**FEMA**

November 08, 2018          NOV 0 8 2018          IN REPLY REFER TO:  COMMENT RES

The Honorable Rick Mullen                    Community:          12-09-1165S
Mayor, City of Malibu                        Community Name:  City of Malibu
23825 Stuart Ranch Road                                          Los Angeles County, CA
Malibu, California 90265                      Community No.:     060745

Dear Mayor Mullen:

This is in response to a letter dated November 6, 2017 and a report prepared by Moffatt & Nichol for the City of Malibu dated February 2018 received from Rob DuBoux, Assistant Public Works Director on behalf of the City of Malibu providing comments regarding the proposed Base (1-percent-annual chance) Flood Elevations (BFEs)/Special Flood Hazard Area (SFHA) boundary/zone designations for the City of Malibu, as presented on the Preliminary Flood Insurance Rate Map (FIRM) ) and in the Preliminary Flood Insurance Study (FIS) report for Los Angeles County and Incorporated Areas, dated October 28, 2016.  Please note that only those submittals that relate to the addition or modification of the proposed flood hazard information (i.e., Base Flood Elevations, base flood depths, Special Flood Hazard Area boundaries, zone designations, or regulatory floodways) shown on the FIRM and in the FIS report that satisfy the data requirements defined in Title 44, Chapter I, Part 67 of the Code of Federal Regulations are considered appeals.  Upon detailed review of the materials submitted in the November 6, 2017 letter and the February 2018 report, it was determined that the submittals did not meet these criteria; however, FEMA has processed the letter and report as 'comments.'

Our responses to your comments are presented in the Attachment A, "Summary of City of Malibu comments and FEMA responses."

We have determined that changes to the Preliminary FIRM and Preliminary FIS report dated October 28, 2016 are warranted based on the submitted data and have enclosed Revised Preliminary copies of revised FIRM panels 06037C1518G, 06037C1519G, and 06037C1542G and FIS report volume 06037CV002C for your review.

Please submit any comments regarding this resolution within 30 days of the date of this letter to the following address:

> Federal Emergency Management Agency (FEMA)
> Mitigation Division
> 1111 Broadway, Suite 1200
> Oakland, California 94607
> Attention:  Ed Curtis, Regional Engineer, FEMA Region IX

At the end of the 30-day period, FEMA will address any additional comments that are submitted. FEMA will then finalize the FIRM and FIS report by issuing a Letter of Final Determination (LFD). The LFD will explain the adoption/compliance process and will state when the FIRM and FIS report will become effective.

We appreciate your community's comments and commitment to having the most accurate flood hazard information available reflected on the FIRM and in the FIS report. If you have any questions regarding this matter, please contact Ed Curtis, FEMA Region IX, Risk Analysis Branch, either by e-mail at edward.curtis@fema.dhs.gov or by telephone at (510) 627-7207.

Sincerely,

Juliette Hayes, Director
Mitigation Division
FEMA Region IX

**Enclosures:**
> Attachment A-Summary of Los Angeles County/Moffat & Nichol/City of Malibu comments and FEMA responses
> FIS Report 06037CV002C
> FIRM Panels 06037C1518G, 06037C1519G, and 06037C1542G

cc:   Rob DuBoux, Assistant Public Works Director, City of Malibu
   Skylar Peak, Malibu City Council
   Robert Brager, Public Works Director, City of Malibu
   Reva Feldman, City Manager, City of Malibu
   Craig George, Environmental Sustainability Director, City of Malibu
   Raul Barba, Acting State NFIP Coordinator, California Department of Water Resources

# Attachment A: Summary of City of Malibu Comments and FEMA Responses

| Comment # (L=Letter) (R=Report*) | Transect # | Comment / Response |
|---|---|---|
| 1 <br><br> (L1) <br> (R1) | 10, 11, 26, 27, 28, 29, 32, 33, 39, 40, 41 | The general transect layout is acceptable. However, it is recommended to add one transect between each of the following: Transects 10 and 11, 26 and 27, 27 and 28, 28 and 29, 32 and 33, 39 and 40, as well as 40 and 41. Also, if the difference in BFEs between neighboring transects is more than 10 feet, a transitional zone shall be provided as stated in the Pacific Guidelines (Section D.4.9.6). "Transition zones may be necessary between areas with high run-up elevations to avoid large differences in BFEs and smooth the changes in flood boundaries." |
| | | Significant Base Flood Elevation (BFE) differences can occur between mapping reaches where coastal BFEs are dominated by wave runup. Wave runup is very dependent on shore type and cross-shore profile characteristics, particularly runup slope. For example, a reach with a mildly sloping sandy beach adjacent to a reach with no beach and a steep vertical bluff can lead to a much lower BFE at the beach compared with the bluff. The FEMA Pacific Coast Guidelines (Reference 1) allow for the creation of transition zones between areas with high runup elevations to avoid large differences in BFEs and to smooth the change in flood boundaries. However, in the case of Los Angeles County, the rapid shore-type changes support rapid BFE differences, so the criterion for transition zones does not apply. <br> Transect 10, for example, is partially sheltered from wave exposure as compared to Transect 11, resulting in a 7-foot difference in BFEs. The reaches are bounded appropriately according to shore types. A transition zone is not needed since the features of each reach are rather discrete. Similarly, Transects 26 through 29 exhibit marked differences in shore type, slope, and exposure. Transect 26 is partially sheltered and Transect 28 is based upon runup on a very steep slope with a deep toe, at about 5.1 feet NAVD88, which allows larger waves to break on the face of the bluff, resulting in significantly higher runup values. In this area, the reaches appear to be appropriately bound to the representative transects, and transition zones are not needed. Additionally, due to the steepness of the bluff, the horizontal difference at the transition from Transect 28 to Transect 29 is approximately 50 feet. None of the homes in this reach would be removed from an adjusted SFHA. Transects 32 and 33 have only a 6-foot difference in BFE and both transects represent their assigned reaches well. <br> Transects 39 and 40 differ by 9 feet in BFEs, with the differences attributable to the marked difference in slope between the two reaches. The toe becomes deeper at Transect 41, further increasing the runup. <br> Outside of those areas discussed, the only other area where the BFE difference exceeds 10 feet is between Transects 22 and 23. Transect 23 has a steep bluff face and a deep toe, resulting in a BFE of 23, which is 11 feet higher than at Transect 22. The reaches are well represented by the transect placements. |
| 2 | General | The Base Flood Elevation (BFE) is very sensitive to topography, especially to bluff/structure toe elevation. Toe elevation determines which of three wave run-up methods (Stockdon, DIM or TAW) shall be used. When the |

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| Comment # (L=Letter) (R=Report*) | Transect # | Comment / Response |
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| **(L2)** <br> **(R2, R2a)** | | DWL2% (dynamic water level 2%) is below the toe of bluff/structure: 1) the Stockdon method is used if the foreshore slope is mild, and 2) the DIM method is used if the foreshore slope is steep. Physically, a steeper slope will result in a higher wave run-up than that in a milder slope. However, the Stockdon method for milder slopes results in higher wave run-up than that of the DIM method for steeper slopes. Hence, there is a clear sign that the Stockdon method is more conservative than DIM method for a similar shore type. When the DIM method is used, the BFE is often a few feet up to 10 feet lower than the neighboring transects. <br> Different methods contributed to the alongshore BFE variations. Also, different methods were used for neighboring transects although they have similar shore/structure type. The City is currently conducting further review and analysis of several transects. Supporting and clarifying data will be submitted to FEMA within 30 days. Report addendum: The additional analysis provided in Section 2.2 indicates the differences between Stockdon and DIM Methods are much greater than described in the Study Contractor memo dated December 5, 2012. The large differences call into question the validity of these runup methods when applied to the Malibu coast. <br> Report 2. a: The use of different runup methods contributed to the significant alongshore BFE variations. Also, different runup methods were used for neighboring transects although they have similar shore/structure type. A more consistent application of runup methods would result in less variation in BFE. |
| | | Please refer to Section 4.3.2 in the IDS 3 Report (Reference 3) which describes the applied methodology in more detail. Due to the steep backshore topography of bluff-backed shorelines, the Stockdon and DIM methodologies cannot be applied for the calculation of wave runup during times when the dynamic water level, DWL2%, exceeds the bluff toe elevation and waves directly impact the steep face of the bluff. The FEMA Pacific Coast Guidelines recommends the use of the TAW method for computation of wave runup on steep profiles ($m >$ 0.125 or steeper than 8:1 H:V). A hybrid method was adopted for application to bluff-backed shorelines within the Los Angeles County study area (described in more detail in the IDS 3 Report). The basic approach is to use either the Stockdon or DIM method (depending on foreshore slope steepness) to compute wave runup on the fronting beach for times when the bluff toe is not inundated, and the application of TAW is not reliable. Stockdon was often applied for beaches which had a steeper foreshore feature to appropriately capture the wave dynamics; DIM was typically used for reaches in which a more consistent onshore slope was appropriate. These assessments were made by the study team based upon a variety of factors as described in the IDS 3 Report. |

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|---|---|---|
| | | The City of Malibu did not submit alternate or additional analysis and mapping in support of this comment during the 90-day appeal period. The City may submit alternate or additional analysis and mapping for consideration for revised mapping in the future using FEMA's Letter of Map Revision process. |
| 3<br><br>(L3)<br>(R3, 3a, 3b) | General | Wave analysis transects begin at a depth of 40-m. Using wave parameters at the 40-m depth from the nearshore wave model as input parameters for the wave run-up analysis is a poor choice for reaches with oblique wave approach angles and wave refraction patterns, which occur around the many headlands. Some of the two-dimensional (2-D) wave phenomena captured in a 2-D refraction model is not adequately represented in the one-dimensional transect based analysis, potentially leading to overestimates of the BFE. However, this may not be an issue if the depth-limited wave height is used in the wave run-up analyses. Report addendum: A detailed review of shelf model results including nearshore wave height and refraction patterns should be performed by FEMA to demonstrate that using wave parameters from the SHELF model at the 40-meter depth for 1D transect based analysis does not over-estimate wave conditions nearshore. Limited wave runup analysis indicates that the BFE may be reduced by 10% if oblique wave approach impact is properly considered. Additional potential issues related to wave input data are listed below:<br>Report 3. a: The record event jumps around between consecutive neighboring transects, as shown in Table 5-1. Transects 35, 37 and 39 have the same record event and time step, but Transect 36 in between has a different record event, and Transect 38 has a different time step, which is strange and does not make sense.<br>Report 3. b: Wave periods between neighboring transects were often different for the same storm event and time step, which does not make sense. Wave period is a key input parameter in wave runup calculations, and a wrong period could lead to a wrong TWL and BFE. Below are some examples:<br>Wave periods were different for the same storm event and time step between following pairs of consecutive neighboring transects: Transects 11 and 12, Transects 23 and 24, Transects 27 and 28, and Transects 41 and 42<br>Table 5-2 illustrates wave period variations between consecutive neighboring transects during 1/27/1983 storm event. The time steps were within 3 hours, but three different periods were used, which does not make sense. Similarly, Table 5-3 illustrates wave period variations for 3/1/1983 storm. Three different periods were used from Transect 22 through 28 for the same time step, and again three different periods were used on three consecutive transects for the same time step.<br>Report 3. c: Note, there are two transects in the table below where the wave heights used in the analysis are much lower than adjacent transects. Based on our review of the profile data it appears that Transects 19 and 25 used wave parameters from the depth contours of 25 and 15 meters, respectively. These wave heights are 50% lower than wave heights used at the other transects (assumed to be from the 40-meter depth contour) |

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|---|---|---|
| | | and illustrate how much wave heights could be overestimated by applying wave parameters that don't account for the dissipating and sheltering effects of nearshore points, reefs and headlands. |
| | | Waves considered in the analysis are spectrum waves rather than monotonic waves. Nearshore wave modeling was performed to transform deepwater wave conditions at the edge of the surf zone, at 5, 10, and 15m water depths, using the spectral refraction model, SHELF. The output from the nearshore wave transformation model provided the input conditions for the 1-D transect-based wave hazard analyses, including wave runup calculations. Different dynamics occur during each event at different locations, so it is not uncommon or unusual to have different time steps or events correlate with the highest wave heights or Total Water Levels (TWLs). Different wave heights and periods are also common between different locations due to underlying influences including sheltering, bathymetric features, etc. A comparison of the wave spectra of neighboring transects that experience similar wave exposure shows that they are similar in shape and the mean periods show consistent values across similar transects. Similarly, as the waves approach shallow water, there is a there is a shift in wave energy from lower frequencies to higher frequencies, resulting in smaller wave periods nearshore, but the mean periods and overall shape of the wave spectra is similar. Detailed information regarding the offshore wave modeling can be found in the IDS 2 Report (Reference 2). |
| 4 (L4) | General | The foreshore slope is not considered in determining the wave breaking criterion (ratio of wave height to water depth). A wave breaking factor of 0.78 for the flat beach was used for all transects, which may lead to an under-estimate of the depth-limited breaking wave height and resulting BFE. |
| | | Waves considered in the FEMA analysis are random waves. The method suggested in the comment letter applies the following expression for the breaker depth index noted in the Coastal Engineering Manual (Reference 5): $\gamma_b = b - a\frac{H_b}{g\,T^2}; a = 43.8(1 - e^{-19tan\beta}); b = \frac{1.56}{(1+e^{-19.5tan\beta})}$ which was derived for regular waves from laboratory data on monochromatic waves breaking on smooth, plane slopes. The monochromatic breaking criteria is overly conservative for random waves. To address this, the study applied a different formula in order to have a better estimation of breaking wave height (*equation 4.3-20 as shown in the IDS 3 Report*). |
| 5 (L5) (R5, 5a) | General, 31, 32, 34, 35, 37, and 39 | Treatment of shore protection structures has a significant impact on BFEs. The revetment was assumed to be intact for Transects 11 and 42. Shore protection structures at other transects were assumed to be removed (failed) in the analyses. For failed condition analyses, rubble/riprap were completely removed from the transect geometry and the roughness factor was replaced with that of sand (i.e., very smooth). The roughness treatment was not consistent with Section D.4.7.3.2 of the Pacific Guidelines, which states: "the Mapping Partner shall |

| Comment # (L=Letter) (R=Report*) | Transect # | Comment / Response |
|---|---|---|
| | | select an appropriate roughness factor when conducting run-up and overtopping analyses on the failed structure." Report addendum: The additional analysis provided in Section 4 indicate a use of an intermediate roughness value for rocky bluffs or "partially failed" structures could result in a significant reduction in calculated TWL and BFE.<br><br>There are several reaches in Malibu where coastal structures line the back beach but were not included in the analysis. These reaches are represented by Transects 31, 32, 34, 35, 37 and 39. As the cover photo indicates, runup at the structures can reach high elevations, yet there is very little flooding landward of the structures. This is a case where the runup method should have accounted for these structures and their effect on primary and secondary hazard zones. |
| | | For certain transects, a partial failure scenario was evaluated to test the full range of possible structure configurations. These include revetments at dunes. Partial failure configurations were also considered for revetments at bluffs, but only applied at revetments where there is verified, documented evidence that a partial failure analysis is warranted over a removed analysis. This evidence might include accreditation by FEMA or the USACE, assessment of historical performance, or detailed structural evaluation. Furthermore, the partial failure scenario was only considered at transects where the partial failure geometry is physically reasonable and fits within the physical constraints of the profile. For removed analyses, roughness reduction factors were selected to best match the underlying natural profile material (e.g., sandy or rocky) *(IDS 3 Report)*. The treatment for each reach that contains structures and the roughness coefficients selected follows the approach prescribed in the Pacific Coast Guidelines and is documented in the IDS 3 Report. Note that the analysis at Transect 39 was re-evaluated per Comment #11 in this document because the feature points were incorrectly identified. |
| 6 | 11 | The secondary VE elevation in Table 1 of IDS4 is 1 foot higher than the primary VE elevation. |
| (L6a) (R6a) | | For Transect 11, the VE Zone BFE behind the crest of the feature should be 18.4 feet using the Cox-Machemel method. Note that this BFE does not inform the mapping at this location. |
| 7 | 20 | For Transect 20, the BFE is 19 feet, while the total water level (TWL) of the event of the record is only 11.7 feet according to the supporting FIS documents. |

