 1.4 Considerations for using this Flood Insurance Study Report | 15 |
| | |
| SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS | 28 |
| 2.1 Floodplain Boundaries | 28 |
| 2.2 Floodways | 48 |
| 2.3 Base Flood Elevations | 49 |
| 2.4 Non-Encroachment Zones | 49 |
| 2.5 Coastal Flood Hazard Areas | 49 |
| 2.5.1 Water Elevations and the Effects of Waves | 49 |
| 2.5.2 Floodplain Boundaries and BFEs for Coastal Areas | 51 |
| 2.5.3 Coastal High Hazard Areas | 52 |
| 2.5.4 Limit of Moderate Wave Action | 53 |
| | |
| SECTION 3.0 – INSURANCE APPLICATIONS | 53 |
| 3.1 National Flood Insurance Program Insurance Zones | 53 |
| | |
| SECTION 4.0 – AREA STUDIED | 54 |
| 4.1 Basin Description | 54 |
| 4.2 Principal Flood Problems | 55 |
| 4.3 Non-Levee Flood Protection Measures | 64 |
| 4.4 Levees | 74 |

Figures

| | <u>Page</u> |
|---|-------------|
| Figure 1: FIRM Panel Index | 17 |
| Figure 2: FIRM Notes to Users | 20 |
| Figure 3: Map Legend for FIRM | 24 |
| Figure 4: Floodway Schematic | 48 |
| Figure 5: Wave Runup Transect Schematic | 51 |
| Figure 6: Coastal Transect Schematic | 53 |

Tables

| | <u>Page</u> |
|--|-------------|
| Table 1: Listing of NFIP Jurisdictions | 2 |

| | |
|---|----|
| Table 2: Flooding Sources Included in this FIS Report | 29 |
| Table 3: Flood Zone Designations by Community | 54 |
| Table 4: Basin Characteristics | 55 |
| Table 5: Principal Flood Problems | 56 |
| Table 6: Historic Flooding Elevations | 64 |
| Table 7: Non-Levee Flood Protection Measures | 64 |
| Table 8: Levees | 75 |

Volume 2

| | <u>Page</u> |
|--|-------------|
| SECTION 5.0 – ENGINEERING METHODS | 78 |
| 5.1 Hydrologic Analyses | 78 |
| 5.2 Hydraulic Analyses | 107 |
| 5.3 Coastal Analyses | 138 |
| 5.3.1 Total Stillwater Elevations | 139 |
| 5.3.2 Waves | 141 |
| 5.3.3 Coastal Erosion | 141 |
| 5.3.4 Wave Hazard Analyses | 141 |

Figures

| | <u>Page</u> |
|--|-------------|
| Figure 7: Frequency Discharge-Drainage Area Curves | 104 |
| Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas | 140 |

Tables

| | <u>Page</u> |
|--|-------------|
| Table 9: Summary of Discharges | 79 |
| Table 10: Summary of Non-Coastal Stillwater Elevations | 105 |
| Table 11: Stream Gage Information used to Determine Discharges | 106 |
| Table 12: Summary of Hydrologic and Hydraulic Analyses | 108 |
| Table 13: Roughness Coefficients | 135 |
| Table 14: Summary of Coastal Analyses | 138 |
| Table 15: Tide Gage Analysis Specifics | 141 |
| Table 16: Coastal Transect Parameters | 142 |

Volume 3

| | <u>Page</u> |
|--|-------------|
| SECTION 5.0 – ENGINEERING METHODS (continued) | |
| 5.4 Alluvial Fan Analyses | 170 |
| SECTION 6.0 – MAPPING METHODS | 174 |
| 6.1 Vertical and Horizontal Control | 174 |
| 6.2 Base Map | 174 |
| 6.3 Floodplain and Floodway Delineation | 175 |

Figures

| | <u>Page</u> |
|---------------------------------|-------------|
| Figure 9: Transect Location Map | 164 |

Tables

| | <u>Page</u> |
|---|-------------|
| Table 17: Summary of Alluvial Fan Analyses | 171 |
| Table 18: Results of Alluvial Fan Analyses | 173 |
| Table 19: Countywide Vertical Datum Conversion | 174 |
| Table 20: Stream-Based Vertical Datum Conversion | 174 |
| Table 21: Base Map Sources | 175 |
| Table 22: Summary of Topographic Elevation Data used in Mapping | 176 |
| Table 23: Floodway Data | 185 |

Volume 4

Tables

| | <u>Page</u> |
|-------------------------------------|-------------|
| Table 23: Floodway Data (continued) | 251 |

Volume 5

| | <u>Page</u> |
|--|-------------|
| SECTION 6.0 – MAPPING METHODS (continued) | |
| 6.4 Coastal Flood Hazard Mapping | 340 |
| 6.5 FIRM Revisions | 347 |
| 6.5.1 Letters of Map Amendment | 347 |
| 6.5.2 Letters of Map Revision Based on Fill | 347 |
| 6.5.3 Letters of Map Revision | 348 |

| | | |
|--|------------------------|------------|
| 6.5.4 | Physical Map Revisions | 348 |
| 6.5.5 | Contracted Restudies | 348 |
| 6.5.6 | Community Map History | 349 |
| SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION | | 352 |
| 7.1 | Contracted Studies | 352 |
| 7.2 | Community Meetings | 368 |
| SECTION 8.0 – ADDITIONAL INFORMATION | | 371 |
| SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES | | 373 |

Tables

| | <u>Page</u> |
|---|-------------|
| Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams | 340 |
| Table 25: Summary of Coastal Transect Mapping Considerations | 341 |
| Table 26: Incorporated Letters of Map Change | 348 |
| Table 27: Community Map History | 350 |
| Table 28: Summary of Contracted Studies Included in this FIS Report | 352 |
| Table 29: Community Meetings | 369 |
| Table 30: Map Repositories | 371 |
| Table 31: Additional Information | 372 |
| Table 32: Bibliography and References | 374 |

Exhibits

| Flood Profiles | <u>Panel</u> |
|---|--------------|
| Adobe Creek | 01 P |
| Agua Hedionda Creek | 02-03 P |
| Agua Hedionda Creek (at City of Carlsbad) | 04-06 P |
| Agua Hedionda Creek (at City of Vista) | 07-11 P |
| Alvarado Creek | 12-34 P |
| Beaver Hollow Creek | 35-39 P |
| Beeler Creek | 40-46 P |

Volume 6

Exhibits

| Flood Profiles | <u>Panel</u> |
|-------------------------------|--------------|
| Broadway Creek | 47-49 P |
| Buena Creek | 50-58 P |
| Buena Vista Creek | 59-79 P |
| Buena Vista Creek Tributary 1 | 80-81 P |
| Buena Vista Creek Tributary 3 | 82-85 P |

| | |
|---------------------------------------|-----------|
| Calavera Creek | 86 P |
| Calavera Creek Split Flow | 87 P |
| Carmel Valley Creek | 88-90 P |
| Carroll Canyon Creek | 91-101 P |
| Coleman Creek | 102-108 P |
| County Ditch Creek | 109-110 P |
| Deer Springs Creek | 111 P |
| Descanso Creek | 112-114 P |
| Encanto Branch | 115-118 P |
| Escondido Creek (Above Lake Wohlford) | 119 P |
| Escondido Creek (at Encinitas) | 120-123 P |
| Escondido Creek (at Escondido) | 124-128 P |
| Escondido Creek (Left Reach) | 129 P |
| Eucalyptus Hills Creek (East Branch) | 130 P |
| Eucalyptus Hills Creek (West Branch) | 131-132 P |
| Florida Drive Branch | 133 P |

Volume 7
Exhibits

| Flood Profiles | <u>Panel</u> |
|----------------------------------|--------------|
| Forester Creek | 134-146 P |
| Garrison Creek | 147-150 P |
| Gonzales Canyon Creek | 151 P |
| Gopher Canyon Creek | 152-155 P |
| Green Valley Creek | 156-158 P |
| Green Valley Creek Tributary | 159 P |
| Harbison Canyon Creek | 160-166 P |
| Hatfield Creek | 167-168 P |
| Home Avenue Branch | 169-171 P |
| Johnson Canyon Creek | 172-177 P |
| Keys Canyon Creek | 178-180 P |
| Keys Canyon Creek Tributary 1 | 181-184 P |
| Keys Canyon Creek Tributary 2 | 185-187 P |
| Kit Carson Park Creek | 188-192 P |
| Lake San Marcos/San Marcos Creek | 193-194 P |
| Las Chollas Creek | 195-199 P |
| Las Posas Creek (Upper) | 200 P |
| Las Puleta Creek | 201-202 P |
| Lawson Valley Creek | 203-208 P |
| Loma Alta Creek | 209-214 P |
| Los Penasquitos Creek | 215-223 P |
| Lusardi Creek | 224 P |

Volume 8
Exhibits

| Flood Profiles | <u>Panel</u> |
|------------------------------------|--------------|
| McGonigle Canyon Creek | 225-226 P |
| McGonigle Canyon Creek Tributary A | 227 P |

| | |
|--------------------------------------|-----------|
| Mexican Canyon Creek | 228-231 P |
| Moosa Creek (North Branch) | 232-234 P |
| Moosa Creek (South Branch) | 235 P |
| Murphy Canyon Creek | 236-238 P |
| Murray Canyon Creek | 239-244 P |
| Nestor Creek | 245-250 P |
| North Avenue Tributary | 251 P |
| North Branch Poway Creek | 252-253 P |
| North Tributary to Santa Maria Creek | 254-255 P |
| Olive Creek | 256-257 P |
| Otay River | 258-281 P |
| Pala Mesa Creek | 282-283 P |
| Paradise Creek | 284-288 P |
| Paradise Creek Split Flow | 289 P |
| Paradise Creek - Valley Road Branch | 290 P |
| Pilgrim Creek | 291-293 P |
| Poggi Canyon Creek | 294-296 P |
| Pomerado Creek | 297 P |
| Poway Creek | 298-305 P |
| Rainbow Creek | 306-307 P |
| Rainbow Creek (West Branch) | 308 P |

Volume 9

Exhibits

| Flood Profiles | <u>Panel</u> |
|--|--------------|
| Rattlesnake Creek | 309-316 P |
| Rattlesnake Creek Split Flow at Heritage Hills | 317-318 P |
| Rattlesnake Creek Split Flow at Midland Road | 319 P |
| Reidy Creek | 320-324 P |
| Reidy Creek Split Flow | 325 P |
| Rice Canyon Creek | 326-329 P |
| Rincon Avenue Tributary | 330 P |
| Rose Canyon Creek | 331-337 P |
| Samagutuma Creek | 338-340 P |
| San Clemente Canyon Creek | 341-343 P |
| San Diego River | 344-378 P |
| San Dieguito River | 379-381 P |
| San Elijo Creek | 382 P |
| San Luis Rey River (at Oceanside) | 383-391 P |
| San Marcos Creek | 392-395 P |
| San Marcos Creek (Below Lake San Marcos) | 396-397 P |
| San Marcos Creek - Highway 78 Split Flow | 398 P |

Volume 10
Exhibits

| Flood Profiles | <u>Panel</u> |
|---|--------------|
| San Vicente Creek | 399-401 P |
| Santa Maria Creek (San Pasqual Valley Area) | 402-405 P |
| Santa Maria Creek (Santa Maria Valley Area) | 406-426 P |
| Santa Ysabel Creek | 427-438 P |
| Slaughterhouse Creek | 439-440 P |
| Soledad Canyon | 441-445 P |
| South Branch Poway Creek | 446-447 P |
| South Fork Moosa Canyon Creek | 448-452 P |
| South Las Chollas Creek | 453-457 P |
| South Tributary to Santa Maria Creek | 458-459 P |
| Steele Canyon Creek | 460-468 P |
| Stevenson Creek | 469 P |

Volume 11
Exhibits

| Flood Profiles | <u>Panel</u> |
|---|--------------|
| Sweetwater River (Above Reservoir) | 470-496 P |
| Sweetwater River (At National City) | 497-501 P |
| Sweetwater River (Descanso Area) | 502-505 P |
| Switzer Creek | 506 P |
| Tecolote Creek | 507-520 P |
| Telegraph Canyon Creek | 521-540 P |
| Tijuana River | 541-545 P |
| Tributary of South Tributary to Santa Maria Creek | 546 P |
| Tributary to Forester Creek | 547 P |
| Tributary to Forester Creek South Branch | 548 P |
| Tributary to Sweetwater River | 549-550 P |

Volume 12
Exhibits

| Flood Profiles | <u>Panel</u> |
|---|--------------|
| Twin Oaks Valley Creek | 551-557 P |
| Unnamed Tributary to San Dieguito River | 558 P |
| Wabash Branch | 559 P |
| Witch Creek | 560-562 P |

Published Separately

Flood Insurance Rate Map (FIRM)

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 26, “Incorporated Letters of Map Change”, which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, “FIRM Revisions.”

