FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 7

RIVERSIDE COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
Agua Caliente Band of Cahuilla Indian Reservation	060763	City of Lake Elsinore	060636
City of Banning	060246	City of Menifee	060176
City of Beaumont	060247	City of Moreno Valley	065074
City of Blythe	060248	City of Murrieta	060751
City of Calimesa	060740	City of Norco	060256
City of Canyon Lake	060753	City of Palm Desert	060629
City of Cathedral City	060704	City of Palm Springs	060257
City of Coachella	060249	City of Perris	060258
City of Corona	060250	City of Rancho Mirage	060259
City of Desert Hot Springs	060251	City of Riverside	060260
City of Eastvale	060155	City of San Jacinto	065056
City of Hemet	060253	City of Temecula	060742
City of Indian Wells	060254	City of Wildomar	060221
City of Indio	060255	Colorado River Indian Reservation	060069
City of Jurupa Valley	060286	Riverside County, Unincorporated Areas	060245
City of La Quinta	060709		

REVISED:

MONTH DAY, YEAR

FLOOD INSURANCE STUDY NUMBER
06065CV002D

Version Number 2.3.3.2

FEMA

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Table 9: Levees

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Cathedral City, City of	East Cathedral Channel	Left Bank	RCFCWCD	No	1911031026	*	06065C1588G, 06065C1589G
Cathedral City, City of	East Cathedral Channel	Right Bank	RCFCWCD	No	1911031025	*	06065C1589G
Cathedral City, City of	West Cathedral Channel	Left Bank	RCFCWCD	No	1911031002	*	06065C1586G, 06065C1588G
Cathedral City, City of	West Cathedral Channel	Right Bank	RCFCWCD	No	1911031003	*	06065C1586G, 06065C1588G
Cathedral City, City of	Whitewater River	Left Bank	RCFCWCD - CVWD	No	1911031005	*	06065C1587G, 06065C1589G, 06065C1595G
Cathedral City, City of	Whitewater River; Spring Brook Wash	Left Bank	RCFCWCD - CVWD	No	1911031006	*	06065C1576G, 06065C1578G, 06065C1586G
Hemet, City of	San Jacinto River	Left Bank, Right Bank	RCFCWCD	Yes	1911031024	*	06065C1490H, 06065C1495H
Indian Wells, City of	Channel A; Zone AO Flooding	Left Bank, Right Bank	CVWD	No	1911031044	*	06065C2220H, 06065C2236G
Indian Wells, City of	Haystack Channel; Zone AO Flooding	Left Bank	CVWD	No	1911031042	*	06065C2228H
Indio, City of	Coachella Valley Stormwater Channel	Left Bank	CVWD	No	1911031041	*	06065C2232G, 06065C2234G, 06065C2251H, 06065C2252H, 06065C2254H, 06065C2260H, 06065C2270H, 06065C2910J, 06065C2930J

Table 9: Levees, Continued

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Indio, City of	Coachella Valley Stormwater Channel	Right Bank	CVWD	No	1911031040	*	06065C2232G, 06065C2234G, 06065C2251H, 06065C2252H, 06065C2254H, 06065C2260H, 06065C2270H, 06065C2910J, 06065C2930J
La Quinta, City of	Bear Creek	Right Bank	CVWD	No	1911031045	*	06065C2237H, 06065C2239H, 06065C2243H
Murrieta, City of	Murrieta Creek	Right Bank	RCFCWCD	No	1911031011	*	06065C2715G, 06065C2720G
Palm Desert, City of	Palm Valley Stormwater Channel	Right Bank	CVWD	No	1911031030	*	06065C2207H
Palm Desert, City of	Palm Valley Stormwater Channel	Right Bank	CVWD	No	1911031031	*	06065C2207H, 06065C2209H
Palm Desert, City of	Palm Valley Stormwater Channel	Right Bank	CVWD	No	1911031032	*	06065C2208H, 06065C2209H, 06065C2220H
Palm Springs, City of	Chino Canyon Levee	Right Bank	RCFCWCD	No	1911031049	*	06065C1552H
Palm Springs, City of	Palm Canyon Wash	Right Bank	RCFCWCD	No	1911031033	*	06065C1567G, 06065C1586G
Palm Springs, City of	Palm Canyon Wash; Arenas Canyon Creek	Left Bank	RCFCWCD	No	1911031034	*	06065C1566G, 06065C1567G, 06065C1568G
Palm Springs, City of	Tahquitz Creek	Left Bank	Palm Springs	No	1911031035	*	06065C1567G, 06065C1586G
Rancho Mirage, City of	Whitewater River	Left Bank	CVWD	No	1911031028	*	06065C1595G, 06065C2206G, 06065C2207H, 06065C2226H

Table 9: Levees, Continued

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Riverside County Unincorporated Areas	Big Morongo Wash	Left Bank	RCFCWCD - CVWD	No	1911031017	*	06065C0885G
Riverside County Unincorporated Areas	North Shore Beach Channel	Left Bank	CVWD	No	1911031048	*	06065C2975G
Riverside County Unincorporated Areas	North Shore Beach Channel	Right Bank	CVWD	No	1911031047	*	06065C2975G
Riverside County Unincorporated Areas	Santa Ana River	Right Bank	RCFCWCD	No	1911031008	*	06065C0045G, 06065C0710G
Riverside County Unincorporated Areas	Unnamed Creek	Right Bank	RCFCWCD - CVWD	No	1911031018	*	06065C1620G, 06065C1650G
Riverside, City of	Santa Ana River	Left Bank	RCFCWCD	No	1911031009	*	06065C0045G, 06065C0065G, 06065C0710G
San Jacinto, City of	San Jacinto Reservoir	Ring Levee	RCFCWCD	No	1911031010	*	06065C1470G, 06065C1490H
Temecula, City of	Murrieta Creek	Left Bank	RCFCWCD	No	1911031013	*	06065C2715G, 06065C2720G

*Data not available

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.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1% annual chance flood elevation and a 1% annual chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1% annual chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Flood County FIRM are listed in Table 27. Please note that this table only includes LOMCs that have been issued on the FIRM panels updated by this map revision. For all other areas within this county, users should be aware that revisions to the FIS Report made by prior LOMRs may not be reflected herein and users will need to continue to use the previously issued LOMRs to obtain the most current data.
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
Arroyo del Toro	Within City of Lake Elsinore	5.7	*	*	*	2,300 [2]	5,799
Bautista Wash	At Lyon Avenue	10.6 [1]	200	*	1,550	3,200	12,100
Bautista Wash	At San Jacinto Avenue	4.4 [1]	120	*	750	1,440	5,200
Bautista Wash	At Atchison, Topeka & Santa Fe Railroad	*	80	*	800	1,760	6,900
Bear Creek	At Adams Street	2.2	105	*	540	1,420	2,348
Bear Creek	At Avenida Bermudas	0.8	45	*	230	877	1,539
Beaumont Channel	At Sunnyslope Cemetery	1.5	650	*	1,000	1,200	2,200
Beaumont Channel	At First Street	1.3	550	*	820	1,000	1,900
Beaumont Channel	At Southern Pacific Railroad	1.1	460	*	680	820	1,600
Beaumont Channel	At Pennsylvania Avenue	1.1	520	*	760	940	1,800
Beaumont Channel	At Palm and East 5th Streets	0.4	240	*	340	410	780
Beaumont Channel	At East 8th Street	0.3	200	*	270	320	600
Beaumont Channel	At 12th Street	0.2	120	*	180	230	420
Beaumont Channel	At 13th Street	0.1	50	*	90	130	230
Big Morongo Wash	At Pierson Boulevard	42.0	1,000	*	6,590	11,560	31,020
Biskra Palms Channel	At apex	0.9	620	*	950	1,090	1,390
Blind Canyon Channel	At confluence with Desert Hot Springs Channel	4.6	560	*	1,900	2,800	6,500

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
Blind Canyon Channel	Approximately 2,500 feet upstream of West 16'h Street	4.6	560	*	1,900	2,800	6,500
Blind Canyon Channel	At confluence with Colorado River Aqueduct	3.2	440	*	1,500	2,200	5,100
Box Springs Wash	At 12th Street	0.96 [3]	0	*	*	427	*
Box Springs Wash	At Gage Canal	0.60 [3]	338	*	*	491	*
Box Springs Wash	At Canyon Crest Drive	0.22 [3]	170	*	*	247	*
Channel A	Approximately 2,500 feet down-stream of Control Point 175	0.2	70	*	150	220	430
Channel A	At California Avenue	0.1	40	*	90	120	230
Channel B	Approximately 3,200 feet down-stream of Control Point 178	0.9	210	*	500	720	1,500
Channel B	At California Avenue	0.5	130	*	310	450	900
Channel B	At Beaumont Avenue	0.3	90	*	200	300	600
Channel H	Approximately 2,000 feet down-stream of confluence with Wash G	1.5	220	*	630	990 [2]	2,200
Channel H	At confluence with Wash G	0.9	150	*	420	650	1,400
Channel H	At Grand Avenue	0.3	63	*	170	260	540
Cherry Avenue Channel	At Highland Avenue	1.4	300	*	730	1,070	2,300
Cherry Avenue Channel	At U.S. Highway 60 culvert	1.2	270	*	650	950	2,000
Cherry Avenue Channel	At East 6th Street	1.1	250	*	600	880	1,900

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
Cherry Avenue Channel	At East 8th Street	1.0	200	*	530	810	1,700
Cherry Avenue Channel	At Channel Bend	0.9	180	*	490	740	1,600
Cherry Avenue Channel	At East 11th Street	0.6	140	*	350	530	1,100
Cherry Avenue Channel	At 14th Street	0.2	60	*	150	210	430
Cherry Avenue Channel	At 15th Street	0.1	40	*	80	120	230
Colorado River	At Needles	170,600.0	*	*	*	40,000	*
Colorado River	At Bullhead City	169,300.0	*	*	*	40,000	*
Colorado River	Just downstream of Piute Wash	*	*	*	*	45,000	*
Colorado River	Just downstream of Sacramento Wash	*	*	*	*	49,600	*
Colorado River	At Parker	*	*	*	*	40,000	*
Colorado River	At Palo Verde Dam	*	*	*	*	40,000	*
Colorado River	Just downstream of Tyson Wash	*	*	*	*	46,400	*
Colorado River	Just downstream of Arroyo Salada	*	*	*	*	46,600	*
Colorado River	At I-10/Blythe	*	*	*	*	43,200	*
Colorado River	Just downstream of Trigo Wash	*	*	*	*	46,900	
Colorado River	Just downstream of Gould Wash	*	*	*	*	47,000	*
Colorado River	At Imperial Dam	*	*	*	*	40,000	*
Colorado River	At I-8/Yuma	*	*	*	*	40,000	*
Country Club Creek	At confluence with Prado Impoundment	1.3	240	*	620	910	2,000

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
Country Club Creek North Tributary	At Paseo Grande	0.5	100	*	270	400	800
Dead Indian Canyon	At Della Robia Lane	16.5	1,000	*	4,200	6,700	20,000
Dead Indian Canyon	Approximately 200 feet south of Della Robia Lane	16.2	1,000	*	4,200	6,700	20,000
Deep Canyon Channel	Approximately 1,000 feet east of Haystack Channel Junction	63.8	2,000	*	8,200	13,000	40,000
Deep Canyon Channel	At Buckboard Trail	63.1	2,000	*	8,200	13,000	40,000
Deep Canyon Storm Water Channel	At Whitewater River	68.7	2,000	*	8,600	14,000	40,000
Deep Canyon Storm Water Channel	At Camino Del Ray	67.4	2,000	*	8,600	14,000	40,000
Deep Canyon Storm Water Channel	Approximately 700 feet south of El Dorado Drive	66.2	2,000	*	8,200	13,000	40,000
Deep Canyon Storm Water Channel	Approximately 1,000 feet east of Haystack Channel Junction	63.8	2,000	*	8,200	13,000	40,000
Deep Canyon Storm Water Channel	At Buckboard Trail	63.1	2,000	*	8,200	13,000	40,000
Desert Hot Springs Channel	At confluence with Big Morongo Wash	8.2	600	*	2,000	3,000	7,000
Desert Hot Springs Channel	Approximately 500 feet south of West 8th Street	7.9	600	*	2,000	3,000	7,000