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|---|---|---|
| (L6b) (R6b) | | For Transect 20, an 11.7 feet total water level has been confirmed and the associated mapping on Preliminary Flood Insurance Rate Map (FIRM) panels 06037C1518G and 06037C1519G has been changed to reflect a BFE of 12 feet. |
| 8 (L7) (R7) | General | A 35-foot minimum distance criterion was applied in mapping a secondary VE or AO zone for transects with overtopping. If the resulting landward overtopping distance was less than 35 feet, the overtopping run-up zones were integrated into the primary wave run-up Zone VE or, where the VE and AO overtopping zones together were at least 35 feet, combined to create a secondary overtopping zone VE with a different (often lower) BFE. At 13 transects there was overtopping calculated, but the distance was less than 35 feet; therefore, the primary run-up zone BFE was extended to cover this area. Since the primary run-up zone BFE is often a few feet higher than the calculated overtopping zone BFE, the resulting mapped BFE is higher than the calculated BFE at these transects. This practice is inconsistent with Pacific Guidelines (Section D.4.9.4) as the City of Malibu was not consulted about setting 35-foot as the minimum mappable distance criterion. |
| | | A minimum mapping distance criterion of up to 38 feet is regularly applied due to limitations in map scale on FIRMs. However, communities can consult the more detailed breakdown of the overtopping hazard information listed in the IDS 4 Report (Reference 4) to administer their flood hazard ordinances in these overtopped areas. |
| 9 (L, closing) | | As stated, the City's consultant will be performing additional review and analysis of 22 transects (8, 9, 11, 20, 23-25, 27, 28, 31-43). This additional analysis will also include evaluating FEMA's topographic data located where houses are elevated on pile structures. Since FEMA utilized LIDAR data to obtain the topographic data, this method would not cover the area under the house and the assumptions made by FEMA may not represent actual site conditions. This additional review and analysis will be used to provide supporting data and documentation as part of this appeal. |
| | | Alternate analysis and mapping must be provided to FEMA within the 90-day appeal period to be considered for revised mapping. Neither the original comment letter received on November 6, 2017, nor the February 2018 report compiled by Moffat & Nichol contain revised analysis and mapping, and therefore will not be incorporated into the revision. |

**Attachment A: Summary of City of Malibu Comments and FEMA Responses**

| Comment # (L=Letter) (R=Report*) | Transect # | Comment / Response |
|---|---|---|
| 10<br><br>(L3d)<br>(R3d) | 30-37 | At Transects 30 to 37 there is an extreme event with a very long wave period (>25 seconds) that is outside of the typical range seen here on the west coast. Wave periods longer than 22 seconds are typically associated with forerunners from southern hemisphere swell events with small wave heights often less than 2 feet. The April 25, 1998 wave event listed in the IDS TWL has a wave height of 5 feet associated with the very long wave period. A closer review of measured data at nearby wave buoys indicates no sign of such an event. As the CDIP nearshore wave plot (below) shows, the wave periods reported on this day are much shorter than used in the analysis. Since this event ranks among the highest calculated TWL events at several transects, it does have an influence over the BFE in several locations. We recommend additional investigation by the Study Contractor to determine if this is a valid wave event to be included in the TWL and BFE analysis. If this wave event is not represented by actual buoy measurements and is an artifact of the hindcast methods, it should be discarded from the analysis. |
| | | Statistics for Transects 30-37 were recalculated after removing the April 25, 1998 event. While this led to a reduction in BFEs for each transect, the results were consistently less than 0.3 feet and result in no changes to the BFEs along these transects which are rounded off to the nearest whole foot. |
| 11<br>(R6c) | 39 | Transect 39: shoreline features (crest and toe) are incorrectly determined. If transect crest and toe were defined in a manner consistent with adjacent transects, a different runup method (probably TAW) would have been applied, resulting in a BFE similar to adjacent transects. |
| | | FEMA agrees that the toe and crest locations were incorrectly determined for this transect. The toe and crest locations were re-selected for this profile, and the new BFE was recalculated as 21.7 feet, resulting in a whole foot BFE of 22 feet. This result is more consistent with the adjacent BFEs of 20 feet at Transect 38 and 21 feet at Transect 40. The associated mapping on Preliminary FIRM panel 06037C1542G has been changed to reflect a BFE of 22 feet. |
| 12<br>(R6d) | 42 | Transect 42: The secondary VE BFE is higher than the primary VE BFE. |

# Attachment A: Summary of City of Malibu Comments and FEMA Responses

| Comment # (L=Letter) (R=Report*) | Transect # | Comment / Response |
|---|---|---|
| | | The Transect 42 study reach is mapped with a whole foot BFE of 22 feet (identified as the primary BFE in the comment) which is based on analysis of wave runup on an intact revetment at the transect location resulting in a TWL of 21.5 feet.  The calculated TWL for the unprotected bluff condition which is prevalent over much of the Transect 42 study reach is 28.4 feet. The study team determined that the unprotected bluff overtops with a TWL of 25.7 feet (identified as the secondary BFE in the comment). Comparing the runup and overtopping TWLs for the unprotected bluff condition, the overtopping TWL is 3.7 feet lower than the runup TWL which is consistent with the water surface elevation results at other overtopped bluff transects. The overtopped area extends 31.1 feet beyond the crest of the bluff. <br><br> The study team based the mapping for the Transect 42 study reach on the intact structure TWL of 21.5 feet with a horizontal extension of 31.1 beyond the bluff crest to account for overtopping. |
| 13 <br><br> (R4) | | Wave runup is very sensitive to the beach slope. Sandy beaches are highly dynamic and beach slopes can vary over time. The beach slope is based on a single data set, and long-term beach profile data can help to identify a range of slopes to determine the most appropriate slope value to apply in runup calculations. Another issue with a single transect is the representation of the slope for the reach being represented. |
| | | The study team chose slopes that were representative of the conditions generally found along that study reach. The City of Malibu did not submit alternate or additional analysis in support of this comment during the 90-day appeal period.  The City may submit alternate or additional analysis and mapping for consideration for revised mapping. in the future using FEMA's Letter of Map Revision process. |
| 14 <br><br> (R, Section 3) | General | The effect of oblique wave approach cannot be included in Stockdon and DIM Methods but should have been captured in the two-dimensional (2D) SHELF model performed for the FEMA study. Therefore, it would be more accurate if wave parameters used in wave runup analyses were extracted from the SHELF model at a shallower depth, such as 10 meters or even 5 meters instead of 40 meters. The wave approach angle varies from transect to transect and are more than 45 degrees for the seven selected transects for analyses; hence, a 45-degree approach angle, which would result in a reduction factor of 0.8, was used in the limited analysis. |
| | | Nearshore wave modeling was performed to transform deepwater wave conditions at the edge of the surf zone, at 5, 10, and 15m water depths, using the spectral refraction model SHELF. The output from the nearshore wave transformation model provided the input conditions for the 1-D transect-based wave hazard analyses, including wave runup calculations. <br><br> Waves approaching the shoreline at each transect that were greater than 45 degrees from that transect were excluded from the analysis. |

*Unless otherwise noted, all Report comment numbers correspond to Section 4. Technical Comments.

**Attachment A: Summary of City of Malibu Comments and FEMA Responses**

*References:*

1) "Final Draft Guidelines for Coastal Flood Hazard Analysis and Mapping of the Pacific Coast of the United States," FEMA, January 2005
2) "Intermediate Data Submittal #2, Offshore Waves and Water Levels, Southern California," BakerAECOM, January 6, 2015
3) "Intermediate Data Submittal #3, Nearshore Hydraulics, Los Angeles County, California," BakerAECOM, October 12, 2015
4) "Intermediate Data Submittal #4, Flood Hazard Mapping, Los Angeles County, California," BakerAECOM, March 10, 2016
5) *Coastal Engineering Manual* (EM 1110-2-1100), U.S. Army Corps of Engineers, August 1, 2008

# FLOOD INSURANCE STUDY
## FEDERAL EMERGENCY MANAGEMENT AGENCY

**VOLUME 2 OF 5**

# LOS ANGELES COUNTY, CALIFORNIA
## AND INCORPORATED AREAS

| COMMUNITY NAME | NUMBER | COMMUNITY NAME | NUMBER |
|---|---|---|---|
| CITY OF AGOURA HILLS | 065072 | CITY OF COMMERCE | 060110 |
| CITY OF ALHAMBRA* | 060095 | CITY OF COMPTON | 060111 |
| CITY OF ARCADIA* | 065014 | CITY OF COVINA* | 065024 |
| CITY OF ARTESIA* | 060097 | CITY OF CUDAHY | 060657 |
| CITY OF AVALON | 060098 | CITY OF CULVER CITY | 060114 |
| CITY OF AZUSA | 065015 | CITY OF DIAMOND BAR | 060741 |
| CITY OF BALDWIN PARK* | 060100 | CITY OF DOWNEY | 060645 |
| CITY OF BELL* | 060101 | CITY OF DUARTE* | 065026 |
| CITY OF BELL GARDENS | 060656 | CITY OF EL MONTE* | 060658 |
| CITY OF BELLFLOWER | 060102 | CITY OF EL SEGUNDO | 060118 |
| CITY OF BEVERLY HILLS* | 060655 | CITY OF GARDENA | 060119 |
| CITY OF BRADBURY* | 065017 | CITY OF GLENDALE* | 065030 |
| CITY OF BURBANK | 065018 | CITY OF GLENDORA | 065031 |
| CITY OF CALABASAS | 060749 | CITY OF HAWAIIAN GARDENS* | 065032 |
| CITY OF CARSON | 060107 | CITY OF HAWTHORNE* | 060123 |
| CITY OF CERRITOS | 060108 | CITY OF HERMOSA BEACH | 060124 |
| CITY OF CLAREMONT* | 060109 | CITY OF HIDDEN HILLS | 060125 |

*No Special Flood Hazard Areas Identified

## REVISED: April 4, 2018

FEMA

| COMMUNITY NAME | NUMBER | COMMUNITY NAME | NUMBER |
|---|---|---|---|
| CITY OF HUNTINGTON PARK* | 060126 | CITY OF POMONA* | 060149 |
| CITY OF INDUSTRY* | 065035 | CITY OF RACHO PALOS VERDES | 060464 |
| CITY OF INGLEWOOD* | 065036 | CITY OF REDONDO BEACH | 060150 |
| CITY OF IRWINDALE* | 060129 | CITY OF ROLLING HILLS* | 060151 |
| CITY OF LA CANADA FLINTRIDGE* | 060669 | CITY OF ROLLING HILLS ESTATES* | 065054 |
| CITY OF LA HABRA HEIGHTS* | 060701 | CITY OF ROSEMEAD* | 060153 |
| CITY OF LA MIRADA | 060131 | CITY OF SAN DIMAS | 060154 |
| CITY OF LA PUENTE* | 065039 | CITY OF SAN FERNANDO* | 060628 |
| CITY OF LA VERNE | 060133 | CITY OF SAN GABRIEL* | 065055 |
| CITY OF LAKEWOOD | 060130 | CITY OF SAN MARINO* | 065057 |
| CITY OF LANCASTER | 060672 | CITY OF SANTA CLARITA | 060729 |
| CITY OF LAWNDALE* | 060134 | CITY OF SANTA FE SPRINGS | 060158 |
| CITY OF LOMITA* | 060135 | CITY OF SANTA MONICA | 060159 |
| CITY OF LONG BEACH | 060136 | CITY OF SIERRA MADRE* | 065059 |
| CITY OF LOS ANGELES | 060137 | CITY OF SIGNAL HILL* | 060161 |
| CITY OF LYNWOOD | 060635 | CITY OF SOUTH EL MONTE* | 060162 |
| CITY OF MALIBU | 060745 | CITY OF SOUTH GATE | 060163 |
| CITY OF MANHATTAN BEACH | 060138 | CITY OF SOUTH PASADENA* | 065061 |
| CITY OF MAYWOOD* | 060651 | CITY OF TEMPLE CITY* | 060653 |
| CITY OF MONROVIA* | 065046 | CITY OF TORRANCE | 060165 |
| CITY OF MONTEBELLO | 060141 | CITY OF VERNON* | 060166 |
| CITY OF MONTEREY PARK* | 065047 | CITY OF WALNUT* | 065069 |
| CITY OF NORWALK | 060652 | CITY OF WEST COVINA | 060666 |
| CITY OF PALMDALE | 060144 | CITY OF WEST HOLLYWOOD | 060720 |
| CITY OF PALOS VERDES ESTATES | 060145 | CITY OF WESTLAKE VILLAGE | 060744 |
| CITY OF PARAMOUNT | 065049 | CITY OF WHITTIER | 060169 |
| CITY OF PASADENA* | 065050 | LOS ANGELES COUNTY UNINCORPORATED AREAS | 065043 |
| CITY OF PICO RIVERA | 060148 | | |

*No Special Flood Hazard Areas Identified

# REVISED: April 4, 2018

FEMA

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Flood Insurance Rate Map (FIRM)

# SECTION 5.0 – ENGINEERING METHODS

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

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

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Amargosa Creek | East of Antelope Valley Freeway North of Avenue H | 206 | 3,000 | * | 9,000 | 13,000 | * | 30,000 |
| Amargosa Creek | West of Antelope Valley Freeway North of Avenue H | 147 | 2,000 | * | 5,600 | 8,400 | * | 18,000 |
| Amargosa Creek | Approximately Midway between 20th Street West and 10th Street West | 32.7 | 1,800 | * | 3,300 | 5,000 | * | 10,100 |
| Amargosa Creek | At 10th Street West | 32.0 | * | * | * | 2,364 | * | * |
| Amargosa Creek | At 25th Street West Bridge | 30.0 | * | * | * | 2,341 | * | * |
| Amargosa Creek | At Elizabeth Lake Ford Crossing | 28.6 | * | * | * | 2,288 | * | * |
| Amargosa Creek | At Vineyard Ranch | 26.5 | * | * | * | 2,063 | * | * |
| Amargosa Creek | At Outlet of Ritter Ranch Detention Pond | 23.8 | * | * | * | 1,856 | * | * |
| Amargosa Creek | At 90th Street West | 6.9 | 580 | * | 2,000 | 3,100 | * | 4,500 |
| Amargosa Creek Tributary | Intersection of Avenue I and Spearman Avenue | 7.2 | 310 | * | 900 | 1,220 | * | 2,400 |

# 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Amargosa Creek Tributary | Intersection of Avenue L and 3rd Street East | 2.4 | 150 | * | 420 | 560 | * | 1,000 |
| Amargosa Creek Tributary | Avenue M and Valleyline Drive | 1.8 | 120 | * | 340 | 460 | * | 850 |
| Anaverde Creek | Acton Canyon Road, Escondido Canyon Road, and Crown Valley Road | 20.3 | * | * | * | 3,421 | * | 6,052 |
| Anaverde Creek | West of Sierra Highway at Avenue P-8 | 19.0 | 700 | * | 2,100 | 3,100 | * | 6,600 |
| Anaverde Creek | At Antelope Freeway | 16.4 | * | * | * | 3,730 | * | * |
| Anaverde Creek | East of Antelope Valley Freeway | 16.0 | 700 | * | 2,100 | 3,000 | * | 6,400 |
| Anaverde Creek | 1.85 Miles Downstream of California Aqueduct | 15.7 | * | * | * | 3,630 | * | * |
| Anaverde Creek | 1.47 miles Downstream of California Aqueduct | 12.8 | * | * | * | 3,200 | * | * |
| Anaverde Creek | 0.75 miles Downstream of California Aqueduct | 11.8 | * | * | * | 3,050 | * | * |
| Anaverde Creek | At California Aqueduct | 8.3 | * | * | * | 2,440 | * | * |