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 12. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9. Frequency Discharge-Drainage Area Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 10. (Coastal stillwater elevations are discussed in Section 5.3 and shown in Table 16.) Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Adobe Creek | 2,200 Feet Upstream of Peet Lane | 0.67 | 375 | * | 485 | 560 | 710 |
| Agua Hedionda Creek | At El Camino Real | 23.8 | * | * | * | 9,850 | * |
| Agua Hedionda Creek | Upstream of Calavera Creek | 17.3 | * | * | * | 8,080 | * |
| Agua Hedionda Creek | 2,200 Feet Upstream of Rancho Carlsbad Drive | 16.5 | * | * | * | 7,810 | * |
| Agua Hedionda Creek | At Confluence with Buena Creek | 6.3 | 1,600 | * | 4,800 | 7,000 | 15,500 |
| Alvarado Creek | At San Diego River | 14.0 | 2,700 | * | 4,500 | 5,100 | 6,500 |
| Alvarado Creek | Downstream of Tributary Channel | 13.4 | 2,600 | * | 4,300 | 4,800 | 6,100 |
| Alvarado Creek | Upstream of Tributary Channel | 12.1 | 2,300 | * | 3,700 | 4,300 | 5,400 |
| Alvarado Creek | At Downstream Side of College Avenue | 11.4 | 2,100 | * | 3,400 | 3,900 | 5,000 |
| Alvarado Creek | Downstream of Murray Creek | 10.1 | 1,700 | * | 2,900 | 3,300 | 4,200 |
| Alvarado Creek | Upstream of Murray Creek | 6.3 | 1,600 | * | 2,600 | 3,000 | 3,800 |
| Alvarado Creek | At Interstate 8, Near Murray Boulevard | 5.7 | 1,400 | * | 2,400 | 2,700 | 3,500 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---------------------|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Alvarado Creek | At Interstate 8, Near Trailer Park | 5.3 | 1,300 | * | 2,200 | 2,500 | 3,200 |
| Alvarado Creek | At Lake Shore Drive | 4.6 | 1,200 | * | 2,000 | 2,300 | 3,000 |
| Beaver Hollow Creek | Approximately 1,200 Feet Downstream of Beaver Hollow Road | 5.0 | * | * | * | 4,000 | * |
| Beeler Creek | At U.S. Geological Survey (USGS) Gage on Downstream Side of Pomerado Road | 5.5 | 700 | * | 2,400 | 3,600 | 9,200 |
| Borrego Palm Canyon | At Apex of Alluvial Fan | 23.3 | 3,100 | * | 7,700 | 10,650 | 14,800 |
| Box Canyon | At Apex of Alluvial Fan | 5.9 | 850 | * | 2,600 | 3,850 | 4,950 |
| Broadway Creek | At Mouth | 3.8 | 500 | * | 1,200 | 1,600 | 4,200 |
| Buena Creek | At Mouth | 6.3 | 1,880 | * | 3,520 | 4,100 | 5,420 |
| Buena Creek | At Buena Creek Road | 1.5 | * | * | * | 1,980 | * |
| Buena Vista Creek | Upstream of Interstate Highway 5 | 20.8 | 2,000 | * | 5,600 | 8,500 | 19,000 |
| Buena Vista Creek | At Sunset Drive | 15.9 | 1,700 | * | 5,100 | 8,000 | 18,000 |
| Buena Vista Creek | Just Downstream of Melrose Drive | 9.5 | 3,300 | * | 5,480 | 6,540 | 12,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-------------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Buena Vista Creek | At State Highway 78 | 9.3 | 3,170 | * | 5,320 | 6,340 | 11,000 |
| Buena Vista Creek | Just Upstream of Confluence with Buena Vista Creek Tributary 3 | 7.5 | 2,060 | * | 3,520 | 4,400 | 9,500 |
| Buena Vista Creek | Approximately 400 Feet Downstream of South Santa Fe Avenue | 5.4 | 1,470 | * | 2,340 | 2,650 | 5,000 |
| Buena Vista Creek | At South Santa Fe Avenue | 5.3 | 1,435 | * | 2,280 | 2,580 | 5,000 |
| Buena Vista Creek | Approximately 500 Feet Upstream of Escondido Avenue | 4.4 | 750 | * | 1,880 | 2,270 | 4,000 |
| Buena Vista Creek | At Intersection of Vista Way and Arcadia Avenue | 0.2 | 40 | * | 100 | 130 | 170 |
| Buena Vista Creek Tributary 1 | At Confluence with Buena Vista Creek | 2.6 | 460 | * | 1,180 | 1,510 | 2,020 |
| Buena Vista Creek Tributary 1 | At Intersection of Monte Vista Drive and Santa Fe Avenue | 1.7 | 320 | * | 800 | 1,010 | 1,350 |
| Buena Vista Creek Tributary 1 | At Intersection of Monte Vista and Valley Drives | 1.0 | 210 | * | 510 | 630 | 840 |
| Buena Vista Creek Tributary 2 | At Confluence with Buena Vista Creek | 0.8 | 110 | * | 410 | 530 | 700 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-------------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Buena Vista Creek Tributary 2 | At Intersection of Eucalyptus Avenue and Tiger Tail Road | 0.5 | 110 | * | 280 | 360 | 480 |
| Buena Vista Creek Tributary 3 | At Confluence with Buena Vista Creek | 4.7 | * | * | * | 1,880 | 3,500 |
| Buena Vista Creek Tributary 4 | At Confluence with Buena Vista Creek | 2.5 | 570 | * | 1,210 | 1,450 | 1,860 |
| Calavera Creek | Confluence with Agua Hedionda Creek | 5.8 | * | * | * | 910 | * |
| Calavera Creek | Upstream of Rancho Carlsbad Mobile Home Park | 4.5 | * | * | * | 500 | * |
| Carmel Valley Creek | Above Confluence with Soledad Canyon | 15.7 | 2,100 | * | 6,500 | 9,800 | 21,300 |
| Carmel Valley Creek | Below Confluence with Shaw Valley Creek | 11.0 | 1,400 | * | 4,200 | 6,300 | 13,700 |
| Carroll Canyon Creek | At Atchison, Topeka & Santa Fe Railway | 17.8 | 1,500 | * | 4,500 | 6,700 | 18,700 |
| Carroll Canyon Creek | At Interstate Highway 805 | 15.0 | 1,300 | * | 3,800 | 5,600 | 15,700 |
| Carroll Canyon Creek | At Carroll Canyon Road | 12.0 | 1,000 | * | 3,000 | 4,500 | 12,500 |
| Coleman Creek | Approximately 1,800 Feet Downstream of Highway 78 | 8.1 | * | * | * | 8,750 | * |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|--------------------|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Coyote Creek | At Apex of Alluvial Fan | 132.0 | 5,200 | * | 16,000 | 24,000 | 35,200 |
| Culp-Tubb Canyon | At Apex of Alluvial Fan | 13.0 | 2,400 | * | 6,000 | 8,500 | 12,500 |
| Deer Springs Creek | At Mouth | 1.8 | * | * | * | 1,550 | * |
| Descanso Creek | At Mouth | 5.6 | 1,300 | * | 3,800 | 6,000 | 10,400 |
| Dry Canyon | At Apex of Alluvial Fan | 1.9 | 450 | * | 1,150 | 1,700 | 2,650 |
| Encanto Branch | Above Confluence with South Las Chollas Creek | 6.0 | 1,200 | * | 2,700 | 3,500 | 6,600 |
| Encanto Branch | Above Confluence with Radio Drive Tributary | 4.8 | 1,100 | * | 2,600 | 3,400 | 6,500 |
| Encanto Branch | At 64th Street | 4.2 | 950 | * | 2,300 | 3,000 | 6,100 |
| Encanto Branch | Above Confluence with Jamacha Branch | 2.4 | 640 | * | 1,400 | 1,700 | 3,200 |
| Escondido Creek | At Interstate Highway 5 | 77.7 | 3,400 | * | 15,500 | 22,000 | 41,000 |
| Escondido Creek | Upstream of Lake Val Sereno | 68.0 | 3,200 | * | 14,500 | 21,000 | 38,400 |
| Escondido Creek | Upstream of Elfin Forest Lake | 55.7 | 2,800 | * | 13,000 | 19,000 | 35,000 |
| Escondido Creek | At Harmony Grove Road | 48.3 | 2,600 | * | 12,000 | 18,000 | 32,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|------------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Escondido Creek | Approximately 11,200 feet Upstream of Wohlford Dam | 2.2 | * | * | * | 2,700 | * |
| Eucalyptus Hills East Branch | At Riverside Drive | 1.5 | * | * | * | 860 | * |
| Eucalyptus Hills West Branch | At Riverside Drive | 1.9 | * | * | * | 970 | * |
| Fire Canyon | At Apex of Alluvial Fan | 0.8 | 200 | * | 550 | 900 | 1,500 |
| Florida Drive Branch | Above Confluence with Switzer Creek | 2.5 | 490 | * | 1,120 | 1,350 | 2,340 |
| Forester Creek | At Prospect Avenue | 22.7 | 6,000 | * | 11,000 | 12,450 | 28,000 |
| Forester Creek | At Terra Lane | 2.3 | * | * | * | * | * |
| Garrison Creek | At Confluence with Loma Alta Creek | 2.24 | 230 | * | 780 | 1,130 | 1,940 |
| Garrison Creek | 6,500 Feet Upstream of El Camino Real | 0.97 | 110 | * | 340 | 570 | 970 |
| Gopher Canyon Creek | At Mouth | 11.0 | * | * | * | 7,690 | * |
| Gonzales Canyon Creek | At Old El Camino Real | 2.4 | * | * | * | 1,606 | * |
| Green Valley Creek | At Corporate Limits with City of San Diego | 3.2 | 950 | * | 2,050 | 2,700 | 4,700 |
| Green Valley Creek | At Orchard Bend Road | 1.5 | 450 | * | 925 | 1,200 | 2,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|------------------------------|---------------------------------------|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Green Valley Creek Tributary | At Confluence with Green Valley Creek | 0.3 | 80 | * | 200 | 300 | 600 |
| Harbison Canyon Creek | At Noakes Street Crossing | * | 500 | * | * | 2,100 | * |
| Harbison Canyon Creek | At Warfield Way Crossing | * | 750 | * | * | 3,000 | * |
| Harbison Canyon Creek | At Collier Way Crossing | * | 775 | * | * | 3,200 | * |
| Harbison Canyon Creek | At Dehesa Road Crossing | * | 1,050 | * | * | 4,700 | * |
| Hatfield Creek | At Mouth | 20.8 | 1,700 | * | 7,900 | 13,700 | 35,600 |
| Hellhole Canyon | At Apex of Alluvial Fan | 4.8 | 1,900 | * | 4,250 | 6,450 | 9,200 |
| Henderson Canyon | At Apex of Alluvial Fan | 4.8 | 750 | * | 2,100 | 3,500 | 5,650 |
| Home Avenue Branch | At Confluence with Las Chollas Creek | 2.1 | 430 | * | 950 | 1,200 | 2,200 |
| Home Avenue Branch | 0.8 Mile Above Fairmont Avenue | 1.3 | 260 | * | 580 | 730 | 1,340 |
| Home Avenue Branch | At Euclid Avenue | 1.1 | 220 | * | 500 | 630 | 1,200 |
| Home Avenue Branch | At Auburn Drive | 0.8 | 160 | * | 360 | 450 | 830 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-------------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Keys Canyon Creek | Just downstream of Keys Canyon Creek Tributary 1 | 31.58 | * | * | * | 22,911 | * |
| Keys Canyon Creek | Just upstream of Keys Canyon Creek Tributary 1 | 14.98 | * | * | * | 13,120 | * |
| Keys Canyon Creek | Just upstream of Keys Canyon Creek Tributary 2 | 14.62 | * | * | * | 13,044 | * |
| Keys Canyon Creek Tributary 1 | Just upstream of Keys Canyon Creek | 14.98 | * | * | * | 13,120 | * |
| Keys Canyon Creek Tributary 2 | Just upstream of Keys Canyon Creek | 14.62 | * | * | * | 13,044 | * |
| Kit Carson Park Creek | At Mouth | 6.8 | 1,000 | * | 2,900 | 4,400 | 9,600 |
| Kit Carson Park Creek | At Bear Valley Parkway | 3.5 | 600 | * | 1,900 | 2,800 | 6,100 |
| Las Chollas Creek | At Main Street | 26.4 | 4,200 | * | 8,000 | 10,000 | 21,000 |
| Las Chollas Creek | Above Confluence with South Las Chollas Creek | 15.3 | 3,000 | * | 6,000 | 7,900 | 15,000 |
| Las Chollas Creek | At Market Street | 12.7 | 2,700 | * | 5,400 | 7,100 | 13,500 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---------------------|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Las Chollas Creek | Above Confluence with Wabash Branch | 8.7 | 1,900 | * | 3,800 | 4,700 | 7,700 |
| Las Chollas Creek | Above Confluence with Home Avenue Branch | 6.6 | 1,500 | * | 2,800 | 3,500 | 5,500 |
| Las Chollas Creek | Above Confluence with Chollas Reservoir Branch | 4.9 | 1,400 | * | 2,400 | 3,000 | 4,300 |
| Las Posas Creek | Upstream of Confluence with San Marcos Creek | * | 1,100 | * | 1,800 | 2,450 | 3,150 |
| Las Posas Creek | Upstream of Las Posas Culvert Entrance | * | 750 | * | 1,200 | 1,850 | 2,350 |
| Las Puleta Creek | At San Diego and Arizona Eastern Railroad | 2.8 | 550 | * | 1,200 | 1,400 | 2,500 |
| Las Puleta Creek | Downstream of Confluence with Logan Avenue Branch | 1.5 | 300 | * | 730 | 870 | 1,690 |
| Las Puleta Creek | At 47th Street | 0.8 | 160 | * | 390 | 470 | 910 |
| Las Puleta Creek | 0.6 Mile Upstream of Cervantes Avenue | 0.1 | 20 | * | 20 | 60 | 120 |
| Lawson Valley Creek | Approximately 7,200 Feet Upstream of Mouth | 10.2 | * | * | * | 9,000 | * |
| Loma Alta Creek | At Mouth | 9.1 | 800 | * | 2,500 | 3,800 | 8,200 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|------------------------------------|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Loma Alta Creek | Downstream of El Camino Real | 4.7 | 450 | * | 1,500 | 2,200 | 4,800 |
| Loma Alta Creek | Upstream of El Camino Real | 2.9 | 350 | * | 1,100 | 1,700 | 3,700 |
| Los Penasquitos Creek | Above Confluence with Soledad Canyon | 58.3 | 3,700 | * | 11,300 | 16,800 | 37,600 |
| Los Penasquitos Creek | At U.S. Highway 395 | 42.7 | 3,100 | * | 10,000 | 15,400 | 35,800 |
| Los Penasquitos Creek | Upstream of confluence with Chicarita Creek | 33.6 | 2,500 | * | 8,700 | 14,000 | 34,000 |
| Lusardi Creek | At Mouth | 8.6 | * | * | * | 5,680 | * |
| McGonigle Canyon Creek | Downstream of Camino Ruiz Road | 2.04 | * | * | * | 853 | * |
| McGonigle Canyon Creek | Upstream of Camino Ruiz Road | 1.35 | * | * | * | 571 | * |
| McGonigle Canyon Creek | Approximately 1,400 feet upstream of Camino Ruiz Road | 1.22 | * | * | * | 537 | * |
| McGonigle Canyon Creek Tributary A | Approximately 200 feet upstream of Confluence with McGonigle Canyon Creek | 0.08 | * | * | * | 57 | * |
| Mexican Canyon Creek | At Confluence with Sweetwater River | 4.7 | 360 | * | 1,480 | 2,250 | 3,300 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|----------------------|---|------------------------------|----------------------|------------------|--------------------|---------------------|---------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Mexican Canyon Creek | At U.S. Highway 94, 9,600 Feet Upstream of Confluence | 2.0 | 160 | * | 700 | 1,060 | 1,470 |
| Moosa Canyon Creek | Near Junction of Moosa Road and U.S. Highway 395 | 34.7 | 2,600 ¹ | * | 9,000 ¹ | 13,000 ¹ | 29,000 ¹ |
| Moosa Canyon Creek | At U.S. Highway 395, Near River at Elevation 400 Feet | 29.2 | 2,200 ¹ | * | 7,500 | 11,550 ¹ | 26,000 ¹ |
| Moosa Canyon Creek | Upstream of Confluence with South Fork Moosa Canyon Creek | 21.4 | 1,400 ¹ | * | 5,100 ¹ | 7,800 ¹ | 17,000 ¹ |
| Moosa Canyon Creek | At Old Castle Ranch | 15.0 | 800 ¹ | * | 3,300 ¹ | 5,100 ¹ | 11,000 ¹ |
| Moosa Canyon Creek | At Unnamed Road | 3.0 | * | * | * | 3,120 | * |
| Murphy Canyon Creek | Upstream of Friars Road | 12.1 | 1,500 | * | 2,700 | 3,500 | 5,500 |
| Murphy Canyon Creek | Downstream of Aero Drive | 10.1 | 1,100 | * | 2,400 | 3,000 | 3,800 ² |
| Murphy Canyon Creek | Upstream at Aero Drive | 10.1 | 1,100 | * | 2,400 | 3,000 | 5,000 |
| Murphy Canyon Creek | Downstream of Confluence with Shepard Canyon | 9.2 | 850 | * | 2,000 | 2,400 | 4,200 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---------------------|---|------------------------------|----------------------|------------------|--------------------|--------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Murphy Canyon Creek | Upstream of Confluence with Shepard Canyon | 6.2 | 550 | * | 1,400 | 1,700 | 3,300 |
| Murphy Canyon Creek | Downstream of Balboa Boulevard | 5.9 | 550 | * | 1,400 | 1,700 | 3,300 |
| Murphy Canyon Creek | Upstream of Balboa Boulevard | 5.9 | 550 | * | 1,400 | 1,700 | 3,300 |
| Murphy Canyon Creek | Downstream of Confluence with Unnamed Tributary | 5.8 | 550 | * | 1,400 | 1,700 | 3,300 |
| Murphy Canyon Creek | Downstream of Clairemont Mesa Boulevard | 3.4 | 350 | * | 800 ² | 1,000 ² | 1,850 ² |
| Murphy Canyon Creek | Upstream of Clairemont Mesa Boulevard | 3.4 | 350 | * | 950 | 1,400 | 2,800 |
| Murray Canyon Creek | At Mouth | 3.93 | 1,200 | * | 2,400 | 3,100 | 4,800 |
| Murray Canyon Creek | Upstream of Unnamed Tributary | 2.74 | 1,000 | * | 1,700 | 2,100 | 3,300 |
| Murray Canyon Creek | Downstream of Interstate Highway 805 | 1.76 | 800 | * | 1,200 ³ | 1,400 ³ | 1,800 ³ |
| Murray Canyon Creek | Upstream of Interstate Highway 805 | 1.76 | 800 | * | 1,600 | 2,100 | 3,400 |
| Nestor Creek | At Palm Avenue | 2.75 | * | * | * | 1,093 | * |
| Nestor Creek | At 19th Street | * | * | * | * | 864 ⁴ | * |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|--------------------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Nestor Creek | At Elm Avenue | 2.45 | * | * | * | 796 ⁴ | * |
| Nestor Creek | At Coronado Avenue | 2.33 | * | * | * | 698 ⁴ | * |
| Nestor Creek | At Hollister Street | 1.99 | * | * | * | 496 ⁴ | * |
| Nestor Creek | At 25th Street/Interstate 5 | 1.71 | * | * | * | 456 ⁴ | * |
| Nestor Creek | At San Diego and Arizona Eastern Railroad | 1.40 | 555 | * | 860 | 1,015 | 2,295 |
| North Avenue Tributary | Approximately 1,730 feet upstream of North Broadway | 0.5 | * | * | * | 440 | * |
| North Branch Poway Creek | At Sycamore Canyon Road | 4.5 | 650 | * | 2,000 | 3,000 | 7,200 |
| North Tributary to Santa Maria Creek | At Mouth | 1.6 | 100 | * | 600 | 1,100 | 2,900 |
| Olive Creek | At Mouth | 1.0 | * | * | * | 1,370 | * |
| Otay River | At Otay Valley Road | 122.7 | 1,200 | * | 12,000 | 22,000 | 50,000 |
| Pala Mesa Creek | Approximately 265 Feet Upstream of Interstate Highway 15 | 2.1 | * | * | * | 1,700 | * |
| Paradise Creek – Valley Road Branch | At Confluence with Paradise Creek | 0.68 | * | * | * | 468 | * |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|--------------------|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pauma Creek | At Apex of Alluvial Fan | 14.7 | 1,550 | * | 6,270 | 10,480 | 30,460 |
| Pilgrim Creek | At Mouth | 19.0 | * | * | * | 1,925 | * |
| Pilgrim Creek | Just Upstream of the Confluence with Windmill Creek | 15.8 | * | * | * | 1,888 | * |
| Pilgrim Creek | Downstream End of Oceanside Golf Course | 14.0 | * | * | * | 1,244 | * |
| Pilgrim Creek | Upstream End of Oceanside Golf Course | 14.0 | * | * | * | 5,775 | * |
| Poggi Canyon Creek | At Confluence with Otay River | 4.63 | 220 | * | 930 | 1,400 | 2,630 |
| Poggi Canyon Creek | At City of Chula Vista Corporate Limit | 3.74 | 180 | * | 830 | 1,280 | 2,470 |
| Pomerado Creek | At confluence with Poway Creek | 4.3 | * | * | * | 2,100 | * |
| Pomerado Creek | At Tassel Road | 3.9 | * | * | * | 1,990 | * |
| Pomerado Creek | At Vaughn Road | 3.3 | * | * | * | 1,750 | * |
| Pomerado Creek | At Holland Road | 2.9 | * | * | * | 1,570 | * |
| Poway Creek | USGS Gage at Cobblestone Creek Road | 31.2 | 2,500 | * | 8,700 | 14,000 | 34,000 |
| Poway Creek | US GS Gage 1,000 feet Upstream of Standish Drive | 7.9 | 1,100 | * | 3,700 | 5,600 | 14,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Rainbow Creek | At Interstate Highway 15 | 7.1 | * | * | * | 5,210 | * |
| Rattlesnake Creek | USGS Gage 400 feet Upstream of Confluence with Poway Creek | 8.1 | 750 | * | 2,500 | 3,900 | 9,700 |
| Reidy Creek | Above Confluence with Escondido Creek | 15.1 | 1,300 | * | 5,000 | 7,700 | 14,000 |
| Reidy Creek | At Rincon Avenue | 10.5 | 1,100 | * | 5,000 | 7,100 | 14,000 |
| Reidy Creek | Upstream of Jesmond Dene Avenue | 4.5 | 600 | * | 2,600 | 4,000 | 7,300 |
| Rice Canyon Creek | At Confluence with Sweetwater River | 3.60 | 180 | * | 920 | 1,400 | 2,030 |
| Rice Canyon Creek | At H Street | 3.25 | 170 | * | 890 | 1,350 | 1,940 |
| Rice Canyon Creek | 4,780 Feet Upstream of H Street | 2.64 | 140 | * | 780 | 1,200 | 1,710 |
| Rincon Avenue Tributary | Approximately 1,400 feet upstream of Confluence with Reidy Creek | 2.33 | * | * | * | 1,830 | * |
| Rose Canyon Creek | At Mouth | 37.0 | 2,700 | * | 8,100 | 12,000 | 28,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Rose Canyon Creek | Downstream of Confluence with San Clemente Creek | 32.1 | 2,500 | * | 7,600 | 11,000 | 26,500 |
| Rose Canyon Creek | Upstream of Confluence with San Clemente Creek | 13.7 | 1,300 | * | 4,000 | 6,200 | 13,900 |
| Rose Canyon Creek | Upstream of State Highway 52 | 13.2 | 1,300 | * | 3,800 | 6,100 | 13,400 |
| Rose Canyon Creek | Downstream of Genesse Avenue | 9.7 | 1,100 | * | 3,200 | 5,000 | 11,200 |
| Rose Canyon Creek | Downstream of Interstate Highway 805 | 6.9 | 900 | * | 2,700 | 4,100 | 9,400 |
| Samagutuma Creek | At Mouth | 6.4 | 900 | * | 2,600 | 4,000 | 7,000 |
| San Clemente Canyon Creek | Upstream of Confluence with Rose Canyon Creek | 18.4 | 1,400 | * | 4,200 | 6,900 | 16,000 |
| San Clemente Canyon Creek | Upstream of Genesee Avenue | 15.3 | 1,200 | * | 3,600 | 5,600 | 12,000 |
| San Clemente Canyon Creek | Upstream of Interstate Highway 805 | 12.5 | 1,000 | * | 3,100 | 4,900 | 11,000 |
| San Diego River | At Confluence with Murphy Canyon Creek | 420.0 | 3,100 | * | 17,000 | 36,000 | 112,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|--------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego River | Just Downstream of Confluence of San Vicente Creek | 290.0 | 2,500 | * | * | 31,000 | * |
| San Dieguito River | Upstream of Camino Del Mar Bridge | * | 5,700 | * | 31,400 | 41,800 | 90,000 |
| San Dieguito River | Upstream of Atchison, Topeka & Santa Fe Railway Bridge | * | 5,700 | * | 31,400 | 41,800 | 90,000 |
| San Dieguito River | Upstream of Jimmy Durante Bridge | * | 5,800 | * | 32,100 | 42,400 | 90,000 |
| San Dieguito River | Upstream of U.S. Interstate Highway 5 Bridge | * | 5,900 | * | 32,500 | 42,800 | 90,000 |
| San Elijo Creek | 0.1 Mile Upstream of El Camino Road | 5.4 | 500 | * | 1,600 | 2,100 | 5,500 |
| San Luis Rey River | At Mouth | 560.0 | 6,600 | * | 31,000 | 51,000 | 120,000 |
| San Luis Rey River | Downstream of Confluence with Moosa Canyon | 355.6 | 6,200 | * | 30,000 | 48,000 | 110,000 |
| San Luis Rey River | Downstream of Confluence with Keys Canyon | 252.3 | 5,000 | * | 25,000 | 41,000 | 98,000 |
| San Luis Rey River | Upstream of Confluence with Keys Canyon | 180.4 | 4,000 ⁵ | * | 20,000 | 33,000 | 85,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|--------------------|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Luis Rey River | Downstream of Palma | 167.3 | 4,000 ⁵ | * | 18,000 | 30,000 | 78,000 |
| San Luis Rey River | Downstream of Confluence with Puma Creek | 126.7 | 4,000 ⁵ | * | 16,800 | 28,000 | 72,800 |
| San Luis Rey River | Upstream of Confluence with Puma Creek | 71.5 | 5,000 | * | 15,000 | 24,500 | 64,000 |
| San Marcos Creek | Upstream of the San Marcos Dam (Lake San Marcos) | 28.1 | * | * | * | 15,700 | * |
| San Marcos Creek | Upstream of Discovery Street | * | 7,400 | * | 13,300 | 14,700 | 19,350 |
| San Marcos Creek | Upstream of Confluence with Las Posas Creek | * | 6,450 | * | 11,650 | 13,150 | 16,950 |
| San Marcos Creek | Upstream of Highway 78 | * | 6,200 | * | 11,000 | 12,450 | 16,000 |
| San Marcos Creek | Upstream of Confluence with Twin Oaks Valley Creek | * | 2,600 | * | 4,550 | 5,150 | 6,600 |
| San Marcos Creek | Approximately 1,000 Feet Upstream of Confluence with Twin Oaks Valley Creek | * | 2,200 | * | 3,900 | 4,400 | 5,600 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Vicente Creek | At Mouth | 83.0 | 1,400 | * | 10,500 | 16,000 | 34,000 |
| Santa Maria Creek (Santa Maria Valley Area) | Below Confluence with North Tributary | 33.1 | 1,900 | * | 9,200 | 15,600 | 42,000 |
| Santa Maria Creek (San Pasqual Valley Area) | At Confluence with Santa Ysabel Creek | 60.0 | 3,200 | * | 14,700 | 19,000 | 30,000 |
| Santa Ysabel Creek | Lake Hodges at Hodges Dam | 290 | 10,000 | * | 48,000 | 62,000 | 95,000 |
| Santa Ysabel Creek | Below Confluence with Santa Maria Creek | 221 | 9,000 | * | 42,500 | 55,000 | 85,000 |
| Santa Ysabel Creek | Above Confluence with Santa Maria Creek | 160 | 6,100 | * | 29,000 | 37,000 | 60,000 |
| Santa Ysabel Creek | Approximately 15,500 Feet Upstream of Confluence with Witch Creek | 23.8 | * | * | * | 20,750 | * |
| Shallow Flooding Area – South | Citrus Wash at Escondido Creek, 500 Feet Downstream of the Rose Street Bridge | 2.4 | 600 | * | 1,440 | 1,920 | 2,550 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-------------------------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Shallow Flooding Area – South | Citrus Wash at Reed Road, 600 Feet West of Falconer Road | 0.3 | 100 | * | 230 | 290 | 380 |
| Shallow Flooding Area – South | South Midway Wash at Midway Drive, 400 Feet Northwest of Grand Avenue | 2.0 | 490 | * | 1,180 | 1,570 | 2,070 |
| Shallow Flooding Area – North | Midway Wash at Midway Drive Crossing of Escondido Creek | 2.0 | 350 | * | 1,060 | 1,520 | 2,020 |
| Shallow Flooding Area – North | Lincoln Avenue and Midway Drive | 1.7 | 290 | * | 920 | 1,310 | 1,750 |
| Shallow Flooding Area – North | Maywood Wash at Intersection of East Lincoln Avenue and Nightingale Place | 1.3 | 230 | * | 720 | 1,020 | 1,350 |
| Shallow Flooding Area – West | Country Club Creek at El Norte Parkway, 1,100 Feet Northwest of Bennett Avenue | 2.1 | 540 | * | 1,330 | 1,700 | 2,220 |
| Shallow Flooding Area – West | Country Club Creek at Nutmeg Street, 1,200 Feet North of Golden Circle Drive | 0.3 | 70 | * | 200 | 260 | 350 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-------------------------------|--|------------------------------|----------------------|------------------|------------------|--------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Shallow Flooding Area – West | Unnamed Tributary at Intersection of Golden Circle Drive and Country Club Lane | 0.9 | 240 | * | 590 | 770 | 990 |
| Slaughterhouse Creek | Approximately 1,800 Feet Upstream of Mouth | 2.9 | * | * | * | 2,450 | * |
| Soledad Canyon | At Mouth | 95.5 | 5,000 | * | 15,400 | 23,000 | 51,500 |
| Soledad Canyon | Downstream of Confluence with Los Penasquitos Creek | 76.1 | 4,200 | * | 13,100 | 19,000 | 43,700 |
| South Branch Poway Creek | Approximately 1,150 Feet Upstream of Sycamore Canyon Road | 1.8 | 400 | * | 1,200 | 1,800 | 4,300 |
| South Fork Moosa Canyon Creek | 0.3 Mile Above Mouth | 7.1 | 1,200 ¹ | * | 3,400 | 5,200 ¹ | 10,400 |
| South Fork Moosa Canyon Creek | At Oak Shadows Drive | 4.3 | 700 | * | 2,100 | 3,200 | 6,500 |
| South Las Chollas Creek | Above Confluence with Las Chollas Creek | 10.9 | 2,000 | * | 3,900 | 5,300 | 9,500 |
| South Las Chollas Creek | Above Confluence with Encanto Branch | 3.3 | 730 | * | 1,400 | 1,900 | 3,400 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|--------------------------------------|---|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| South Las Chollas Creek | At Kelton Road | 2.6 | 580 | * | 1,100 | 1,500 | 2,700 |
| South Tributary to Santa Maria Creek | At Mouth | 9.3 | 700 | * | 3,400 | 5,800 | 15,000 |
| Spring Valley Creek | Below Confluence with Casa de Oro Creek | 7.1 | 1,300 | * | 2,600 | 3,600 | 9,300 |
| Steele Canyon Creek | At Mouth | 2.7 | * | * | * | 2,980 | * |
| Stevenson Creek | At Mouth | 1.2 | * | * | * | 900 | * |
| Sweetwater River (Above Reservoir) | At Broadway | 219.0 | 1,200 | * | 21,000 | 35,000 | 60,000 |
| Sweetwater River (Above Reservoir) | At Intersection of Sweetwater and Bonia Roads | 197.0 | 1,200 | * | 21,000 | 35,000 | 60,000 |
| Sweetwater River (Above Reservoir) | Below Confluence with Spring Valley Creek | 194.0 | 1,200 | * | 21,000 | 35,000 | 60,000 |
| Sweetwater River (Above Reservoir) | Above Sweetwater Reservoir | 174.0 | 5,600 | * | 21,500 | 29,500 | 53,600 |
| Sweetwater River (Above Reservoir) | Below Confluence with Harbison Creek | 138.0 | 5,500 | * | 21,000 | 29,000 | 53,000 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-------------------------------------|---|------------------------------|----------------------|------------------|------------------|--------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Sweetwater River (Above Reservoir) | Below Confluence with North Fork | 131.0 | 5,300 | * | 20,500 | 28,000 | 50,000 |
| Sweetwater River (At National City) | At Broadway | 291.0 | 1,200 | * | 21,000 | 35,000 | 60,000 |
| Sweetwater River (Near Descanso) | At Japatul Valley Road Bridge | 41.0 | 3,800 | * | 14,800 | 20,300 | 36,800 |
| Sweetwater River (Near Descanso) | Above Confluence with Descanso Creek | 25.2 | 2,900 | * | 11,000 | 15,100 | 27,200 |
| Switzer Creek | At Harbor Drive | 4.3 | 830 | * | 2,200 | 2,600 | 5,000 |
| Switzer Creek | Upstream of Russ Boulevard | 3.5 | 675 | * | 1,540 | 1,870 | 3,220 |
| Switzer Creek | Above Confluence with Florida Drive Branch | 1.0 | 185 | * | 420 | 510 | 880 |
| Tecolote Creek | At Interstate Highway 5 | 9.29 | 2,100 | * | 3,800 | 4,900 | 9,300 |
| Tecolote Creek | Downstream of Confluence with Unnamed Tributary | 7.28 | 2,000 | * | 3,700 | 4,700 | 8,900 |
| Tecolote Creek | Upstream of Confluence with Unnamed Tributary | 4.04 | 1,100 | * | 1,900 | 2,400 | 4,500 |
| Tecolote Creek | Downstream of Balboa Avenue | 2.54 | 750 | * | 1,300 | 1,600 ⁷ | 2,600 ⁷ |
| Tecolote Creek | Upstream of Balboa Avenue | 2.54 | 750 | * | 1,300 | 1,700 | 3,100 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---|--|------------------------------|----------------------|------------------|------------------|--------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Tecolote Creek | Downstream of Genesee Avenue | 1.64 | 640 | * | 1,100 | 1,400 ⁸ | 2,100 ⁸ |
| Tecolote Creek | Upstream of Genesee Avenue | 1.64 | 640 | * | 1,100 | 1,500 | 3,000 |
| Telegraph Canyon Creek | At Interstate Highway 5 | 7.3 | 900 | * | 2,100 | 2,800 | 5,500 |
| Telegraph Canyon Creek | At Hilltop Drive | 5.5 | 600 | * | 1,600 | 2,200 | 4,700 |
| Telegraph Canyon Creek | Upstream of La Media Road | 2.35 | * | * | * | 1,197 | * |
| Telegraph Canyon Creek | Downstream of La Media Road | 2.35 | * | * | * | 962 ⁹ | * |
| Telegraph Canyon Creek | At approximately 2,000 feet upstream of St. Claire Drive | 1.04 | 290 | * | 583 | 854 | 1,100 |
| Tijuana River | At Mouth | 1,700.0 | 17,000 | * | 50,000 | 75,000 | 150,000 |
| Travertine Palms Wash | At Apex of Fan | 4.6 | * | * | * | | * |
| Tributary of South Tributary to Santa Maria Creek | At Mouth | 5.8 | 400 | * | 2,100 | 3,600 | 9,400 |
| Tributary to Sweetwater River | At Arroyo Road | 2.8 | * | * | * | 2,070 | * |
| Tributary to Forester Creek | At Madison Avenue | 1.8 | * | * | * | 1,002 | * |
| Twin Oaks Valley Creek | Upstream of Confluence with San Marcos Creek | * | 3,450 | * | 6,250 | 7,100 | 9,100 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|---|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Twin Oaks Valley Creek | Approximately 1,700 feet Upstream of Windy Way | * | 3,250 | * | 5,900 | 6,700 | 8,700 |
| Twin Oaks Valley Creek | At Olive Drive | 6.7 | 3,200 | * | 5,250 | 6,500 | 8,400 |
| Twin Oaks Valley Creek | Upstream Buena Creek Road | * | 2,600 | * | 4,600 | 5,200 | 6,700 |
| Unnamed Canyon | At Apex of Alluvial Fan | 4.6 | 650 | * | 1,900 | 2,900 | 5,100 |
| Unnamed Canyon 1 | At Apex of Alluvial Fan | 7.5 | * | * | * | | * |
| Unnamed Canyon 2 | At Apex of Alluvial Fan | 3.7 | * | * | * | | * |
| Unnamed Canyon North of Travertine Palms Wash | At Apex of Alluvial Fan | 2.3 | * | * | * | | * |
| Unnamed Tributary 2 | At Apex of Alluvial Fan | 4.3 | * | * | * | | * |
| Unnamed Tributary to San Dieguito River | At Four Gee Road | 1.82 | * | * | * | 1,217 | * |
| Vado Canyon | At Apex of Alluvial Fan | 3.5 | 400 | * | 1,500 | 2,200 | 4,100 |
| Wabash Branch | Above Confluence with Las Chollas Creek | 4.1 | 700 | * | 1,380 | 1,600 | 2,700 |
| Wabash Branch | Above Confluence with Wabash Tributary | 3.5 | 570 | * | 1,190 | 1,380 | 2,330 |