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
Desert Hot Springs Channel	Below confluence with Blind Canyon Channel	5.8	600	*	2,000	3,000	7,000
Desert Hot Springs Channel	At Palm Drive	1.0	200	*	660	1,000	2,300
Desert Hot Springs Channel	At Verbena Drive	0.5	160	*	330	500	1,200
Dry Morongo Wash	At Apex	8.9	500	*	3,060	5,170	12,610
East Gilman Home Channel	At confluence with Gilman Home Channel	1.1	290	*	690	1,000	2,000
East Gilman Home Channel	At Canyon Base	1.0	290	*	690	1,000	2,000
East Pershing Channel	At Ramsey Street	0.7	140	*	380	590	1,200
East Pershing Channel	At corporate limits	0.2	70	*	160	240	460
East Rancho Mirage Storm Channel	At confluence with Palm Valley Drain	0.9	120	*	510	860	2,400
East Rancho Mirage Storm Channel	Approximately 4,000 feet southwest of Indian Trail Road	0.4	70	*	300	500	1,400
Elsinore Spillway Channel [4]	At Flint Street	[5]	540	*	1,100	1,440	11,000 [6]
Elsinore Spillway Channel [4]	At Lakeshore Drive	1.1	340	*	660	900	11,000 [6]
Gilman Home Channel	At confluence with Smith Creek	3.0	600	*	850	1,000	1,700
Gilman Home Channel	At Interstate Highway 10	2.3	660	*	1,400	2,000	4,100
Gilman Home Channel	Downstream of Interstate Highway 10	2.3	450	*	450	450	450

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
Gilman Home Channel	Downstream of George Street	2.0	600	*	1,300	1,820	3,700
Gilman Home Channel	At George Street	0.9	320	*	700	940	1,900
Gilman Home Channel	Downstream of confluence of Gilman Home Channels A and B	0.7	270	*	560	780	1,500
Gilman Home Channel A	At Canyon Base	0.3	120	*	250	350	670
Gilman Home Channel B	At Canyon Base	0.4	150	*	320	450	860
Hargrave Street Drain	At Interstate Highway 10	0.4	140	*	270	400	750
Hargrave Street Drain	At Gilman Street	0.2	90	*	160	220	410
Haystack Channel	At confluence with Deep Canyon Channel	0.7	100	*	440	730	2,000
Haystack Channel	At Medina Drive	0.1	30	*	120	200	600
Haystack Channel	Approximately 1,500 feet upstream of Medina Drive	0.1	20	*	80	131	400
Highland Springs Channel	At Ramsey Street	1.6	270	*	750	1,100	2,500
Highland Springs Channel	At corporate limits	1.4	250	*	670	1,000	2,200
Indian Canyon Channel	At Wilson Street	0.8	170	*	340	590	1,400
Indian Canyon Channel	At Canyon mouth	0.7	130	*	280	510	1,100
Interstate 10 Wash	At Apex	52.3 [7]	3,270	*	7,290	9,530	17,000
Lakeview Wash	At Juniper Flat Road	6.9	*	*	*	2,470	*

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
Leach Canyon Channel	At Machado Street	5.7	700	*	2,000	3,200	7,600
Lime Street Channel	At Lake Elsinore	0.6	110	*	300	460 [2]	983
Lime Street Channel	At Lake View	0.5	96	*	260	400	850
Lincoln Avenue Drain	At confluence with Oak Street Channel	2.2	380	*	1,300	2,000	4,500
Lincoln Avenue Drain	At Citron Street	2.0	330	*	1,200	1,900	4,100
Lincoln Avenue Drain	At Ontario Avenue	1.9	330	*	1,200	1,900	4,100
Little Morongo Wash	At Pierson Boulevard	63.7	1,250	*	9,090	16,420	46,320
Long Canyon	At 2S./5E.-34 SW. corner	26.0	6,570	*	11,300	13,350	19,600
Long Creek	At Apex	19.4	2,910	*	10,420	13,370	18,030
Macomber Palms Channel	At Apex	2.0	870	*	1,330	1,530	2,040
Magnesia Springs Channel	At confluence with Whitewater River	5.2	480	*	2,100	3,400	9,500
Magnesia Springs Channel	Approximately 4,000 feet southwest of Indian Trail Road	4.7	460	*	2,000	3,200	9,000
Mangular Channel	Upstream of confluence with Oak Street Channel	2.1	230	*	800	1,300	2,800
Mangular Channel	At Ontario Avenue	1.9	230	*	800	1,300	2,800
Mangular Channel	At corporate limits	1.5	190	*	660	1,000	2,300
Marshall Creek	Upstream of Interstate Highway 10	4.4	620	*	1,800	2,700	6,100

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
Marshall Creek Tributary	At Elm Street	0.2	80	*	200	240	460
Marshall Creek Tributary	At 14th Street	0.1	40	*	100	120	230
Martinez Canyon	*	48.5	2,219	*	7,948	12,376	*
Mcvicker Canyon	At Lake Elsinore	*	*	*	*	4,060	*
Mcvicker Canyon	At mouth of canyon	2.5	*	*	*	1,690	*
Mission Creek	At Highway 62	41.1	1,930	*	8,480	13,170	28,550
Montgomery Creek	At confluence of Smith Creek	2.6	770	*	1,600	2,300	2,800
Montgomery Creek	At Ramsey Street	2.1	660	*	1,300	1,880	3,700
Montgomery Creek	Downstream of Interstate Highway 10	2.1	660	*	1,300	1,880	1,900
Montgomery Creek	At Sunrise Avenue	1.6	540	*	1,100	1,500	2,900
Montgomery Creek	At Sunset Avenue (at Canyon Base)	1.1	400	*	800	1,000	2,100
Montgomery Creek Tributary	At confluence with Montgomery Creek Channel	0.1	33	*	80	120	230
Murrieta Creek	At confluence	220.0	*	*	*	30,900	*
Murrieta Creek	At Washington Avenue	48.7	*	*	*	9,700	*
Murrieta Creek	At Lemon Street	32.8	*	*	*	9,700	*
Murrieta Creek	At Clinton Keith Road	12.3	*	*	*	5,364	*
Murrieta Creek	At McVicar Street	10.4	*	*	*	4,822	*
Murrieta Creek	Approximately 1,000 feet downstream of confluence with Santa Gertrudis Creek	*	*	*	*	19,300	*

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
Murrieta Creek	Approximately 3,200 feet upstream of confluence with Long Valley Creek	*	*	*	*	28,500	*
North Cathedral Channel	Downstream of confluence with Tramview Wash	3.9	400	*	1,550	2,600	7,400
North Norco Channel	At Rincon Street	7.8	530	*	1,700	2,900	7,400
North Norco Channel	Downstream of confluence with West Norco Channel	7.3	500	*	1,700	2,800	7,000
North Norco Channel	Upstream of confluence with West Norco Channel	6.2	460	*	1,500	2,500	6,400
North Norco Channel	At Hamner Avenue	5.2	410	*	1,300	2,200	5,500
North Norco Channel	Downstream of confluence with North Norco Channel, Tributary A	4.4	360	*	1,200	1,900	4,800
North Norco Channel	At Fifth Street	3.2	270	*	850	1,400	3,400
North Norco Channel	Downstream of confluence with North Norco Channel, Tributary B	2.9	270	*	850	1,400	3,400
North Norco Channel	At Valley View Avenue	1.3	130	*	410	670	1,600
North Norco Channel	At Corona Avenue	1.0	130	*	350	570	1,300

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
North Norco Channel, Tributary A	At confluence with North Norco Channel	1.0	130	*	410	660	1,600
North Norco Channel, Tributary A	At Valley View Avenue	1.0	130	*	410	660	1,600
North Norco Channel, Tributary A	At Hillside Avenue	0.5	70	*	200	320	740
North Norco Channel, Tributary B	At confluence with North Norco Channel	1.0	130	*	350	570	1,300
North Norco Channel, Tributary B	At Corona Avenue	0.7	90	*	270	430	980
North Norco Channel, Tributary B	At California Avenue	0.1	20	*	56	86	180
North Norco Channel, Tributary C	At Valley View Avenue	1.3	130	*	410	670	1,600
North Norco Channel, Tributary C	At Corona Avenue	0.7	90	*	270	430	980
North Norco Channel, Tributary C	At California Avenue	0.3	50	*	140	210	470
North Side Wolf Valley	At mouth	2.9	*	*	*	1,600	*
North Side Wolf Valley	Near AmFac Driveway	1.0	*	*	*	1,210	*
Oak Street Channel	At confluence with Temescal Creek	15.8	1,100	*	3,700	5,500	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
Oak Street Channel	At Riverside Freeway	11.4	1,000	*	3,500	5,500	12,000
Oak Street Channel	Downstream of confluence with Mangular Channel	9.0	900	*	3,100	4,800	11,000
Oak Street Channel	At confluence with Mangular Channel	6.9	900	*	3,100	4,500	10,000
Oak Street Channel	At Ontario Avenue	6.6	900	*	3,000	4,500	10,000
Oak Street Channel	At Chase Drive	6.2	900	*	3,000	4,500	9,800
Ortega Channel	At Grand Avenue	1.0	160	*	460	710	1,600
Ortega Channel	At Lake Elsinore	1.0	160	*	460	710	1,600
Palm Canyon Wash	Downstream of confluence with Tahquitz Creek	138.8	4,600	*	17,000	25,000	81,000
Palm Desert Channel	Downstream of confluence with Palm Desert Channel Tributary	18.0	1,000	*	4,400	7,000	21,000
Palm Desert Channel	At State Highway 74	1.4	160	*	800	1,250	3,500
Palm Valley Storm Water Channel	At confluence with Whitewater River	9.7	700	*	3,000	5,000	14,000
Palm Valley Storm Water Channel	At Park View Drive upstream of confluence with Diversion Channel	8.4	640	*	2,700	4,600	13,000
Palm Valley Storm Water Channel	At Pitahaya Street	7.9	620	*	2,700	4,500	12,000
Palm Valley Storm Water Channel	At Willow Street	7.0	560	*	2,500	4,200	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
Palm Valley Storm Water Channel	Approximately 1,500 feet southwest of State Highway 74 and Bel Air Road	6.2	520	*	2,400	3,800	11,000
Palm Valley Storm Water Channel	At Starburst Drive	4.6	450	*	2,000	3,200	9,000
Paloma Valley Channel	At Holland Road	8.6	*	*	*	2,820	*
Park Hill Drain	At mouth	4.1	*	*	*	1,220	*
Park Hill Drain Basin	At outlet of Park Hill Detention	2.8	*	*	*	700	*
Pechanga Creek	At mouth	14.0	3,920 [8]	*	5,840 [8]	6,680 [8]	8,980 [8]
Perris Valley Storm Drain	At confluence with San Jacinto River	82.5	2,200	*	8,100	13,000	34,000
Perris Valley Storm Drain	At Nuevo Road	75.7	2,200	*	8,100	13,000	34,000
Perris Valley Storm Drain	At Rider Street	67.7	1,900	*	7,000	11,300	30,000
Pershing Creek And Smith Creek	Downstream of Southern Pacific Railroad	7.4	1,200	*	400	5,100	9,300
Pershing Creek And Smith Creek	Upstream of Interstate Highway 10	7.3	1,200	*	4,000	6,000	13,700
Pushawalla Canyon	At Apex	33.7	3,460	*	6,680	8,050	11,700
Ramsey Street Drain	At San Gorgonio Avenue	1.1	310	*	620	870	1,800
Ramsey Street Drain	Upstream of Interstate Highway 10	0.7	210	*	430	600	1,200
Ramsey Street Drain	Downstream of Interstate Highway 10	0.7	210	*	430	600	640
Rice Canyon	At mouth	2.8	*	*	*	1,900	*