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## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Anaverde Creek | 3,000 feet East of 165th Street East and 4.000 feet South of Pearblossom Highway | 7.3 | 500 | * | 1,700 | 2,300 | * | 4,700 |
| Anaverde Creek | West of 136th Street East at Avenue W-8 | 2.4 | 440 | * | 1,500 | 1,900 | * | 3,900 |
| Anaverde Creek | 165th Street East Approximately 4,000 feet South of Pearblossom Highway | 1.0 | 370 | * | 1,300 | 1,600 | * | 3,100 |
| Anaverde Creek Tributary | Division Street between Avenue P and Avenue P-8 | 1.4 | 300 | * | 1,100 | 1,600 | * | 3,000 |
| Avalon Canyon | At Cross Section A | 3.7 | 859 | * | 1,895 | 2,419 | * | 3,785 |
| Avalon Canyon | At Cross Section G | 1.8 | 440 | * | 971 | 1,239 | * | 1,938 |
| Ballona Creek | At intersection of Adams Boulevard and Genesee Avenue | 16.7 | 2,100 | * | 4,700 | 6,000 | * | 9,400 |
| Bel Air Estates Shallow Flooding | Beverly Glen Boulevard North of Sunset Boulevard | 1.2 | 700 | * | 1,000 | 1,200 | * | 1,600 |
| Bel Air Estates Shallow Flooding | Stone Canyon Road South of Bellagio Road | 1.0 | 630 | * | 940 | 1,100 | * | 1,400 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Bel Air Estates Shallow Flooding | Stone Canyon Road South of Somma Way | 0.7 | 480 | * | 710 | 800 | * | 1,100 |
| Big Rock Wash | At mouth, Southwest | 23.0 | * | * | * | 15,000 | * | * |
| Big Tujunga Canyon | Upstream of Wheatland Avenue | 43.3 | 9,300 | * | 26,800 | 38,900 | * | 66,000 |
| Big Tujunga Canyon | Approximately 1,200 feet Upstream of Foothill Boulevard and Tujuna Valley Street | 34.6 | 8,100 | * | 24,700 | 36,500 | * | 62,600 |
| Bouquet Canyon | Approximately 2,600 feet upstream of Bouquet Canyon Road | 32.1 | * | * | * | 11,117 | * | 22,707 |
| Bouquet Canyon | Approximately 4,500 feet Upstream of Vasquez Canyon Road | 38.6 | * | * | * | 11,303 | * | 23,161 |
| Brentwood Shallow Flooding | North of San Vicente Boulevard, West of Westgate Avenue | 0.2 | 60 | * | 140 | 180 | * | 280 |
| Brentwood Shallow Flooding | Northeast of Sunset Boulevard and Barrington Avenue | 0.2 | 230 | * | 340 | 390 | * | 520 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Castaic Canyon | Approximately 2,100 feet Upstream of Confluence with Charlie Canyon | 16.8 | * | * | * | 11,805 | * | 22,326 |
| Century City Shallow Flooding | Northwest of Santa Monica Boulevard and Avenue of the Stars | 0.5 | 400 | * | 590 | 700 | * | 900 |
| Chatsworth Shallow Flooding | Vicinity of Variel Avenue and Chatsworth Street | 13.4 | 2,100 | * | 4,700 | 6,000 | * | 9,300 |
| Chatsworth Shallow Flooding | Vicinity of Santa Susana Pass Road and Santa Susana Avenue | 1.5 | 450 | * | 990 | 1,300 | * | 2,000 |
| Chatsworth Shallow Flooding | Vicinity of Chatsworth Street and Corbin Avenue | 0.9 | 220 | * | 480 | 610 | * | 960 |
| Chatsworth Shallow Flooding | Vicinity of Canoga Avenue and Devonshire Street | 0.8 | 230 | * | 510 | 650 | * | 1,000 |
| Chatsworth Shallow Flooding | Vicinity of Valley Circle Boulevard and Lassen Street | 0.8 | 220 | * | 480 | 600 | * | 950 |
| Chatsworth Shallow Flooding | Vicinity of Farrolone Avenue and Lassen Street | 0.4 | 100 | * | 220 | 280 | * | 440 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Chatsworth Shallow Flooding | Vicinity of Topanga Canyon Boulevard and Lassen Street | 0.3 | 50 | * | 120 | 150 | * | 230 |
| Chatsworth Shallow Flooding | Vicinity of Topanga Canyon Boulevard and Santa Susana Place | 0.1 | 20 | * | 50 | 60 | * | 100 |
| Cheseboro Creek | 1,100 feet Upstream of Driver Avenue | 7.6 | 2,169 | * | 4,779 | 6,088 | * | 9,551 |
| Cold Creek | Cross Section A | 8.1 | 2,280 | * | 5,019 | 6,406 | * | 10,023 |
| Cold Creek | Cross Section C | 7.8 | 2,280 | * | 5,041 | 6,432 | * | 10,066 |
| Cold Creek | Cross Section G | 5.7 | 1,734 | * | 3,826 | 4,881 | * | 7,640 |
| Dark Canyon | Cross Section A | 1.2 | 753 | * | 1,600 | 2,118 | * | 3,314 |
| Dowd Canyon Creek | At Calle Corona Extended | 3.9 | * | * | * | 2,982 | * | 5,963 |
| Dry Canyon | Approximately 2,000 feet Upstream of San Francisquito Road | 5.5 | * | * | * | 5,235 | * | 10,470 |
| Dry Canyon | Cross Section C | 1.1 | 527 | * | 1,104 | 1,484 | * | 2,323 |
| Dry Canyon | Cross Section M | 0.8 | 490 | * | 1,083 | 1,382 | * | 2,162 |
| Dry Canyon | Cross Section T | 0.4 | 242 | * | 534 | 681 | * | 1,065 |
| Elizabeth Canyon Creek | Approximately 2,300 feet Downstream of Elizabeth Lake Pine Canyon Road | 7.7 | * | * | * | 3,455 | * | 7,176 |

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# 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Escondido Canyon | Cross Section B | 3.2 | 958 | | 2,116 | 2,700 | | 4,226 |
| Escondido Canyon | Cross Section F | 1.7 | 986 | | 2,176 | 2,778 | | 4,346 |
| Garapito Canyon | Cross Section A | 2.9 | 996 | * | 2,171 | 2,807 | * | 4,392 |
| Garapito Canyon | Cross Section E | 2.0 | 675 | * | 1,470 | 1,910 | * | 2,974 |
| Gorman Creek | Approximately 250 feet North of Interstate Highway 5 Overcrossing Gorman Road | 3.8 | * | * | * | 1,713 | * | 3,221 |
| Granada Hills Shallow Flooding | Superior Street, West of Paso Robles Avenue | 0.5 | 90 | * | 200 | 260 | * | 400 |
| Granada Hills Shallow Flooding | Vicinity of Balboa Boulevard and Citronia Street | 0.5 | 90 | * | 200 | 260 | * | 400 |
| Hacienda Creek | Cross Section A | 1.5 | 626 | * | 1,381 | 1,762 | * | 2,758 |
| Halsey Canyon | Approximately 1,150 feet Downstream of Halsey Canyon Road | 7.3 | * | * | * | 5,544 | * | 10,163 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Halsey Canyon | Approximately 550 feet Downstream of Romero Canyon Road | 5.9 | * | * | * | 4,523 | * | 8,292 |
| Hancock Park Shallow Flooding | Vicinity of Highland Avenue and St. Elmo Drive | 20.2 | 3,600 | * | 7,700 | 9,300 | * | 13,700 |
| Hancock Park Shallow Flooding | Vicinity of San Vicente and Pico Boulevards | 18.9 | 3,500 | * | 7,400 | 9,000 | * | 13,100 |
| Hancock Park Shallow Flooding | Vicinity of West Boulevard and Dockweiler Street | 18.8 | 3,600 | * | 7,600 | 9,300 | * | 13,600 |
| Hancock Park Shallow Flooding | Vicinity of Bronson Avenue and Country Club Drive | 18.1 | 3,700 | * | 7,900 | 9,600 | * | 14,000 |
| Hancock Park Shallow Flooding | Sixth Street, Vicinity of Alexandria Avenue | 8.1 | 2,100 | * | 4,600 | 5,900 | * | 9,200 |
| Hancock Park Shallow Flooding | Chesapeake Avenue, Vicinity of Exposition Boulevard | 8.0 | 1,100 | * | 2,400 | 3,000 | * | 3,700 |
| Hancock Park Shallow Flooding | Vicinity of Western Avenue and 11th Street | 3.5 | 670 | * | 1,300 | 1,600 | * | 2,500 |
| Hancock Park Shallow Flooding | Victoria Avenue, Vicinity of Jefferson Boulevard | 1.2 | 320 | * | 1,100 | 1,400 | * | 2,600 |

**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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Hancock Park Shallow Flooding | Arlington Avenue, Vicinity of 37th Place | 0.8 | 440 | * | 990 | 1,400 | * | 2,500 |
| Hancock Park Shallow Flooding | Olympic Boulevard at Hudson Avenue | 0.6 | 130 | * | 290 | 370 | * | 570 |
| Hancock Park Shallow Flooding | Harcourt Avenue, Vicinity of Westhaven Street | 0.5 | 160 | * | 350 | 450 | * | 700 |
| Hancock Park Shallow Flooding | Lucerne Boulevard at Francis Avenue | 0.3 | 70 | * | 160 | 200 | * | 320 |
| Harbor Area Shallow Flooding | North of Carson Street Between Vermont and Berendo Avenues | 0.4 | 74 | * | 164 | 209 | * | 327 |
| Harbor Lake | Southeast of Vermont Avenue and Pacific Coast Highway | 19.0 | 3,200 | * | 7,000 | 8,900 | * | 14,000 |
| Harbor District Shallow Flooding | Denker Avenue, Vicinity of 204th Street | 0.3 | 60 | * | 130 | 170 | * | 260 |
| Haskell Canyon | Approximately 1,300 feet Downstream of Headworks | 6.7 | * | * | * | 5,363 | * | 10,516 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Haskell Canyon | Approximately 6,400 feet Upstream of Confluence with Bouquet Canyon | 10.4 | * | * | * | 7,268 | * | 14,072 |
| Hollywood Shallow Flooding | Third Street at Kenmore Avenue | 3.4 | 800 | * | 1,800 | 2,300 | * | 3,500 |
| Hollywood Shallow Flooding | South of Hollywood Freeway, Vicinity of Kenmore Avenue | 3.2 | 830 | * | 1,800 | 2,300 | * | 3,700 |
| Hollywood Shallow Flooding | Santa Monica Boulevard, Vicinity of Mariposa Avenue | 2.8 | 940 | * | 2,100 | 2,700 | * | 4,200 |
| Hollywood Shallow Flooding | Madison Avenue at Monroe Street | 0.5 | 160 | * | 350 | 440 | * | 690 |
| Hyde Park | South of Southwest Drive, Vicinity of Van Ness Avenue | 4.2 | 730 | * | 1,600 | 2,100 | * | 3,200 |
| Hyde Park | Wilton Place, Vicinity of Gage Avenue | 3.3 | 770 | * | 1,600 | 1,900 | * | 3,000 |
| Hyde Park | Halldale Avenue, Vicinity of 65th Street | 1.2 | 300 | * | 660 | 850 | * | 1,300 |
| Industry Area Shallow Flooding | Vicinity of Brea Canyon Road and Lycoming Street | 3.9 | 952 | * | 2,102 | 2,682 | * | 4,197 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Iron Canyon | Approximately 2,000 feet Upstream of Sand Canyon Road | 2.8 | * | * | * | 2,078 | * | 2,833 |
| Kagel Canyon Area | Cross Section A | 2.0 | 490 | * | 1,081 | 1,380 | * | 2,159 |
| Kagel Canyon | Approximately 650 feet Upstream of Osborne Avenue | 2.0 | 490 | * | 1,100 | 1,400 | * | 12,200 |
| La Mirada Area Shallow Flooding | Mystic Street, Vicinity of Parkinson Avenue | 0.3 | 81 | * | 179 | 228 | * | 357 |
| La Mirada Creek | Approximately 1,100 feet Downstream of La Mirada Boulevard | 5.0 | 610 | * | 1,350 | 1,720 | * | 2,690 |
| La Mirada Creek | At Ocaso Avenue | 4.6 | 610 | * | 1,340 | 1,700 | * | 2,670 |
| Las Flores Canyon | Cross Section F | 4.1 | 1,758 | * | 3,882 | 4,954 | * | 7,752 |
| Las Virgenes Creek | Approximately 1,500 feet downstream of the confluence of Stokes Canyon | 24.3 | 9,230 | 11,913 | 13,678 | 15,521 | * | 18,704 |
| Las Virgenes Creek | Downstream of the confluence of Stokes Canyon | 24.3 | 9,228 | 11,909 | 13,673 | 15,515 | * | 18,811 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Las Virgenes Creek | Upstream of the confluence of Stokes Canyon | 19.7 | 9,193 | 12,066 | 13,766 | 15,646 | * | 19,340 |
| Las Virgenes Creek | At Mulholland Highway | 19.1 | 6,873 | 9,014 | 10,346 | 11,929 | * | 14,853 |
| Las Virgenes Creek | Upstream of the confluence of Liberty Canyon | 16.6 | 6,871 | 9,025 | 10,348 | 11,935 | * | 15,210 |
| Las Virgenes Creek | Approximately 1,500 feet upstream of the confluence of Liberty Canyon | 16.5 | 5,862 | 7,440 | 8,799 | 10,069 | * | 12,755 |
| Las Virgenes Creek | Approximately 4,000 feet upstream of the confluence of Liberty Canyon | 16.2 | 5,783 | 7,350 | 8,676 | 9,913 | * | 12,554 |
| Las Virgenes Creek | Approximately 1,800 feet downstream of Lost Hills Road | 15.0 | 5,414 | 6,923 | 8,112 | 9,246 | * | 11,714 |
| Las Virgenes Creek | At Lost Hills Road | 15.0 | 5,420 | 6,932 | 8,133 | 9,281 | * | 11,764 |
| Las Virgenes Creek | At Meadow Creek Lane | 14.9 | 5,414 | 6,923 | 8,124 | 9,269 | * | 11,751 |
| Las Virgenes Creek | Approximately 1,600 feet upstream of Meadow Creek Lane | 13.3 | 4,860 | 6,190 | 7,211 | 8,197 | * | 10,356 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Las Virgenes Creek | Just downstream of Agola Road | 12.7 | 4,783 | 6,091 | 7,040 | 8,005 | * | 10,076 |
| Las Virgenes Creek | Just downstream of US Highway 101 | 10.4 | 3,830 | 4,875 | 5,644 | 6,419 | * | 8,137 |
| Las Virgenes Creek | Just downstream of Las Virgenes Road | 10.2 | 3,787 | 4,818 | 5,577 | 6,340 | * | 8,044 |
| Liberty Canyon | Cross Section E | 1.4 | 938 | * | 2,072 | 2,645 | * | 4,140 |
| Lindero Canyon | Cross Section N | 3.1 | 1,258 | * | 2,776 | 3,542 | * | 5,545 |
| Lindero Canyon | At Reyes Adobe Road (Cross Section M) | 3.4 | 1,290 | * | 2,847 | 3,632 | * | 5,685 |
| Lindero Canyon | Cross Section H | 3.8 | 1,343 | * | 2,965 | 3,783 | * | 5,920 |
| Lindero Canyon | Approsimately 700 feet Downstream of Thousand Oaks Boulevard | 4.1 | 1,369 | * | 3,024 | 3,858 | * | 6,037 |
| Lindero Canyon | Cross Section C | 6.7 | 1,725 | * | 3,809 | 4,860 | * | 7,604 |
| Little Rock Wash | At Little Rock Reservoir | 48.0 | * | * | * | 20,000 | * | * |
| Little Tujunga Wash | Approximately 1,600 feet Upstream of Foothill Boulevard | 20.3 | 2,700 | * | 6,000 | 7,700 | * | 12,200 |
| Little Tujunga Wash | Approximately 3,000 feet Upstream of the City of Los Angeles Corporate Limits | 17.9 | 2,273 | * | 5,019 | 6,405 | * | 10,022 |

# 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Lobo Canyon | Cross Section B | 3.8 | 1,572 | * | 3,473 | 4,429 | * | 6,932 |
| Lobo Canyon | Cross Section C | 2.5 | 1,625 | * | 3,588 | 4,579 | * | 7,166 |
| Lockheed Drain Channel | Approximately 100 feet Downstream of Burbank Boulevard | 3.7 | * | * | * | 2,910 | * | * |
| Lockheed Drain Channel | Approximately 300 feet Downstream of Victory Place | 2.5 | * | * | * | 2,410 | * | * |
| Lockheed Drain Channel | Approximately 100 feet Downstream of Naomi Street | 1.9 | * | * | * | 2,026 | * | * |
| Lockheed Drain Channel | At Ontario Street | 1.8 | * | * | * | 2,054 | * | * |
| Lockheed Drain Channel | Approximately 300 feet Upstream of Lima Street | 1.4 | * | * | * | 1,635 | * | * |
| Lockheed Drain Channel | Approximately 150 feet Downstream of Hollywood Way | 0.9 | * | * | * | 965 | * | * |
| Lockheed Drain Channel | Approximately 450 feet Upstream of Clybourn Avenue | 0.4 | 278 | * | * | 448 | * | * |
| Lopez Canyon Channel | Cross Section A | 1.8 | 682 | * | 1,506 | 1,922 | * | 3,007 |
| Los Angeles River | At Compton Creek | 808 | 92,900 | * | 133,000 | 142,000 | * | 143,000 |
| Los Angeles River | At Imperial Highway | 752 | 89,400 | * | 126,000 | 140,000 | * | 156,000 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Malibu Creek | Cross Section A | 110 | 14,183 | * | 31,648 | 40,544 | * | 63,934 |
| Malibu Lake | Malibu Lake | 64.6 | 11,859 | * | 26,556 | 34,043 | * | 53,712 |
| Medea Canyon | Cross Section B | 24.6 | 5,794 | * | 12,788 | 16,319 | * | 25,537 |
| Medea Canyon | Cross Section H | 23.0 | 6,174 | * | 13,628 | 17,389 | * | 25,537 |
| Medea Canyon | Cross Section K | 22.2 | 6,363 | * | 14,074 | 17,925 | * | 28,049 |
| Medea Canyon | Cross Section P | 6.3 | 2,558 | * | 5,647 | 7,204 | * | 11,272 |
| Medea Creek | Downstream of Venture Highway | 6.3 | 2,560 | * | 2,645 | 7,200 | * | 11,270 |
| Medea Creek | Approximately 950 feet Upstream of Canwood Street | 1 | * | * | * | 6,720 | * | * |
| Medea Creek | Approximately 1,100 feet Upstream of Kanan Road | 1 | * | * | * | 5,960 | * | * |
| Medea Creek | At Thousand Oaks Boulevard | 1 | * | * | * | 5,946 | * | * |
| Medea Creek | Approximately 1,700 feet Downstream of Laro Drive | 4.1 | * | * | * | 5,320 | * | * |
| Medea Creek | Approximately 575 feet Downstream of Fountainwood Street | 3.9 | * | * | * | 5,240 | * | * |
| Medea Creek | Just Upstream of Fountainwood Street | 3.4 | * | * | * | 4,700 | * | * |