Table 9: Summary of Discharges, continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | |
|-----------------|--|------------------------------|----------------------|------------------|------------------|------------------|--------------------|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Witch Creek | Approximately 7,700 Feet Upstream of Mouth | 3.3 | * | * | * | 3,540 | * |

*Not calculated for this Flood Risk Project

¹Flows partially controlled by Turner Dam

²Decreases due to ponding upstream

³Decrease due to overbank losses upstream

⁴Decrease due to construction of "Lot 6 Detention Basin" upstream of Railroad

⁵Discharge decreases with increasing area due to breakouts from the low flow channel

⁶This area is subject to overflow flooding; and therefore, does not have a defined contributing drainage

⁷Decrease due to culvert restriction at Balboa Avenue

⁸Decrease due to culvert restriction at Genesee Avenue

⁹Decrease due to detention upstream of culvert

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 10: Summary of Non-Coastal Stillwater Elevations

| Flooding Source | Location | Elevations (feet NAVD88) | | | | |
|-----------------|-------------------|--------------------------|------------------|------------------|------------------|--------------------|
| | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | Detention Basin 1 | * | * | * | 526.1 | 527.1 |

*Not calculated for this Flood Risk Project

Table 11: Stream Gage Information used to Determine Discharges

| Flooding Source | Gage Identifier | Agency that Maintains Gage | Site Name | Drainage Area (Square Miles) | Period of Record | |
|---------------------------|-----------------|----------------------------|--|------------------------------|------------------|----|
| | | | | | From | To |
| Alhambra Wash | 11101380 | USGS | Near Klingerman Street | 15.2 | * | * |
| Alvarado Creek | * | * | | * | * | * |
| Bandy Canyon | * | * | Upstream end of Bandy Canyon | * | * | * |
| Beeler Creek | 11023325 | USGS | Downstream side of Pomerado Road | 5.46 | * | * |
| Compton Creek | 11102750 | USGS | At 120 th Street | 14.5 | * | * |
| Compton Creek | * | * | Near Greenleaf Drive | * | * | * |
| Forester Creek | * | * | At Cuyamaca Street | * | * | * |
| Las Chollas Creek | * | * | At Wabash and Oceanview | * | * | * |
| Poway Creek | * | USGS | At Cobblestone Creek Road | * | * | * |
| Poway Creek | 11023250 | USGS | 1,000 feet upstream of Standish Drive | 7.92 | * | * |
| Rattlesnake Creek | 11023310 | USGS | 400 feet upstream of confluence with Poway Creek | 8.13 | * | * |
| Rubio Wash | 11101180 | USGS | At Glendon Way | 11.1 | * | * |
| Santa Ysabel Creek | 11026000 | USGS | San Pasqual | 128 | * | * |
| Santelle-Westwood Channel | * | * | Near Cuber Boulevard | * | * | * |

Table 11: Stream Gage Information used to Determine Discharges, continued

| Flooding Source | Gage Identifier | Agency that Maintains Gage | Site Name | Drainage Area (Square Miles) | Period of Record | |
|--|-----------------|----------------------------|-----------------------------|------------------------------|------------------|----|
| | | | | | From | To |
| South Chollas Tributary (Encanto Branch) | * | * | At Euclid and Market Street | * | * | * |
| Spring Valley Creek | * | * | At Coodland Acres park | * | * | * |

