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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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 27, "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 13. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 10. 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 11. (Coastal stillwater elevations are discussed in Section 5.3 and shown in Table 17.) Stream gage information is provided in Table 12.

Table 10: 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 10: 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 10: 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 10: 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

Table 10: 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
Coleman Creek	Approximately 1,800 Feet Downstream of Highway 78	8.1	*	*	*	8,750	*
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 10: 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

Table 10: 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	At Orchard Bend Road	1.5	450	*	925	1,200	2,000
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

Table 10: 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
Home Avenue Branch	At Auburn Drive	0.8	160	*	360	450	830
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

Table 10: 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	At Market Street	12.7	2,700	*	5,400	7,100	13,500
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 10: 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 10: 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 10: 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 10: 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 10: 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

Table 10: 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
Poway Creek	US GS Gage 1,000 feet Upstream of Standish Drive	7.9	1,100	*	3,700	5,600	14,000
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 10: 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 10: 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 10: 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
San Vicente Creek	At Mouth	83.0	1,400	*	10,500	16,000	34,000

Table 10: 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
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
Shallow Flooding Area – South	Citrus Wash at Reed Road, 600 Feet West of Falconer Road	0.3	100	*	230	290	380

Table 10: 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	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
Shallow Flooding Area – West	Unnamed Tributary at Intersection of Golden Circle Drive and Country Club Lane	0.9	240	*	590	770	990

Table 10: 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
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
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

Table 10: 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
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
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

Table 10: 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 (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
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

Table 10: 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
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
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
Twin Oaks Valley Creek	Approximately 1,700 feet Upstream of Windy Way	*	3,250	*	5,900	6,700	8,700

Table 10: 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	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 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
Witch Creek	Approximately 7,700 Feet Upstream of Mouth	3.3	*	*	*	3,540	*

*Not calculated for this Flood Risk Project
[1]Flows partially controlled by Turner Dam
[2]Decreases due to ponding upstream
[3]Decrease due to overbank losses upstream
[4]Decrease due to construction of “Lot 6 Detention Basin” upstream of Railroad
[5]Discharge decreases with increasing area due to breakouts from the low flow channel
[6]This area is subject to overflow flooding; and therefore, does not have a defined contributing drainage
[7]Decrease due to culvert restriction at Balboa Avenue
[8]Decrease due to culvert restriction at Genesee Avenue
[9]Decrease due to detention upstream of culvert

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 11: 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
Detention Basin 1	Otay Lakes Rd near SR 125 South Bay Expressway	*	*	*	526.1	527.1

*Not calculated for this Flood Risk Project

Table 12: 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 120th 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 12: 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 24, “Floodway Data.”

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 13. Roughness coefficients are provided in Table 14. 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 13: 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.

Table 13: 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
Arroyo Drive Tributary	Not provided	Not provided	*	*	1979	A	
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.

Table 13: 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
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).
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	

Table 13: 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 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	
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	

Table 13: 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
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).
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.

Table 13: 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
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	
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).

Table 13: 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
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.
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).

Table 13: 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	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.
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.

Table 13: 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
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)).
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	

Table 13: 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 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.
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	

Table 13: 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	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).
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	

Table 13: 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
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).
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	

Table 13: 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	Confluence with Otay River	Upstream side of Interstate Highway 5	SCS	HEC-2	1989	AE w/ Floodway	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”. Starting water-surface elevations were computed using the slope-area methods.
Nestor Creek	Interstate Highway 5 embankment	Above Interstate Highway 5	SCS	HEC-2	1989	AH	Separate inlet control analysis performed to determine elevation of ponding.
Nestor Creek	Upstream side of Interstate Highway 5	Approximately 800 feet upstream of 30th Street	NRCS	HEC-2	1979	AE	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	

Table 13: 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
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	
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.

Table 13: 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
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.
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	

Table 13: 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
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.
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.

Table 13: 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
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).
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	

Table 13: 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
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)).
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.

Table 13: 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
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/Rose Inlet	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 13: 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.

Table 13: 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	Not provided	Not provided	*	*	1981	A	Peak discharges were taken from a California Department of Water Resources report (California Department of Water Resources, unpublished).
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).

Table 13: 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 Margarita River	Not provided	Not provided	*	*	*	A	
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).

Table 13: 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	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.
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).

Table 13: 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	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).
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	

Table 13: 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
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).
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	

Table 13: 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
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 (At National City)	Not provided	Not provided	*	HEC-2	1984	AE	
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, AO	Normal-depth calculations were used to establish water-surface elevations.
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)).