## Table 10: Summary of Discharges, Continued

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Mill Creek | Cross Section B | 14.8 | 2,274 | * | 5,019 | 6,405 | * | 10,024 |
| Mint Canyon | Approximately 1,600 feet Downstream of Sierra Highway Crossing | 29.3 | * | * | * | 8.300 | * | 14,581 |
| Mint Canyon | Approximately 3,600 feet Downstream of Vasquez Canyon Road | 26.8 | * | * | * | 7,896 | * | 14,179 |
| Mint Canyon | Approximately 2,600 feet Downstream of Davenport Road | 19.9 | * | * | * | 6,691 | * | 12,604 |
| Newhall Creek | Approximately 650 feet Downstream of Railroad Canyon | 7.3 | * | * | * | 3,892 | * | 6,228 |
| Newhall Creek | Approximately 650 feet Upstream of Railroad Canyon | 6.2 | * | * | * | 3,390 | * | 5,424 |
| Newhall Creek | Approximately 800 feet Upstream of Railroad Canyon | 5.2 | * | * | * | 3,224 | * | 4,396 |
| Oak Springs Canyon | Approximately 100 feet Upstream of Union Pacific Railroad (former Southern Pacific Railroad) | 5.7 | * | * | * | 2,703 | * | 4,054 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Old Topanga Canyon | Cross Section E | 1.7 | 567 | * | 1,253 | 1,597 | * | 2,499 |
| Old Topanga Canyon | Cross Section H | 0.8 | 251 | * | 554 | 706 | * | 1,104 |
| Overland Flow | Marquardt Avenue, 1400 feet North of Rosecrans Avenue | 2.1 | 411 | * | 907 | 1,158 | * | 1,812 |
| Overland Flow | North of Florence Avenue and East of Pioneer Boulevard | 1.3 | 270 | * | 596 | 760 | * | 1,190 |
| Overland Flow | North of Lakeland Road, 1000 feet East of Bloomfield Avenue | 0.4 | 68 | * | 151 | 192 | * | 301 |
| Palo Comando Creek | Cross Section E | 4.1 | 1,159 | * | 2,562 | 3,268 | * | 5,113 |
| Palo Comando Creek | At Fairview Place (Cross Section J) | 3.5 | 1,074 | * | 2,374 | 3,028 | * | 4,738 |
| Palo Comando Creek | Cross Section K | 3.2 | 1,032 | * | 2,279 | 2,908 | * | 4,551 |
| Park La Brea Shallow Flooding | Vicinity of Orange Drive and Pickford Street | 24.7 | 4,400 | * | 9,500 | 11,800 | * | 17,700 |
| Park La Brea Shallow Flooding | Venice Boulevard, Vicinity of Fairfax Avenue | 18.4 | 3,400 | * | 7,500 | 9,500 | * | 14,900 |

# 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Park La Brea Shallow Flooding | Vicinity of Whitworth Drive and La Cienega Boulevard | 17.1 | 3,400 | * | 7,600 | 9,700 | * | 15,200 |
| Park La Brea Shallow Flooding | Fairfax Avenue, Vicinity of La Cienega Boulevard | 16.7 | 2,100 | * | 4,700 | 6,000 | * | 9,600 |
| Park La Brea Shallow Flooding | Houser Boulevard, Vicinity of La Cienega Boulevard | 14.8 | 1,900 | * | 4,300 | 5,500 | * | 8,800 |
| Park La Brea Shallow Flooding | Redondo Boulevard, Vicinity of Roseland Street | 14.5 | 2,000 | * | 4,400 | 5,700 | * | 9,100 |
| Park La Brea Shallow Flooding | Wilshire Boulevard, Vicinity of Crescent Heights Avenue | 6.6 | 1,500 | * | 3,300 | 4,200 | * | 6,600 |
| Park La Brea Shallow Flooding | Redondo Boulevard, Vicinity of Santa Monica Freeway | 1.2 | 300 | * | 670 | 860 | * | 1,300 |
| Pine Canyon | Approximately 1,200 feet Upstream of Lake Hughes Road | 6.4 | * | * | * | 2,969 | * | 6,166 |
| Placerita Creek | Approximately 575 feet Downstream of San Fernando Road | 9.3 | * | * | * | 5,321 | * | 7,981 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Placerita Creek | Approximately 2,900 feet Upstream of San Fernando Road | 8.6 | * | * | * | 4,988 | * | 7,482 |
| Placerita Creek | Approximately 2,000 feet Upstream of Quigley Canyon Road | 7.1 | * | * | * | 4,085 | * | 6,313 |
| Placerita Creek | Approximately 850 feet Downstream of Antelope Valley Freeway | 6.3 | * | * | * | 3,546 | * | 5,673 |
| Plum Canyon | Approximately 2,350 feet Upstream of Bouquet Canyon Road | 3.4 | * | * | * | 1,942 | * | 3,453 |
| Ponding | At Intersection of Mines Avenue and Taylor Avenue | 0.5 | 120 | * | 250 | 330 | * | 510 |
| Portal Ridge Wash | Intersection of Avenue H and Antelope Valley Freeway | 147 | 1,600 | * | 5,000 | 7,200 | * | 16,000 |
| Porter Ranch Shallow Flooding | Mayerling Street, Northwest of Shoshone Avenue | 0.2 | 40 | * | 100 | 120 | * | 190 |
| Porter Ranch Shallow Flooding | Vicinity of Sesnon Boulevard | 0.1 | 30 | * | 60 | 70 | * | 120 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Railroad Canyon | Approximately 350 feet Upstream of San Fernando Road | 1.2 | * | * | * | 835 | * | 1,253 |
| Ramirez Canyon | Cross Section B | 3.3 | 1,066 | * | 2,352 | 3,000 | * | 4,696 |
| Ramirez Canyon | Cross Section I | 2.8 | 1,150 | * | 2,540 | 3,240 | * | 5,070 |
| Rio Hondo | At Stewart and Gray Road | 132 | 35,600 | * | 41,000 | 39,300 | * | 40,200 |
| Rio Hondo | At Beverly Boulevard | 113 | 33,800 | * | 37,50 | 38,000 | * | 38,400 |
| Rio Hondo | At Outflow from Whittier Narrows Dam | 110 | 33,500 | * | 36,500 | 36,500 | * | 36,500 |
| Rustic Canyon | Approximately 1,030 feet Downstream (South) of Sunset Boulevard | 5.7 | 700 | * | 1,500 | 2,000 | * | 3,100 |
| San Fernando Pacoima Wash | Approximately 150 feet Downstream of Shablow Avenue | 31.1 | 1,900 | * | 5,600 | 8,100 | * | 12,100 |
| San Francisquito Canyon Creek | At Spunky Road | 2.7 | * | * | * | 2,140 | * | 4,281 |
| San Gabriel River | Whittier Narrows Flood Control Basin At Siphon Road | 524 | * | * | * | 90,000 | * | * |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| San Martinez-Chiquito Canyon | Approximately 250 feet Downstream of Verdale Street | 1.1 | * | * | * | 1,205 | * | 2,208 |
| San Martinez-Chiquito Canyon | Approximately 400 feet Upstream of Chiquito Canyon Road (Upper Crossing) | 3.1 | * | * | * | 3,112 | * | 5,705 |
| San Martinez-Chiquito Canyon | Approximately 1,000 feet Upstream of Chiquito Canyon Road (Lower Crossing) | 4.7 | * | * | * | 4,659 | * | 8,607 |
| Sand Canyon Creek | Approximately 800 feet Upstream of Placerita Canyon Road | 6.4 | * | * | * | 4,371 | * | 5,961 |
| Sand Canyon Creek | Approximately 2,900 feet Downstream of Placerita Canyon Road | 7.3 | * | * | * | 4,908 | * | 6,693 |
| Sand Canyon Creek | Approximately 250 feet Downstream of Iron Canyon Confluence | 10.1 | * | * | * | 6,372 | * | 8,689 |
| Santa Clara River | Approximately 2,600 feet Upstream of Los Angeles Aqueduct | 235.4 | * | * | * | 15,182 | * | 26,369 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Santa Clara River | At Sand Canyon Road | 179 | 3,840 | * | 12,810 | 19,500 | * | 30,490 |
| Santa Clara River | Approximately 7,600 feet Upstream of Oak Springs Canyon | 172.7 | * | * | * | 13,412 | * | 22,588 |
| Santa Clara River | Approximately 3,500 feet Upstream of Confluence of Arraste Canyon Road | 67.7 | * | * | * | 8,408 | * | 13,849 |
| Santa Fe Springs Area Shallow Flooding | Vicinity of Rivera Road and Vicki Drive | 0.4 | 80 | * | 176 | 225 | * | 352 |
| Santa Maria Canyon | Cross Section C | 3.1 | 1,070 | * | 2,333 | 3,016 | * | 4,719 |
| Savage Creek | At Intersection of York Avenue and Mar Vista Street | 0.9 | 260 | * | 570 | 730 | * | 1,150 |
| Sepulveda | Haskell Avenue North of Union Pacific Railroad (former Southern Pacific Railroad) | 1.0 | 230 | * | 500 | 640 | * | 1,000 |
| Sepulveda | Roscoe Boulevard at Haskell Avenue | 0.8 | 160 | * | 360 | 460 | * | 720 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Shallow Flooding | At intersection of Ripley Avenue and Rindge Lane | 1 | 61 | * | 135 | 172 | * | 270 |
| Shallow Flooding | At Gould Avenue between Ford and Goodman Avenues | 0.0 | 66 | * | 146 | 186 | * | 291 |
| Shallow Flooding | At intersection of Sixth Street and Quincy Avenue | 1.0 | 271 | * | 598 | 763 | * | 1,194 |
| Shallow Flooding | At intersection of Vincent Street and South Irena Avenue | 1 | 68 | * | 149 | 190 | * | 298 |
| Shallow Flooding | At intersection of Camino Real and South Juanita Avenue | 10.0 | 50 | * | 111 | 141 | * | 221 |
| Shallow Flooding | At intersection of Avenue H and Massena Avenue | $5^2$ | 154 | * | 340 | 434 | * | 679 |
| Sherman Oaks Shallow Flooding | Magnolia Boulevard at Haskell Avenue | 1.2 | 360 | * | 800 | 1,000 | * | 1,600 |
| Silver Lake Shallow Flooding | Myra Avenue, Vicinity of Del Mar Avenue | 1.8 | 490 | * | 1,110 | 1,400 | * | 2,200 |
| Silver Lake Shallow Flooding | Silver Lake Boulevard East of Virgil Avenue | 1.3 | 420 | * | 900 | 1,100 | * | 1,800 |

# 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Silver Lake Shallow Flooding | Between Hyperion Avenue and Griffith Park Boulevard, North of Fountain Avenue | 0.9 | 290 | * | 650 | 830 | * | 1,300 |
| Silver Lake Shallow Flooding | Griffith Park Boulevard at Tracy Street | 0.6 | 220 | * | 490 | 620 | * | 970 |
| South Fork Santa Clara River | Approximately 500 feet Downstream of Wiley Canyon Road | 12.9 | * | * | * | 8,483 | * | 13,704 |
| South Fork Santa Clara River | Approximately 600 feet Downstream of Golden State Freeway | 12.8 | * | * | * | 8,417 | * | 13,596 |
| Spade Springs Canyon | At confluence with Mint Canyon | 4.5 | 471 | * | 1,099 | 1,364 | * | 1,839 |
| Spade Springs Canyon | At boundary of Angeles National Forest | 3.4 | 428 | * | 911 | 1,118 | * | 1,491 |
| Stokes Canyon | Cross Section C | 2.9 | 1,089 | * | 2,403 | 3,067 | * | 4,799 |
| Stokes Canyon | Cross Section B | 2.4 | 934 | * | 2,062 | 2,631 | * | 4,117 |
| Surface Runoff | At Intersection of Garfield Avenue and Beverly Boulevard | 2.9 | 820 | * | 1,810 | 2,310 | * | 3,610 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Surface Runoff | Laurel Canyon Boulevard at Hollywood Boulevard | 1.9 | 600 | * | 800 | 1,160 | * | 2,100 |
| Surface Runoff | Happy Lane | 1.7 | 640 | * | 1,400 | 1,800 | * | 2,800 |
| Surface Runoff | Vicinity of Rosewood Avenue and Huntley Drive West Los Angeles and Central Districts | 1.1 | 670 | * | 1,479 | 1,888 | * | 3,329 |
| Sylmar Area Shallow Flooding | East Side of Golden State Freeway South of Sierra Highway | 0.2 | 50 | * | 120 | 150 | * | 240 |
| Topanga Canyon | Cross Section H | 19.6 | 4,095 | * | 9,040 | 11,537 | * | 18,054 |
| Topanga Canyon | Cross Section M | 15.0 | 5,404 | * | 11,930 | 15,223 | * | 23,882 |
| Topanga Canyon | Cross Section Q | 14.5 | 5,208 | * | 11,499 | 14,672 | * | 22,960 |
| Topanga Canyon | Cross Section T | 7.3 | 2,560 | * | 5,656 | 7,215 | * | 11,289 |
| Topanga Canyon | Cross Section V | 7.0 | 2,364 | * | 5,222 | 6,601 | * | 10,422 |
| Topanga Canyon | Cross Section X | 5.5 | 1,862 | * | 4,113 | 5,247 | * | 8,210 |
| Topanga Canyon | Cross Section AG | 0.3 | 259 | * | 572 | 729 | * | 1,141 |

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# 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Trancas Creek | Upstream of Pacific Coast Highway (Cross Section A) | 8.6 | 2,499 | * | 5,518 | 7,040 | * | 11,106 |
| Triunfo Creek | Approximately 1,200 feet upstream of Crags Drive | 39.22 | 10,167 | 14,221 | 17,118 | 20,021 | * | 26,901 |
| Triunfo Creek | Approximately 320 feet downstream of Kanan Road | 38.1 | 9,942 | 13,861 | 16,647 | 19,443 | * | 26,105 |
| Triunfo Creek | Approximately 1,340 feet upstream of Kanan Road | 36.8 | 9,675 | 13,464 | 16,163 | 18,870 | * | 25,364 |
| Triunfo Creek | Approximately 4,940 feet upstream of Kanan Road | 36.5 | 9,608 | 13,366 | 16,041 | 18,725 | * | 25,168 |
| Triunfo Creek | Approximately 7,520 feet upstream of Kanan Road | 30.1 | 8,135 | 11,278 | 13,520 | 15,781 | * | 21,252 |
| Triunfo Creek | Approximately 11,000 feet upstream of Kanan Road | 29.5 | 7,995 | 11,074 | 13,267 | 15,480 | * | 20,846 |
| Triunfo Creek | Approximately 2,300 feet downstream of Westlake Dam | 29.0 | 7,874 | 10,900 | 13,052 | 15,226 | * | 20,505 |
| Triunfo Creek | At Westlake Lake Dam | 28.5 | 7,766 | 10,748 | 12,872 | 15,011 | * | 20,227 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Turnbull Canyon Ponding | At intersection of Painter Avenue and Camilla Street | 1.0 | 250 | * | 540 | 690 | * | 1,080 |
| Turnbull Canyon Shallow Flooding | Vicinity of Broadway and Alta Drive | 1.0 | 250 | * | 540 | 690 | * | 1,080 |
| Unnamed Canyon (Serra Retreat Area) | Serra Retreat Area (Cross Section C) | 0.4 | 281 | * | 619 | 791 | * | 1,237 |
| Unnamed Stream Main Reach | At Pacific Ocean | 1.2 | 353 | * | 724 | 917 | * | 1,400 |
| Unnamed Stream Main Reach | Downstream of Confluence with Tributary 2 | 1.1 | 338 | * | 692 | 876 | * | 1,282 |
| Unnamed Stream Main Reach | Upstream of Confluence with Tributary 2 | 0.7 | 229 | * | 462 | 580 | * | 865 |
| Unnamed Stream Main Reach | Upstream of Confluence with Tributary 1 | 0.4 | 146 | * | 290 | 361 | * | 523 |
| Unnamed Stream Tributary 1 | At Confluence with Main Reach | 0.2 | 97 | * | 191 | 236 | * | 381 |
| Unnamed Stream Tributary 2 | At Confluence with Main Reach | 0.4 | 164 | * | 331 | 413 | * | 600 |