*Data not available

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed on Table 23, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|--|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Adobe Creek | Confluence with Kit Carson Park Creek | Approximately 1,735 feet upstream of Las Palmas Avenue | * | * | 1985 | AE | |
| Agua Hedionda Creek | Approximately 1,500 feet downstream of Melrose Drive | Approximately 200 feet downstream of the confluence of Buena Creek | Drainage Area Ratio Method | HEC-GeoRAS and HEC-RAS | 2002 | AE | |
| Agua Hedionda Creek | Approximately 1,735 feet upstream of Sunny Creek Road | Approximately 200 feet downstream of the confluence of Buena Creek | * | * | 1981 | A | |
| Agua Hedionda Creek (At City of Carlsbad) | 0.2 miles downstream of El Camino Real | Oak Lake | * | HEC-2 | 1995 | AE w/ Floodway | The 100-year peak discharges were obtained from the Hydrologic Study for Northeastern Carlsbad. |
| Agua Hedionda Creek (At City of Vista) | Approximately 200 feet downstream of the confluence of Buena Creek | Cherimoya Drive | * | HEC-2 | 1981 | AE w/ Floodway | |
| Agua Hedionda Lagoon | Not provided | Not provided | * | * | 1981 | A | |
| Alpine Creek | Not provided | Not provided | * | * | 1986 | A | |
| Alvarado Creek | Confluence with San Diego River | Approximately 1.5 miles downstream of Baltimore Drive | HEC-1 | HEC-2 | 1998 | AE w/ Floodway | |
| Alvarado Creek | Approximately 1.5 miles downstream of Baltimore Drive | Baltimore Drive | HEC-1 | HEC-RAS and HEC-2 | 2000 | AE w/ Floodway | This study is using the flow values that were computed and approved by FEMA in the 1997 Limited Map Maintenance Program study. |
| Arroyo Drive Tributary | Not provided | Not provided | * | * | 1979 | A | |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---------------------|---|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Bailey Creek | Not provided | Not provided | * | * | * | A | |
| Barrett Lake | Not provided | Not provided | * | * | * | A | |
| Batiquitos Lagoon | Not provided | Not provided | * | * | * | A, AE | |
| Beaver Hollow Creek | Approximately 2,680 feet upstream of confluence with Sweetwater Creek | Approximately 900 feet upstream of Beaver Hollow Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Bee Canyon | Not provided | Not provided | * | * | * | A | |
| Beeler Creek | Confluence with Poway Creek | Approximately 2.7 miles upstream of Pomerado Road | * | HEC-2 | 1983 | AE w/ Floodway | Peak discharges for the 1-percent annual chance floods were taken from Hydrology Report for Poway Creek Complex (San Diego County, Department of Sanitation and Flood Control, 1977). Discharges for 10-, 2-, and 0.2-percent annual chance recurrence intervals were taken from Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (USACE, April 1976). |
| Borrego Palm Canyon | Not provided | Not provided | * | HEC-2 | * | A, AO | Studied by the alluvial fan method. |
| Borrego Sink | Not provided | Not provided | * | * | * | A | |
| Borrego Sink Wash | Not provided | Not provided | * | * | * | A | |
| Box Canyon | Not provided | Not provided | * | HEC-2 | * | AO | Studied by the alluvial fan method. |
| Broadway Creek | Confluence with Forester Creek | Approximately 35 feet upstream of Oro Street | * | HEC-2 | 1976 | AE w/ Floodway | Peak discharges were taken from a Hydrology for Survey Report (USACE, 1974). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|----------------------------------|---|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Buena Creek | Confluence with Agua Hedionda Creek | Approximately 600 feet upstream of Hollyberry Drive | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Buena Vista Creek | Not provided | Not provided | * | HEC-2 | 1986 | AE w/ Floodway | Discharges were taken from a 1976 San Diego County Department of Sanitation and Flood Control (DSPC) study (San Diego County, Department of Sanitation and Flood Control, 1976). Starting water-surface elevations were calculated assuming critical depth. |
| Buena Vista Creek | Northwestern portion in City of Vista | Northwestern portion in City of Vista | * | HEC-2 | 1985 | AE w/ Floodway | Discharges were taken from a 1976 San Diego County Department of Sanitation and Flood Control (DSPC) study (San Diego County, Department of Sanitation and Flood Control, 1976). Starting water-surface elevations were calculated assuming critical depth. |
| Buena Vista Creek Tributary 1 | Approximately 1,420 feet downstream of Monte Vista Drive | Valley Drive | * | HEC-2 | * | AE | Starting water-surface elevation was derived from the downstream culvert analysis. |
| Buena Vista Creek Tributary 2 | Not provided | Not provided | * | * | * | A | |
| Buena Vista Creek Tributary 3 | Confluence with Buena Vista Creek | Approximately 40 feet upstream Cananea Street | * | * | * | AE | |
| Buena Vista Creek Tributary 4 | Not provided | Not provided | * | * | * | A | |
| Buena Vista Lagoon | Not provided | Not provided | * | * | 1981 | A | |
| Cadman Street Tributary | Not provided | Not provided | * | * | 1979 | A | |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--------------------------|--|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Calavera Creek | Confluence with Agua Hedionda Creek | Approximately 0.2 mile upstream of the boundary of the Rancho Carlsbad Mobile Home | * | HEC-2 | 1995 | AE w/ Floodway | The 100-year peak discharges were obtained from the Hydrologic Study for Northeastern Carlsbad. |
| Campo Creek | Not provided | Not provided | * | * | 1993 | A | |
| Carmel Valley Creek | Approximately 125 feet downstream of Sorrento Valley Road | Approximately 350 feet upstream of confluence of McGonigle and Deer Canyon | * | HEC-2 | 1985 | AE w/ Floodway | Peak discharges were modified to better account for changes in drainage area along the detailed study reach. Starting water-surface elevations were taken from the flood profile for Soledad Canyon. |
| Carroll Canyon Creek | At Atchinson, Topeka and Santa Fe Railroad bridge | Approximately 450 feet upstream of Semillon Boulevard | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from the 1976 Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (U.S. Department of the Army, Corps of Engineers, April 1976). Starting water-surface elevations were determined from the flood profile for Soledad Canyon. |
| Casa De Oro Creek | Not provided | Not provided | * | * | 1981 | A | Peak discharges were taken from a 1973 hydrology report (USACE, June 1973 (a)). |
| Chicarita Creek | Not provided | Not provided | * | * | 1985 | A | |
| Chocolate Canyon | Not provided | Not provided | * | * | * | A | |
| Chollas Reservoir Branch | Not provided | Not provided | * | * | 1979 | A | |
| Coleman Creek | Approximately 5,800 feet upstream of confluence with San Diego River | Approximately 20 feet upstream of State Route 78 | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|-----------------------|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Coleman Creek | Not provided | Not provided | * | * | * | A | |
| County Ditch Creek | Confluence with Forester Creek | Approximately 230 feet upstream of West Renetta Avenue | HEC-1 | HEC-2 | 1976 | AE w/ Floodway | The Modified Puls Method was used to account for heavy ponding upstream from Interstate 8. |
| Coyote Creek | Not provided | Not provided | * | HEC-2 | * | A, AO | Studied by the alluvial fan method. |
| Culp-Tubb Canyon | Not provided | Not provided | * | HEC-2 | * | AO | Studied by the alluvial fan method. |
| Curlew Creek | Not provided | Not provided | * | * | 1979 | A | |
| Deer Springs Creek | Approximately 650 feet upstream of confluence with Twin Oaks Valley Creek | Approximately 4,370 feet upstream of Marilyn Lane | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Descanso Creek | Confluence with Sweetwater River | Approximately 1,970 feet upstream of Camino De Tierra Road | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from a 1973 hydrology report (USACE, May 1973). |
| Dry Canyon | Not provided | Not provided | * | HEC-2 | * | AO | Studied by the alluvial fan method. |
| Dulzura Creek | Not provided | Not provided | * | * | 1993 | A | |
| El Vado Canyon | Not provided | Not provided | * | HEC-2 | * | A, AO | Studied by the alluvial fan method. |
| Encanto Branch | Confluence with South Las Chollas Creek | Approximately 1,240 feet upstream of 69th Street | * | HEC-2 | 1979 | AE w/ Floodway | |
| Encinitas Creek | Not provided | Not provided | * | * | 1981 | A | |
| Escondido Creek | Not provided | Not provided | * | * | 1993 | A | |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|--|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Escondido Creek (Above Lake Wohlford) | Approximately 2 miles upstream of Wohlford Dam | Approximately 1,400 feet upstream of Bear Valley Heights Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Escondido Creek (At Encinitas) | Approximately 2 miles upstream of Pacific Ocean | Approximately 0.8 mile upstream of El Camino Del Norte | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). Starting water-surface elevations were calculated by a reservoir-routing procedure at San Elijo Lagoon near the Pacific Ocean. |
| Escondido Creek (At Escondido) | Approximately 10.4 miles upstream of Pacific Ocean | Approximately 1,440 feet upstream of Harmony Grove Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Escondido Creek (Left Reach) | Approximately 2 miles upstream of Wohlford Dam | Approximately 2,025 feet upstream of Guejito Road | * | HEC-2 | 1993 | AE | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Eucalyptus Hills (East Branch) | Approximately 1,620 feet upstream of confluence with San Diego River | Approximately 2,660 feet upstream of Lakeside Avenue | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Eucalyptus Hills (West Branch) | Approximately 850 feet upstream of confluence with San Diego River | Approximately 4,775 feet upstream of Chase Creek Lane | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Fire Canyon | Not provided | Not provided | * | HEC-2 | * | AO | Studied by the alluvial fan method. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|-----------------------|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Florida Drive Branch | Confluence with Switzer Creek | Approximately 360 feet upstream of confluence of Pershing Drive Branch | * | HEC-2 | 1979 | AE w/ Floodway | |
| Forester Creek | State Highway 67 | Approximately 1.2 miles upstream of Shadow Mountain Road | * | HEC-2 | 1993 | A, AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). Starting water-surface elevation was determined by the slope-area method. |
| Garrison Creek | Not provided | Not provided | * | HEC-2 | 1985 | A, AE w/ Floodway | Flood hydrographs and peak discharges were based on rainfall-runoff hydrograph computations. |
| Gonzales Canyon Creek | Not provided | Not provided | * | HEC-2 | 1985 | A, AE w/ Floodway | |
| Gopher Canyon Creek | Approximately 525 feet upstream of confluence with San Luis Rey River | Approximately 620 feet upstream of Valley of the King Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Green Valley Creek | Approximately 3,040 feet downstream of Avenida Florencia | Approximately 3,100 feet upstream of Orchard Bend Road | CN and HYDRO2 | HEC-2 | 1983 | AE w/ Floodway | The 10- and 1-percent annual chance peak discharges are based on computation methods explained in the San Diego County Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). Starting water-surface elevations were taken from a known 1-percent annual chance flood elevation approximately 170 feet upstream of Pomerado Road in the community of Rancho Bernardo. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---------------------------------|--|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Green Valley Creek Tributary | Confluence with Green Valley Creek | Painted Desert Road | CN and HYDRO2 | HEC-2 | 1983 | AE w/ Floodway | The 10- and 1-percent annual chance peak discharges are based on computation methods explained in the San Diego County Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). Starting water-surface elevations were taken from the main stem. |
| Guejito Creek | Not provided | Not provided | * | * | * | A | |
| Harbison Canyon Creek | Approximately 1,520 feet downstream of 26th East Street | Approximately 620 feet upstream of Patrick Drive | * | HEC-2 | 1986 | AE w/ Floodway | Peak discharges were taken from a 1973 hydrology report (USACE, May 1973). |
| Hatfield Creek | Confluence with Santa Maria Creek | Approximately 200 feet upstream of State Highway 78 | * | HEC-2 | 1981 | AE w/ Floodway | |
| Hellhole Canyon | Not provided | Not provided | * | HEC-2 | * | AO | Studied by the alluvial fan method. |
| Henderson Canyon | Not provided | Not provided | * | HEC-2 | * | A, AO | Studied by the alluvial fan method. |
| Home Avenue Branch | Confluence with Las Chollas Creek | Approximately 550 feet upstream of Auburn Drive | * | * | 1979 | AE w/ Floodway | Normal-depth calculations were used to establish water-surface elevations. |
| Jamacha Branch | Not provided | Not provided | * | * | 1979 | A | |
| Johnson Canyon Creek | Approximately 120 feet upstream of confluence with Otay River | Approximately 2.6 miles upstream of confluence with Otay River | * | * | * | AE w/ Floodway | |
| Keys Canyon Creek | Not provided | Not provided | * | * | 1993 | A, AE | The 100-year flood elevations were computed using Manning's equation, USGS Flood-Prone Area Maps (USGS various (a)), and USGS topographic maps (USGS various (b)). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|------------------------------------|---|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Keys Canyon Creek Tributary 1 | Not provided | Not provided | * | * | * | A, AE | Discharges were gathered from LOMR # 07-09-1709P that was filed for Keys Canyon Creek at Lilac Ranch. |
| Keys Canyon Creek Tributary 2 | Confluence with Keys Canyon Creek | Approximately 1,125 feet upstream above Old Lilac Road | * | * | * | AE | Discharges were gathered from LOMR #07-09-1709P that was filed for Keys Canyon Creek at Lilac Ranch. |
| Kit Carson Park Creek | Approximately 2.2 miles above Lake Hodges Dam | Approximately 2,450 feet upstream of Bear Valley Parkway | * | HEC-2 | 1981 | AE w/ Floodway | Starting water-surface elevations are based on the resulting Lake Hodges elevation when the spillway discharges 50,000 cfs. |
| Kit Carson Park Creek | Not provided | Not provided | * | * | 1993 | A | The 100-year flood elevations were computed using Manning's equation, USGS Flood-Prone Area Maps (USGS various (a)), and USGS topographic maps (USGS various (b)). |
| Kit Carson Park Creek Tributary | Not provided | Not provided | * | * | 1981 | A | |
| La Orillia Road Tributary | Not provided | Not provided | * | * | * | A | |
| La Zanja Canyon | Not provided | Not provided | * | * | 1985 | A | |
| Lake Hodges | Not provided | Not provided | * | * | 1985 | A | |
| Las Chollas Creek | Approximately 85 feet downstream of Main Street | Approximately 1,775 feet upstream of 54th Street | * | HEC-2 | 1979 | AE w/ Floodway | Peak discharges below Federal Boulevard reflect values obtained by the USACE (USACE, April 1975) and agreed upon by representatives of San Diego County, the City of San Diego, and the USACE. Normal-depth calculations were used to establish water-surface elevations. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|----------------------------|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Las Posas Creek (Lower) | Not provided | Not provided | NRCS | HEC-2 | 1989 | AE w/ Floodway | The method used to develop the hydrology follows the procedures recommended in the San Diego County Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). |
| Las Posas Creek (Upper) | Linda Vista Drive | Approximately 930 feet upstream of West Mission Road | NRCS | HEC-2 | 1989 | AE w/ Floodway | The method used to develop the hydrology follows the procedures recommended in the San Diego County Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). |
| Las Puleta Creek | Not provided | Not provided | * | HEC-2 | 1979 | A, AE, AO | Normal-depth calculations were used to establish water-surface elevations. |
| Lawson Valley Creek | Approximately 1.4 miles upstream of confluence with Sweetwater River | Approximately 1,770 feet upstream of Rudnick Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Loma Alta Creek | Pacific Street | Approximately 1 mile upstream of Railroad | * | * | 1997 | AE w/ Floodway | |
| Los Coches Creek | Confluence with San Diego River | Ha-Hana Road | * | * | 1987 | A | |
| Los Coches Creek | Ha-Hana Road | Approximately 1.4 miles upstream of Rios Canyon Road | * | * | 1981 | A | |
| Los Pensaquitos Creek | Just upstream of confluence of Chicarita Creek | At Chambers Dam | * | HEC-2 | 1985 | AE w/ Floodway | Peak discharges were taken from the 1976 Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (U.S. Department of the Army, Corps of Engineers, April 1976). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--|--|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Los Pensaquitos Creek | Not provided | Not provided | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from the 1976 Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (U.S. Department of the Army, Corps of Engineers, April 1976). |
| Lusardi Creek | Confluence with San Diego River | Approximately 1 mile upstream of confluence with San Diego River | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Lusardi Creek | Not provided | Not provided | * | * | 1985 | A | |
| Maple Street Canyon Tributary | Not provided | Not provided | * | * | 1979 | A | |
| Mataqual Creek | Not provided | Not provided | * | * | * | A | |
| McGonigle Canyon Creek | Not provided | Not provided | * | HEC-2 | 1985 | A, AE w/ Floodway | |
| McGonigle Canyon Creek Tributary A | Confluence with McGonigle Canyon Creek Tributary A | Approximately 560 feet upstream of confluence with McGonigle Canyon Creek Tributary A | * | HEC-2 | 1985 | AE w/ Floodway | |
| Mexican Canyon Creek | Confluence with Sweetwater River | Approximately 1,580 feet upstream of Jamul Drive | * | HEC-2 | * | AE w/ Floodway | |
| Miramar Reservoir | Not provided | Not provided | * | * | 1985 | A | |
| Moosa Canyon Creek | Not provided | Not provided | * | * | * | A | |
| Moosa Creek (North Branch) | Private Road | Approximately 25 feet upstream of South Canal Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|-------------------------------|--|---|---------------------------------------|--------------------------------------|-------------------------------|------------------------------|--|
| Moosa Creek (South Branch) | Confluence with Moosa Creek North Branch | Approximately 10 feet upstream of North Lake Wohlford Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Murphy Canyon Creek | Approximately 170 feet upstream of Friars Road | Approximately 165 feet upstream of Clairemont Mesa Boulevard | * | * | 1985 | AE w/ Floodway | Peak discharges were taken from Revised Murphy Canyon Peak Discharge Table (USACE, 1980). The 0.2-percent annual chance flood peak was extrapolated graphically from the smaller peaks. Normal-depth calculations were used to establish water-surface elevations. |
| Murray Canyon Creek | Not provided | Not provided | * | HEC-2 | 1981 | A, AE | Peak discharges were taken from Hydrology for Flood Insurance Studies, Murray Canyon Creek, San Diego County, California (USACE, 1978). Discharges decrease in a downstream direction due to two breakouts. Breakouts occur just upstream of the gravel pit area and at the Friars Road overpass. Starting water-surface elevations were taken from flood profiles for San Diego River. |
| Murray Reservoir | Not provided | Not provided | * | * | 1985 | A | |
| Nestor Creek | Confluence with Otay River | Upstream side of Interstate Highway 5 | SCS | HEC-2 | 1989 | AE, AE w/ Floodway, AH | The 1-percent annual chance discharges for the Nestor Creek restudy were developed by the National Resources conservation Service (NRCS) formerly Soil Conservation Service (SCS) (U.S. Department of Agriculture, Soil Conservation Service, 1964, with updates and Boyle Engineering Corporation, Hydrologic Analysis, 1978) for the previous FIS, but these values have been changed according to the Leedshill-Herkenhoff, Inc., report published in November 1986 "Nestor Creek Flood Control Master Plan". |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--|---|--|---------------------------------------|--------------------------------------|-------------------------------|------------------------------|---|
| Nestor Creek, continued | Confluence with Otay River | Upstream side of Interstate Highway 5 | SCS | HEC-2 | 1989 | AE, AE w/ Floodway, AH | Starting water-surface elevations were computed using the slope-area methods. |
| Nestor Creek | Upstream side of Interstate Highway 5 | Approximately 800 feet upstream of 30 th Street | NRCS | HEC-2 | 1979 | AE, AE w/ Floodway, AH | Peak discharge-frequency relationships were determined by utilizing rainfall runoff techniques developed by the NRCS. The NRCS computer program, TR-20, Project Formulation-Hydrology, was used in the analysis (U.S. Department of Agriculture, Soil Conservation Service, 1964). |
| North Avenue Tributary | Confluence with Reidy Creek | Approximately 3,200 feet upstream of confluence with Reidy Creek | * | HEC-2 | 1988 | AE | |
| North Branch Poway Creek | Not provided | Not provided | * | HEC-2 | 1983 | A, AE w/ Floodway | Peak discharges for the 1-percent annual chance floods were taken from Hydrology Report for Poway Creek Complex (San Diego County, Department of Sanitation and Flood Control, 1977). Discharges for 10-, 2-, and 0.2- percent annual chance recurrence intervals were taken from Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (USACE, April 1976). |
| North Tributary to Santa Maria Creek | Confluence with Santa Maria Creek | Approximately 1,100 feet upstream of Ramona Airport Road | * | HEC-2 | 1981 | AE w/ Floodway | |