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
Salt Creek	At Lyon Avenue	42.4	1,500	*	5,700	9,200	24,000
Salt Creek Tributary	At State Street	7.0	500	*	1,700	2,800	7,000
San Gorgonio River	At San Gorgonio River - Banning Levee	22.4	2,400	*	8,000	12,000	28,000
San Jacinto River [9]	Downstream of Wash D	701.9	1,200	*	12,000	24,500	70,000
San Jacinto River [9]	At Gage Station	700.3	1,200	*	12,000	24,500	70,000
San Jacinto River [9]	At Spillway	692.0	1,200	*	12,000	24,500 [2]	70,000
San Jacinto River [9]	At I-215 Freeway	509.0	8,737 [10]	*	25,603 [10]	22,403 [10]	32,747 [10]
San Jacinto River [9]	At Bridge Street	343.0	27,405 [10]	*	51,730 [10]	62,068 [10]	87,110 [10]
Santa Ana River	At Hamner Avenue	963.0	22,000	*	102,000	175,000	340,000
Sidney Street Channel	At Wilson Street	0.3	100	*	210	300	590
Sidney Street Channel	At Canyon mouth	0.1	33	*	80	120	230
Smith Creek	At City of Banning corporate limits	29.1	3,200	*	11,000	16,000	37,000
Smith Creek	Approximately 500 feet downstream of Hathaway Street	26.1	2,800	*	9,400	14,000	33,000
Smith Creek	At Banning Idyllwild Road	22.5	2,600	*	8,700	13,000	31,000
Smith Creek	Downstream of Pershing Creek	15.5	2,000	*	6,700	10,000	24,000
Smith Creek East Tributary	At confluence with Smith Creek West Tributary	0.2	56	*	140	210	410
Smith Creek East Tributary	At corporate limits	0.1	33	*	80	120	230

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
Smith Creek West Tributary	At Ramsey Street	5.1	920	*	3,000	4,600	11,000
Smith Creek West Tributary	At corporate limits	4.5	860	*	2,900	4,300	10,000
South Norco Channel	At confluence with Temescal Wash	4.3	150 [11]	*	440 [11]	1,700	4,700
South Norco Channel	At River Road	4.1	107 [11]	*	340 [11]	1,600	4,700
South Norco Channel	Approximately 4,000 feet downstream of First Street	0.5	70	*	200	320	740
South Norco Channel, Tributary A	Approximately 500 feet downstream of Parkridge Avenue	1.3	0	*	0	390	1,500
South Norco Channel, Tributary A	At Hamner Avenue	1.0	130	*	350	570	1,300
South Norco Channel, Tributary A	Approximately 4,000 feet downstream of First Street	0.8	98	*	300	480	1,100
South Norco Channel, Tributary A	At First Street	0.5	70	*	200	320	740
South Norco Channel. Tributary B	At confluence with South Norco Channel	1.3	130	*	410	670	1,600
South Norco Channel. Tributary B	At Hillside Avenue	1.1	130	*	370	600	1,400
Springbrook Wash	At Lake Evans	18.8	1,990	*	*	2,900	*
Springbrook Wash	At confluence with University Wash	9.4	680	*	*	1,000	*

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
Stetson Avenue Channel	At Hemet Storm Channel	2.5	500	*	850	1,100	2,600
Stetson Avenue Channel	At Palm Avenue	2.1	450	*	700	950	2,200
Stetson Avenue Channel	At State Street	1.9	400	*	650	850	2,000
Stetson Avenue Channel	At San Jacinto Street	1.3	300	*	490	650	1,500
Stovepipe Canyon Creek	At State Highway 71	1.3	150	*	460	750	1,700
Stream A	At 2S./5E.-29 NW. corner	0.6	440	*	620	740	970
Taylor Avenue Drain	At Cota Street	1.5	280	*	590	850	1,900
Taylor Avenue Drain	At Riverside Freeway	1.4	260	*	550	800	1,800
Taylor Avenue Drain	At Grand Boulevard	1.3	220	*	500	750	1,700
Taylor Avenue Drain	At Olive Avenue	0.9	160	*	370	550	1,200
Taylor Avenue Drain	At Citron Avenue	0.8	150	*	340	500	1,100
Taylor Avenue Drain	At Ontario Avenue	0.7	130	*	300	450	1,000
Temecula Creek	At mouth	370.0	7,500	*	27,000	36,000	58,000
Temescal Wash	Below confluence with Arlington Channel	170.9	2,345	*	14,500	29,000	69,150
Temescal Wash	Above confluence with Arlington Channel	*	1,970	*	12,180	24,000	58,090
Temescal Wash	At Magnolia Avenue	134.0	1,800	*	11,700	22,000	52,000
Tequesquite Arroyo	At Tequesquite Avenue	4.89 [12]	1,972	*	*	2,880	*

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
Tequesquite Arroyo	At Magnolia Avenue	3.54 [12]	685	*	*	750	*
Tequesquite Arroyo	At Atchison, Topeka & Santa Fe Railway	3.01 [12]	1,240	*	*	2,350	*
Thousand Palms Canyon	At Apex	84.1	5,330	*	11,170	14,510	24,600
Thousand Palms Main Channel	At Apex	7.5	1,240	*	2,350	2,820	4,090
Thousand Palms Tributary A	At Apex	1.4	640	*	980	1,160	1,650
Thousand Palms Tributary B	At Apex	0.9	560	*	850	1,000	1,400
Thousand Palms Tributary C	At Apex	1.1	680	*	1,030	1,220	1,780
Thunderbird Wash	At confluence with Whitewater River	1.0	120	*	550	920	2,600
Thunderbird Wash	At Pecos Road	0.6	90	*	400	660	1,900
Thunderbird Wash	At Thunderbird Road	0.4	70	*	300	500	1,400
Tramview Tributary	At State Highway 111	1.1	180	*	700	1,160	3,170
Tramview Wash	Approximately 230 feet upstream of upstream corporate limits	1.7	240	*	920	1,530	4,240
University Wash	At confluence with Springbrook Wash	9.1	1,000	*	*	1,900	*
University Wash	At Gage Canal crossing	3.8	500	*	*	1,600	*
Unnamed Stream A	At 2S./5E.-29 NW. corner	0.6	110	*	470	715	1,450
Unnamed Stream B	At 2S./5E.-29 S. Half	1.1	160	*	750	1,160	2,460

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
Unnamed Stream C	At 2S./5E.-33 NE. Quarter	0.7	120	*	520	790	1,620
Wash D	At confluence with San Jacinto River	0.9	110	*	340	530	1,200
Wash D	At State Highway 71	0.6	82	*	240	390	880
Wash G	At confluence with Channel H	0.5	90	*	260	390	840
Wash G	At Machado Street	0.2	45	*	120	180	380
Wash I	At Lake Elsinore	0.5	90	*	240	380	890
Wash I	At Grand Avenue	0.4	80	*	210	330	700
Wasson Canyon Creek	At confluence with Temescal Wash	8.3 [13]	580	*	1,900	2,400 [2]	2,540
Wasson Canyon Creek	At State Highway 71	8.2 [13]	580	*	1,900	2,400 [2]	2,540
West Macomber Palms Channel	At Apex	2.9	1,260	*	1,930	2,220	2,980
West Norco Channel	At confluence with North Norco Channel	0.9	200	*	400	550	1,200
West Norco Channel	At Pine Avenue	0.5	130	*	250	350	740
West Pershing Channel	At Ramsey Street	1.3	230	*	630	960	2,100
West Pershing Channel	At corporate limits	0.7	140	*	380	580	1,200
Whitewater River	Below Palm Valley Drain	*	8,800	*	28,000	46,000	106,000
Whitewater River	At Salton Sea	1,600.0	8,500	*	27,000	43,000	100,000
Whitewater River	At Point Happy	843.0	8,500	*	27,000	43,000	100,000
Whitewater River	Downstream of confluence with Palm Canyon Wash	743.0	9,000	*	30,000	47,000	110,000

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
Whittier Avenue Channel	At Hemet Storm Channel	1.9	400	*	630	840	1,900
Whittier Avenue Channel	At Lyon Avenue	1.8	380	*	610	800	1,800
Whittier Avenue Channel	At Palm Avenue	1.3	300	*	460	610	1,400
Whittier Avenue Channel	At San Jacinto Avenue	0.8	200	*	320	410	900

1 Excluding Bautista Wash Non-Contributing Area (1.1 square miles)
2 Peak discharge provided by Riverside County Flood Control and Water Conservation District
3 Drainage area reflects on the contributory portion of drainage basin
4 Flows going toward Lake Elsinore
5 Flows represent 60 percent of flows leaving Wasson Canyon Creek
6 Represents spillway flow out of Lake Elsinore
7 Does not include 33.2 square miles behind West Wide Canyon Dam
8 Includes adjustment for flow transfer from Pechanga Creek
9 Excludes 18 square miles above Pidgeon Pass and Perris Drive
10 Represents flow rate at peak stage (elevation) at this location for updated unsteady San Jacinto River model. San Jacinto unit hydrograph data downstream of Bridge St. to mouth of Railroad Canyon, used in unsteady hydraulic analysis for this reach, found in Section 10 “1st Revision”
11 Decrease due to storage upstream
12 Drainage area reflects only the contributing portion of the drainage basin
13 Flows limited by freeway culvert
* Data not available

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
Lake Elsinore	USGS Survey Gage No. 11-705	1,260	*	1,265	1,266	1,270

*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
Andreas Canyon Wash	10259000	USGS	Upstream of the Palm Springs corporate limits	-[1]	-[1]	26*
Andreas Creek	10-2590	USGS	Andreas Creek near Palm Springs	8.6	-[1]	23*
Arch Creek	9-4285.3	USGS	At Arch Creek, Near Earp	1.52	-[1]	15*
Bautista Creek	11-700	USGS	Bautista Creek near Hemet	39.4	-[1]	22*
Betz Wash	10.2540.2	USGS	At Betz Wash, near Salton Beach, California	5.95	-[1]	14*
Cajon Creek	11-630	USGS	Cajon Creek near Keen Brook, California	40.6	-[1]	52*
Chemehuevi Wash Tributary	9-4240.5	USGS	At Chemehuevi Wash Tributary, Near Needles	2.04	-[1]	14*
City Creek	11-558	USGS	City Creek near Highland	19.6	-[1]	53*
Colorado River Tributary	4285.3	USGS	At Colorado River Tributary, Near Vidal	1.12	-[1]	14*
Cottonwood Wash	10-2596	USGS	At Cottonwood Wash, near Cottonwood Spring, California	0.71	-[1]	14*
Cucamonga Creek	11-734.7	USGS	Cucamonga Creek at Upland	101.1	-[1]	43*
Day Creek	11-670	USGS	Day Creek at Etiwanda	4.6	-[1]	45*