# 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Unnamed Stream Tributary 2 | At Via Zurita | 0.4 | 144 | * | 290 | 361 | * | 525 |
| Van Nuys | Victory Boulevard, Vicinity of Hayvenhurst Avenue | 0.7 | 90 | * | 200 | 250 | * | 390 |
| Vasquez Canyon | Approximately 1,373 feet Upstream of Vasquez Canyon Road | 4.2 | * | * | * | 2,851 | * | 5,009 |
| Violin Canyon | Approximately 2,000 feet Downstream of Interstate Highway 5 | 10.5 | * | * | * | 9,421 | * | 17,818 |
| Weldon Canyon | Approximately 1,570 feet Downstream of Sierra Highway and San Fernando Road | 1.5 | 410 | * | 900 | 1,150 | * | 1,800 |
| West Hollywood Shallow Flooding | Third Street, Vicinity of Fairfax Avenue | 6.1 | 1,500 | * | 3,200 | 4,100 | * | 6,800 |
| West Hollywood Shallow Flooding | Fifth Street, Vicinity of Orlando Avenue | 5.7 | 1,600 | * | 3,600 | 4,500 | * | 7,100 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| West Hollywood Shallow Flooding | Third Street, Vicinity of La Cienga Boulevard | 5.1 | 1,600 | * | 3,500 | 4,500 | * | 7,200 |
| West Hollywood Shallow Flooding | Beverly Boulevard, Vicinity of Spaulding Avenue | 4.0 | 730 | * | 1,600 | 2,100 | * | 2,900 |
| West Hollywood Shallow Flooding | Genesse Avenue North of Hollywood Boulevard | 1.0 | 370 | * | 820 | 1,000 | * | 1,600 |
| West Hollywood Shallow Flooding | Vicinity of Pan Pacific Auditorium | 4.0 | 730 | * | 1,600 | 3,600 | * | 4,500 |
| West Hollywood Shallow Flooding | Vicinity of Rosemead Avenue and Huntley Drive | 1.1 | 670 | * | 1,479 | 1,888 | * | 3,329 |
| West Los Angeles Shallow Flooding | Between Westwood Boulevard and Overland Avenue, Vicinity of Exposition Boulevard | 4.0 | 190 | * | 1,200 | 1,500 | * | 2,700 |
| West Los Angeles Shallow Flooding | Manning Avenue, Vicinity of Tennessee Avenue | 3.4 | 530 | * | 1,300 | 1,700 | * | 2,600 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| West Los Angeles Shallow Flooding | Balsam Avenue, Vicinity of Olympic Boulevard | 1.2 | 290 | * | 550 | 660 | * | 940 |
| West Los Angeles Shallow Flooding | Roundtree Road, Vicinity of Manning Avenue | 0.7 | 500 | * | 740 | 840 | * | 1,100 |
| Westchester Shallow Flooding | Arizona Avenue North of Arizona Circle | 1.7 | 340 | * | 740 | 950 | * | 1,500 |
| Westchester Shallow Flooding | Sepulveda Boulevard South of San Diego Freeway | 1.4 | 310 | * | 690 | 880 | * | 1,400 |
| Westlake Shallow Flooding | Vicinity of Wilshire Boulevard West of Hoover Street | 1.4 | 360 | * | 790 | 1,000 | * | 1,600 |
| Whittier Area Shallow Flooding | Vicinity of Turnbull Canyon Road | 1.0 | 246 | * | 543 | 692 | * | 1,084 |
| Whittier Narrows Flood Control Basin | Whittier Narrows Flood Control Basin | 524 | * | * | * | 90,000 | * | * |
| Wildwood Canyon | Approximately 600 feet Upstream of Intersection of Valley Street and Maple Street | 0.2 | * | * | * | 172 | * | 279 |

## 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 Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Woodland Hills Shallow Flooding | Vicinity of Mulholland Drive and Ventura Freeway | 2.3 | 490 | * | 1,100 | 1,400 | * | 2,200 |
| Woodland Hills Shallow Flooding | Vicinity of Saltillo Street and Canoga Avenue | 0.3 | 100 | * | 250 | 300 | * | 500 |
| Zuma Canyon | Cross Section A | 8.9 | 2,024 | * | 4,469 | 5,705 | * | 8,925 |
| Zuma Canyon | Cross Section W | 8.4 | 2,079 | * | 4,590 | 5,858 | * | 9,167 |

[1] Data not available

[2] Pump capacity

* Not calculated for this Flood Risk Project

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**Figure 7: Frequency Discharge-Drainage Area Curves**



1% Annual Chance Discharges

Legend:
- Acton Canyon Creek
- Agua Dulce Canyon Creek
- Bouquet Canyon Creek
- Escondido Canyon Creek
- Haskell Canyon Creek
- Newhall Creek
- San Francisquito Canyon Creek
- Santa Clara River
- South Fork Santa Clara River

X-axis: Drainage Area (square miles)
Y-axis: 1% Annual Chance Discharges (cfs)
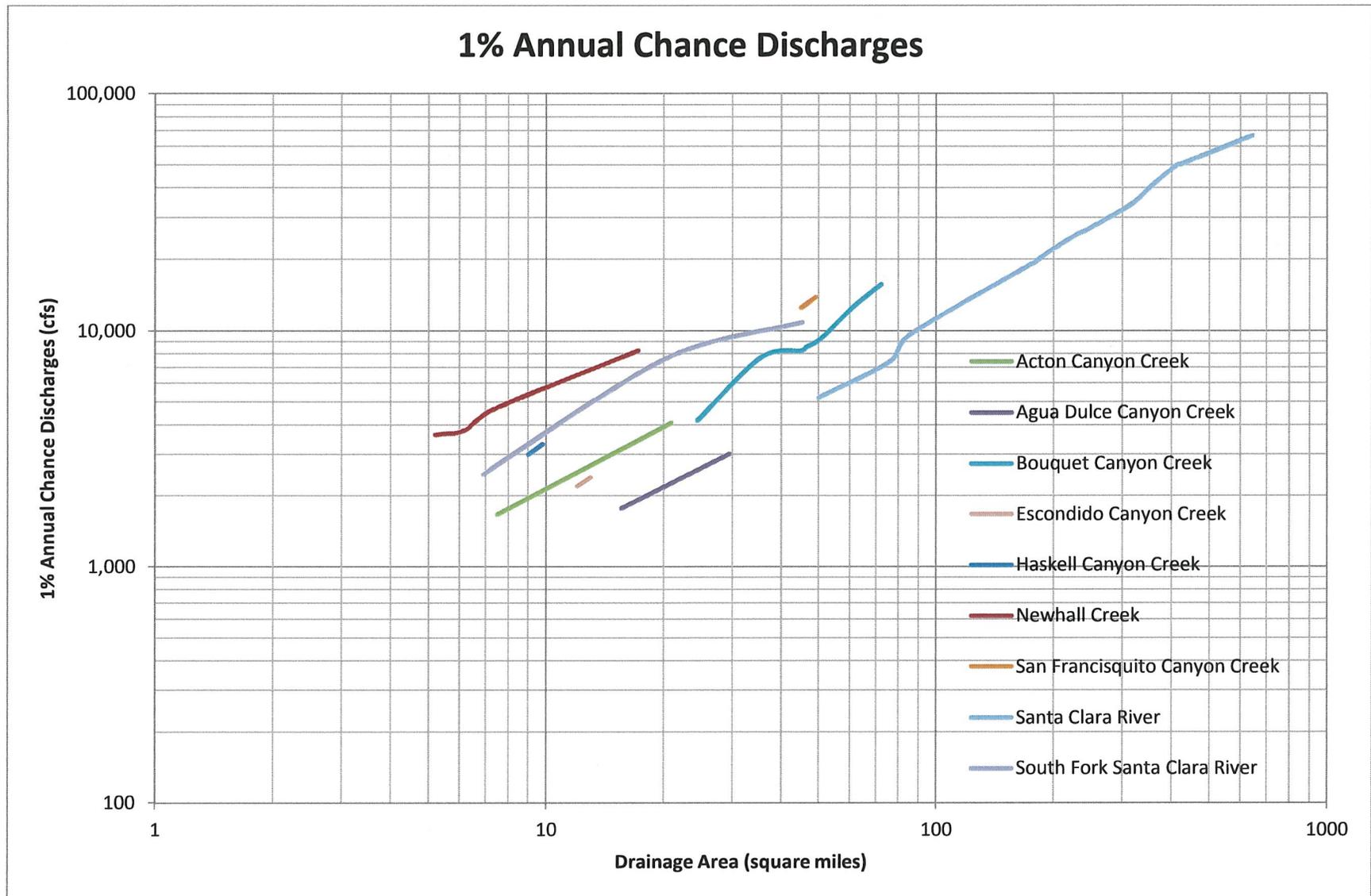
## Table 11: Summary of Non-Coastal Stillwater Elevations

| Flooding Source | Location | Elevations (feet NAVD88) | | | | |
|---|---|---|---|---|---|---|
| | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| La Canada Verde Creek | At Marquardt Avenue 1,400 feet North of Rosecrans Avenue | 83.8 | * | 85.8 | 86.8 | 88.8 |
| Malibu Lake | At confluence of Triunfo Creek and Medea Creek. | * | * | * | 737.0 | * |
| Ponding | 600 feet East of Bloomfield Avenue North of Lakeland Road | 139.8 | * | 142.8 | 143.8 | 143.8 |
| Ponding | 1,000 feet East of Bloomfield Avenue North of Lakeland Road | 116.8 | * | 148.3 | 148.8 | 149.8 |
| Rio Hondo Channel | Intersection of Mines Avenue and Taylor Avenue | 186.7 | * | 188.8 | 188.8 | 188.8 |
| San Gabriel River | At Whittier Narrows Flood Control Basin | 213.8 | * | 222.8 | 222.8 | 231.8 |
| Savage Creek | Intersection of York Avenue and Mar Vista Street | 382.8 | * | 382.8 | 382.8 | 382.8 |
| Shallow Flooding | Intersection of Ripley Avenue and Rindge Lane | * | * | 62.9 | 64.9 | 68.9 |

## Table 11: Summary of Non-Coastal Stillwater Elevations (continued)

| Flooding Source | Location | Elevations (feet NAVD88) | | | | |
|---|---|---|---|---|---|---|
| | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Shallow Flooding | At Gould Avenue between Ford and Goodman Avenues | 83.4 | * | 91.4 | 95.9 | 105.9 |
| Shallow Flooding | Intersection of Vincent Street and South Irena Avenue | 81.9 | * | 82.9 | 83.6 | 84.9 |
| Shallow Flooding | Intersection of Camino Real and South Juanita Avenue | 120.5 | * | 121.9 | 122.9 | 124.3 |
| Shallow Flooding | Intersection of Avenue H and Massena Avenue | 61.4 | * | 64.4 | 65.4 | 67.4 |
| Surface Runoff – Deep Ponding Area | Southwest of the Intersection of Carson Street and Madrona Avenue | 60.1 | * | 66.1 | 68.8 | 74.8 |
| Surface Runoff – Deep Ponding Area | Intersection of Doris Way and Reese Road | 61.6 | * | 64.8 | 65.8 | 67.7 |
| Surface Runoff – Ponding Area | Intersection of Anza Avenue and Spencer Street | 82.6 | * | 83.4 | 83.8 | 84.9 |
| Surface Runoff – Ponding Area | Northeast of Sepulveda Boulevard and Madrona Avenue | 77.3 | * | 78.4 | 78.8 | 79.5 |
| Surface Runoff – Ponding Area | Intersection of California Street and Alaska Avenue | 78.7 | * | 80.1 | 80.8 | 81.6 |

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## Table 11: Summary of Non-Coastal Stillwater Elevations (continued)

| Flooding Source | Location | Elevations (feet NAVD88) | | | | |
|---|---|---|---|---|---|---|
| | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
| Turnbull Canyon | Intersection of Painter Avenue and Camilla Street | 411.8 | * | 419.8 | 420.8 | 421.8 |
| Westlake Lake | City of Westlake Village | 875.5 | 976.2 | 876.6 | 877.1 | 878.1 |

* Not calculated for this Flood Risk Project

## Table 12: Stream Gage Information used to Determine Discharges

| Flooding Source | Gage Identifier | Agency that Maintains Gage | Site Name | Drainage Area (Square Miles) | Period of Record | |
|---|---|---|---|---|---|---|
| | | | | | From | To |
| Aliso Creek | F152B-R | Los Angeles County Flood Control District (LACFCD) | At Nordhoff Street | 189 | * | * |
| Ballona Creek | F38C-R | LACFCD | Ballona Creek above Sawtelle Boulevard | 88.6 | 02/27/1928 | 09/18/2014 |
| Big Rock Creek | 10263500 | USGS | Big Rock Creek near Valyermo, CA | 22.9 | 02/01/1923 | 09/18/2014 |
| Big Tujunga Creek | 11095500 | USGS | Big Tujunga Creek near Sunland, CA | 106 | 11/01/1916 | 09/30/1977 |
| Burbank Western Flood Control Channel | * | LACFCD | At Tujunga Avenue | 401 | 01/01/1950 | * |
| Compton Creek | F37B-R | LACFCD | Compton Creek near Greenleaf Boulevard | 22.6 | 01/22/1928 | 09/18/2014 |
| Coyote Creek | 3208 | LACFCD | Centralia Street | 110 | 34 years | — |
| Dominguez Channel | * | * | * | 33 | * | * |
| Little Rock Creek | L1-R | LACFCD | Little Rock Creek above Little Rock Dam | 49.2 | 10/01/1930 | 09/18/2014 |
| Los Angeles River | F300-R | LACFCD | At Tujunga Avenue | 401 | 05/08/1950 | 09/18/2014 |
| Los Angeles River | F57-R | LACFCD | Los Angeles River above Arroyo Seco | 511 | 12/05/1929 | 09/18/2014 |

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**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 |
| Los Angeles River Flood Control Channel | * | LACFCD | * | * | * | * |
| Malibu Creek | F130-R | LACFCD | Malibu Creek below Cold Creek | 105 | 01/17/1931 | 09/18/2014 |
| San Gabriel River | F262-R | LACFCD | San Gabriel River above Florence Avenue | 215.8 | 08/06/1968 | 09/18/2014 |
| Sawtelle-Westwood Storm Drain Channel | F301-R | LACFCD | At Culver Boulevard | 23 | 01/01/1951 | * |
| Topanga Creek | F548-R | LACFCD | * | * | * | * |
| Zuma Creek | F53-R | LACFCD | * | * | * | * |

* 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

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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 |
|---|---|---|---|---|---|---|---|
| Acton Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Acton Canyon Creek Tributary 1 | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Acton Canyon Creek Tributary 1-A | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Acton Canyon Creek Tributary 2 | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Agua Amarge Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Agua Dulce Canyon Creek | Confluence with Santa Clara River | 0.8 miles upstream of State Highway 14 | Regional Regression Equations | HEC-2 | — | A, AO | |
| Agua Dulce Canyon Creek | Approximately 900 feet upstream of Sierra Highway | 0.6 miles upstream of Hierba Road | Regional Regression Equations | HEC-2 | — | A | |
| Agua Dulce Canyon Creek Lateral | Confluence with Agua Dulce Canyon Creek | 0.2 miles upstream of confluence with Agua Dulce Canyon Creek | HEC-1 | HEC-RAS 3.1.3 | 08/01/2008 | AE w/ Floodway | |
| Alamitos Bay | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Aliso Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Aliso Creek Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A | |
| Amargosa Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | 11/01/1985 | A, AH, AO | |
| Amargosa Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | 11/01/1985 | AE | |
| Amargosa Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | 11/01/1985 | A, AO | |
| Amargosa Creek Tributary | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A | |
| Anaverde Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | 11/01/1985 | AE w/ Floodway | |
| Anaverde Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | 11/01/1985 | A | |
| Arrastre Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Arroyo Calabasas | — | — | Regional Regression Equations | HEC-2 | — | AE | |

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**Table 13: Summary of Hydrologic and Hydraulic Analyses, Continued**

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|---|---|---|---|---|---|---|
| Arroyo San Miguel | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | A | |
| Arroyo Sequit | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Avalon Bay | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Avalon Canyon Creek | At confluence with Pacific Ocean | 0.9 miles upstream of confluence with Pacific Ocean | Regional Regression Equations | HEC-2 | — | AE | |
| Back Channel | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Ballona Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | AE | |
| Ballona Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A, AO | |
| Ballona Creek Watershed | — | — | XPSWMM 15.0 | XPSWMM 15.0 | 07/01/2015 | AE, X | |
| Bar Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Bee Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Bee Canyon Creek (2) | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Bee Canyon Creek (3) | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Big Rock Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A | |
| Big Rock Creek South Fork | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Big Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Big Rock Wash (Profile Base Line) | City of Palmdale Corporate Limits | City of Palmdale Corporate Limits | Regional Regression Equations | HEC-2 | 11/01/1985 | AE | |
| Big Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Big Tujunga Wash | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A, AO | |
| Boulder Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Bouquet Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Bouquet Reservoir | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Broad Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Browns Creek | — | — | Regional Regression Equations | HEC-2 | — | AO | |
| California Aqueduct | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Canada De Los Alamos Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Carlos Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Carr Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Castaic Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Castaic Lagoon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Castaic Lake | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Channel No. 2 | — | — | Regional Regression Equations | HEC-2 | — | 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 |
|---|---|---|---|---|---|---|---|
| Channel No. 3 | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Charlie Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Chatsworth Reservoir | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Cherry Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Cheseboro Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Cold Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Cold Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Colorado Lagoon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Consolidated Channel | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Coyote Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Coyote Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A | |