| Northern Split | Not provided | Not provided | * | HEC-2 | 1989 | AE w/ Floodway | |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|-----------------|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Olive Creek | Confluence with Twin Oaks Valley Creek | Approximately 940 feet upstream of Mulberry Drive | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Opato Creek | Not provided | Not provided | * | * | 1985 | A | |
| Otay River | Confluence with San Diego Bay | Confluence of Nestor Creek | * | * | 2015 | AE | |
| Otay River | Not provided | Not provided | * | HEC-2 | 1989 | AE w/ Floodway | The 1-percent annual chance discharge was established in 1974 by the USACE and the City of San Diego (USACE, December 1974). Discharges for the 10-, 2-, and 0.2-percent annual chance floods were determined through coordination between the USACE, the City of San Diego, and San Diego County. |
| Otay River | Not provided | Not provided | * | HEC-2 | 1981 | AE w/ Floodway | The 1-percent annual chance discharge was established in 1974 by the USACE and the City of San Diego (USACE, December 1974). Discharges for the 10-, 2-, and 0.2-percent annual chance floods were determined through coordination between the USACE, the City of San Diego, and San Diego County. |
| Pala Mesa Creek | U.S. Highway 395 (Escondido Expressway) | Approximately 1,740 feet upstream of Tecalote Drive | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Paradise Creek | Not provided | Not provided | * | HEC-2 | 1976 | AE w/ Floodway, AO | The discharge-frequency was based on the average mean discharge per square mile. This analysis was determined from three, short-term stream gages in the immediate vicinity and five selected long-term stream gages in urbanized portions of southern California. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|---------------------------------------|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Paradise Creek, continued | Not provided | Not provided | * | HEC-2 | 1976 | AE w/ Floodway, AO | The frequency-discharge curve was adjusted to consider diversions at River Mile 3.0 and overflows at River Mile 3.6 of the stream, this resulted in reductions of the peak discharges at downstream concentration points. |
| Paradise Creek North Branch | Not provided | Not provided | * | * | 1979 | A, AE | |
| Paradise Creek North Branch Tributary | Not provided | Not provided | * | * | 1979 | A | |
| Paradise Creek - Valley Road Branch | Not provided | Not provided | * | HEC-2 | 1985 | A, AE w/ Floodway | |
| Pauma Creek | Not provided | Not provided | * | * | * | A | |
| Pilgrim Creek | Confluence with San Luis Rey River | Approximately 2.4 miles upstream of confluence with San Luis Rey River | HEC-1 | HEC-2 | 1991 | AE w/ Floodway, AH | |
| Pine Valley Creek | Not provided | Not provided | * | * | * | A | |
| Poggi Canyon Creek | Not provided | Not provided | * | * | 1993 | A | The 100-year flood elevations were computed using Manning's equation, USGS Flood-Prone Area Maps (USGS various (a)), and USGS topographic maps (USGS various (b)). |
| Poggi Canyon Creek | Not provided | Not provided | * | HEC-2 | 1984 | AE w/ Floodway | Flood hydrographs and peak discharges were based on rainfall-runoff hydrograph computations. Starting water-surface elevation considered previously determined backwater conditions on Otay River. However, critical depth controls upstream of the confluence with Otay River. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|-----------------------|---|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Pomerado Creek | Confluence with Poway Creek | Immediately Downstream of Glen Oak Avenue | HEC-1 | HEC-2 | 1995 | AE w/ Floodway | The 1-percent annual chance peak discharges were determined using the USACE HEC-1 computer program (USACE, 1990). There is a wall that extends from Robinson Road to McFerron Road along the east side of Pomerado Road. This wall acts as a levee, however, it is not recognized as a levee by FEMA. Therefore, in accordance with FEMA criteria, the wall was evaluated under two conditions: reflecting the wall intact and the wall failed. Plotted profiles represent the worst-case condition in the channel and the overbanks. |
| Potrero Creek | Not provided | Not provided | * | * | 1993 | A | The 100-year flood elevations were computed using Manning's equation, USGS Flood-Prone Area Maps (USGS various (a)), and USGS topographic maps (USGS various (b)). |
| Poway Creek | Confluence with Los Pensaquitos Creek | Confluence with North Branch and South Branch Poway Creek | * | HEC-2 | 1983 | AE w/ Floodway | Peak discharges for the 1-percent annual chance floods were taken from Hydrology Report for Poway Creek Complex (San Diego County, Department of Sanitation and Flood Control, 1977). Discharges for 10-, 2-, and 0.2-percent annual chance recurrence intervals were taken from Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (U.S. Department of the Army, Corps of Engineers, April 1976). |
| Radio Drive Branch | Not provided | Not provided | * | * | 1979 | A | |
| Rainbow Creek | Interstate 15 | Approximately 4,585 feet upstream of Rainbow Valley Boulevard | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--|--------------------------------------|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Rainbow Creek (West Branch) | Confluence with Rainbow Creek | Approximately 1,900 feet upstream of 1st Street | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Rainbow Creek (West Branch) | Not provided | Not provided | * | * | * | A | |
| Rattlesnake Creek | Confluence with Poway Creek | Approximately 1,430 feet upstream of Range Park Road | * | HEC-2 | 1983 | AE w/ Floodway | Peak discharges for the 1-percent annual chance floods were taken from Hydrology Report for Poway Creek Complex (San Diego County, Department of Sanitation and Flood Control, 1977). Discharges for 10-, 2-, and 0.2-percent annual chance recurrence intervals were taken from Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (U.S. Department of the Army, Corps of Engineers, April 1976). |
| Rattlesnake Creek Split Flow at Heritage Hills | Confluence with Rattlesnake Creek | Divergence from Rattlesnake Creek | * | HEC-2 | 1983 | AE w/ Floodway | |
| Rattlesnake Creek Split Flow at Midland Road | Confluence with Rattlesnake Creek | Divergence from Rattlesnake Creek | * | HEC-2 | 1983 | AE w/ Floodway | |
| Reidy Creek | Rincon Avenue | City of Escondido corporate limits | * | HEC-2 | 1988 | AE w/ Floodway | Peak discharges were taken from previous studies (USACE, 1971, January 1973, June 1973 (a)). Starting water-surface elevations were determined by calculating critical depth at Lincoln Avenue. |
| Reidy Creek | Not provided | Not provided | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from previous studies (USACE, 1971, January 1973, June 1973 (a)). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|------------------------------|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Rice Canyon Creek | Not provided | Not provided | * | HEC-2 | 1984 | A | Flood hydrographs and peak discharges were based on rainfall-runoff hydrograph computations. Starting water-surface elevations were based on Sweetwater River flood elevations at the confluence. |
| Rincon Avenue Tributary | Confluence with Reidy Creek | Approximately 1,405 feet upstream of confluence with Reidy Creek | * | * | 1985 | AE | |
| Rios Canyon Creek | Not provided | Not provided | * | * | * | A | |
| Rose Canyon Creek | Approximately 1,500 feet upstream of Mission Bay | Approximately 2,210 feet upstream of Interstate Highway 805 | * | HEC-2 | 1981 | AE | Peak discharges were taken from the 1972 Hydrology for Flood Plain Information Studies, Rose and San Clemente Canyons (USACE, 1972). Starting water-surface elevations were taken from Mission Bay. |
| Samagutuma Creek | Confluence with Sweetwater River (Descanso Area) | Approximately 2,180 feet upstream of Tecate Cypress Trail | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from a 1973 hydrology report (USACE, May 1973). |
| San Clemente Canyon Creek | Confluence with Rose Canyon Creek | Approximately 210 feet upstream of Interstate Highway 905 | * | HEC-2 | 1981 | AE | Peak discharges were taken from the 1972 Hydrology for Flood Plain Information Studies, Rose and San Clemente Canyons (USACE, 1972). Starting water-surface elevations were taken from the flood profile for rose Canyon Creek. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--------------------|--|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| San Diego River | Just upstream of Friars Road | Approximately 845 feet upstream of State Highway 67 | * | HEC-2 | 1985 | AE w/ Floodway | Peak discharges were taken from Upper San Diego River Flood Control Investigation (California Department of Water Resources, February 1976). Starting water-surface elevations at Friars Road were taken from the flood profiles of the 1983 San Diego River Flood Insurance Study. Starting water surface elevations for the upstream reach were taken from a known 1-percent annual chance flood elevation at Mission Dam. |
| San Diego River | Approximately 1,370 feet upstream of Pacific Ocean | Just upstream of Friars Road | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from San Diego River Design Memorandum No. 1 (USACE, July 1975). Starting water-surface elevations at the mouth were computed assuming critical depth. |
| San Diego River | Not provided | Not provided | * | * | 1981 | A | |
| San Dieguito River | Not provided | Not provided | * | HEC-2 | 1985 | A, AE w/ Floodway | The flood flows were taken from a study by Leedshill-Herkenhoff, Inc., for the City of Del Mar (Leedshill-Herkenhoff, Inc., May 1985). Starting water-surface elevations were based on the MHHW for the Pacific Ocean. |
| San Elijo Creek | Not provided | Not provided | * | * | * | A, AE w/ Floodway | |
| San Elijo Lagoon | Not provided | Not provided | * | * | * | A, AE | |
| San Luis Rey River | Pacific Ocean | College Boulevard | * | * | 2001 | A99 | Starting water-surface elevations were calculated assuming critical depth and MBHW of the Pacific Ocean. |
| San Luis Rey River | Not provided | Not provided | * | * | 1981 | A | Peak discharges were taken from a California Department of Water Resources report (California Department of Water Resources, unpublished). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--|---|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| San Luis Rey River (At Oceanside) | College Boulevard | Approximately 4.1 miles upstream of College Boulevard | * | HEC-2 | 1986 | AE w/ Floodway | Peak discharges were taken from a California Department of Water Resources report (California Department of Water Resources, unpublished). |
| San Marcos Creek | Approximately 1,600 feet upstream of Lake San Marcos | Woodland Parkway | NRCS | HEC-2 | 1989 | AE w/ Floodway | The method used to develop the hydrology follows the procedures recommended in the San Diego County Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). |
| San Marcos Creek | Not provided | Not provided | * | * | 1975 | A | |
| San Marcos Creek (Below Lake San Marcos) | Approximately 310 feet downstream of Rancho Santa Fe Road | Approximately 2,425 feet upstream of Melrose Drive | * | HEC-2 | 1989 | AE w/ Floodway | |
| San Marcos Creek Highway 78 Split Flow | Confluence with San Marcos Creek | Divergence with San Marcos Creek | * | HEC-2 | 1989 | AE w/ Floodway | |
| San Vicente Creek | Approximately 1 mile downstream of San Vicente Avenue | Approximately 2,095 feet upstream of Moreno Avenue | * | HEC-2 | 1981 | AE w/ Floodway | The 10- and 1-percent annual chance discharges were taken from a 1976 flood-control report (California Department of Water Resources, February 1976). The 2-percent annual chance discharges were computed using the same techniques as in the 1976 flood-control report. The 0.2-percent annual chance discharge was computed based on the San Diego County Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). |
| Santa Margarita River | Not provided | Not provided | * | * | * | A | |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--|--|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Santa Maria Creek (San Pasqual Valley Area) | Confluence with Santa Ysabel Creek | Approximately 1,700 feet upstream of Bandy Canyon Road | NRCS | HEC-2 | 1986 | AE w/ Floodway | Peak discharges were taken from the Flood and Sediment Control Study for the San Pasqual Preliminary Report (Boyle Engineering Corporation, November 1980). This study used the NRCS methods contained in the computer program TR-20 (U.S. Department of Agriculture, Soil Conservation Service, 1964). Input to the program was determined following the method given in the County of San Diego Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). Starting water-surface elevations were taken from the Santa Ysabel flood profiles, due to coincident flooding. |
| Santa Maria Creek (Santa Maria Valley Area) | Approximately 1.6 miles downstream of Rangeland Road | Approximately 1.4 miles upstream of Pile Street | NRCS | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from the Flood and Sediment Control Study for the San Pasqual Preliminary Report (Boyle Engineering Corporation, November 1980). This study used the NRCS methods contained in the computer program TR-20 (U.S. Department of Agriculture, Soil Conservation Service, 1964). Input to the program was determined following the method given in the County of San Diego Hydrology Manual (San Diego County, Flood Control Division, January and October 1983). |
| Santa Ysabel Creek | Interstate Highway 15 | Approximately 1.4 miles upstream of State Highway 78 | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). Starting water-surface elevations are based on elevations resulting from routing of flood hydrographs from San Dieguito River Flood Studies (Leedshill-Herkenhoff, Inc., May 1985) through Lake Hodges. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|-----------------------------|--|---|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Santa Ysabel Creek | Approximately 2.9 miles upstream of confluence with Witch Creek | Approximately 2,930 feet upstream of State Route 79 | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). Starting water-surface elevations are based on elevations resulting from routing of flood hydrographs from San Dieguito River Flood Studies (Leedshill-Herkenhoff, Inc., May 1985) through Lake Hodges. |
| Santa Ysabel Creek | Not provided | Not provided | * | * | 1986 | A | |
| Shaw Valley Creek | Not provided | Not provided | * | * | 1985 | A | |
| Sheperd Canyon | Not provided | Not provided | * | * | 1985 | A | |
| Slaughterhouse Creek | Approximately 1,800 feet upstream of confluence with San Vicente Creek | Approximately 4,180 feet upstream of Slaughterhouse Canyon Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Soledad Canyon | North Torrey Pines Road | Atchinson Topeka & Santa Fe Railroad | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from the 1976 Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (U.S. Department of the Army, Corps of Engineers, April 1976). |
| South Branch Poway Creek | Confluence with Poway Creek and North Branch Poway Creek | Approximately 1,000 feet upstream of Sycamore Canyon Road | * | HEC-2 | 1983 | AE w/ Floodway | Peak discharges for the 1-percent annual chance floods were taken from Hydrology Report for Poway Creek Complex (San Diego County, Department of Sanitation and Flood Control, 1977). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|--|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| South Branch Poway Creek, continued | Confluence with Poway Creek and North Branch Poway Creek | Approximately 1,000 feet upstream of Sycamore Canyon Road | * | HEC-2 | 1983 | AE w/ Floodway | Discharges for 10-, 2-, and 0.2-percent annual chance recurrence intervals were taken from Hydrology for Flood Insurance Studies, Soledad Canyon and Tributaries, San Diego County, California (U.S. Department of the Army, Corps of Engineers, April 1976). |
| South Fork Alpine Creek | Not provided | Not provided | * | * | * | A | |
| South Fork Moosa Canyon Creek | Approximately 350 feet upstream of confluence with Moosa Canyon Creek | Approximately 525 feet upstream of Cork Oak Drive | * | HEC-2 | 1986 | AE w/ Floodway | |
| South Las Chollas Creek | Interstate Highway 805 | Approximately 650 feet upstream of 47th Street | * | HEC-2 | 1991 | AE w/ Floodway | |
| South Las Chollas Creek | Interstate Highway 805 | Approximately 650 feet upstream of 47th Street | * | HEC-2 | 1991 | AE w/ Floodway | |
| South Las Chollas Creek | Not provided | Not provided | * | HEC-2 | 1979 | AE w/ Floodway | |
| South Tributary to Santa Maria Creek | Confluence with Santa Maria Creek | Approximately 930 feet upstream of State Highway 67/Main Street | * | HEC-2 | 1981 | AE w/ Floodway | |
| Spring Valley Creek | Not provided | Not provided | * | * | 1981 | A | Peak discharges were taken from a 1973 hydrology report (USACE, June 1973 (b)). |
| Steele Canyon Creek | Approximately 480 feet upstream of confluence with Sweetwater River | Approximately 2,900 feet upstream of Vista Sage Lane | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|-------------------------------------|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Stevenson Creek | Approximately 550 feet upstream of confluence with Twin Oaks Valley Creek | Approximately 210 feet upstream of Country Garden Lane | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Sweetwater River | Not provided | Not provided | * | * | 1981 | A | Peak discharges were taken from a 1973 hydrology report (USACE, May 1973). |
| Sweetwater River (Above Reservoir) | At Sweetwater Reservoir | Approximately 1.2 miles upstream of Sloane Canyon Road | * | HEC-2 | 1986 | AE w/ Floodway | |
| Sweetwater River (At National City) | Not provided | Not provided | * | HEC-2 | 1984 | AE w/ Floodway | The discharge-frequency data were obtained from the Sweetwater River Flood Control Channel Report (USACE, January 1976 (a)). Peak discharge-frequency relations for floods of the selected recurrence intervals at its mouth were based on the current operating policies of the California American Water Company for Loveland arid Sweetwater Reservoirs (USACE, January 1976 (a)). Starting water-surface elevations were determined by either the critical depth at the mouth or the tidal data in San Diego Bay, whichever is higher. Critical depth was used in the computation of the 2-, 1-, and 0.2-percent annual chance floods, while the mean higher high tide of 2.9 feet was used for the 10-percent annual chance flood. |
| Sweetwater River (Descanso Area) | Approximately 0.75 mile downstream of Riverside Drive | Approximately 3.0 miles upstream of Viejas Boulevard | * | HEC-2 | 1981 | AE w/ Floodway | Peak discharges were taken from a 1973 hydrology report (USACE, May 1973). |
| Switzer Creek | Not provided | Not provided | * | HEC-2 | 1979 | A, AE w/ Floodway | Normal-depth calculations were used to establish water-surface elevations. |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|------------------------|----------------------------------|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Sycamore Creek | Not provided | Not provided | * | * | 1983 | A | |
| Tecate Creek | Not provided | Not provided | * | * | 1993 | A | The 100-year flood elevations were computed using Manning's equation, USGS Flood-Prone Area Maps (USGS various (a)), and USGS topographic maps (USGS various (b)). |
| Tecolote Creek | Confluence with Mission Bay | Approximately 775 feet upstream of Derrick Drive | * | HEC-2 | 1981 | AE | Discharges were taken from Hydrology for Flood Insurance Studies, Murphy, Murray, Alvarado, and Tecolote Canyons, San Diego County, California (USACE, April 1973). Starting water-surface elevations were taken from Mission Bay. |
| Telegraph Canyon Creek | Not provided | Not provided | * | HEC-2 | 1984 | A, AE w/ Floodway | Peak discharges were taken from a 1976 information brochure for flood control (USACE, January 1976 (b)). Starting water-surface elevations were calculated assuming critical depth. |
| Tijuana River | Confluence with Oneonta Slough | Approximately 4,400 feet upstream of West Tia Juana Street | * | HEC-2 | 1985 | AE w/ Floodway | Peak discharge-frequency relationships were established by the USACE (USACE, 1964). They were determined from U.S. Geological Survey (USGS) records and historical data on Tijuana River and other nearby streams (USACE, 1964). Starting water-surface elevation is the MHHW for the Pacific Ocean. |
| Travertine Palms Wash | Apex of Fan | Salton Sea | HEC-HMS 3.0 | FAN | 2018 | AE | |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|--|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Tributary of South Tributary to Santa Maria Creek | Confluence with South Tributary to Santa Maria Creek | Approximately 1,650 feet upstream of State Highway 67/ Main Street | * | * | * | AE w/ Floodway | |
| Tributary to Forester Creek | Approximately 115 feet downstream of Melody Lane | Approximately 2,720 feet upstream of 4th Street | * | HEC-2 | 1976 | AE w/ Floodway | |
| Tributary to Forester Creek (South Branch) | Confluence with Tributary to Forester Creek | Approximately 2,955 feet upstream of 4th Street | * | HEC-2 | 1976 | AE w/ Floodway | |
| Tributary to Sweetwater River | Approximately 800 feet above Loma Del Sol Drive | Approximately 1,400 feet upstream of San Miguel Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Tributary to Sweetwater River | Not provided | Not provided | * | * | * | A | |
| Twin Oaks Valley Creek | Confluence with San Marcos Creek | Approximately 935 feet upstream of Solar Lane | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |
| Unnamed Canyon | Not provided | Not provided | * | HEC-2 | * | AO | Studied by the alluvial fan method. |
| Unnamed Canyon 1 | Apex of Fan | Salton Sea | HEC-HMS 3.0 | FAN | 2018 | AE | |