Table 13: 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
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.
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	

Table 13: 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 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 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 14: 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

Table 14: Roughness Coefficients, continued

Flooding Source	Channel “n”	Overbank “n”
Lawson Valley Creek	*	*
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 14: 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	*	*
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 15 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.

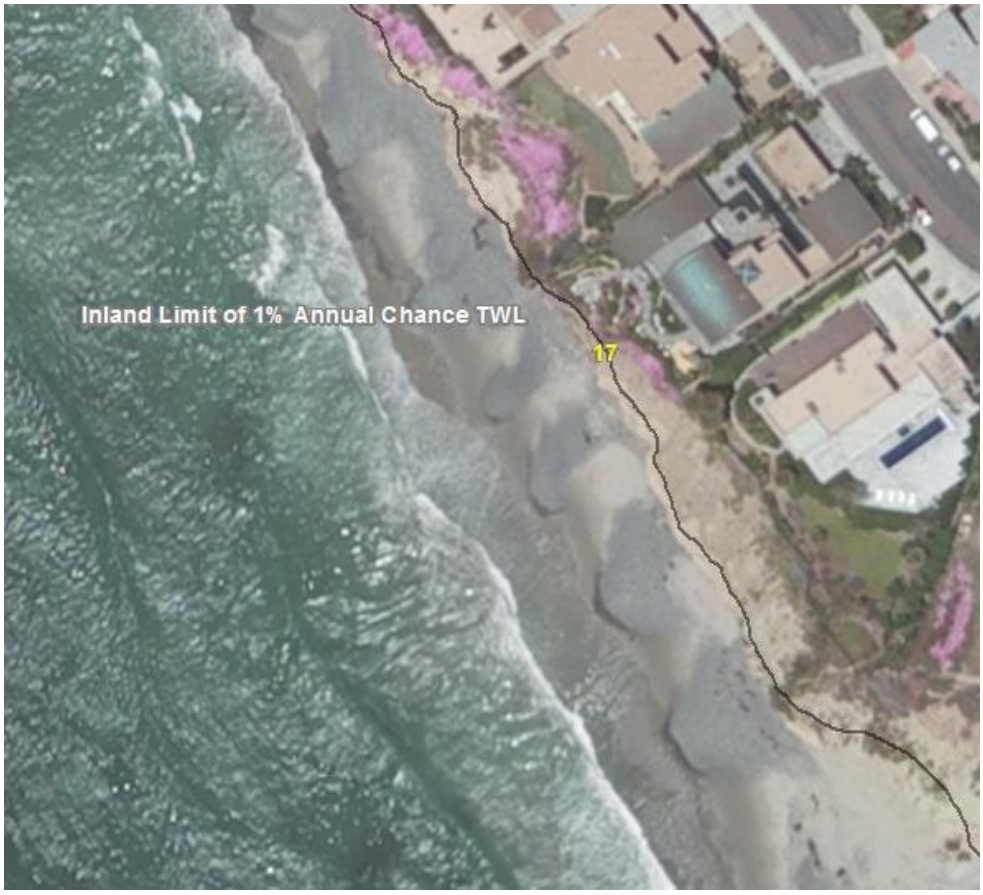
Table 15: Summary of Coastal Analyses

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
San Diego Bay	Pacific Ocean	Confluence of Otay River	Wave Setup and Runup	FEMA Pacific Guidelines 2005, Stockdon/DIM TAW	02/1/2016
San Diego Bay	Pacific Ocean	Confluence of Otay River	Wave Overtopping	FEMA Pacific Guidelines 2005, Cox-Machemehl	02/1/2016

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 15. The TWL that was calculated for each transect during the coastal analyses is shown in Table 17, "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 16 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 16: 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 15.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 17: 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 17: 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

Table 17: 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	15	462592.4477	3674167.8203	14.8	15.2	15.4	15.6	16.0
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
Pacific Ocean	56	475258.8246	3637009.0600	12.0	12.5	12.9	13.4	14.4

Table 17: 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	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 17: 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

Table 17: 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	71	474703.5679	3628923.7592	14.2	15.1	15.8	16.6	18.8
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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
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

Table 17: 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	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)
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

Table 17: 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	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
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

Table 17: 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	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
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
[1]Transect for which the maximum likelihood GEV/AM TWL results were applied in place of the GPD/POT results
[2]Transect where WHAFIS and an event-based approach was used to determine the 1% TWL
[3]Transect where the 1% SWEL is greater than the 1% TWL. The values in parenthesis are the SWEL values estimated at each transect