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**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 |
|---|---|---|---|---|---|---|---|
| Cruthers Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Dark Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Dark Canyon West Branch | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Dewitt Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Dominguez Channel | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | AE | |
| Dorr Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Dowd Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Dry Canyon | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Dry Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| East Basin | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Elizabeth Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A, 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 |
|---|---|---|---|---|---|---|---|
| Elizabeth Lake | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Elizabeth Lake Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Eller Slough | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Elsmere Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Encino Reservoir | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Entrance Channel (Marina Del Ray) | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Escondido Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Escondido Canyon (2) | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Fenner Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Fish Harbor | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Flood Control Channel to Aliso Creek | — | — | Regional Regression Equations | 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 |
|---|---|---|---|---|---|---|---|
| Flowline No. 1 | — | — | Regional Regression Equations | HEC-2 | 10/01/1978 | AE | |
| Garapito Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Gavin Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Gorman Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AH, AO | |
| Gorman Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Graham Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Grandview Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Grandview Canyon Creek (2) | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Harbor Lake | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Haskell Canyon | — | — | Regional Regression Equations | HEC-2 | — | AO | |
| Hasley Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Holcomb Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Holmes Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Hughes Lake | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Iron Canyon | Confluence with Sand Canyon Creek | 0.5 miles upstream of North Iron Canyon Road | HEC-1 | HEC-RAS 4.1 | 02/01/2010 | AE, AO w/ Floodway | |
| Jesus Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Kagel Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE w/ Floodway | |
| Kagel Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Kentucky Springs Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| La Mirada Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Lake Lindero | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Lake Palmdale | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 Street Overflow | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Las Flores Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Las Flores Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Las Virgenes Creek | At confluence with Malibu Creek | Immediately downstream of Las Virgenes Road | HEC-HMS 3.5 | HEC-RAS 4.1 | 08/01/2010 | AE | |
| Leaming Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Lemontaine Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Liberty Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Limekiln Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Lindero Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Little Rock Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A | |
| Little Rock Reservoir | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Little Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Little Rock Wash - Profile A | City of Palmdale Corporate Limits | City of Palmdale Corporate Limits | Regional Regression Equations | HEC-2 | 11/01/1985 | A, AE | |
| Little Rock Wash - Profile B | City of Palmdale Corporate Limits | City of Palmdale Corporate Limits | Regional Regression Equations | HEC-2 | 11/01/1985 | AE | |
| Little Rock Wash - Profile C | — | — | Regional Regression Equations | HEC-2 | 11/01/1985 | AE | |
| Little Tujunga Wash | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Lobo Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Lockheed Drain Channel | — | — | Regional Regression Equations | HEC-2 | — | AE, AO | |
| Lockheed Storm Drain | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Lopez Canyon Channel | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Lopez Canyon Channel | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Los Angeles County Flood Control Channel | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## Table 13: Summary of Hydrologic and Hydraulic Analyses, Continued

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|---|---|---|---|---|---|---|
| Los Angeles County Flood Control Channel to Aliso Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Los Angeles County Storm Drain | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Los Angeles County Storm Drain (2) | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Los Angeles Harbor | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Los Angeles Reservoir | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Los Angeles River | — | — | Regional Regression Equations | HEC-2 | 05/01/1991 | A | |
| Los Angeles River Flood Control Channel | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Los Angeles River Flood Control Channel | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Los Cerritos Channel (1) | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Los Cerritos Channel (2) | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Lyon Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |

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**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 |
|---|---|---|---|---|---|---|---|
| Main Channel | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Malaga Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Malibu Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Malibu Creek | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | AE | |
| Malibu Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Malibu Lake | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Marina Del Ray | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Marine Stadium | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Medea Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Medea Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Middle Harbor | — | — | Regional Regression Equations | HEC-2 | — | 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 |
|---|---|---|---|---|---|---|---|
| Mill Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Milton B. Arthur Lakes | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Mint Canyon Creek | Confluence with Santa Clara River | Immediately downstream of Adon Avenue | HEC-1 | HEC-RAS 4.1 | 02/01/2010 | AE | |
| Mint Canyon Creek | Immediately downstream of Adon Avenue | 0.9 miles upstream of Rocking Horse Road | HEC-1 | HEC-RAS 4.1 | 02/01/2010 | AE w/ Floodway | |
| Mint Canyon Creek Overflow | Confluence with Santa Clara River | Immediately downstream of Adon Avenue | Regional Regression Equations | HEC-2 | — | AE, AO | |
| Mint Canyon Spring | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Montebello Municipal Golf Course Pond | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Muscal Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Myrick Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Oak Springs Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Oakgrove Canyon Creek | — | — | Regional Regression Equations | 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 |
|---|---|---|---|---|---|---|---|
| Old Topanga Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AE | |
| Oro Fino Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Oso Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Pacific Terrace Harbor | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Pacoima Channel | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Pacoima Wash | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Palmdale Ditch | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Palo Comando Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Palomas Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Pico Canyon | — | — | Regional Regression Equations | HEC-2 | 1984 | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Pine Canyon Creek (3) | — | — | Regional Regression Equations | HEC-2 | 11/01/1985 | A | |
| Piru Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Placerita Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Plum Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Portal Ridge Wash | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| Potrero Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Potrero Valley Creek (Westlake Lake) | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Puzzle Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Pyramid Lake | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Quail Lake | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Quigley Canyon Creek | — | — | Regional Regression Equations | HEC-2 | 1984 | A | |

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**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 |
|---|---|---|---|---|---|---|---|
| Railroad Canyon | — | — | Regional Regression Equations | HEC-2 | 1984 | A, AO | |
| Ramirez Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Reservoir near UCLA | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Rice Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Rio Hondo River | — | — | Regional Regression Equations | HEC-2 | 05/01/1991 | A | |
| Rio Hondo River Tributary | — | — | Regional Regression Equations | HEC-2 | 05/01/1991 | AE | |
| Roberts Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Rock Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Romero Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Rustic Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE w/ Floodway | |
| Rustic Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Salt Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| San Dimas Wash | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| San Francisquito Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| San Gabriel River | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | A | |
| San Martinez Chiquito Canyon | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| San Martinez Grande Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| San Pedro Bay | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Sand Canyon Creek | Confluence with Santa Clara River | 0.4 miles upstream of Coyote Canyon Creek | HEC-1 | HEC-RAS 4.1 | 02/01/2010 | AE, AO w/ Floodway | |
| Sand Canyon Creek (2) | — | — | Regional Regression Equations | HEC-2 | 1984 | A, AO | |
| Sand Canyon Creek Tributary 1 | — | — | Regional Regression Equations | HEC-2 | 1984 | A, AO | |
| Sand Canyon Creek Tributary 2 | — | — | Regional Regression Equations | HEC-2 | 1984 | A, AO | |

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## 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 Clara River | Approximately 1,200 feet downstream of Southern Pacific Railroad at Capra Road Tunnel | 1.0 miles downstream of Arrastre Canyon Road | Regional Regression Equations | HEC-2 | — | A | |
| Santa Clara River | Confluence of Aliso Canyon Creek | 1.3 miles upstream of confluence of Soledid Canyon Creek | Regional Regression Equations | HEC-2 | — | A | |
| Santa Maria Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Santa Maria Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Santa Susana Pass Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Santa Ynez Canyon Reservoir | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Savage Creek | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | AE | |
| Sierra Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Sloan Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Soledad Canyon | — | — | Regional Regression Equations | 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 |
|---|---|---|---|---|---|---|---|
| South Portal Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Spade Spring Canyon Creek | Confluence with Mint Canyon Creek | 2.8 miles upstream of confluence with Mint Canyon Creek | HEC-1 | HEC-RAS 4.1 | 02/01/2010 | AE w/ Floodway | |
| Stokes Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Stokes Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Sullivan Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Sunshine Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Tacobi Creek | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | A | |
| Tapia Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Texas Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| Tonner Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Topanga Canyon | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | — | AE | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Topanga Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Towsley Canyon Creek | — | — | Regional Regression Equations | HEC-2 | 1984 | A, AO | |
| Trancas Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Triunfo Creek | Approximately 200 feet downstream of Crags Drive | At Westlake Lake Dam | HEC-HMS 4.0 | HEC-RAS 4.0 | 09/25/2015 | AE | |
| Turnbull Canyon Creek | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | AE, AO | |
| Unnamed Canyon Creek (Serra Retreat Area) | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Unnamed Stream Main Reach | — | — | 1993 Regional Regression Equations | HEC-RAS 3.1.3 | 02/01/2010 | AE w/ Floodway | |
| Unnamed Stream Tributary 1 | — | — | 1993 Regional Regression Equations | HEC-RAS 3.1.3 | 02/01/2010 | AE w/ Floodway | |
| Unnamed Stream Tributary 2 | — | — | 1993 Regional Regression Equations | HEC-RAS 3.1.3 | 02/01/2010 | AE w/ Floodway | |
| Upper Los Angeles River Left Overbank | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Vasquez Canyon | — | — | Regional Regression Equations | HEC-2 | — | A, 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 |
|---|---|---|---|---|---|---|---|
| Villa Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Vine Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Violin Canyon Creek | Confluence with Castaic Creek | At I-5 (Golden State Freeway) | Regional Regression Equations | HEC-2 | — | AE, AO | |
| Violin Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Wayside Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Weldon Canyon | — | — | Regional Regression Equations | HEC-2 | — | AE w/ Floodway | |
| West Basin | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| West Channel | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| Westlake Lake | At the Westlake Lake Dam | At the County Boundary | HEC-HMS 4.0 | — | 2015 | AE | |
| Whitney Canyon Creek | — | — | Regional Regression Equations | HEC-2 | 1984 | A | |
| Wildwood Canyon Creek | — | — | Regional Regression Equations | HEC-2 | 1984 | A, AO | |

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## 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 |
|---|---|---|---|---|---|---|---|
| Wiley Canyon Creek | — | — | Regional Regression Equations | HEC-2 | 1984 | A | |
| Willow Springs Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Young Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Zuma Canyon | — | — | Regional Regression Equations | HEC-2 | — | A | |
| Zuma Canyon | — | — | Log-Pearson Type III Frequency Analysis | HEC-2 | | AE | |
| UNKNOWN 1 near W. 3rd Street | — | — | Regional Regression Equations | HEC-2 | 12/01/1980, 11/01/1985 | AO | |
| UNKNOWN 2 near W. 3rd Street | — | — | Regional Regression Equations | HEC-2 | 12/01/1980, 11/01/1985 | A | |
| UNKNOWN 3 near W. 3rd Street | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near 4th Street | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Aberdeen Avenue | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Alameda Street | — | — | Regional Regression Equations | 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 2 near Alameda Street | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Alaska Avenue | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | AH | |
| UNKNOWN 1 near Amsler Street | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | AH | |
| UNKNOWN 1 to Anaverde Creek | — | — | Regional Regression Equations | HEC-2 | 11/01/1985 | A | |
| UNKNOWN 1 near Anza Avenue | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | AH | |
| UNKNOWN 1 to Arroyo Calabasas | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to Arroyo Calabasas | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Baile Avenue | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 2 near Baile Avenue | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 1 near S. Beverley Glen Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 to Big Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A, 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1-A to Big Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| UNKNOWN 2 to Big Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| UNKNOWN 1 near Blinn Avenue | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to Broad Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to Broad Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 3 to Broad Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to California Aqueduct | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to California Aqueduct | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 3 to California Aqueduct | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 4 to California Aqueduct | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 5 to California Aqueduct | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1 near Camino Real Calle | — | — | Regional Regression Equations | HEC-2 | 06/01/1981 | AE | |
| UNKNOWN 1 near Chaparal Street | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Childs Court | — | — | Regional Regression Equations | HEC-2 | — | AO | |
| UNKNOWN 1 near Club View Drive | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Denker Avenue | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Edwards AF Base | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 near Edwards AF Base | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2-A near Edwards AF Base | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Eubank Avenue | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Glade Avenue | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 2 near Glade Avenue | — | — | Regional Regression Equations | HEC-2 | — | AH | |

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## 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1 to Glenoaks Boulevard | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to Glenoaks Boulevard | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 3 to Glenoaks Boulevard | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Gould Avenue | — | — | Regional Regression Equations | HEC-2 | 06/01/1981 | AE | |
| UNKNOWN 1 near Grenola Street | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near N. Hoover Street | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near S. La Cienega Boulevard | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Lake Palmdale | — | — | Regional Regression Equations | HEC-2 | 11/01/1985 | A | |
| UNKNOWN 1 near Laurel Canyon Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AO | |
| UNKNOWN 1 to Little Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |

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## 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 2 to Little Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 3 to Little Rock Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Long Beach Freeway | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Louise Avenue | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Lucerne Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near S. Main Street | — | — | Regional Regression Equations | HEC-2 | — | AO | |
| UNKNOWN 1 near Magnolia Avenue | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 to Malaga Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to Malaga Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2-A to Malaga Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Marathon Street | — | — | Regional Regression Equations | HEC-2 | — | AH | |

# 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1 near Melrose Avenue | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Mines Avenue | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 1 to Myrick Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Overland Avenue | — | — | Regional Regression Equations | HEC-2 | — | AO | |
| UNKNOWN 2 near Overland Avenue | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near W. Olympic Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 to Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-A to Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-A-1 to Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-A-2 to Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-B to Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |

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## 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1-B-1 to Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-C to Pallett Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to Paso Robles Avenue | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 1 near Pershing Drive | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to Portal Ridge Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-A to Portal Ridge Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-B to Portal Ridge Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-C to Portal Ridge Wash | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Rexbon Road | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 1 near Ripley Avenue | — | — | Regional Regression Equations | HEC-2 | 06/01/1981 | AE | |
| UNKNOWN 1 near Roscoe Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AH | |

## 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1 near San Diego Freeway | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 to San Fernando Road | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to San Fernando Road | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to San Gabriel River | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to Santa Susana Creek | — | — | Regional Regression Equations | HEC-2 | — | A, AO | |
| UNKNOWN 1-A to Santa Susana Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to Santa Susana Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Sesnon Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 1 near Sheldon Street | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near W. Slausson Avenue | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 2 near W. Slausson Avenue | — | — | Regional Regression Equations | HEC-2 | — | AH | |

**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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1 near State Highway 110 | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near W. Sunset Boulevard | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Sunset Canyon Drive | — | — | Regional Regression Equations | HEC-2 | — | AO | |
| UNKNOWN 1 near Susanna Place | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near W. Temple Street | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Toledo Street | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | AE | |
| UNKNOWN 2 near Toledo Street | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | AH | |
| UNKNOWN 1 near UCLA | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Vail Avenue | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near S. Van Ness Avenue | — | — | Regional Regression Equations | HEC-2 | — | A, AH, AO | |
| UNKNOWN 1 near Via Valmonte | — | — | Regional Regression Equations | HEC-2 | 08/01/1978 | A | |

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**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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 1 near Victory Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 1 near Vincent Street | — | — | Regional Regression Equations | HEC-2 | 06/01/1981 | AE | |
| UNKNOWN 2 near Vincent Street | — | — | Regional Regression Equations | HEC-2 | 06/01/1981 | AE | |
| UNKNOWN 1 to Vine Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to Vine Creek | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Walker Avenue | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to Weldon Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN 1-A to Weldon Canyon Creek | — | — | Regional Regression Equations | HEC-2 | — | AE | |
| UNKNOWN WEST of Edwards AF Base | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN WEST of Edwards AF Base | — | — | Regional Regression Equations | 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN WEST of Edwards AF Base | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1-A to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2 to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 2-A to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 3 to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 3-A to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 4 to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 5 to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 6 to UNKNOWN WEST | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Wilshire Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AH, AO | |

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## 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 |
|---|---|---|---|---|---|---|---|
| UNKNOWN 2 near Wilshire Boulevard | — | — | Regional Regression Equations | HEC-2 | — | AH | |
| UNKNOWN 3 near Wilshire Boulevard | — | — | Regional Regression Equations | HEC-2 | — | A | |
| UNKNOWN 1 near Woodman Place | — | — | Regional Regression Equations | HEC-2 | — | A | |

## Table 14: Roughness Coefficients

| Flooding Source | Channel "n" | Overbank "n" |
|---|---|---|
| Acton Canyon | 0.030-0.039 | 0.032-0.075 |
| Agua Dulce Canyon | 0.042-0.045 | 0.045-0.100 |
| Amargosa Creek | 0.040 | 0.040 |
| Anaverde Creek | 0.040 | 0.040 |
| Avalon Canyon | 0.030-0.050 | 0.030-0.050 |
| Ballona Creek | NA[1] | 0.012-0.110 |
| Big Rock Wash | 0.050 | 0.050 |
| Bouquet Canyon | 0.020-0.048 | 0.045-0.080 |
| Cheseboro Creek | 0.030 | 0.050 |
| Cold Creek | 0.030 | 0.050 |
| Dark Canyon | 0.030 | 0.050 |
| Dry Canyon | 0.030 | 0.050-0.060 |
| Escondido Canyon | 0.039 | 0.040-0.100 |
| Flow along Empire Avenue | 0.014-0.050 | 0.014-0.050 |
| Flowline No. 1 | 0.030 | 0.030 |
| Garapito Creek | 0.030 | 0.050 |
| Hacienda Creek | 0.030 | 0.060 |
| Haskell Canyon | 0.020-0.042 | 0.031-0.050 |
| Iron Canyon | 0.040 | 0.050-0.130 |
| Kegal Canyon | 0.035-0.065 | 0.035-0.065 |
| La Mirada Creek | 0.025-0.030 | 0.025-0.030 |
| Lake Street Overflow | 0.014-0.050 | 0.014-0.050 |
| Las Flores Canyon | 0.030 | 0.050 |
| Las Virgenes Creek | 0.012-0.040 | 0.050-0.130 |
| Liberty Canyon | 0.030 | 0.050 |
| Lindero Canyon above Confluence with Medea Creek | 0.030 | 0.050 |
| Lindero Canyon above Spillway above Lake Lindero | 0.030 | 0.050 |

[1] This stream was studied using detailed 2-dimensional methods. Channel "n" values are not applicable in this case.