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
Devil Canyon Creek	11-636.8	USGS	Devil Canyon Creek near San Bernardino	5.6	-[1]	50*
East Twin Creek	11-585	USGS	East Twin Creek near Arrowhead Springs	8.8	-[1]	53*
Glamis Wash	10-2544.75	USGS	At Glamis Wash, Near Glamis	0.6	-[1]	14*
Lone Pine Creek	11-635	USGS	Lone Pine Creek Near Keen Brook	15.1	-[1]	42*
Long Canyon	18100200	USGS	Long Canyon, near Desert Hot Springs	19.4	-[1]	16*
Long Creek	18100200	USGS	Long Creek, near Desert Hot Springs	19.4	-[1]	16*
Lytle Creek	11-620	USGS	Lytle Creek near Fontana	46.3	-[1]	39*
Mill Creek	11-540	USGS	Mill Creek near Yucaipa	38.1	-[1]	50*
Mission Creek	10257600	USGS	At Mission Creek, near Desert Hot Springs	35.7	-[1]	20*
Monument Wash	10-2537.5	USGS	At Monument Wash, Near Desert Center	4.29	-[1]	14*
Palm Canyon	10-2585	USGS	Palm Canyon near Palm Springs	93.3	-[1]	38*
Palm Canyon Tributary	10-2581	USGS	Palm Canyon Tributary Near Anza	0.5	-[1]	9*
Plunge Creek	11-555	USGS	Plunge Creek Near East Highlands	16.9	-[1]	53*

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
Reche Canyon	S-2702A	USGS	Reche Canyon at Barton Road	11.2	-[1]	15*
San Antonio Creek	11-730	USGS	San Antonio Creek near Claremont	16.5	-[1]	55*
San Jacinto River	11- 695	USGS	San Jacinto River Near San Jacinto	141.0	-[1]	44*
San Timoteo Creek	11-570	USGS	San Timoteo Creek near Redlands	119.0	-[1]	41*
Santa Ana River	11-515	USGS	Santa Ana River at Mentone	209.0	-[1]	55*
Santa Ana River	11-665	USGS	Santa Ana River at Riverside Narrows	850.0	-[1]	45*
South Fork San Jacinto Tributary	11-693	USGS	South Fork San Jacinto Tributary near Valley Vista	2.2	-[1]	9*
Tahquitz Creek	10-2580	USGS	Tahquitz Creek near Palm Springs	16.8	-[1]	25*
Temescal Creek	11-720	USGS	Temescal Creek Near Corona	164.0	-[1]	43*
Waterman Canyon Creek	11-586	USGS	Waterman Canyon Creek near Arrowhead Springs	4.7	-[1]	49*
Whitewater River	10-2560	USGS	Whitewater River at Whitewater	57.4	-[1]	23*

*The Period of Record date information is not available. This is the total number of years of record.
[1]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
1001 Ranch Drain	33.967754, -117.469601	33.973696, -117.464798	*	*	8/28/2008	A	*
1001 Ranch Drain	33.973849, -117.464881	33.9935, -117.4501	*	*	8/28/2008	AE	*
1001 Ranch Drain West Tributary	33.978968, -117.460631	33.983488, -117.461342	*	*	8/28/2008	AE	*
Alessandro Reservoir	N/A	N/A	*	*	*	A	*
Alessandro Wash	33.931945, -117.379255	33.929812, -117.3656	*	*	*	AE	*
Anza Creek	33.549978, -116.670195	33.555061, -116.673671	*	*	*	A	*
Arenas Canyon Creek	33.788848, -116.522246	33.784655, -116.528171	Log Pearson Type III Frequency Analysis	*	August 1979	AE	Gage 10259000 used in hydrologic analysis.
Arenas Canyon Creek	33.784655, -116.528171	33.772295, -116.545509	*	*	*	A	Levee 14: Based on engineering judgment, the shaded Zone X behind these levees was recommended as the levee failure floodplain
Arlington Channel	33.880785, -117.554794	33.890003, -117.500631	*	*	9/17/1980	AE	*
Arroyo Del Toro Creek	33.695995, -117.34092	33.702068, -117.330134	*	*	*	A	Hydrologic studies prepared by the Riverside County Flood Control District
Avery Canyon	33.702935, -116.962467	33.701378, -116.953829	*	*	*	A	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)

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
Bautista Creek	at Lyon Ave	*	Log Pearson Type III Frequency Analysis	*	*	A	*
Bautista Wash	San Jacinto Avenue	Charlton Avenue	*	HEC2	*	A	Hydrological discharges taken from USACE. May 1973. Unpublished FIS, San Jacinto CA (USACE May 1973)
Bear Creek	33.678137, -116.312955	33.644794, -116.319042	HEC 1	HEC 2	10/17/1978	A	There is a flood profile and floodway data table for Bear Creek, but the reach is a Zone A on panel 1360.
Beaumont Channel	33.921879, -116.964152	33.943391, -116.976411	*	*	*	AO	HEC 1 AND regional regression equation (USGS 1970) were used. The effects of urbanization on runoff were accounted for by utilizing the results of a USGS study (USGS February 1974).
Bedford Canyon Wash	33.824312, -117.506234	33.818678, -117.515226	*	*	*	A	There is a flood profile and floodway data table for Bedford Canyon Wash, but the reach is a Zone A on panel 1360.
Big Morongo Wash	33.883297, -116.499857	33.902965, -116.505909	Regional Regression equation	*	*	A	Approximate methods
Big Morongo Wash	33.902965, -116.505909	34.00033, -116.559396	Regional Regression equation	HEC 2	*	AO	*
Biskra Palms Channel	33.789586, -116.25788	33.792794, -116.253288	*	*	*	AO	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Blaisdel Canyon Creek	33.885629, -116.600907	33.87854, -116.632817	*	*	8/28/2008	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
Blind Canyon Channel	33.975213, -116.504738	33.984906, -116.497883	RCFCWCD unpublished hydrology report	HEC 2	*	AE	*
Bly Channel	33.988134, -117.483351	34.018952, -117.492029	*	*	*	AE	*
Box Springs Wash	33.974183, -117.368745	33.961689, -117.331229	*	*	*	AE	*
Bundy Canyon	33.596073, -117.267524	33.612286, -117.269293	*	*	*	A	*
Cactus Valley	33.683713, -116.95549	33.668735, -116.920513	*	*	*	A	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Cahuilla Creek	33.541882, -116.683526	33.568343, -116.690502	*	*	*	A	*
Cahuilla Creek Tributary	33.559729, -116.691143	33.561332, -116.696424	*	*	*	A	*
Calimesa Channel	34.00324, -117.065134	34.004535, -117.040414	*	*	10/17/1978	AE	*
Cat Creek	33.68992, -116.408036	33.691157, -116.42282	*	*	1/19/1982	A	*
Channel A	33.922685, -116.995007	33.924428, -116.981739	Regional regression equation	Normal depth calculations	1/19/1982	X	To define discharge-frequency data for the streams under study, a regional relationship of basin characteristics to streamflow characteristics (U.S. Department of the Interior 1970) was used. The effects of urbanization on runoff were accounted for by utilizing the results of a USGS study (USGS February 1974).

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
Channel A	33.691537, -116.371798	33.687177, -116.37281	*	*	10/17/1978	A	Levee 39: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain (1/19/82)
Channel B	33.691998, -116.365785	33.684505, -116.365071	*	*	9/17/1980	AE	*
Channel B	33.922754, -116.99636	33.921542, -116.976855	*	Normal depth calculations	10/17/1978	X	*
Channel C	33.68647, -116.372297	33.683802, -116.365259	*	*	*	AE	*
Channel H	*	*	*	*	*	*	Hydrologic studies prepared by the Riverside County Flood Control District
Cherry Avenue Channel	33.928836, -116.957802	33.950915, -116.964067	Regional Regression equation	Normal depth calculations	*	A	To define discharge-frequency data for the streams under study, a regional relationship of basin characteristics to streamflow characteristics (U.S. Department of the Interior 1970) was used. The effects of urbanization on runoff were accounted for by utilizing the results of a USGS study (USGS February 1974)
Cherry Valley Creek	33.964442, -116.993771	33.976095, -116.985151	*	*	*	A	*
Chino Canyon Creek	33.864033, -116.513836	33.869846, -116.561599	*	*	*	AE	Levee 9: For the western part of the levee, failure floodplain was developed using Alluvial Fan analysis. A discharge of 4,000 cfs was computed for a drainage area of 49 sq. mi. using the USGS NFF equations for California

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
Coachella Valley Stormwater Channel (Whitewater River)	33.508459, -116.058311	33.736942, -116.241511	USACE Report (USACE 1980)	HEC-RAS 4.1 for the channel. FLO-2D Version 2007.06 for the overbanks	*	AE	LAMP Analysis on both right and left levees performed using the Structural-Based Inundation procedure. (FEMA 2013) Hydrographs developed at the breach locations using HEC-RAS unsteady for use in the 2D analysis.
Country Club Creek	33.881868, -117.620024	33.870378, -117.606283	*	*	*	AE	*
Country Club Creek North Tributary	33.878315, -117.613335	33.871974, -117.604045	*	*	1/19/1982	AE	*
Country Club Wash	33.759793, -116.432885	33.7565, -116.440912	*	*	*	X	*
Day Creek	33.967093, -117.53183	34.025909, -117.541916	*	*	*	A	*
Dead Indian Alluvial Fan	33.68713, -116.388277	33.684751, -116.393102	*	*	*	A	*
Deep Canyon Wash	33.670657, -116.372519	33.656244, -116.37186	*	*	*	AO	Alluvial Fan: Engineering judgment used to determine floodplain boundary. Levee 37: Based on engineering judgment the levee failure floodplain was delineated using contours derived from the USGS 10-meter DEM
Deep Canyon Storm Water Channel	33.718139, -116.299077	33.705151, -116.362114	*	HEC 2	*	A	*
Desert Hot Springs Channel	33.964742, -116.522305	33.972167, -116.490898	*	HEC 2	*	AE	RCFCWCD unpublished hydrology report

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
Desert Hot Springs Creek	33.906852, -116.497393	33.945631, -116.49444	*	*	*	AO	*
Dry Morongo Wash	33.999798, -116.56804	34.009828, -116.574357	Regional Regression equation	*	*	X	*
East Cathedral Channel	33.778928, -116.452133	33.759548, -116.476532	*	*	*	AE	Flood discharges taken from the FIS for the unincorporated areas of Riverside County, California (FEMA 1980). Flood boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet. Levee 21: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain. Levee 22: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain.
East Gilman Home Channel	33.930927, -116.889298	33.939791, -116.896077	*	Sheet flow analysis	*	X	1-percent annual chance discharge from studies prepared by the Riverside County Flood Control and Water Conservation District (RCFCWCD Unpublished). Discharge bulked by 1.25 to account for debris.
East Hemet Wash	33.729854, -116.938306	33.730879, -116.927681	*	*	*	X	*
East La Quinta Channel	33.66338, -116.299977	33.655118, -116.303788	*	*	*	A	*
East Pershing Channel	*	*	*	*	*	A	Floodplain boundaries were determined by topography and hand calculations using Manning's equation.

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
Edgemont B East Fork	33.93162, -117.280707	33.923293, -117.286247	*	*	*	A, X	*
El Cerrito Channel	33.839511, -117.511687	33.827107, -117.537325	*	*	10/17/1978	A	*
El Cerrito Channel	33.838873, -117.515762	33.831525, -117.530821	*	*	10/17/1978	AE	*
El Cerrito Tributary	33.838019, -117.519053	33.839651, -117.526622	*	*	10/17/1978	A	Boundaries taken from the 1977 FHBM for the City of Corona (HUD May 1974)
Ethanac Wash	*	*	*	*	*	A	Entire surface of wash considered to be in 1% annual chance flood. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Garden Air Golf Course Wash	33.98919, -117.055579	33.998812, -117.026975	*	*	*	AE	*
Garner Valley Wash	33.618263, -116.627133	33.593273, -116.595093	*	*	9/29/1978	A	*
Gilman Home Channel	33.908593, -116.878814	33.937269, -116.896407	*	HEC 2, sheet flow analysis	10/17/1978	AE	1-percent annual chance discharge were obtained from studies prepared by the Riverside County Flood Control and Water Conservation District (RCFCWCD Unpublished).
Gilman Home Channel A	33.937296, -116.89682	33.940208, -116.901655	*	*	*	X	Flood discharges determined by a regional relationship of basin characteristics to streamflow characteristics was used (USACE June 1973). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS February 1974). Flood boundaries determined by topography.