Table 12: Summary of Hydrologic and Hydraulic Analyses, continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|--|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|---|
| Unnamed Canyon 2 | Apex of Fan | Salton Sea | HEC-HMS 3.0 | FAN | 2018 | AO | |
| Unnamed Canyon North of Travertine Palms Wash | Apex of Fan | Salton Sea | HEC-HMS 3.0 | FAN | 2018 | AO | |
| Unnamed Tributary 2 | Apex of Fan | Salton Sea | HEC-HMS 3.0 | FAN | 2018 | AE | |
| Unnamed Tributary to San Dieguito River | Not provided | Not provided | * | HEC-2 | 1985 | A, AE w/ Floodway | |
| Unnamed Tributary to San Marcos Creek | Not provided | Not provided | * | * | 1975 | A | |
| Wabash Branch | Confluence with Las Chollas Creek | Approximately 1,550 feet upstream of 36th Street | * | HEC-2 | 1979 | AE w/ Floodway | |
| Wabash Tributary | Not provided | Not provided | * | * | 1979 | A | |
| Witch Creek | Approximately 1.4 miles upstream of confluence with Santa Ysabel Creek | Approximately 2,670 feet upstream of Slaughterhouse Road | * | HEC-2 | 1993 | AE w/ Floodway | Peak discharges were determined using the methods described in the "County of San Diego Hydrology Manual" (San Diego 1985). |

*Data not available

Table 13: Roughness Coefficients

| Flooding Source | Channel "n" | Overbank "n" |
|--------------------------------|-------------|--------------|
| Agua Hedionda Creek | 0.014-0.040 | 0.020-0.040 |
| Alvarado Creek | 0.015-0.065 | 0.035-0.075 |
| Beaver Hollow Creek | * | * |
| Beeler Creek | 0.041-0.060 | 0.030-0.060 |
| Broadway Creek | * | * |
| Buena Creek | 0.020-0.050 | 0.015-0.050 |
| Buena Vista Creek | 0.015-0.045 | 0.024-0.050 |
| Buena Vista Creek Tributary 1 | 0.015-0.045 | 0.024-0.050 |
| Carmel Valley Creek | 0.040-0.070 | 0.040-0.100 |
| Carroll Canyon Creek | 0.037-0.070 | 0.037-0.070 |
| Coleman Creek | * | * |
| County Ditch Creek | * | * |
| Deer Springs Creek | * | * |
| Descanso Creek | 0.027-0.050 | 0.030-0.050 |
| Encanto Branch | 0.015-0.045 | 0.025-0.080 |
| Escondido Creek | 0.016-0.025 | 0.040-0.050 |
| Eucalyptus Hills (East Branch) | * | * |
| Eucalyptus Hills (West Branch) | * | * |
| Florida Drive Branch | 0.015-0.045 | 0.040-0.070 |
| Forester Creek | 0.022 | 0.022 |
| Garrison Creek | 0.018-0.050 | 0.030-0.050 |
| Gopher Canyon Creek | * | * |
| Green Valley Creek | 0.015-0.050 | 0.015-0.050 |
| Green Valley Creek Tributary | 0.015-0.035 | 0.015-0.035 |
| Harbison Canyon Creek | * | * |
| Hatfield Creek | 0.015-0.090 | 0.015-0.065 |
| Home Avenue Branch | 0.013-0.035 | 0.035-0.065 |
| Kit Carson Park Creek | 0.032-0.070 | 0.020-0.060 |
| Las Chollas Creek | 0.015-0.045 | 0.030-0.150 |
| Las Posas Creek Upper | * | * |
| Las Puleta Creek | 0.013-0.060 | 0.025-0.070 |
| Lawson Valley Creek | * | * |

Table 13: Roughness Coefficients, continued

| Flooding Source | Channel "n" | Overbank "n" |
|--|-------------|--------------|
| Loma Alta Creek | 0.018-0.070 | 0.035-0.045 |
| Los Penasquitos Creek | 0.030-0.060 | 0.020-0.080 |
| Lusardi Creek | * | * |
| Mexican Canyon Creek | 0.025-0.040 | 0.030-0.050 |
| Moosa Creek (North Branch) | * | * |
| Moosa Creek (South Branch) | * | * |
| Murphy Canyon Creek | 0.015-0.035 | 0.030-0.040 |
| Murray Canyon Creek | 0.020-0.050 | 0.080 |
| Nestor Creek | 0.030-0.045 | 0.030-0.100 |
| North Branch Poway Creek | 0.014-0.035 | 0.018-0.035 |
| North Tributary to Santa Maria Creek | 0.015-0.090 | 0.015-0.060 |
| Olive Creek | * | * |
| Otay River | 0.040 | 0.040 |
| Pala Mesa Golf Course | * | * |
| Paradise Creek | 0.016-0.030 | 0.018 |
| Poggi Canyon Creek | 0.013-0.050 | 0.050-0.040 |
| Poway Creek | 0.014-0.050 | 0.018-0.040 |
| Rainbow Creek (Main Branch) | * | * |
| Rainbow Creek (West Branch) | * | * |
| Rattlesnake Creek | 0.014-0.040 | 0.010-0.060 |
| Rattlesnake Creek Split Flow at Heritage Hills | 0.014-0.040 | 0.010-0.060 |
| Rattlesnake Creek Split Flow at Midland Road | 0.014-0.040 | 0.010-0.060 |
| Reidy Creek | 0.014-0.040 | 0.010-0.060 |
| Rice Canyon Creek | 0.013 | 0.013 |
| Rose Canyon Creek | 0.040 | 0.035-0.040 |
| Samagutuma Creek | 0.035-0.040 | 0.030-0.040 |
| San Clemente Canyon Creek | 0.035-0.040 | 0.015-0.040 |
| San Diego River | 0.025-0.125 | 0.030-0.125 |
| San Dieguito River | 0.030-0.035 | 0.030-0.045 |
| San Elijo Creek | * | * |