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## Table 14: Roughness Coefficients, Continued

| Flooding Source | Channel "n" | Overbank "n" |
|---|---|---|
| Little Rock Wash-Profile A | 0.030 | 0.050 |
| Little Rock Wash-Profile B | 0.030 | 0.050 |
| Little Rock Wash-Profile C | 0.030 | 0.050 |
| Lobo Canyon | 0.030 | 0.050 |
| Lockheed Drain Channel | 0.014-0.050 | 0.014-0.050 |
| Lopez Canyon Channel | 0.030 | 0.060 |
| Los Angeles River Left Overbank Path 2 | 0.016 | 0.050-0.150 |
| Los Angeles River Right Overbank Path 1 | 0.016 | 0.050-0.150 |
| Los Angeles River Right Overbank Path 2 | 0.016 | 0.050-0.150 |
| Malibu Creek | 0.030 | 0.050 |
| Medea Creek | 0.030 | 0.050 |
| Medea Creek (above Ventura Freeway) | 0.030 | 0.050 |
| Mill Creek | 0.030 | 0.060 |
| Mint Canyon | 0.015-0.050 | 0.050-0.130 |
| Mint Canyon Overflow | 0.015-0.100 | 0.080-0.100 |
| Newhall Creek | 0.015-0.052 | 0.045-0.100 |
| Newhall Creek Left Overbank 2 | 0.032-0.040 | 0.100-0.120 |
| Newhall Creek Left Overbank 3 | 0.032 | 0.100 |
| Newhall Creek Right Overbank 1 | 0.032 | 0.100-0.120 |
| North Overflow | 0.014-0.050 | 0.014-0.050 |
| Old Topanga Canyon | 0.030 | 0.050 |
| Overflow Area of Lockheed Drain Channel | 0.030-0.040 | 0.030-0.040 |
| Overflow Area of Lockheed Storm Drain | 0.014-0.050 | 0.014-0.050 |
| Palo Comando Creek | 0.030 | 0.050 |
| Railroad Canyon | 0.035-0.045 | 0.100 |
| Railroad Canyon Left Overbank | 0.028-0.032 | 0.100 |
| Ramirez Canyon | 0.030 | 0.050 |

## Table 14: Roughness Coefficients, Continued

| Flooding Source | Channel "n" | Overbank "n" |
|---|---|---|
| Rio Honda Left Overbank Path 3 | 0.050-0.150 | 0.050-0.150 |
| Rio Honda Left Overbank Path 5 | 0.050-0.150 | 0.050-0.150 |
| Rio Honda Left Overbank Path 6 | 0.050-0.150 | 0.050-0.150 |
| Rustic Canyon | 0.035-0.065 | 0.030-0.065 |
| San Francisquito Canyon | 0.038 | 0.042 |
| Sand Canyon | 0.020-0.130 | 0.050-0.130 |
| Santa Clara River | 0.032-0.040 | 0.010-0.100 |
| Santa Clara River Overflow | 0.032 | 0.036 |
| Santa Maria Canyon | 0.030 | 0.050 |
| South Fork Santa Clara River | 0.020-0.050 | 0.05-0.100 |
| South Fork Santa Clara River Tributary | 0.020-0.050 | 0.05-0.100 |
| Spade Spring Canyon | 0.070 | 0.075 |
| Stokes Canyon | 0.030 | 0.050 |
| Topanga Canyon | 0.030 | 0.050 |
| Trancas Creek | 0.030 | 0.050 |
| Triunfo Creek | 0.012-0.045 | 0.012-0.06 |
| Unnamed Canyon (Serra Retreat Area) | 0.030 | 0.050 |
| Unnamed Stream Main Reach | 0.015-0.040 | 0.015-0.120 |
| Unnamed Stream Tributary 1 | 0.015-0.045 | 0.015-0.110 |
| Unnamed Stream Tributary 2 | 0.015-0.045 | 0.015-0.110 |
| Upper Los Angeles River Left Overbank | 0.050-0.150 | 0.050-0.150 |
| Weldon Canyon | 0.035-0.065 | 0.035-0.065 |
| Zuma Canyon | 0.030 | 0.050 |

## 5.3 Coastal Analyses

For the areas of Los Angeles County that are impacted by coastal flooding processes, coastal flood hazard analyses were performed to provide estimates of coastal BFEs. Coastal BFEs reflect the increase in water levels during a flood event due to extreme tides and storm surge as well as overland wave effects.

The following subsections provide summaries of how each coastal process was considered for this FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation. Table 15 summarizes the methods and/or models used for the coastal analyses and is followed by more detailed narratives describing the coastal analyses. Refer to Section 2.5 for descriptions of the terms used in this section.

### Table 15: Summary of Coastal Analyses

| Flooding Source | Study Limits From | Study Limits To | Hazard Evaluated | Model or Method Used | Date Analysis was Completed |
|---|---|---|---|---|---|
| Alamitos Bay, San Pedro Bay | Shoreline within Long Beach, City of | Shoreline within Long Beach, City of | Astronomical tide, Wave Runup, Tsunami | Various | June 1981 (FEMA, 1983) |
| Pacific Ocean | Shoreline within Avalon, City of | Shoreline within Avalon, City of | Wave Runup, Wave Setup | * | June 1981 (Tetra Tech, 1979/1982) |
| Pacific Ocean | Shoreline within Los Angeles, City of, and Los Angeles County Unincorporated Areas | Shoreline within Los Angeles, City of, and Los Angeles County Unincorporated Areas | Wave Runup, Wave Setup | Regression Relations | 1984 (FEMA, 1984) |
| Pacific Ocean | Shoreline within Redondo Beach, City of | Shoreline within Redondo Beach, City of | Astronomical tide, Wave Runup, Tsunami | Various | (Tetra Tech, 1979/1982) |
| Pacific Ocean | Shoreline within Torrance, City of | Shoreline within Torrance, City of | Storm Surge, Wave Runup | Approximate analysis based on tidal data | * (FIA, 1979) |

### 5.3.1 Total Stillwater Elevations

Stillwater elevations for the 1% annual chance flood were determined for specific coastal locations. The stillwater elevations used for these locations is shown below.

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Stillwater Elevations, Pacific Ocean

| Location | 10% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance |
|---|---|---|---|---|
| San Pedro Bay | 7.4 | 7.9 | 10.0 | 15.7 |
| San Pedro Bay | 7.0 | 7.6 | 8.8 | 12.3 |
| San Pedro Bay | 8.9 | * | 8.9 | * |
| Alamitos Bay | 7.0 | 7.6 | 8.8 | 12.3 |
| Swimming Lagoon | 7.4 | 7.9 | 10.0 | 15.7 |
| At King Harbor | 6.9 | 6.9 | 6.9 | 8.3 |
| At Pleasure Pier | 8.9 | * | 8.9 | * |
| At Pleasure Pier | 10.3 | 11.2 | 11.6 | 12.3 |

*Data Not Available

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

**[Not Applicable to this Flood Risk Project]**

An approximate coastal high-hazard analysis was conducted in the City of Torrance. Flooding due to storm surge and wave runup was approximated by adding 3 feet to the highest tide observed in the Los Angeles area. The highest tide observed was taken from observations at Los Angeles Harbor by the U.S. Coast and Geodetic Survey, during the period from 1941 through 1959. The highest tide observed during that period was 4.9 feet. The city's coastline has been designated as beach land by the County of Los Angeles, which will preclude any substantial development of the beach below an elevation of 7.9 feet. Because there are no existing structures and no likelihood of structures being built in the future below an elevation of 7.9 feet along the Torrance coastline, only an approximate coastal high-hazard area has been shown.

**Table 16: Tide Gage Analysis Specifics**

**[Not applicable to this Flood Risk Project]]**

Note: Please see the discussion of coastal analyses in Sections 5.3.1 and 5.3.2 for details on astronomical tide used in the coastal analyses.

## 5.3.2 Waves

Coastal elevations were modeled using the methods and models listed in Table 15. Table 26 provides the wave runup and wave setup elevations for each location evaluated for coastal wave hazards.

The following areas of Los Angeles County are impacted by coastal flooding processes, and were analyzed following the same methodology applied in the original study of the City of Long Beach: the Cities of Hermosa Beach, Long Beach, Los Angeles, Malibu, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Santa Monica, and the Unincorporated Areas of Los Angeles County. The principal coastal flood source for these communities is the Pacific Ocean, including areas with landward intrusions of stillwater

elevation into San Pedro Bay, Alamitos Bay, and Marina Del Rey. Coastal flooding is attributed to the following mechanisms:

- Swell runup from intense offshore winter storms in the Pacific
- Tsunamis from the Aleutian-Alaskan and Peru-Chile Trenches
- Runup from wind waves generated by landfalling storms
- Swell runup from waves generated off Baja California by tropical cyclones
- Effects of landfalling tropical cyclones

The influence of the astronomical tides on coastal flooding is also incorporated in each of the previously mentioned mechanisms. A flood producing event from any of these mechanisms is considered to occur with a random phase of the astronomical tide. Each of these mechanisms is considered to act alone, so that the joint occurrence of any combination of the above mechanisms in a flooding event is considered to be irrelevant to the determination of flood elevations with return periods of less than 0.2-percent annual chance.

For each mechanism, the frequency of occurrence of causative events, as well as the probability distribution of flood elevations at a given location due to the ensemble of events, were determined using methods discussed in "Methodology for Coastal Flooding in Southern California." A brief outline follows.

*Winter Swell*

The statistics of flooding due to winter swell runup were determined using input data provided by the Navy Fleet Numerical Weather Center (FNWC). These input data consist of daily values of swell heights, periods, and directions at three deep water locations beyond the continental shelf bordering the study area. The data are inclusive from 1951 to 1974, and were computed by FNWC using input from ship observations, meteorological stations, and synoptic surface meteorological charts of the Pacific Ocean. For the original study, the incoming swells provided by FNWC were classified into 12 direction sectors of 10 degrees band width each. (Exposure of the study area to winter swells was confined to a 120 degree band, from directions 220° to 340°T). Within each sector, 10 days of swell height and period values were selected from the 24 years of FNWC data to represent extreme flood producing days. The selection criteria were guided by Hunts formula for runup. The 120 days at each of the three deepwater stations were merged to obtain a master list of 161 extreme runup producing days. For each of 161 days, the input swell provided by FNWC was refracted across the continental shelf and converted to runup at selected locations in the study area. Of the 161 days, a number of groups of consecutive days could be identified.

Each such group of days is considered to represent one event only; the largest runup from each group of days was selected as the maximum runup for that event. As a result of refraction and island sheltering effects, a number of the input swells produced no significant runup at certain locations. Therefore, the number of extreme runup events is less than 161. The average number of events in the study area is approximately 40. For each location in the study area, the runup for the extreme events were fitted to a Weibull distribution to obtain a probability distribution of runup from winter swell. The Weibull distribution was found to be best suited for representing runup statistics. Because extreme winter swell runup lasts for at least one day, the maximum runup must

be considered to coexist with the maximum high tide.

Regarding the extreme runup values as a statistical sample only, the influence of the astronomical tides was included by convolving the probability distribution of runup with the probability distribution of daily high tides. The latter was obtained from standard tide prediction procedures using the harmonic constants at the nearest available tide gage for which such data exists as supplied by the Tidal Prediction Branch of the National Oceanic and Atmospheric Administration. At each location, the frequency of occurrence of extreme events is determined by the number of runup values used in the Weibull curve fit. The number of years over which these occur is 24. The product of the frequency occurrence with the complement of cumulative probability distribution of the runup-plus-tide (convolved) distribution gives the exceedence frequency curve for flood elevations due to winter swell runup.

*Tsunamis*

Elevation-frequency curves for tsunami flooding were obtained from information supplied by the USACE's Waterways Experiment Station (WES). The use of the results of the WES study were directed by FEMA.

In the WES study, the statistics of tsunami elevations along the coastline were derived by synthesizing data on tsunami source intensities, source dimensions, and frequencies of occurrence along the Aleutian- Alaskan and Peru-Chile Trenches. As a result, 75 different tsunamis, each with a known frequency of occurrence, were generated and propagated across the Pacific Ocean using a numerical hydrodynamic model of tsunamis. At a number of locations in the study area, these 75 tsunami time signatures were each added to the tidal time signature at the nearest tide gage location for which harmonic constants for tide computations are available. One year of tidal signature was generated from the harmonic constants. A given tsunami signature was then combined with the tide signature and the maximum of tsunami plus tide for the combination recorded. To simulate the occurrence of the tsunami at random phases of the tide, the tsunami signature was repeatedly combined to the tide signature starting at random phases over the entire year of the tide signature. Each combination produces a maximum tsunami-plus tide elevation with a frequency of occurrence equal to the frequency of occurrence of the particular tsunami signature used, divided by the total number of such combinations for that particular tsunami. The process was repeated for all 75 tsunamis and the elevation frequency curve for tsunami flooding was thus established.

*Wind Waves From Landfalling Storms*

The source of data for wind waves is the same as that for winter swell, the FNWC (1951 through 1974) data. The stations for which daily height, period, and direction data are available are also the same as for winter swells. The FNWC wind-wave data are directly correlated to local wind speeds. For obtaining runup statistics, the FNWC daily wave data were converted to daily runup data using the method outlined in this section. The daily runup data were then fitted to a Weibull distribution and convolved with the tide in the same manner as for winter swells.

*Tropical Cyclone Swell*

Runup from swell generated by tropical cyclones off Baja California was computed

using the techniques discussed in this section. To establish the statistics of hurricane swell runup, the following procedure was used. Data concerning tropical cyclone tracks were obtained from the National Climatic Center (NCC). The data comprise 12-hourly positions of eastern North Pacific tropical cyclones from 1949 to 1974. This was supplemented by data on tropical cyclone tracks from the period 1975 to 1978, as reported in the Monthly Weather Review.

Besides position data, storm intensities at each 12-hourly position are also given. The intensity classifications are based on estimated maximum wind speeds. The intensity categories are tropical depression (less than 35 knot winds), tropical storm (less than 65 knot winds), and hurricane (at least 65 knot winds). Storms with tropical depression status were considered to generate negligible swell and omitted from this study. Data on actual maximum wind speeds were available from the NCC only from 1973 to 1977. These were used as the basis for obtaining values to represent maximum wind speeds from each of the two intensity classifications associated with the track data. Data on storm radii were derived from North American Surface Weather Charts by analysis of pressure fields of tropical cyclones off Baja California. These were used to define typical radius of maximum winds for each of two relevant intensity classes. For each tropical cyclone between 1949 and 1918, the hurricane wind waves were computed using the mean radius and maximum wind speeds established for each intensity class along with the track data. The swell and resultant runup were computed using the techniques described at the end of this section. For each tropical cyclone and each location of interest in the study area, a time history of swell runup was determined. These were added to time histories of the local astronomical tide in a procedure analogous to that used in determining tsunami plus tide effects. The exceedence frequencies of tropical cyclone swell runup were computed in a manner similar to that used for tsunamis.

*Landfalling Tropical Cyclones*

The frequency of landfalling tropical cyclones in southern California is extremely low. During those years covered by the NCC tape of eastern North Pacific tropical cyclones (1949 to 1974), no tropical cyclone hit southern California. A longer period of record was used to estimate the frequency of an event such as the Long Beach 1939 storm. A study by Pyke was used to compile a list of landfalling tropical cyclones along the coast of southern California. The study was a result of extensive investigation of historical records such as precipitation and other weather and meteorological data. The study spanned the period from 1889 to 1977 and showed only 5 or 6 identifiable landfalling tropical cyclones, of which the 1939 Long Beach event was the strongest, and only one in the tropical storm category. The others were all weak tropical depressions (with maximum winds of less than 35 knots). The low frequency event, once in 105 years over approximately 360 miles of coastline, coupled with an impact diameter of approximately 60 miles, implies that for any given location, the return period of a landfalling tropical cyclone is about 600 years. Therefore, landfalling tropical cyclones were not considered in the original study.