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
Gilman Home Channel B	33.937681, -116.896997	33.940446, -116.898725	*	*	*	X	Flood discharges determined by a regional relationship of basin characteristics to streamflow characteristics was used (USACE June 1973). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS February 1974). Flood boundaries determined by topography.
Hamilton Creek	33.551252, -116.665788	33.564132, -116.629383	*	*	*	A	*
Hargrave Street Drain	33.925477, -116.867867	33.938164, -116.867967	Regional regression equation	*	6/17/1991	X	Flood discharges were developed with a regional relationship of basin characteristics to streamflow characteristics (USACE 1973). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS February 1974).
Harrison Wash	33.893063, -117.437583	33.886929, -117.432202	*	*	*	AE	*
Haystack Channel	*	*	*	*	*	*	Levee 34: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain. Levee 35: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain.
Hemet Storm Channel	33.719773, -117.046155	33.731255, -117.015316	unknown	unknown	*	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
Highland Springs Channel	33.932871, -116.946981	33.937346, -116.947143	Regional regression equation	*	11/20/1996	AE	Flood discharges were developed with a regional relationship of basin characteristics to streamflow characteristics (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS February 1974).
Homeland – East Fork	*	*	*	*	6/18/1987	A	*
Homeland – West Fork	*	*	*	*	8/28/2008	A	*
Howell Canyon	33.595008, -117.276665	33.59375, -117.282222	*	*	9/17/1980	X	*
Indian Canyon Channel	33.92782, -116.876137	33.940271, -116.885272	*	Sheet flow analysis	*	AO, X	*
Interstate 10 Wash	*	*	*	*	*	A	*
Jenson Creek	33.899774, -116.747535	33.875911, -116.742851	*	*	*	A	1% discharges developed by shallow flooding analysis
Joseph Canyon	33.828963, -117.511301	33.828118, -117.513541	*	*	9/17/1980	A	*
Kalmia Street Wash	33.551892, -117.223285	33.567191, -117.209297	*	*	4/16/1979	AE	*
Kitching Drain	33.882579, -117.213717	33.918851, -117.217788	*	*	*	A	Floodplain boundaries taken from USGS flood prone area maps (USGS 1974). Boundaries reflect channel improvements made by the Riverside County Flood Control and Water Conservation District (RCFCWCD 1986)

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
Lake Elsinore	N/A	N/A	*	*	*	AE	USACE HEC-5 (USACE 1999), RCFCWCD synthetic unit hydrograph rainfall runoff model (RCFCWCD 1978)
Lake Elsinore Spillway Channel	33.670334, -117.329106	33.663732, -117.332929	*	*	*	AE	Boundaries developed with normal-depth calculations with extensive field investigation and analysis of existing topography.
Lakeland Village Area	*	*	*	*	*	A	*
Lakeland Village Channel	33.639714, -117.343693	33.634888, -117.34796	*	*	*	AE	*
Leach Canyon Channel	33.670787, -117.37235	33.676928, -117.398687	*	*	*	X	*
Lime Street Channel	33.663836, -117.377064	33.661573, -117.380796	*	*	10/17/1978	X	Hydrologic studies prepared by the Riverside County Flood Control District
Line "J" Channel	*	*	*	*	10/17/1978	*	Boundaries determined by a synthesis of normal depth calculations and engineering judgment based on topography and field investigations
Little Morongo Wash	33.970724, -116.531564	33.990228, -116.524044	Regional Regression equation	FEMA alluvial fan methodology	*	AO	Regional regression equations developed from select gages noted in effective FIS

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
Long Canyon	33.909987, -116.473257	33.961643, -116.44378	Synthetic Unit Hydrograph method from RCFCWCD Hydrology Manual (1978) AND least-squares fit of a Log Pearson Type III distribution	FEMA alluvial fan methodology	4/16/1979	AO	*
Macomber Palms Channel	33.789351, -116.265715	33.796286, -116.262873	*	*	*	AO	*
Magnesia Falls Road	33.736058, -116.400114	33.733086, -116.417019	*	HEC 2	*	A	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Magnesia Springs Channel	33.748653, -116.419051	33.731484, -116.432134	*	HEC 2	*	A	*
Main Street Channel	33.87529, -117.549016	33.831397, -117.569419	*	*	*	AE	*
Mangular Channel	33.854616, -117.598333	33.850406, -117.608667	*	*	*	AE	Discharges taken from hydrology study prepared by the USACE (USACE 1975)
Marshall Creek	33.945106, -116.983899	33.948454, -116.97891	*	HEC 2	10/17/1978	AE	Flood discharges were developed with a regional relationship of basin characteristics to streamflow characteristics (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).

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
Marshall Creek Tributary	33.944552, -116.983593	33.945806, -116.979437	*	Normal depth calculations	10/17/1978	A, X	Flood discharges were developed with a regional relationship of basin characteristics to streamflow characteristics (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).
McVicker Canyon	33.68477, -117.396674	33.687306, -117.416682	*	unknown		A, X	Boundaries taken from City of Lake Elsinore FIS (HUD 1980)
Metz Road Basin	*	*	*	unknown	4/16/1979	A	*
Millard Canyon	33.918816, -116.77677	33.947925, -116.79775	*	unknown	4/16/1979	A	*
Mirage Indian Trail	33.745079, -116.415953	33.739893, -116.421215	*	HEC 2	*	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
Mission Creek	33.905268, -116.524167	33.991638, -116.572504	Synthetic Unit Hydrograph method from RCFCWCD Hydrology Manual (1978) AND least-squares fit of a log Pearson Type III distribution. 1% annual chance peak discharges for these streams were taken from report entitled "Mission Creek Flow Conditions Near the I-10 Embankment", Schall, James D., 1989	Manning's equation and highway culvert nomographs (US Department of Transportation, 1985)	*	AO, X	*
Mockingbird Canyon Wash	33.893658, -117.415042	33.86428, -117.380916	*	*	11/20/1996	A	*
Mockingbird Canyon Wash	33.908461, -117.427121	33.894534, -117.41979	*	*	11/20/1996	AE	*
Mockingbird Reservoir	*	*	*	*	*	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
Montgomery Creek	33.909144, -116.882687	33.936013, -116.912642	Regional regression equation	HEC 2, sheet flow analysis	*	AE	A portion of stream discharges are from 1-percent annual chance discharge from studies prepared by the Riverside County Flood Control and Water Conservation District (RCFCWCD Unpublished). Discharge bulked by 1.25 to account for debris.
Montgomery Creek Tributary	*	*	Regional regression equation	*	2/15/1979	*	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).
Moreno Beach Wash	*	*	*	*	2/15/1979	*	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Mountain Avenue Wash	33.758571, -117.235459	33.772608, -117.246428	*	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979.	2/15/1979	A	*
Mountain Avenue Wash	33.746722, -117.230596	33.758592, -117.235464	*	*	*	AE	*
Murrieta Creek	33.594816, -117.266213	33.608962, -117.285952	*	HEC 2	*	A	Boundaries taken from "Riverside County Flood Hazard Investigation - Murrieta Creek" (CADWR 1975).

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
Murrieta Creek	33.474228, -117.141659	33.594816, -117.266213	*	HEC 2	9/2/1993	AE	Levee 44: The levee failure floodplain was developed using engineering judgment based on alluvial fan analysis concepts and contours developed from USGS 10-meter DEMs. Levee 45: The levee failure floodplain was developed using engineering judgment based on alluvial fan analysis concepts and contours developed from USGS 10-meter DEMs.
Murrieta Creek Tributary	*	*	*	HEC 2	4/16/1979	*	Entire surface of wash considered to be in 1% annual chance flood. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Murrieta Hot Springs Creek	*	*	*	*	9/17/1980	A	*
North Cathedral Channel	33.779803, -116.453448	33.78669, -116.473133	*	*	*	AE	Flood discharges taken from the FIS for the City of Palm Springs (FEMA 1982). Boundaries were delineated using approximate hydraulic calculations in conjunction with existing topographic mapping (RCFCD 1968, 1972).
North Norco Channel	33.900702, -117.595117	33.938353, -117.551087	Regional regression equation	*	*	AE	*
North Norco Channel Tributary A	33.926289, -117.555856	33.925659, -117.538164	*	*	*	X	*
North Norco Channel Tributary B	33.933545, -117.551916	33.933004, -117.52838	*	*	*	X	*

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 Norco Channel Tributary C	33.93834, -117.551203	33.942887, -117.544611	*	*	*	A	Boundaries were delineated using approximate hydraulic calculations in conjunction with existing topographic mapping (RCFCD 1968, 1972)
North Palm Springs Wash	33.904714, -116.544784	33.982862, -116.587037	*	*	*	X	*
North Shore Beach Channel	33.514789, -115.934818	33.527789, -115.919629	*	*	*	A	*
North Side Wolf Valley Creek	*	*	RCFCWCD synthetic unit hydrograph rainfall run off model (1978)	Shallow flooding analysis	9/2/1993	AH	*
Oak Street Channel	33.846339, -117.596459	33.83959, -117.597574	*	*	6/18/1987	AE	Discharges taken from hydrology study prepared by the USACE (USACE 1975)
Ocotillo Drive	33.738397, -116.409754	33.73521, -116.417319	*	HEC 2	6/18/1987	A	*
Orange Lateral	*	*	*	*	7/4/1905	*	*
Ortega Channel	*	*	*	*	10/17/1978	*	*
Ortega Wash	*	*	*	*	6/18/1987	*	Boundaries taken from City of Lake Elsinore FIS (HUD 1980)
Palm Canyon Wash	33.794199, -116.471538	33.77413, -116.532958	Log Pearson Type III Frequency Analysis	HEC 2	6/18/1987	A, AE	USGS Gage 1258500. Levee 14 and 15: Based on engineering judgment, the shaded Zone X behind these levees was recommended as the levee failure floodplain.
Palm Valley Drain	33.741456, -116.395657	33.732821, -116.399751	*	Normal depth calculations	*	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
Palm Valley Stormwater Channel	33.732821, -116.399751	33.68992, -116.408036	*	*	*	A	Levee 27, 29, 33: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain. Levee 29 analysis completed 06/18/1987.
Paloma Valley Channel	33.690608, -117.177911	33.666915, -117.175161	*	*	*	AE	*
Park Hill Drain	33.764671, -116.963719	33.751093, -116.947976	*	Shallow flooding analysis	10/17/1978	AH	*
Pechanga Creek	33.450847, -117.103707	33.448291, -117.093833	1% discharges developed by shallow flooding analysis	HEC 2	*	A	*
Pechanga Creek	33.473395, -117.129774	33.456233, -117.111434	Rainfall Runoff modeling	HEC 2	*	AE	RCFCWCD synthetic unit hydrograph rainfall run off model (RCFCWCD 1978)
Perris Lateral A	*	*	*	*	9/17/1980	D	*
Perris Lateral B	*	*	*	*	*	D	*
Perris Valley Storm Drain	33.773376, -117.19964	33.858917, -117.213015	*	HEC 2	*	AE	USACE Flood Information report (USACE 1970)
Pershing Creek	33.904258, -116.88582	33.92527, -116.922885	*	HEC 2	*	A	Discharges taken from USACE Floodplain Information report (USACE June 1973). Discharges bulked by 1.25 to account for debris.
Pigeon Pass Channel	33.941356, -117.236012	33.94643, -117.243558	*	*	9/29/1978	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
Pigeon Pass Channel	33.934013, -117.231632	33.942159, -117.238838	*	*	*	AE	*
Prenda Reservoir	33.912437, -117.371168	33.90942, -117.364784	*	*	9/29/1978	A	*
Prenda Wash	33.923778, -117.400998	33.912464, -117.371228	*	*	10/17/1978	AE	*
Pushawalla Canyon	*	*	*	FEMA alluvial fan methodology	10/17/1978	AO, X	*
Pyrite Channel	33.975096, -117.499378	34.004247, -117.466062	*	*	4/16/1979	A	*
Pyrite Channel	34.004247, -117.466062	34.015822, -117.461381	*	*	*	AE	*
Quincy Wash	33.904074, -117.182448	33.925037, -117.165501	*	*	LOMR 11-09-0820P. PMR date 5/24/2011	A	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Railroad Canyon Reservoir	N/A	N/A	*	*	*	A	*
Ramsey Street Drain	33.923197, -116.84174	33.92782, -116.876137	Regional regression equation	HEC 2, sheet flow analysis	*	A, X	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974). Discharges bulked by factor of 1.25 to account for debris.
Reche Canyon	34.005106, -117.2535	33.98489, -117.218399	*	*	9/2/1993	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
Reche Canyon	34.018677, -117.272009	34.005106, -117.2535	*	*	*	AE	*
Rice Canyon	33.709824, -117.397652	33.696539, -117.416511	*	*	10/17/1978	A, X	*
Romoland Wash	*	*	*	*	*	A	*
Salt Creek	33.678399, -117.23548	33.712357, -117.015243	*	*	*	A	*
Salt Creek	33.692878, -117.211302	33.71634, -116.988999	*	HEC 2	10/17/1978	AE	*
Salt Creek Overflow	*	*	*	*	10/17/1978	*	*
Salt Creek Tributary	33.725526, -116.962822	33.714524, -116.892631	Regional regression equation	HEC 2	10/17/1978	A, X	Regional regression equation (URA 1972)
Salt Creek Tributary	33.721909, -116.97162	33.723763, -116.96715	Regional regression equation	HEC 2	10/17/1978	AE	Regional regression equation (URA 1972)
San Gorgonio River	33.904685, -116.75461	34.025569, -116.875	Regional regression equation	HEC 2	*	A	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).
San Gorgonio River	33.946346, -116.8591	33.950427, -116.878725	Regional regression equation	HEC 2	*	AE	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).