Table 13: Roughness Coefficients, continued

| Flooding Source | Channel “n” | Overbank “n” |
|--|-------------|--------------|
| San Luis Rey River | 0.025-0.120 | 0.030-0.125 |
| San Marcos Creek | * | * |
| San Marcos Creek Highway 78 Split Flow | * | * |
| San Vicente Creek | 0.045-0.050 | 0.042-0.050 |
| Santa Maria Creek (San Pasqual Valley Area) | 0.025-0.035 | 0.035-0.045 |
| Santa Maria Creek (Santa Maria Valley Area) | 0.015-0.090 | 0.015-0.090 |
| Santa Ysabel Creek | 0.025-0.035 | 0.035-0.040 |
| Slaughterhouse Creek | * | * |
| Soledad Canyon | 0.020-0.070 | 0.035-0.150 |
| South Branch Poway Creek | 0.014-0.035 | 0.018-0.035 |
| South Fork Moosa Canyon Creek | 0.015-0.050 | 0.030-0.100 |
| South Las Chollas Creek | 0.015-0.045 | 0.025-0.080 |
| South Tributary to Santa Maria Creek | 0.015-0.090 | 0.015-0.060 |
| Spring Valley Creek | * | * |
| Steele Canyon | * | * |
| Stevenson Creek | * | * |
| Sweetwater River (Above Reservoir) | 0.015-0.060 | 0.030-0.070 |
| Sweetwater River (At National City) | 0.025-0.035 | 0.030-0.060 |
| Sweetwater River (Descanso Area) | 0.035-0.055 | 0.030-0.060 |
| Switzer Creek | 0.013-0.030 | 0.030 |
| Tecolote Creek | 0.014-0.050 | 0.035-0.050 |
| Telegraph Canyon Creek | 0.015-0.045 | 0.015-0.065 |
| Tijuana River | 0.040 | 0.040 |
| Tributary of South Tributary to Santa Maria Creek | 0.015-0.090 | 0.015-0.060 |
| Tributary to Sweetwater River Twin Oaks Valley Creek | * | * |

Table 13: Roughness Coefficients, continued

| Flooding Source | Channel “n” | Overbank “n” |
|-----------------|-------------|--------------|
| Wabash Branch | 0.013-0.035 | 0.065 |
| Witch Creek | * | * |

*Data not available

5.3 Coastal Analyses

For the areas of San Diego County that are impacted by coastal flooding processes, coastal flood hazard analyses were performed to provide estimates of coastal BFEs. Coastal BFEs reflect the increase in water levels during the 1% annual chance flood event due to high tides, storm surge, and wave effects.

The following subsections provide summaries of how each coastal process was considered for this FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation. Table 14 summarizes the methods and/or models used for the coastal analyses. Refer to Section 2.5.1 for descriptions of the terms used in this section.

Table 14: Summary of Coastal Analyses

| Flooding Source | Study Limits From | Study Limits To | Hazard Evaluated | Model or Method Used | Date Analysis was Completed |
|-----------------|--------------------------------------|--------------------------------------|----------------------|--|-----------------------------|
| Pacific Ocean | Entire coastline of San Diego County | Entire coastline of San Diego County | Wave Setup and Runup | FEMA Pacific Guidelines 2005, Stockdon/DIM TAW | 04/01/2015 |
| Pacific Ocean | Entire coastline of San Diego County | Entire coastline of San Diego County | SWEL1 | Tide Frequency Analysis | 04/01/2015 |
| Pacific Ocean | Entire coastline of San Diego County | Entire coastline of San Diego County | Dune Erosion | FEMA Pacific Guidelines 2005, MK&A, Kriebel and Dean | 04/01/2015 |
| Pacific Ocean | Entire coastline of San Diego County | Entire coastline of San Diego County | Wave Overtopping | FEMA Pacific Guidelines 2005, Cox-Machemehl | 04/01/2015 |
| Pacific Ocean | Entire coastline of San Diego County | Entire coastline of San Diego County | Harbor Analysis | FEMA Pacific Guidelines 2005, Penney and Price, Wiegel | 04/01/2015 |

Table 14: Summary of Coastal Analysis, continued

| Flooding Source | Study Limits From | Study Limits To | Hazard Evaluated | Model or Method Used | Date Analysis was Completed |
|-----------------|-------------------|--------------------------|----------------------|--|-----------------------------|
| San Diego Bay | Pacific Ocean | Confluence of Otay River | Wave Setup and Runup | FEMA Pacific Guidelines 2005, Stockdon/DIM TAW | 04/01/2015 |
| San Diego Bay | Pacific Ocean | Confluence of Otay River | Wave Overtopping | FEMA Pacific Guidelines 2005, Cox-Machemehl | 04/01/2015 |

5.3.1 Total Stillwater Elevations

Total stillwater elevations were not analyzed in San Diego County and are not typically analyzed along the Pacific coast. In San Diego County, coastal BFE were ultimately determined from TWL. The TWL for the 1% annual chance event were determined for areas subject to coastal flooding. The models and methods that were used to determine storm surge and wave setup are listed in Table 14. The TWL that was calculated for each transect during the coastal analyses is shown in Table 16, “Coastal Transect Parameters.” Figure 8 shows the TWL for the 1% annual chance event that was determined for this coastal analysis.

Figure 8: 1% Annual Chance Total Water Levels for Coastal Areas (feet NAVD 88)



Astronomical Tide

Water level data were obtained from the NOAA National Ocean Service (NOS) tide gage network, which includes multiple gages along the California coast. The observed tide records were assumed to include all components of the SWL, including astronomical tides and storm surge.

Storm Surge Statistics

Storm surge magnitudes were obtained from the NOAA NOS historical observed tide gage records. Although the observed tide records along the coast are mostly complete, there are some spatial and temporal gaps. Temporal gaps in the records were filled using an approach that applied the statistical relationships of observed non-tidal residuals between adjacent tide gages to estimate the non-tidal residual components at stations with missing data. Using these statistical correlations and an understanding of the spatial variability of regional storms, the gaps in the tide station records were empirically reconstructed to provide a continuous hourly time series of stillwater levels for the 1960-2009 hindcast period at each tide gage in the open Pacific coast study area. SWL time series were subsequently evaluated for observed sea level trends and adjusted to the current national Datum Epoch of 1983-2001.

Once the hourly SWL hindcast was reconstructed at each tide gage, the reconstructed time series were applied along spatially homogeneous reaches of the coastline. For some open Pacific coastal reaches, it was determined that the nearest long-term tide station did not adequately

represent the local tidal characteristics due to smaller-scale effects in the region. For these reaches, the predicted tides from short-term subordinate stations were combined with the reconstructed non-tidal residual time series from the long-term stations to produce a representative SWL hindcast.

Table 15 provides the gage name, managing agency, gage type, gage identifier, start date, end date, and statistical methodology applied to each gage used to determine the 1% annual chance SWEL.

Table 15: Tide Gage Analysis Specifics

| Gage Name | Managing Agency of Tide Gage Record | Gage Type | Start Date | End Date | Statistical Methodology |
|-----------|-------------------------------------|-----------|------------|----------|-------------------------|
| La Jolla | NOAA | Tide | 1924 | 2009 | AM GEV |
| San Diego | NOAA | Tide | 1906 | 2009 | AM GEV |

5.3.2 Waves

The SWL were combined with calculated wave setup and runup heights to determine TWL at each analysis transect. The initial modeling of the offshore and nearshore wave climates within the study area was a critical component to the analysis. To provide adequate wave input data for the 1-D transect-based TWL analyses, Oceanweather Inc. developed a continuous 50-year hourly deepwater wave hindcast for the period of January 1, 1960 to December 31, 2009 along the California coastline (OWI, 2009). The wave modeling consisted of three nested model grids of sequentially higher resolution to resolve the wave conditions at varying spatial scales. These included the basin (global), regional (Northeast Pacific Ocean), and coastal (California) grids.

The deep-water wave characteristics were subsequently transformed to nearshore wave characteristics at the edge of the surf zone in approximately 49 feet water depth. The nearshore wave transformation modeling was conducted by the Scripps Institute of Oceanography (SIO) Coastal Data iNformation Program (CDIP) research group in collaboration with BakerAECOM using the SIO SHELF model (SIO, 2014). In select localized areas of complex shoreline geometry, wave data were also provided at 16 and 33 feet water depth. The output nearshore wave characteristics from this wave transformation model provided the input conditions for the 1-D transect-based wave setup and runup calculations.

5.3.3 Coastal Erosion

A single storm episode can cause extensive erosion in coastal areas. Storm-induced dune erosion was evaluated to determine the modification to existing coastal dune topography that is expected with the 1% annual chance flood events. Dune erosion was analyzed using the methods listed in Table 14.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 16: Coastal Transect Parameters