At each location within the study area, the exceedence frequencies at a given elevation due to the various flood producing mechanisms were summed to give the total exceedence frequency at the flood elevation.

For the incorporated coastal communities and the unincorporated coastal areas of Los Angeles County, coastal flood hazard areas subject to inundation by the Pacific Ocean were determined on the basis of water-surface elevations established from regression relations defined by Thomas (FEMA, 1984). These regression relations were defined as a practical method for establishing inundation elevations at any site along the southern California mainland coast. They were defined through analysis of water-surface elevations established for 125 locations in a complex and comprehensive model study by Tetra Tech, Inc. The regression relations establish wave run-up and wave set-up elevations having 10-, 1-, and 0.2-percent chances of occurring in any year and are sometimes referred to as the 10-, 100-, and 500- year flood events, respectively.

Wave runup elevations were used to determine flood hazard areas for sites along the open coast that are subject to direct assault by deep-water waves. Runup elevations range with location and local beach slope. Areas with ground elevations 3.0 feet or more below the 1-perecent annual chance wave runup elevation are subject to velocity hazard.

Wave setup elevations, determined on the basis of location along the coast, were used to identify flood hazard areas along bays, coves, and areas sheltered from direct action of deep-water waves.

For the City of Avalon, coastal flood hazards were analyzed using a complex hydrodynamic model which considered the effects of storm generated waves/swells and their transformation due to shoaling, refraction and frictional dissipation. Limited fetch distances preclude the City of Avalon from being directly exposed to severe storm-induced surge flooding. Locally generated storm waves combined with astronomical tide is the major cause of flooding along coastal areas in the vicinity of Avalon. Analysis of wave effects included a statistical analysis of historical local wind data to obtain the 10-, 2-, 1-, and 0.2- percent annual chance floods maximum wind magnitudes. Wave characteristics were then computed for the various wind recurrence intervals. Using the methodology cited in Table 15, wave runup and setup elevations were calculated based on the wave characteristics. The wave runup and setup elevations were then statistically combined with the astronomical tide to yield the final coastal flooding conditions.

Wave runup elevations were used to determine flood hazard areas for sites along the open coast that are subject to direct assault by deep-water waves. Runup elevations range with location and local beach slope and were computed at 0.5- mile intervals, or more frequently in areas where the beach profile changes significantly over short distances. Areas with ground elevations 3.0 feet or more below the 1- percent annual chance wave run-up elevation are subject to velocity hazard.

Wave setup elevations determined from the regression equations on the basis of location along the coast were used to identify flood hazard areas along bays, coves, and areas sheltered from direct action of deep-water waves. For the City of Avalon, no wave setup elevations are shown.

### 5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

### 5.3.4 Wave Hazard Analyses

#### Refraction

Refraction computations were conducted to trace the evolution of winter swell and tropical cyclone swell from their source to the 60-foot depth contour. A large grid (200 by 250 miles)

covering the coastal water of southern California with 1,000 by 1,000-foot grid spacing was used for the refraction calculations. Standard raytracing procedures were used to trace rays inward from the deep ocean grid boundaries. Ray spacing was chosen at 1,000 feet to provide adequate density of ray coverage. Wave heights at the 60-foot contour were computed using the principle of wave energy flux conservation between neighboring rays. One set of refraction computations was performed for each selected event from the list of extreme winter swells and the list of tropical cyclones off Baja California. The winter swell input values were obtained for the FNWC tape for the selected days of extreme events. The values at the three FNWC stations were the basis for linear interpolation to obtain input values in between them. For swell generated by tropical cyclones, the tropical cyclone swell procedure was used to provide input to the refraction program.

## Wave Runup

Shoreward of the 60-foot contour, wave runup was determined for each beach profile of interest by adapting to composite beaches the standard empirical runup formulas valid for uniformly sloping beaches. The results of the refraction calculations were used as input. The beach profiles selected were assumed to be locally one-dimensional in order to apply the empirical runup formulas. However, the influence of incident wave directions, refraction, and shoaling effects were also taken into consideration.

Wave heights within the surf zone were also computed using empirical formulas to establish the zone where waves exceed 3 feet.

Computed elevations for wave runup and wave setup are shown in Table 26.

## Tsunamis

Tsunamis were computed using numerical models of the long wave equations describing tsunami behavior. The results were taken from the USACE Study which details the method used to compute tsunami behavior.

## Tropical Cyclone Swells

Waves generated by a tropical cyclone were determined using the JONSWAP spectrum with empirically derived shape and intensity parameters, which were correlated to radial position and wind speed. A cosine function centered about the local wind direction was used for the directional distribution function of the spectrum. The size of the tropical cyclone was defined by the radius at which the wind speed drops below 35 knots. Details of the node are discussed in "Methodology for Coastal Flooding in Southern California".

### Table 17: Coastal Transect Parameters

**[Not applicable to this Flood Risk Project]]**

### Figure 9: Transect Location Map

**[Not Applicable to this Flood Risk Project]**

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## 5.4 Alluvial Fan Analyses

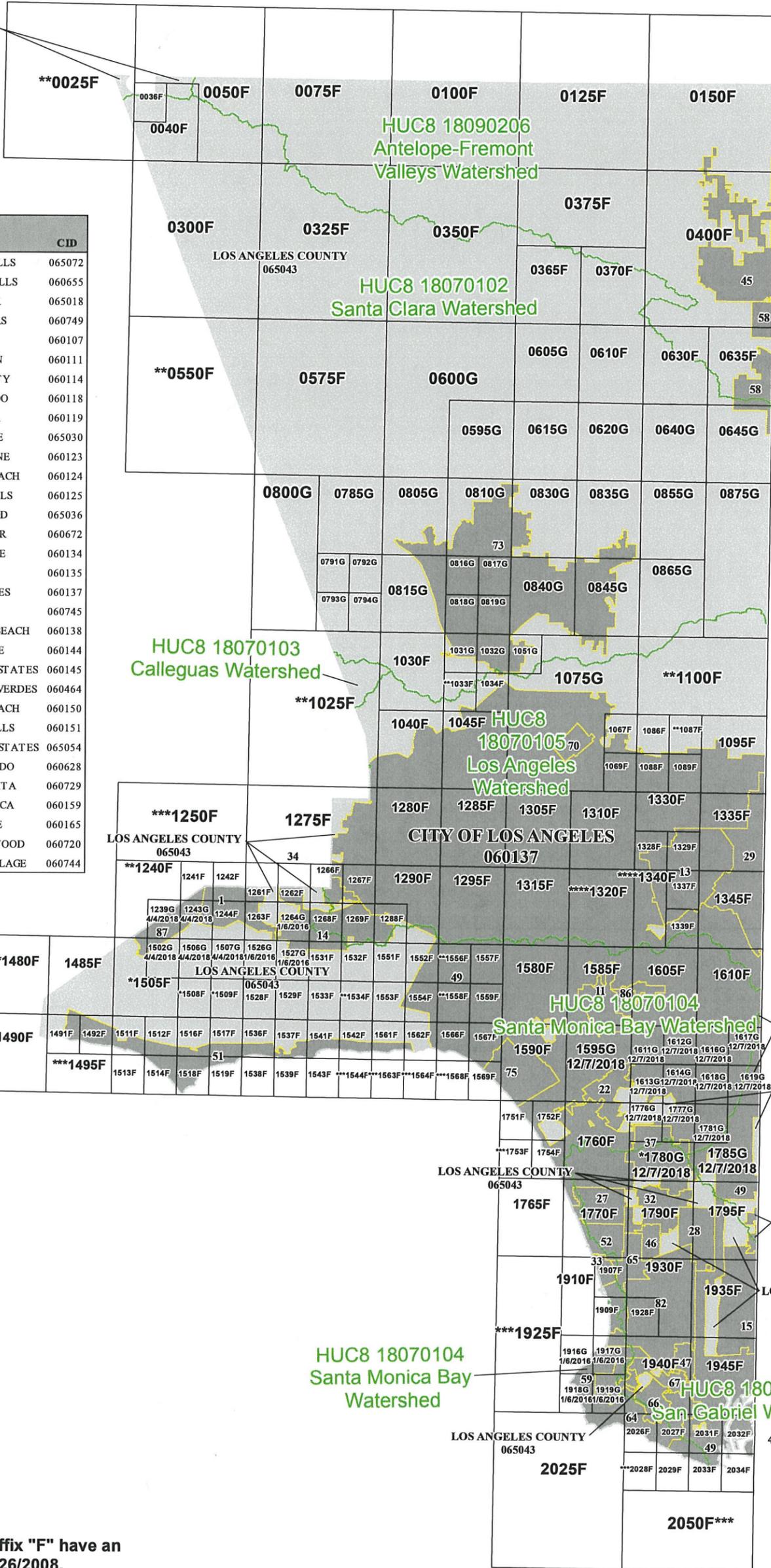This section is not applicable to this Flood Risk Project.

### Table 18: Summary of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

### Table 19: Results of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

HUC8 18030003
Middle Kern-Upper
Tehachapi-Grapevine

HUC8 18090206
Antelope-Fremont
Valleys Watershed

HUC8 18070102
Santa Clara Watershed

LOS ANGELES COUNTY
065043

**0025F   0036F   0050F   0075F   0100F   0125F   0150F
0040F

0300F   0325F   0350F   0375F   0400F   45
0365F   0370F   58

**0550F   0575F   0600G   0605G   0610F   0630F   0635F
58
0595G   0615G   0620G   0640G   0645G

0800G   0785G   0805G   0810G   0830G   0835G   0855G   0875G
73
0791G 0792G   0816G 0817G   0840G   0845G   0865G
0793G 0794G   0815G   0818G 0819G

HUC8 18070103
Calleguas Watershed

1030F   1031F 1032G 1051F   1075G   **1100F
**1025F   1033F 1034F

1040F   1045F   HUC8 18070105   1067F 1086F **1087F   1095F
1280F   1285F   18070105   1069F 1088F 1089F
1040F 1045F   70
Los Angeles
Watershed

***1250F   1275F   1280F 1285F 1305F 1310F   1330F   1335F
LOS ANGELES COUNTY   34   CITY OF LOS ANGELES   1328F 1329F   29
065043   060137
**1240F 1241F 1242F   1266F   1267F   1290F   1295F   1315F   ****1320F   ****1340F 13   1345F
1239G 1243G 1   1261F 1262F   1264G 1268F 1269F 1288F   1337F
87 4/4/2018 4/4/2018 1244F   1263F 1/6/2016   14   1339F
1502G 1506G 1507G 1526G   1527G 1531F 1532F 1551F 1552F ***1556F 1557F   1580F 1585F   1605F   1610F
*1480F 1485F   4/4/2018 4/4/2018 4/4/2018 1/6/2016   1/6/2016   11 86
*1505F   LOS ANGELES COUNTY   *1508F *1509F 1528F 1529F 1533F ***1534F 1553F 1554F ***1558F 1559F   49
065043

HUC8 18070104
Santa Monica Bay Watershed

HUC8 18070105
Los Angeles
Watershed

LOS ANGELES COUNTY
065043

1490F   1491F 1492F 1511F 1512F 1516F 1517F 1536F 1537F 1541F 1542F 1561F 1562F 1566F   1590F   1595G   1611G 1612G 1616G 1617G
***1495F   1513F 1514F 1518F 1519F 1538F 1539F 1543F ***1544F ***1563F 1564F ***1568F 1569F   12/7/2018   12/7/2018 12/7/2018
51   75   1613G 1614G 1618G 1619G
12/7/2018 12/7/2018 12/7/2018
22

1751F 1752F   1776G 1777G
12/7/2018 12/7/2018   1781G
***1753F 1754F   1760F   1785G 12/7/2018
1780F   12/7/2018
LOS ANGELES COUNTY   37
065043   1790F

LOS ANGELES
COUNTY
065043

1765F   1770F 1790F 1795F   27   32   49
52   46   28   19

33   65
1907F   1930F   1935F   LOS ANGELES
1910F   1909F 1928F   82   COUNTY
065043   15

HUC8 18070104
Santa Monica Bay
Watershed

***1925F   1916G 1917G
1/6/2016 1/6/2016
59   1940F 47   1945F
1918G 1919G   67
1/6/2016 1/6/2016   66   HUC8 18070106
64   San Gabriel Watershed
LOS ANGELES COUNTY   2026F 2027F 2031F 2032F
065043   49   49
2025F   ***2028F 2029F 2033F 2034F

2050F***

All panels with a suffix "F" have an
effective date of 09/26/2008.

| KEY NUMBER | COMMUNITY | CID |
|---|---|---|
| 1 | CITY OF AGOURA HILLS | 065072 |
| 11 | CITY OF BEVERLY HILLS | 060655 |
| 13 | CITY OF BURBANK | 065018 |
| 14 | CITY OF CALABASAS | 060749 |
| 15 | CITY OF CARSON | 060107 |
| 19 | CITY OF COMPTON | 060111 |
| 22 | CITY OF CULVER CITY | 060114 |
| 27 | CITY OF EL SEGUNDO | 060118 |
| 28 | CITY OF GARDENA | 060119 |
| 29 | CITY OF GLENDALE | 065030 |
| 32 | CITY OF HAWTHORNE | 060123 |
| 33 | CITY OF HERMOSA BEACH | 060124 |
| 34 | CITY OF HIDDEN HILLS | 060125 |
| 37 | CITY OF INGLEWOOD | 065036 |
| 45 | CITY OF LANCASTER | 060672 |
| 46 | CITY OF LAWNDALE | 060134 |
| 47 | CITY OF LOMITA | 060135 |
| 49 | CITY OF LOS ANGELES | 060137 |
| 51 | CITY OF MALIBU | 060745 |
| 52 | CITY OF MANHATTAN BEACH | 060138 |
| 58 | CITY OF PALMDALE | 060144 |
| 59 | CITY OF PALOS VERDES ESTATES | 060145 |
| 64 | CITY OF RANCHO PALOS VERDES | 060464 |
| 65 | CITY OF REDONDO BEACH | 060150 |
| 66 | CITY OF ROLLING HILLS | 060151 |
| 67 | CITY OF ROLLING HILLS ESTATES | 065054 |
| 70 | CITY OF SAN FERNANDO | 060628 |
| 73 | CITY OF SANTA CLARITA | 060729 |
| 75 | CITY OF SANTA MONICA | 060159 |
| 82 | CITY OF TORRANCE | 060165 |
| 86 | CITY OF WEST HOLLYWOOD | 060720 |
| 87 | CITY OF WESTLAKE VILLAGE | 060744 |

N

1 in = 7 miles   1:420,000
0   3.5   7   14   Miles

Map Projection:
Universal Transverse Mercator Zone 11 North;
North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
HTTP://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION
 * PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
 ** PANEL NOT PRINTED - AREA IN ZONE D
 *** PANEL NOT PRINTED - AREA OUTSIDE COUNTY BOUNDARY
 **** PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
EXCEPT CITY OF LOS ANGELES AREA IN ZONE D
 ***** PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
EXCEPT EDWARDS AIR FORCE BASE AREA IN ZONE D

LOS ANGELES COUNTY, CA
INDEX LOCATOR DIAGRAM

SHEET   THIS AREA
1 OF 3   SHOWN ON
INDEX SHEET
2 OF 3

THIS AREA
SHOWN ON
INDEX SHEET
3 OF 3
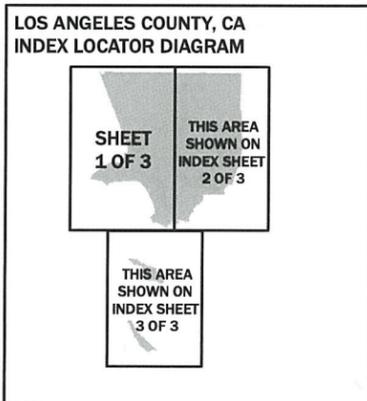
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP INDEX

LOS ANGELES COUNTY, CALIFORNIA and Incorporated Areas
SHEET 1 OF 3
PANELS PRINTED:
0036, 0040, 0050, 0075, 0100, 0125, 0150, 0300, 0325, 0350, 0365, 0370, 0375,
0400, 0575, 0600, 0610, 0625, 0630, 0635, 0640, 0645, 0800, 0805, 0810, 0815,
0820, 0830, 0835, 0840, 0845, 0875, 1030, 1031, 1032, 1034, 1040, 1045, 1067,
1069, 1075, 1086, 1088, 1089, 1095, 1239, 1241, 1242, 1243, 1244, 1261, 1262,
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1528, 1529, 1531, 1532, 1533, 1536, 1537, 1538, 1539, 1541, 1542, 1543, 1551,
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1754, 1760, 1765, 1770, 1776, 1777, 1781, 1785, 1790, 1795, 1907, 1909, 1910,
1916, 1917, 1918, 1919, 1928, 1930, 1935, 1940, 1945, 2025, 2026, 2027,
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