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 Jacinto Lateral	*	*	*	*	2/15/1979	*	*
San Jacinto River	33.665153, -117.276064	33.747217, -116.857879	*	*	*	A	USACE Flood Information report (USACE 1970)
San Jacinto River	33.655344, -117.304852	33.862927, -117.059995	*	HEC-RAS 4.1 for LOMR. HEC 2, normal-depth calculations with extensive field investigation and analysis of existing topography	*	AE	Hydrologic studies prepared by the Riverside County Flood Control District. Levee 158: For the left levee, the levee failure floodplain was developed using engineering judgment based on alluvial fan analysis concepts and contours developed from USGS 10-meter DEMs. For the right levee, HEC-RAS version 4.1 was used to revise the shaded X area. Discharges from levee certification reports prepared in 2012 by Tetra Tech were used in the modeling (Tetra Tech 2012). Topographic data used for the study was 2007 LiDAR data provided by RCFCWCD (RCFCWCD 2007).
San Sevaine Channel	33.973588, -117.505345	34.033505, -117.51563	*	*	9/29/1978	A, AE, X	*
Santa Ana River	33.870266, -117.672443	33.889296, -117.644685	*	*	9/17/1980	A	Hydrologic study (USACE 1975)

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 Ana River	33.919395, -117.602811	34.019453, -117.368504	*	*	*	AE	Hydrologic study (USACE 1975). Levee 1 and 2: Based on engineering judgment, the shaded Zone X behind these levees was recommended as the levee failure floodplain. Levee 3: A review of the topographic information found this structure is actually slope protection and not a levee. Therefore, no levee failure analysis was performed. Furthermore, the attributes of this structure in the DFIRM database were change
Santa Gertrudis Creek	33.540374, -117.125839	33.543048, -117.118145	*	*	*	A	*
Sedco Hills Creek	33.643241, -117.29303	33.644386, -117.28779	*	*	*	A	*
Sidney Street Channel	33.932745, -116.879106	33.946359, -116.880662	Regional regression equation	Sheet flow analysis	*	A, X	A regional relationship of basin characteristics to streamflow characteristics was used (USACE, 1973). The effects of urbanization on runoff were accounted for by using the results of a USGS study (U.S. Department of the Interior, 1974). Discharge bulked by 1.25 to account for debris. The capacity of the channel was determined from the improvement plans and the excess discharge treated as overland flow with the boundaries determined by topography and field investigation and depths checked by using Manning's equation.

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
Sinclair Wash	*	*	*	*	*	*	Entire surface of wash considered to be in 1% annual chance flood. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Small Unnamed Streams	*	*	unknown	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979.	*	A	*
Smith Creek	33.921799, -116.925428	33.943892, -116.937258	Regional regression equation	HEC 2	*	A	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).
Smith Creek	33.917628, -116.840709	33.90148, -116.891382	*	HEC 2	6/18/1987	AE	Hydrology taken from USACE Floodplain Information report (USACE June 1973).
Smith Creek West Tributary	33.925442, -116.925339	33.936439, -116.937229	Regional regression equation	HEC 2	*	AE	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).
South Norco Channel	33.895123, -117.57953	33.918659, -117.546004	HEC 1	*	*	AE	Modified Puls routing used to determine elevation behind structure

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 Norco Channel Tributary A	33.897677, -117.570283	33.901955, -117.545773	HEC 1	*	*	AE, X	Modified Puls routing used to determine elevation behind structure
South Norco Channel Tributary B	33.905758, -117.554531	33.905023, -117.541428	*	*	*	AE, X	*
Spring Brook Wash	33.993862, -117.381174	34.007698, -117.311389	*	*	9/2/1993	AE	*
Spring Brook Wash	34.012263, -117.345077	34.012263, -117.345077	*	*	9/2/1993	A	*
St. Johns Canyon	33.669454, -116.966604	33.636118, -116.939502	*	*	*	A	Entire surface of wash considered to be in 1% acf. Depth calculated based on equation by Dawdy, D. R. 1979. (ASCE 1979)
Stetson Avenue Channel	*	*	Regional regression equation	Shallow flooding analysis	*	A, X	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).
Stovepipe Canyon Creek	33.703895, -117.353008	33.707239, -117.34409	*	*	*	A	*
Strawberry Creek	33.731857, -116.74262	33.767947, -116.688235	*	*	4/16/1979	A	*
Strawberry Creek Tributary	33.746179, -116.707201	33.747628, -116.70442	*	*	*	A	*
Sun City Channel A-A	33.69958, -117.203847	33.721574, -117.197423	*	*	*	AE	*
Sun City Channel A-A	33.693967, -117.204027	33.69958, -117.203847	*	*	*	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
Sun City Channel H-H	33.716826, -117.198992	33.714194, -117.187611	*	*	*	A	*
Sun City Channel H-H	33.714194, -117.187611	33.714189, -117.182937	*	*	*	AE	*
Sun City Southeast Tributary	33.704757, -117.201806	33.707057, -117.186173	*	*	*	A	*
Sunnymead Storm Channel	33.919275, -117.242001	33.942584, -117.22544	*	*	*	AE	*
Sunnyslope Channel	33.987728, -117.422017	34.007302, -117.421593	*	*	*	AE	*
Tahquitz Creek	33.811347, -116.544709	33.81062, -116.553894	*	*	*	A	*
Tahquitz Creek	33.801404, -116.492974	33.802275, -116.564024	Log Pearson Type III Frequency Analysis	HEC 2, normal-depth calculations with extensive field investigations and analysis of existing topography	*	AE	LP Analysis used USGS gage 10258000,Tahquitz Creek near Palm Springs. Levee 16: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain.
Taylor Avenue Drain	*	*	*	*	*	AO, X	*
Temecula Creek	33.47398, -117.111356	33.501244, -117.003378	*	*	*	A	*
Temecula Creek	33.474739, -117.14102	33.474218, -117.111806	*	*	*	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
Temescal Wash	33.904802, -117.611408	33.680929, -117.331863	Log Pearson Type III Frequency Analysis	HEC 2, normal-depth calculations with extensive field investigations and analysis of existing topography	*	AE	LP Analysis used USGS gage 11072000, Temescal Wash near Corona. Portion of boundary taken from City of Corona FIS (HUD 1978). Levee 5: An attempt was made to map the riverside base flood elevations on the landward side of the levee using detailed topographic data provided by Riverside County. Using the riverside base flood elevations, a levee failure floodplain could not be mapped (11/20/1996).
Tequesquite Arroyo	33.975537, -117.398942	33.954758, -117.343908	*	*	11/20/1996	AE	*
The Veldt	*	*	*	HEC 2	9/17/1980	A	*
Third Street Basin	*	*	*	*	9/17/1980	A	*
Thousand Palms Canyon	*	*	*	FEMA alluvial fan methodology	9/17/1980	AO	*
Thousand Palms Main Channel	*	*	*	*	*	AO	*
Thousand Palms Tributary A	33.845755, -116.403091	33.848664, -116.403234	*	*	*	AO	*
Thousand Palms Tributary B	33.850705, -116.394252	33.852658, -116.395779	*	*	10/17/1978	AO	*
Thousand Palms Tributary C	33.847906, -116.384715	33.85207, -116.385118	*	*	*	AO	*

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
Thunderbird Wash	33.753323, -116.426485	33.747851, -116.442561	*	*	*	X	Hydraulic analysis completed by synthesis of hand calculations and engineering judgment
Tin Mine Canyon Creek	33.83959, -117.597574	33.836619, -117.604511	*	*	*	AE	No profile or Floodway Data Table in FIS
Tramview Wash	33.786945, -116.475352	33.781933, -116.48552	Regional regression equation	HEC 2	*	AO, A	To assist in defining the relationship at drainage areas of less than approximately 10 square miles, equations developed by the USGS and shown in Water Resources Investigation 77-21 (USGS 1977) were used.
Tramview Wash Tributary	33.788585, -116.480679	33.791289, -116.486174	*	HEC 2	9/29/1978	AO	To assist in defining the relationship at drainage areas of less than approximately 10 square miles, equations developed by the USGS and shown in Water Resources Investigation 77-21 (USGS 1977) were used.
Tributary to Oak Street Channel	*	*	*	*	*	A	*
University Wash	34.001228, -117.368493	33.979642, -117.309212	*	*	*	AE	*
Unnamed Stream A	33.969822, -116.489778	33.972667, -116.487612	Regional regression equation	*	*	AO	Regional regression equations developed from select gages noted in effective FIS
Unnamed Stream B	33.961888, -116.487197	33.967174, -116.480401	Regional regression equation	*	*	AO	Regional regression equations developed from select gages noted in effective FIS
Unnamed Stream C	33.956489, -116.465865	33.959247, -116.462559	Regional regression equation	*	*	AO	Regional regression equations developed from select gages noted in effective FIS

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
Valle Vista Drain	33.756622, -116.893116	33.746349, -116.885977	*	*	*	A	*
Vander Veer Creek	33.531376, -115.940515	33.547403, -115.936446	*	*	*	A	*
Vander Veer Creek East Tributary	33.534359, -115.928999	33.535704, -115.923317	*	*	*	A	*
Wardlow Wash	33.882077, -117.62919	33.857279, -117.613022	*	*	*	A	*
Warm Spring Creek	33.54497, -117.172435	33.5625, -117.161111	*	*	*	A	*
Warm Spring Creek	33.526265, -117.184498	33.54497, -117.172435	*	*	*	AE	*
Wash I	33.660476, -117.371278	33.657862, -117.373495	*	*	*	X	*
Wasson Canyon Creek	33.698422, -117.311888	33.707841, -117.302693	*	*	*	A	Hydrologic studies prepared by the Riverside County Flood Control District. Hydraulic analysis used normal-depth calculations with extensive field investigation and analysis of existing topography.