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 1 | 444594.8984 | 3693245.5644 | 15.7 | 16.4 | 17.0 | 17.5 | 18.6 |
| Pacific Ocean | 2 | 446065.3955 | 3692433.3194 | 18.7 | 19.4 | 19.9 | 20.3 | 21.2 |
| Pacific Ocean | 3 | 446730.4201 | 3691892.0613 | 19.9 | 20.6 | 21.0 | 21.5 | 22.4 |
| Pacific Ocean | 4 | 447805.9176 | 3691298.5527 | 19.8 | 21.2 | 22.4 | 23.6 | 26.9 |
| Pacific Ocean | 5 | 448609.4634 | 3690892.2428 | 16.3 | 16.6 | 16.8 | 16.9 | 17.2 |
| Pacific Ocean | 6 | 451166.5872 | 3689026.7258 | 16.8 | 17.5 | 18.1 | 18.6 | 19.9 |
| Pacific Ocean | 7 | 455247.3589 | 3683713.3354 | 13.9 | 14.3 | 14.7 | 15.0 | 15.6 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 8 | 455689.4343 | 3683059.9189 | 14.7 | 15.5 | 16.1 | 16.8 | 18.5 |
| Pacific Ocean | 9 | 458256.1215 | 3679263.2866 | 12.9 | 13.2 | 13.5 | 13.7 | 14.1 |
| Pacific Ocean | 10 | 455689.4343 | 3683059.9189 | 13.8 | 14.2 | 14.5 | 14.7 | 15.3 |
| Pacific Ocean | 11 | 458256.1215 | 3679263.2866 | 14.8 | 15.2 | 15.5 | 15.7 | 16.2 |
| Pacific Ocean | 12 | 459775.6480 | 3677015.6554 | 15.0 | 15.4 | 15.6 | 15.8 | 16.2 |
| Pacific Ocean | 13 | 460639.8716 | 3675742.7443 | 16.9 | 17.3 | 17.6 | 17.9 | 18.4 |
| Pacific Ocean | 14 | 461007.4631 | 3675162.0604 | 13.4 | 13.8 | 14.1 | 14.4 | 14.9 |
| Pacific Ocean | 15 | 462592.4477 | 3674167.8203 | 14.8 | 15.2 | 15.4 | 15.6 | 16.0 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 16 | 462923.0994 | 3672696.3896 | 15.6 | 15.9 | 16.1 | 16.3 | 16.7 |
| Pacific Ocean | 17 | 463399.2288 | 3672023.1588 | 14.5 | 14.9 | 15.2 | 15.5 | 16.0 |
| Pacific Ocean | 18 | 463780.9769 | 3671491.5933 | 14.9 | 15.8 | 16.6 | 17.5 | 19.7 |
| Pacific Ocean | 19 | 464318.0337 | 3670744.4537 | 14.4 | 14.8 | 15.0 | 15.2 | 15.6 |
| Pacific Ocean | 20 | 464669.9281 | 3670254.6534 | 14.5 | 14.9 | 15.1 | 15.2 | 15.6 |
| Pacific Ocean | 21 | 464956.7419 | 3669855.7516 | 15.2 | 16.0 | 16.7 | 17.4 | 19.2 |
| Pacific Ocean | 22 | 465496.8754 | 3669104.2478 | 15.5 | 16.1 | 16.6 | 17.1 | 18.1 |
| Pacific Ocean | 23 | 466113.7031 | 3668278.9264 | 13.8 | 14.2 | 14.4 | 14.7 | 15.1 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 24 | 466837.1064 | 3667292.4396 | 16.1 | 16.5 | 16.8 | 17.0 | 17.5 |
| Pacific Ocean | 25 | 467036.0989 | 3667017.3643 | 18.6 | 19.0 | 19.3 | 19.5 | 20.0 |
| Pacific Ocean | 26 | 467430.9753 | 3666437.0068 | 15.1 | 15.8 | 16.2 | 16.7 | 17.6 |
| Pacific Ocean | 27 | 468023.2174 | 3665302.5022 | 23.0 | 25.4 | 27.6 | 30.2 | 38.3 |
| Pacific Ocean | 28 | 468333.4085 | 3664528.0939 | 18.0 | 19.6 | 20.8 | 22.2 | 25.7 |
| Pacific Ocean | 29 | 468590.2773 | 3663777.5175 | 17.3 | 18.7 | 19.9 | 21.2 | 25.1 |
| Pacific Ocean | 30 | 469315.2771 | 3661760.7047 | 15.6 | 17.3 | 18.9 | 20.8 | 26.7 |
| Pacific Ocean | 31 | 469685.5648 | 3660766.8931 | 15.1 | 15.7 | 16.2 | 16.7 | 17.8 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 32 | 469772.1044 | 3660566.7555 | 15.1 | 15.8 | 16.3 | 16.8 | 17.9 |
| Pacific Ocean | 33 | 470485.2471 | 3659161.5441 | 15.2 | 16.0 | 16.6 | 17.2 | 18.8 |
| Pacific Ocean | 34 | 471153.4010 | 3656895.2961 | 13.3 | 14.2 | 15.0 | 15.8 | 18.3 |
| Pacific Ocean | 35 | 471194.1743 | 3656354.5602 | 13.6 | 14.0 | 14.3 | 14.6 | 15.3 |
| Pacific Ocean | 36 | 471250.5749 | 3655886.8108 | 16.0 | 17.0 | 17.9 | 18.9 | 21.7 |
| Pacific Ocean | 37 | 471826.3312 | 3654273.2722 | 14.1 | 15.8 | 17.6 | 19.8 | 27.7 |
| Pacific Ocean | 38 | 472484.8934 | 3653016.2433 | 13.1 | 14.1 | 14.8 | 15.7 | 18.3 |
| Pacific Ocean | 39 | 472612.6486 | 3652718.6303 | 12.4 | 13.6 | 14.7 | 16.0 | 20.5 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 40 | 472698.8944 | 3652497.9375 | 12.7 | 13.1 | 13.3 | 13.6 | 14.0 |
| Pacific Ocean | 41 | 472736.9828 | 3652393.1266 | 13.3 | 14.1 | 14.8 | 15.5 | 17.6 |
| Pacific Ocean | 42 | 472813.8530 | 3651965.7311 | 13.1 | 14.0 | 14.8 | 15.6 | 18.1 |
| Pacific Ocean | 43 | 472851.2051 | 3651517.3763 | 13.7 | 14.2 | 14.7 | 15.2 | 16.3 |
| Pacific Ocean | 44 | 473261.0528 | 3650167.6514 | 14.0 | 15.0 | 15.9 | 16.8 | 19.6 |
| Pacific Ocean | 45 | 473338.8221 | 3649836.0409 | 15.6 | 17.7 | 19.8 | 22.6 | 32.6 |
| Pacific Ocean | 46 | 473774.2652 | 3648210.9835 | 14.7 | 15.9 | 17.0 | 18.2 | 21.8 |
| Pacific Ocean | 47 | 473824.0812 | 3647877.6897 | 14.3 | 15.0 | 15.6 | 16.2 | 17.9 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 48 | 473856.9579 | 3647109.6281 | 15.5 | 15.9 | 16.2 | 16.5 | 17.0 |
| Pacific Ocean | 49 | 473869.2351 | 3646950.7064 | 14.9 | 15.3 | 15.6 | 15.8 | 16.2 |
| Pacific Ocean | 50 | 474284.4890 | 3645048.0255 | 14.5 | 15.6 | 16.7 | 17.9 | 21.5 |
| Pacific Ocean | 51 | 474500.9280 | 3644086.0041 | 15.4 | 16.5 | 17.4 | 18.5 | 21.7 |
| Pacific Ocean | 52 | 474553.7631 | 3643688.2502 | 16.0 | 17.1 | 18.1 | 19.2 | 22.3 |
| Pacific Ocean | 53 | 474673.9809 | 3642549.7158 | 13.9 | 14.6 | 15.2 | 15.8 | 17.4 |
| Pacific Ocean | 54 | 475045.9778 | 3640168.8699 | 13.9 | 14.5 | 15.0 | 15.5 | 16.6 |
| Pacific Ocean | 55 | 475274.3134 | 3638179.1164 | 14.1 | 14.8 | 15.4 | 16.0 | 17.4 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 56 | 475258.8246 | 3637009.0600 | 12.0 | 12.5 | 12.9 | 13.4 | 14.4 |
| Pacific Ocean | 57 | 475200.7165 | 3636660.7921 | 11.2 | 12.1 | 13.0 | 14.1 | 17.6 |
| Pacific Ocean | 58 | 475169.4738 | 3636200.6887 | 12.4 | 13.3 | 14.2 | 15.1 | 18.1 |
| Pacific Ocean | 59 | 475167.7498 | 3636058.4101 | 13.7 | 14.2 | 14.6 | 15.0 | 15.8 |
| Pacific Ocean | 60 | 475137.5530 | 3635507.1287 | 9.5 | 9.7 | 9.9 | 10.1 | 10.5 |
| Pacific Ocean | 61 | 475060.1764 | 3635406.4506 | 18.6 | 20.2 | 21.5 | 23.1 | 27.6 |
| Pacific Ocean | 62 | 474930.8905 | 3635328.7483 | 9.1 | 9.4 | 9.6 | 9.8 | 10.3 |
| Pacific Ocean | 63 | 474835.9050 | 3635308.7679 | 9.9 | 10.4 | 10.8 | 11.2 | 12.4 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 64 | 472862.0827 | 3634401.1969 | 13.4 | 14.6 | 15.8 | 17.3 | 22.5 |
| Pacific Ocean | 65 | 472611.1377 | 3633258.1264 | 13.6 | 14.9 | 16.1 | 17.7 | 23.0 |
| Pacific Ocean | 66 | 472729.1709 | 3632030.2065 | 19.6 | 21.0 | 22.1 | 23.4 | 26.9 |
| Pacific Ocean | 67 | 472731.4017 | 3631825.6610 | 20.2 | 22.5 | 24.7 | 27.3 | 36.0 |
| Pacific Ocean | 68 | 473681.7005 | 3630662.8120 | 12.8 | 14.1 | 15.3 | 16.8 | 21.8 |
| Pacific Ocean | 69 | 474076.8739 | 3629978.7885 | 12.3 | 13.5 | 14.7 | 16.0 | 20.5 |
| Pacific Ocean | 70 | 474470.4961 | 3629246.0487 | 13.8 | 14.7 | 15.5 | 16.5 | 19.3 |
| Pacific Ocean | 71 | 474703.5679 | 3628923.7592 | 14.2 | 15.1 | 15.8 | 16.6 | 18.8 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 72 | 474955.8420 | 3628293.2277 | 15.0 | 16.1 | 17.2 | 18.4 | 22.2 |
| Pacific Ocean | 73 | 475056.9484 | 3627684.6384 | 15.4 | 16.4 | 17.3 | 18.3 | 21.1 |
| Pacific Ocean | 74 | 475157.2781 | 3626625.0840 | 16.8 | 17.9 | 18.8 | 19.9 | 22.8 |
| Pacific Ocean | 75 | 475176.0039 | 3625902.2502 | 15.5 | 16.5 | 17.2 | 18.1 | 20.3 |
| Pacific Ocean | 76 | 475144.7212 | 3625286.5995 | 15.1 | 16.2 | 17.1 | 18.2 | 21.2 |
| Pacific Ocean | 77 | 475096.9999 | 3624737.0043 | 13.7 | 14.3 | 14.8 | 15.2 | 16.3 |
| Pacific Ocean | 78 | 475155.1823 | 3623728.4983 | 15.8 | 16.6 | 17.3 | 17.9 | 19.5 |
| Pacific Ocean | 79 | 475020.1693 | 3622559.0319 | 31.9 | 34.5 | 36.9 | 39.7 | 48.4 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 80 | 475014.6685 | 3618116.5540 | 15.8 | 18.0 | 20.0 | 22.4 | 29.6 |
| Pacific Ocean | 81 | 475758.7449 | 3615003.4349 | 15.8 | 18.1 | 20.3 | 22.9 | 30.7 |
| Pacific Ocean | 82 | 478083.5205 | 3613784.0003 | 10.1 | 10.3 | 10.4 | 10.5 | 10.7 |
| Pacific Ocean | 83 | 479962.0092 | 3615327.5767 | 13.4 | 14.6 | 15.6 | 16.8 | 20.1 |
| Pacific Ocean | 84 | 480654.8038 | 3615423.1542 | 12.8 | 13.6 | 14.3 | 15.1 | 17.0 |
| Pacific Ocean | 85 | 481963.6104 | 3615140.1536 | 15.5 | 16.6 | 17.5 | 18.5 | 21.3 |
| Pacific Ocean | 86 | 482479.9867 | 3614795.2664 | 17.5 | 18.9 | 20.1 | 21.4 | 24.8 |
| Pacific Ocean | 87 | 482766.5913 | 3614578.2131 | 14.3 | 15.4 | 16.4 | 17.5 | 20.6 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 88 | 483474.0300 | 3613934.4681 | 14.2 | 15.1 | 15.8 | 16.6 | 18.7 |
| Pacific Ocean | 89 | 483980.4511 | 3613336.0547 | 13.2 | 13.8 | 14.2 | 14.6 | 15.5 |
| Pacific Ocean | 90 | 484429.1514 | 3612654.6404 | 13.4 | 14.3 | 15.0 | 15.8 | 18.0 |
| Pacific Ocean | 91 | 485079.0346 | 3611404.9178 | 13.4 | 14.1 | 14.6 | 15.2 | 16.8 |
| Pacific Ocean | 92 | 485578.3937 | 3610227.2135 | 13.3 | 14.0 | 14.6 | 15.2 | 16.8 |
| Pacific Ocean | 93 | 486076.0676 | 3608500.8568 | 14.9 | 15.9 | 16.8 | 17.8 | 20.6 |
| Pacific Ocean | 94 | 486357.0110 | 3606191.1137 | 14.9 | 15.8 | 16.6 | 17.4 | 19.6 |
| Pacific Ocean | 95 | 486364.2618 | 3605305.6303 | 14.1 | 14.9 | 15.6 | 16.3 | 18.2 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Pacific Ocean | 96 | 486367.2911 | 3605074.0509 | 16.3 | 17.3 | 18.2 | 19.2 | 21.7 |
| Pacific Ocean | 97 | 486369.0005 | 3604965.1287 | 15.4 | 16.3 | 17.1 | 17.9 | 20.2 |
| Pacific Ocean | 98 | 486373.2511 | 3604648.5852 | 15.1 | 16.1 | 17.0 | 18.0 | 20.9 |
| Pacific Ocean | 99 | 486379.1371 | 3604247.7944 | 17.0 | 18.0 | 18.9 | 19.9 | 22.3 |
| Pacific Ocean | 100 | 486384.0090 | 3603953.4640 | 16.6 | 17.6 | 18.5 | 19.5 | 22.1 |
| Pacific Ocean | 101 | 486391.9714 | 3603461.4883 | 16.1 | 17.5 | 18.8 | 20.3 | 25.0 |
| Pacific Ocean | 102 | 486479.3164 | 3602699.4466 | 14.9 | 15.8 | 16.6 | 17.4 | 19.7 |
| San Diego Bay | 103 | 478304.8373 | 3615201.5590 | 13.0 | 13.8 | 14.3 | 14.9 | 16.4 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 104 | 478169.4369 | 3615984.0234 | 15.4 | 16.0 | 16.3 | 16.7 | 17.5 |
| San Diego Bay | 105 | 478305.5748 | 3616221.4202 | 14.2 | 15.1 | 15.8 | 16.6 | 18.7 |
| San Diego Bay | 106 | 478182.0954 | 3617110.9298 | 8.6 | 8.8 | 9.0 | 9.2 | 9.7 |
| San Diego Bay | 107 | 478078.0547 | 3617617.5158 | 9.0 | 9.3 | 9.5 | 9.7 | 10.0 |
| San Diego Bay | 108 | 478096.7585 | 3618160.4998 | 8.6 | 8.9 | 9.1 | 9.2 | 9.7 |
| San Diego Bay | 109 | 478122.7237 | 3618816.9176 | 8.2 | 8.3 | 8.4 | 8.5 | 8.7 |
| San Diego Bay | 110 | 478161.3071 | 3618843.7267 | 9.2 | 9.7 | 10.1 | 10.5 | 11.7 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 111 | 478891.8666 | 3619305.0474 | 8.4 | 8.7 | 9.0 | 9.3 | 9.9 |
| San Diego Bay | 112 | 479461.9887 | 3619743.4576 | 8.1 | 8.4 | 8.6 | 8.7 | 9.1 |
| San Diego Bay | 113 | 479606.6696 | 3619844.3236 | 9.8 | 10.6 | 11.3 | 12.1 | 14.2 |
| San Diego Bay | 114 | 480614.4636 | 3620304.2493 | 8.4 | 8.9 | 9.3 | 9.7 | 10.9 |
| San Diego Bay | 115 | 482006.6726 | 3620282.5204 | 8.6 | 9.2 | 9.6 | 10.1 | 11.5 |
| San Diego Bay | 116 ¹ | 482671.1740 | 3620489.1588 | 8.5 | 9.2 | 9.8 | 10.5 | 12.9 |
| San Diego Bay | 117 | 483183.2984 | 3620378.3405 | 8.6 | 9.2 | 9.8 | 10.5 | 12.7 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 118 | 483111.4121 | 3619717.4919 | 8.8 | 9.3 | 9.8 | 10.4 | 12.2 |
| San Diego Bay | 119 | 483205.8657 | 3619264.4485 | 8.4 | 8.8 | 9.1 | 9.5 | 10.6 |
| San Diego Bay | 120 | 483554.3428 | 3618714.4233 | 8.2 | 8.5 | 8.8 | 9.1 | 9.9 |
| San Diego Bay | 121 | 483975.6247 | 3618408.4946 | 8.3 | 8.7 | 9.0 | 9.3 | 10.2 |
| San Diego Bay | 122 | 484704.0431 | 3617981.0627 | 8.3 | 8.8 | 9.1 | 9.6 | 10.7 |
| San Diego Bay | 123 ¹ | 485086.5649 | 3617597.5749 | 8.8 | 9.6 | 10.2 | 11.0 | 13.3 |
| San Diego Bay | 124 | 486386.4285 | 3616485.3901 | 8.8 | 9.5 | 10.0 | 10.6 | 12.5 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 125 | 487441.0397 | 3615321.8873 | 9.4 | 10.2 | 11.0 | 12.0 | 15.1 |
| San Diego Bay | 126 | 487900.6471 | 3613861.1883 | 9.4 | 10.1 | 10.8 | 11.6 | 14.1 |
| San Diego Bay | 127 | 488075.2640 | 3612428.9712 | 8.9 | 9.5 | 10.0 | 10.6 | 12.5 |
| San Diego Bay | 128 | 488345.9930 | 3611744.9973 | 7.8 | 7.9 | 8.1 | 8.2 | 8.4 |
| San Diego Bay | 129 | 489591.6934 | 3609689.4905 | 8.9 | 9.4 | 9.8 | 10.3 | 11.7 |
| San Diego Bay | 130 | 490022.8408 | 3609110.4243 | 8.8 | 9.3 | 9.7 | 10.3 | 11.8 |
| San Diego Bay | 131 | 490033.4312 | 3608973.9412 | 8.7 | 9.3 | 9.9 | 10.6 | 13.1 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 132 ² | 488727.1478 | 3607901.4447 | * | * | * | 9.8 | * |
| San Diego Bay | 133 | 488593.5754 | 3607882.8707 | 8.2 | 8.4 | 8.6 | 8.8 | 9.1 |
| San Diego Bay | 134 | 488097.1360 | 3608243.7933 | 8.2 | 8.5 | 8.6 | 8.8 | 9.2 |
| San Diego Bay | 135 | 488079.8213 | 3608316.4741 | 8.3 | 8.5 | 8.7 | 8.8 | 9.0 |
| San Diego Bay | 136 | 488095.5740 | 3608550.3054 | 8.6 | 9.0 | 9.3 | 9.6 | 10.4 |
| San Diego Bay | 137 | 488301.6721 | 3609812.8607 | 8.2 | 8.4 | 8.5 | 8.6 | 8.8 |
| San Diego Bay | 138 | 488196.8358 | 3610123.4824 | 8.5 | 8.8 | 8.9 | 9.1 | 9.5 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 139 | 487808.0863 | 3610713.4535 | 8.2 | 8.5 | 8.7 | 8.9 | 9.4 |
| San Diego Bay | 140 | 487321.9686 | 3610789.9367 | 8.6 | 9.0 | 9.3 | 9.7 | 10.6 |
| San Diego Bay | 141 ³ | 487260.1273 | 3610798.3265 | 7.7 (7.7) | 7.8 (7.9) | 7.9 (8.0) | 8.0 (8.1) | 8.1 (8.3) |
| San Diego Bay | 142 ³ | 486967.0425 | 3612444.1925 | 7.7 (7.7) | 7.8 (7.9) | 7.9 (8.0) | 7.9 (8.1) | 8.0 (8.2) |
| San Diego Bay | 143 | 486643.6912 | 3613035.8951 | 8.7 | 9.2 | 9.5 | 9.9 | 10.8 |
| San Diego Bay | 144 ³ | 485768.1714 | 3614093.7473 | 7.6 (7.7) | 7.7 (7.9) | 7.8 (8.0) | 7.8 (8.1) | 8.0 (8.3) |
| San Diego Bay | 145 ³ | 485426.2580 | 3614582.5300 | 7.7 (7.7) | 7.7 (7.9) | 7.8 (8.0) | 7.8 (8.1) | 7.9 (8.2) |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 146 | 485433.3132 | 3614689.2543 | 8.4 | 8.7 | 8.9 | 9.1 | 9.5 |
| San Diego Bay | 147 ¹ | 485476.4805 | 3614821.4287 | 8.5 | 8.8 | 9.0 | 9.3 | 9.7 |
| San Diego Bay | 148 | 485742.2997 | 3616014.7751 | 8.1 | 8.3 | 8.6 | 8.8 | 9.4 |
| San Diego Bay | 149 | 484734.8763 | 3615783.6845 | 8.2 | 8.5 | 8.8 | 9.1 | 9.9 |
| San Diego Bay | 150 | 484232.2852 | 3615557.0002 | 7.8 | 8.0 | 8.1 | 8.2 | 8.4 |
| San Diego Bay | 151 | 484736.5921 | 3615988.9536 | 7.8 | 8.0 | 8.0 | 8.1 | 8.2 |
| San Diego Bay | 152 | 484909.7061 | 3617069.7373 | 8.5 | 8.9 | 9.2 | 9.5 | 10.2 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 153 ³ | 484558.8880 | 3617892.7348 | 7.7 (7.6) | 7.8 (7.8) | 7.8 (7.9) | 7.9 (8.0) | 7.9 (8.2) |
| San Diego Bay | 154 | 483281.5491 | 3618652.7722 | 8.3 | 8.6 | 8.8 | 9.1 | 9.7 |
| San Diego Bay | 155 | 482446.7141 | 3619732.8947 | 7.9 | 8.1 | 8.3 | 8.4 | 8.8 |
| San Diego Bay | 156 | 481249.9769 | 3620054.0386 | 8.1 | 8.3 | 8.5 | 8.8 | 9.3 |
| San Diego Bay | 157 | 479335.2006 | 3619282.2102 | 8.5 | 9.0 | 9.3 | 9.7 | 10.9 |
| San Diego Bay | 158 | 478559.8110 | 3618139.9752 | 8.4 | 8.7 | 8.9 | 9.1 | 9.7 |
| San Diego Bay | 159 | 478437.6837 | 3617194.9136 | 9.8 | 10.3 | 10.7 | 11.2 | 12.4 |

Table 16: Coastal Transect Parameters, continued

| Flood Source | Coastal Transect | X, Y Coordinates (Meters, NAD83 UTM Zone 11N) | | Total Water Level (feet NAVD88) | | | | |
|---------------|------------------|--|--------------|---------------------------------|------------------|------------------|------------------|--------------------|
| | | X | Y | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| San Diego Bay | 160 ¹ | 478682.4779 | 3616229.2162 | 13.8 | 14.9 | 15.9 | 16.9 | 20.0 |

*Not calculated for this Flood Risk Project

¹Transect for which the maximum likelihood GEV/AM TWL results were applied in place of the GPD/POT results

²Transect where WHAFIS and an event-based approach was used to determine the 1% TWL

³Transect where the 1% SWEL is greater than the 1% TWL. The values in parenthesis are the SWEL values estimated at each transect