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
West Cathedral Channel	33.784135, -116.469222	33.761736, -116.482253	*	*	*	AE	Flood discharges taken from the FIS for the unincorporated areas of Riverside County, California (FEMA 1980).Flood boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet. Levee 17: Based on engineering judgment the shaded Zone X behind these levees was modified based on contours developed from the USGS 1-=m DEMs to develop the recommended levee failure floodplain. Levee 18: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain.
West Norco Channel	33.90759, -117.585721	33.913247, -117.579923	Regional regression equation	*	*	AE	*
West Pershing Channel	33.92527, -116.922885	33.938534, -116.929406	Regional regression equation	HEC 2	*	AE	A regional relationship of basin characteristics to streamflow characteristics was used (USGS 1970). The effects of urbanization on runoff were accounted for by using the results of a USGS study (USGS 1974).
White House Canyon Wash	33.984661, -116.530297	33.989538, -116.537349	*	*	*	A, X	*
Whitewater River	33.7371, -116.241641	33.776146, -116.447887	unknown	HEC 2	*	A	In the City of Cathedral flood discharges for the Whitewater River at the confluence with Palm Canyon Wash were taken from a report prepared by Philip Abrams Consulting Engineers for the Riverside County Flood Control District (Philip 1975).

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
Whitewater River	33.776146, -116.447887	33.879157, -116.534358	unknown	HEC 2	*	AE	In the City of Cathedral flood discharges for the Whitewater River at the confluence with Palm Canyon Wash were taken from a report prepared by Philip Abrams Consulting Engineers for the Riverside County Flood Control District (Philip 1975). Levees 10, 20 and 23: FEMA has certified these levees so no levee failure analysis was performed. For Levees 19, 28,30: Based on engineering judgment the shaded Zone X behind these levees was recommended as the levee failure floodplain. For Levees 36 and 38: Based on engineering judgment the levee failure floodplain was delineated using contours derived from the USGS 10-meter DEM.
Whittier Avenue Channel	*	*	Regional regression equation	Shallow flooding analysis	*	A, X	Hydrology developed with regional regression equation (URA 1972). A combination of extensive field examination of critical street cross sections, normal depth calculations, and a study of current mapping (HUD 1974) was used to determine flood boundaries.
Wide Canyon Wash	33.909404, -116.463243	33.935372, -116.394852	*	*	*	A	*
Wilson Canyon	33.604316, -117.279694	33.596672, -117.291027	*	HEC 2	*	A	*
Woodcrest Reservoir	33.902605, -117.379818	33.903337, -117.375258	*	*	*	A	*

*Data not available

Table 14: Roughness Coefficients

Flooding Source	Channel "n"	Overbank "n"
Arlington Channel	0.015	0.04
Arroyo Del Toro	0.040 - 0.045	0.045 - 0.050
Bautista Wash	0.030 - 0.080	0.065 - 0.140
Beaumont Channel	*	0.015 - 0.080
Blind Canyon Channel	0.015 - 0.035	0.035
Channel H	0.015 - 0.040	0.040 - 0.090
Cherry Avenue Channel	0.015 - 0.040	0.030 - 0.080
Country Club Creek	0.035 - 0.060	0.030 - 0.100
Deep Canyon Storm Water Channel	0.016 - 0.030	0.025 - 0.060
Desert Hot Springs Channel	0.015 - 0.035	0.035
East Cathedral Channel	0.03	0.03
East Gilman Home Channel	0.017	0.035
East Pershing Channel	0.04	0.04
Elsinore Spillway Channel	0.040 - 0.060	0.035 - 0.090
Gilman Home Channel	0.015 - 0.035	0.030 - 0.100
Highland Springs Channel	0.015	0.040 - 0.050
Indian Canyon Channel	0.017	0.035 - 0.100
Leach Canyon	0.015 - 0.040	0.030 - 0.075
Lime Street Channel	0.015 - 0.018	0.035 - 0.050
Lincoln Avenue Drain	*	0.030 - 0.060
Main Street Channel	0.015	0.040 - 0.125
Mangular Channel	0.015 - 0.075	0.020 - 0.075
Marshall Creek	0.030 - 0.050	0.035 - 0.040
McVicker Canyon	0.030 - 0.040	0.035 - 0.050
Montgomery Creek	0.015 - 0.035	0.031 - 0.100
Murrieta Creek	0.020 - 0.035	0.025 - 0.035
North Cathedral Channel downstream of confluence with West Cathedral Channel	0.014	0.050 - 0.080
North Cathedral Channel upstream of confluence with West Cathedral Channel	0.015 - 0.125	*
North Norco Channel	0.030 - 0.060	0.035 - 0.095
North Norco Channel, Tributary A	0.015 - 0.040	0.035 - 0.100
North Norco Channel, Tributary B	*	0.075 - 0.080
North Norco Channel, Tributary C	*	0.07
Oak Street Channel	0.018 - 0.065	0.030 - 0.080
Ortega Channel	0.015 - 0.040	0.035 - 0.085
Palm Canyon Wash	0.03	0.03
Pechanga Creek	0.040 - 0.080	0.065 - 0.140
Perris Valley Storm Drain	0.03	0.03
Ramsey Street Drain	0.014 - 0.035	0.017 - 0.100
Rice Canyon	0.030 - 0.040	0.035 - 0.050
Salt Creek	0.035	0.035
Salt Creek Tributary	0.035	0.035

Table 14: Roughness Coefficients, Continued

Flooding Source	Channel "n"	Overbank "n"
San Gorgonio River	0.035	0.04
San Jacinto River	0.025 - 0.060	0.025 - 0.060
Santa Ana River	0.06	0.06
Sidney Street Channel	0.014 - 0.020	0.035 - 0.060
Smith Creek	0.027	0.035
Smith Creek West Tributary	0.03	0.04
South Norco Channel	0.030 - 0.050	0.035 - 0.095
South Norco Channel Tributary A	0.035 - 0.045	0.035 - 0.125
South Norco Channel, Tributary B	0.030 - 0.075	0.045 - 0.095
Stetson Avenue Channel	0.015	0.035 - 0.040
Stovepipe Canyon Creek	0.020 - 0.030	0.020 - 0.030
Temescal Canyon	0.035 - 0.060	0.035 - 0.045
Temescal Wash	0.030 - 0.100	0.025 - 0.095
Tramview Wash	0.015 - 0.125	*
Tramview Wash Tributary	0.015 - 0.125	*
Wash D	0.024 - 0.040	0.035 - 0.050
Wash G	0.014 - 0.050	0.040 - 0.090
Wash I	*	0.030 - 0.090
Wasson Canyon Creek	0.030 - 0.050	0.035 - 0.050
West Cathedral Channel	0.014	0.014
West Norco Channel	0.035 - 0.060	0.030 - 0.100
West Pershing Channel	0.015 - 0.040	0.030 - 0.035
Whitewater River	0.020 - 0.400	0.030 - 0.100
Whittier Avenue Channel	0.013	0.035 - 0.040

* Data not available

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

Table 15: Summary of Coastal Analyses

[Not Applicable to this Flood Risk Project]

5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Project.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas

[Not Applicable to this Flood Risk Project]

Table 16: Tide Gage Analysis Specifics

[Not Applicable to this Flood Risk Project]

5.3.2 Waves

This section is not applicable to this Flood Risk Project.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Coastal Transect Parameters

[Not Applicable to this Flood Risk Project]

Figure 9: Transect Location Map

[Not Applicable to this Flood Risk Project]

5.4 Alluvial Fan Analyses

Alluvial fan flooding can pose significant risk to communities due to uncertain flow paths and the potential for mud and debris flows. Alluvial fans and flooding on alluvial fans show great diversity because of variations in climate, fan history, rates and styles of tectonism, source area lithology, vegetation, and land use. Acknowledging this diversity, FEMA developed an approach that considers site-specific conditions in the identification and mapping of flood hazards on alluvial fans. The FEMA alluvial fan methodology was used to determine the flood depths and velocities on the alluvial fans described in Table 18.

A summary of the peak discharge at the fan apex and results for the 1% annual chance determinations for all the streams studied by alluvial fan analyses is shown in Table 19, “Results of Alluvial Fan Analyses.”

Table 18: Summary of Alluvial Fan Analyses

Flooding Source	Location From (apex)	Location To (toe)	Drainage Area above Apex (sq mi)	Model(s) Used	Date Analysis was Completed	Method Description
Avery Canyon	Apex of fan	Confluence with Salt Creek	*	N/A	*	No significant entrenched channels identified on topographic maps (RCFCWCD, 1966, etc.) so entire fan included in 1-percent-annual-chance boundary
Biskra Palms Channel	Apex of fan	Confluence with Unnamed Stream	0.9	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995
Cactus Valley	Apex of fan	Confluence with Salt Creek	*	N/A	*	No significant entrenched channels identified on topographic maps (RCFCWCD, 1966, etc.) so entire fan included in 1-percent-annual-chance boundary
Chino Canyon	Tram Way	Blue Sky Way	49.0	*	2008	The landward side of the western part of Levee 9 mapped using regression analysis and topographic data.
Corona Alluvial Fan	City of Corona Corporate Limits	Temescal Wash	10.3[1]	*	*	Boundaries were established by extensive field investigations, topography, and evaluation of historical flooding
Deep Canyon Alluvial Fan	Apex of fan	Southern terminus of Deep Canyon Stormwater Channel	*	*	*	A synthesis of engineering judgments based on topography, field investigation, and historic flooding patterns
Dry Morongo Wash	Apex of fan	Confluence with Big Morongo Creek	8.91	*	*	Regional regression equations used for hydrology. Hydraulic methodology unknown.

Table 18: Summary of Alluvial Fan Analyses, Continued

Flooding Source	Location From (apex)	Location To (toe)	Drainage Area above Apex (sq mi)	Model(s) Used	Date Analysis was Completed	Method Description
Ethanac Wash	Apex of fan	Confluence with San Jacinto River	*	N/A	*	No significant entrenched channels identified on topographic maps (RCFCWCD, 1966, etc.) so entire fan included in 1-percent-annual-chance boundary. The elevated railroad grade was assumed to control flooding.
Interstate 10 Wash	West Wide Canyon Dam	I-10	52.31[2]	Computer Program for Determining Flood Depths and Velocities on Alluvial Fans (Harty, D.S., 1982)	*	Studied by employing a computer solution (Harty, D.S., 1982) of the FEMA alluvial fan methodology (Dawdy, D.R., 1979).
Long Creek alluvial fan	Apex of fan	20th Avenue	19.4	Computer Program for Determining Flood Depths and Velocities on Alluvial Fans (Harty, D.S., 1982)	*	Aerial photographs of the floods of August 8, 1963, and October 22, 1974, on the Long Creek alluvial fan show multiple channels occurring downfan from the two hills north of Dillon Road and west of Wide Canyon Road. The multiple channel region option of the alluvial fan methodology (Dawdy, D.R., 1979) was used to determine depths and velocities for Long Creek downfan from the two hills. The roughness value (n=0.035) used in the multiple channel region analysis was obtained from a report, entitled "Desert Hot Springs Area Flood Insurance Study" (Simons and Associates, 1986). The slope value (s=0.024) was measured from the topographic maps received from RCFCWCD (Riverside County Flood Control and Water Conservation District, 1982).

Table 18: Summary of Alluvial Fan Analyses, Continued

Flooding Source	Location From (apex)	Location To (toe)	Drainage Area above Apex (sq mi)	Model(s) Used	Date Analysis was Completed	Method Description
Macomber Palms Channel	Apex of fan	Confluence with Unnamed Stream	2.0	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995
Martinez Canyon	Apex of fan	Confluence with Coachella Valley Stormwater Channel (Whitewater River)	48.5	*	*	The Martinez Canyon alluvial fan is subject to active alluvial fan flooding. The base flood discharges for Martinez Canyon were computed using regional regression equations developed by the USGS (B. E. Thomas, 1993).
Moreno Beach Wash	*	*	*	*	*	No significant entrenched channels identified on topographic maps (RCFCWCD, 1966, etc.) so entire fan included in 1-percent-annual-chance boundary
Pushawalla Canyon	Apex of fan	Confluence with Unnamed Stream	33.7	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995
Quincy Wash	Apex of fan	Approximately 900 feet downstream of Nason Street.				No significant entrenched channels identified on topographic maps (RCFCWCD, 1966, etc.) so entire fan included in 1-percent-annual-chance boundary

Table 18: Summary of Alluvial Fan Analyses, Continued

Flooding Source	Location From (apex)	Location To (toe)	Drainage Area above Apex (sq mi)	Model(s) Used	Date Analysis was Completed	Method Description
Rancho Mirage Alluvial Fan	Apex of fan	Confluence with Whitewater River	4.7	*	*	Due to the indeterminate nature of flow paths on an alluvial cone, the entire Rancho Mirage cone was delineated as being within the 0.2-percent annual chance flood. The HEC-2 program (USACE, 1973) was used in the analysis of the Magnesia Spring Canyon Flood Control Project including Magnesia Springs Channel, East Rancho Mirage Storm Channel, Mirage, Indian trail, Dunes View and Magnesia Falls Roads, Ocotillo Drive, and the Veldt. The 1-percent flood is contained within the channels, levees and streets of the Magnesia Spring Canyon Flood Control Project.
Sinclair Wash	*	*	*	*	*	No significant entrenched channels identified on topographic maps (RCFCWCD, 1966, etc.) so entire fan included in 1-percent-annual-chance boundary
St. Johns Canyon	Apex of fan	Confluence with Salt Creek	*	N/A	*	No significant entrenched channels identified on topographic maps (RCFCWCD, 1966, etc.) so entire fan included in 1-percent-annual-chance boundary
Thousand Palms Canyon Fan	Apex of fan	I-10	84.1	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995
Thousand Palms Main Channel	Apex of fan	I-10	7.5	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995
Thousand Palms Tributary A	Apex of fan	I-10	1.4	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995
Thousand Palms Tributary B	Apex of fan	I-10	0.9	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995
Thousand Palms Tributary C	Apex of fan	I-10	1.1	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995

Table 18: Summary of Alluvial Fan Analyses, Continued

Flooding Source	Location From (apex)	Location To (toe)	Drainage Area above Apex (sq mi)	Model(s) Used	Date Analysis was Completed	Method Description
Tramview Canyon	Apex of fan	Confluence with West Cathedral Channel	1.7	*	*	Statistical analyses were used to compute flood depths and velocities for the area of Tramview Wash subject to alluvial fan flooding. The depths of flooding on the alluvial fan were computed according to the guidelines issued by FEMA (U.S. Department of Housing and Urban Development, 1979).
West Macomber Palms Channel	Apex of fan	Confluence with Unnamed Stream	2.9	*	May 1995	Unknown, area modified by LOMR dated May 16, 1995

[1]Estimated based on drainage areas from Lincoln Avenue Drain, Mangular Channel, Oak Street Channel, and Taylor Avenue Drain
[2]Does not include 33.2 square miles behind West Wide Canyon Dam
* Data not available

Table 19: Results of Alluvial Fan Analyses

Flooding Source	Location From (apex)	Location To (toe)	1% Annual Chance Peak Flow at Fan Apex (cfs)	Flood Zones and Depths (ft)	Minimum Velocity (fps)	Maximum Velocity (fps)
Avery Canyon	Apex of fan	Confluence with Salt Creek	*	A	*	*
Biskra Palms Channel	Apex of fan	Confluence with Unnamed Stream	1,090	AO 1'	5	6
Cactus Valley	Apex of fan	Confluence with Salt Creek	*	A	*	*
Chino Canyon	Tram Way	Blue Sky Way	4,000	X	*	*
Corona Alluvial Fan	City of Corona Corporate Limits	Temescal Wash	*	A, AE, X	*	*
Deep Canyon Alluvial Fan	Apex of fan	Southern terminus of Deep Canyon Stormwater Channel	*	A, AO 3'	*	*
Dry Morongo Wash	Apex of fan	Confluence with Big Morongo Creek	5,170	X	*	*
Ethanac Wash	Apex of fan	Confluence with San Jacinto River	*	A	*	*
Interstate 10 Wash	West Wide Canyon Dam	I-10	9,350	A	*	*
Long Creek alluvial fan	Apex of fan	20th Avenue	13,370	AO 1-5'	6	10
Macomber Palms Channel	Apex of fan	Confluence with Unnamed Stream	1,530	AO 1-2'	5	6
Martinez Canyon	Apex of fan	Confluence with Coachella Valley Stormwater Channel (Whitewater River)	2,376	A	*	*
Moreno Beach Wash	*	*	*	*	*	*

Table 19: Results of Alluvial Fan Analyses, Continued

Flooding Source	Location From (apex)	Location To (toe)	1% Annual Chance Peak Flow at Fan Apex (cfs)	Flood Zones and Depths (ft)	Minimum Velocity (fps)	Maximum Velocity (fps)
Pushawalla Canyon	Apex of fan	Confluence with Unnamed Stream	8,050	AO 3', X	8	9
Quincy Wash	Apex of fan	Approximately 900 feet downstream of Nason Street.	*	A, X	*	*
Rancho Mirage Alluvial Fan	Apex of fan	Confluence with Whitewater River	3,200[1]	A, X	*	*
Sinclair Wash	*	*	*	*	*	*
St. Johns Canyon	Apex of fan	Confluence with Salt Creek	*	A	*	*
Thousand Palms Canyon Fan	Apex of fan	I-10	14,510	AO 1-4'	5	10
Thousand Palms Main Channel	Apex of fan	I-10	2,820	AO 2-3'	7	8
Thousand Palms Tributary A	Apex of fan	I-10	1,160	AO 1-2'	5	6
Thousand Palms Tributary B	Apex of fan	I-10	1,000	AO 1-2'	5	6
Thousand Palms Tributary C	Apex of fan	I-10	1,220	AO 1-3'	5	8
Tramview Canyon	Apex of fan	Confluence with West Cathedral Channel	1,530[2]	AO 1-2'	*	*
West Macomber Palms Channel	Apex of fan	Confluence with Unnamed Stream	2,220	AO 2'	6	6

[1]From Magnesia Springs Channel discharge in Summary of Discharges table
[2]From Tramview Wash discharge in Summary of Discharges table

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact information services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for Riverside County are provided in Table 20.

Table 20: Countywide Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
*	*	*	*	*

* Data not available

Table 21: Stream-Based Vertical Datum Conversion

Flooding Source	Average Vertical Datum Conversion Factor (feet)
*	*

* Data not available

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

Base map information shown on the FIRM was derived from the sources described in Table 22.

Table 22: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Digital Orthophoto	USDA Farm Service Agency, National Agricultural Imagery Program (NAIP)	2014	1 meter GSD	Color orthoimagery
Digital Orthophoto	USDA Farm Service Agency, National Agricultural Imagery Program (NAIP)	2012	1 meter GSD	Color orthoimagery
Digital Orthophoto	USDA Farm Service Agency, National Agricultural Imagery Program (NAIP)	2009	1 meter GSD	Color orthoimagery

Table 22: Base Map Sources, Continued

Data Type	Data Provider	Data Date	Data Scale	Data Description
Political boundaries	Riverside County GIS	2015	*	Municipal and county boundaries
Public Land Survey System (PLSS)	Riverside County GIS	2015	*	*
Surface Water Features	NHD and NHC	2014	1:5,000	Streams, rivers, and lakes were derived from NHD data. Profile baseline for the Coachella Valley Stormwater Channel (Whitewater River) incorporated from reach line in HEC-RAS model provided by NHC
Transportation Features	Riverside County GIS	2014	*	*
Various Features	USGS	1994 or later	1:12,000	Various features in original studies digitized using Digital Orthophoto Quadrangles

*Data not available

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 24, “Floodway Data.”

Table 23: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Scale	Contour Interval	Citation
City of Coachella	Coachella Valley Stormwater Channel (Whitewater River)	LiDAR	*	*	Airborne 1 2010
City of Indio	Coachella Valley Stormwater Channel (Whitewater River)	LiDAR	*	*	Airborne 1 2010
City of La Quinta	Dike 2	Topographic Maps	1:100	1 ft	PACE 2006
City of La Quinta	Dike 2 and 4 (Without Levee)	LiDAR	1:740	2 ft	FEMA 2012
City of La Quinta	Dike 4	Topographic Maps	1:740	2 ft	PACE 2002
City of Menifee	San Jacinto River	LiDAR	1:100	2 ft	Webb 2011
City of Moreno Valley	Perris Valley Storm Drain	Topographic Maps	1:1000	1 ft	Webb 2013
City of Norco	North Norco Channel Tributary B	Topographic Maps	1:2400	4 & 5 ft	RCFCD 1968, 1972
City of Palm Springs	Mission Creek	Topographic Maps	1:2400	4 ft	RCFCWCD 1980
City of Perris	Perris Valley Storm Drain	LiDAR	1:100	2 ft	Webb 2013
City of Perris	Perris Valley Storm Drain	Topographic Maps	1:1000	1 ft	Webb 2013
City of Perris	San Jacinto River	LiDAR	1:100	2 ft	Webb 2011

Table 23: Summary of Topographic Elevation Data used in Mapping, Continued

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Scale	Contour Interval	Citation
City of San Jacinto	San Jacinto River (Without Levee)	LiDAR	*	2 ft	RCFCWCD 2007
City of Temecula	Temecula Creek	Topographic Maps	1:1200	1 ft	Musser 1991
Riverside County	Various	Topographic Maps	1:2400	2 ft	USACE 1978
Riverside County	Various	Topographic Maps	1:2400	2 & 4 ft	RCFCWCD 1982
Riverside County	Various	Topographic Maps	1:2400	4 & 5 ft	RCFCWCD 1973, 1974
Riverside County	Various	Topographic Maps	1:4800	4 ft	USACE 1971
Riverside County	Various	Topographic Maps	1:24000	20 & 40 ft	USGS 1973
Riverside County	Various	Topographic Maps	1:2400	4 ft	RCFCD 1974
Riverside County	Various	Topographic Maps	1:12000	40 ft	RCFCD 1974
Riverside County Unincorporated Areas	Coachella Valley Stormwater Channel (Whitewater River)	LiDAR	*	*	Airborne 1 2010

Table 23: Summary of Topographic Elevation Data used in Mapping, Continued

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Scale	Contour Interval	Citation
Riverside County Unincorporated Areas	Dike 2 and 4 (Without Levee)	LiDAR	*	2 ft	FEMA 2012
Riverside County Unincorporated Areas	Dike 4	Topographic Maps	1:740	2 ft	PACE 2002
Riverside County Unincorporated Areas	Perris Valley Storm Drain	LiDAR	1:100	2 ft	Webb 2013
Riverside County Unincorporated Areas	San Jacinto River	LiDAR	*	2 ft	Webb 2011
Riverside County Unincorporated Areas	San Jacinto River	LiDAR	1:100	2 ft	Webb 2011
Riverside County Unincorporated Areas	San Jacinto River (Without Levee)	LiDAR	*	2 ft	RCFCWCD 2007

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface 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.