FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 5

MONTEREY COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
CARMEL-BY-THE-SEA, CITY OF	060196
DEL REY OAKS, CITY OF	060197
GONZALES, CITY OF	060198
GREENFIELD, CITY OF	060446
KING CITY, CITY OF	060199
MARINA, CITY OF	060727
MONTEREY, CITY OF	060200
MONTEREY COUNTY, UNINCORPORATED AREAS	060195
PACIFIC GROVE, CITY OF	060201
SALINAS, CITY OF	060202
SAND CITY, CITY OF	060435
SEASIDE, CITY OF	060203
SOLEDAD, CITY OF	060204

FEMA

REVISED:

June 21, 2017

FLOOD INSURANCE STUDY NUMBER
06053CV001B

Version Number 2.3.2.1

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Volume 4 – June 21, 2017

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Volume 5 – June 21, 2017

Exhibits

Published Separately

FLOOD INSURANCE STUDY REPORT
MONTEREY COUNTY, CALIFORNIA

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60.3, *Criteria for land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Monterey County, California.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the 8-digit Hydrologic Unit Codes (HUC-8) sub-basins affecting each, are shown in Table 1. The Flood Insurance Rate Map (FIRM) panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Carmel-By-The-Sea, City of	060196	18060006	06053C0308H 06053C0316H	
Del Rey Oaks, City of	060197	18060015	06053C0326H 06053C0327G 06053C0328G 06053C0329G 06053C0333G	
Gonzales, City of	060198	18060005	06053C0414G 06053C0418G 06053C0581G 06053C0600G	
Greenfield, City of	060446	18060005	06053C0825G 06053C0850G	
King City, City of	060199	18060005	06053C1082G 06053C1084G 06053C1085G 06053C1101G 06053C1103G	

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Marina, City of	060727	18060006, 18060015	06053C0181H 06053C0183H 06053C0185H 06053C0187H 06053C0189H 06053C0191H 06053C0195H 06053C0215G	
Monterey, City of	060200	18060006, 18060015	06053C0306H 06053C0307H 06053C0308H 06053C0309H 06053C0326H 06053C0328G 06053C0329G 06053C0333G	
Monterey County, Unincorporated Areas	060195	18060002, 18060004, 18060005, 18060006, 18060015	06053C0020G 06053C0038G 06053C0039G 06053C0040G 06053C0041G 06053C0042G 06053C0043G 06053C0044G 06053C0056H 06053C0057H 06053C0058H 06053C0059H 06053C0066H 06053C0067H 06053C0068H 06053C0069H 06053C0076G 06053C0077G 06053C0078G 06053C0079G[1] 06053C0081G 06053C0082G	

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Monterey County, Unincorporated Areas (continued)	060195	18060002, 18060004, 18060005, 18060006, 18060015	06053C0083G	
			06053C0084G[1]	
			06053C0086G	
			06053C0087G	
			06053C0088G	
			06053C0089G	
			06053C0091G	
			06053C0092G[1]	
			06053C0093G	
			06053C0094G	
			06053C0105G[1]	
			06053C0113G	
			06053C0115G	
			06053C0120G[1]	
			06053C0140G[1]	
			06053C0164H	
			06053C0168H	
			06053C0179H	
			06053C0181H	
			06053C0183H	
			06053C0185H	
			06053C0187H	
			06053C0188H	
			06053C0189H	
			06053C0191H	
			06053C0195H	
			06053C0205G	
			06053C0206G	
			06053C0207G	
			06053C0208G	
			06053C0209G	
			06053C0215G	
			06053C0216G	
			06053C0218G	
			06053C0219G[1]	
			06053C0226G	
			06053C0228G	
			06053C0230G	
			06053C0235G	
			06053C0236G	

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Monterey County, Unincorporated Areas (continued)	060195	18060002, 18060004, 18060005, 18060006, 18060015	06053C0238G	
			06053C0240G	
			06053C0245G	
			06053C0255G[1]	
			06053C0265G	
			06053C0270G[1]	
			06053C0300G[1]	
			06053C0302H	
			06053C0303H	
			06053C0304H	
			06053C0306H	
			06053C0307H	
			06053C0308H	
			06053C0309H	
			06053C0312H	
			06053C0314H	
			06053C0316H	
			06053C0318H	
			06053C0320H	
			06053C0326H	
			06053C0327G	
			06053C0328G	
			06053C0329G	
			06053C0331G[1]	
			06053C0332G[1]	
			06053C0333G	
			06053C0334G	
			06053C0340G	
			06053C0345G	
			06053C0351G[1]	
			06053C0352G	
			06053C0353G	
			06053C0354G	
			06053C0360G	
			06053C0361G	
			06053C0362G	
			06053C0363G[1]	
			06053C0364G	
			06053C0370G	
			06053C0380G	

Table 1: Listing of NFIP Jurisdictions, continued

<table>
<tr><th>Community</th><th>CID</th><th>HUC-8 Sub-Basin(s)</th><th>Located on FIRM Panel(s)</th><th>If Not Included, Location of Flood Hazard Data</th></tr>
<tr><td>Monterey County, Unincorporated Areas (continued)</td><td>060195</td><td>18060002, 18060004, 18060005, 18060006, 18060015</td><td>06053C0400G
06053C0414G
06053C0418G
06053C0425G
06053C0450G
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06053C0481H
06053C0483H
06053C0485H[1]
06053C0491H
06053C0492H[1]
06053C0493H
06053C0494H
06053C0505G
06053C0510G
06053C0515G[1]
06053C0520G[1]
06053C0530G
06053C0535G
06053C0540G
06053C0545G
06053C0555G
06053C0560G
06053C0565G
06053C0570G
06053C0581G
06053C0600G
06053C0612G
06053C0616G
06053C0625G
06053C0650G
06053C0675G
06053C0681H
06053C0682H
06053C0684H
06053C0691H[1]
06053C0692H
06053C0705G
06053C0710G[1]</td><td></td></tr>
</table>

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Monterey County, Unincorporated Areas (continued)	060195	18060002, 18060004, 18060005, 18060006, 18060015	06053C0711H	
			06053C0712H	
			06053C0713H	
			06053C0714H	
			06053C0720G	
			06053C0750G	
			06053C0775G	
			06053C0791G[1]	
			06053C0792G[1]	
			06053C0793G	
			06053C0794G	
			06053C0800G	
			06053C0825G	
			06053C0850G	
			06053C0875G	
			06053C0900G	
			06053C0925G	
			06053C0950G	
			06053C0952H	
			06053C0956H	
			06053C0957H	
			06053C0959H	
			06053C0978H	
			06053C0979H	
			06053C0980H[1]	
			06053C0985H[1]	
			06053C0986H[1]	
			06053C0987H	
			06053C0991H	
			06053C0992H[1]	
			06053C0993H	
			06053C0994H	
			06053C1025G[1]	
			06053C1026G	
			06053C1027G	
			06053C1028G[1]	
			06053C1029G[1]	
			06053C1031G	
			06053C1032G[1]	
			06053C1033G[1]	

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Monterey County, Unincorporated Areas (continued)	060195	18060002, 18060004, 18060005, 18060006, 18060015	06053C1034G[1] 06053C1040G[1] 06053C1045G[1] 06053C1075G[1] 06053C1080G[1] 06053C1082G 06053C1084G 06053C1085G 06053C1090G[1] 06053C1091G 06053C1092G 06053C1095G 06053C1101G 06053C1103G 06053C1125G 06053C1150G 06053C1175G 06053C1200G 06053C1207H 06053C1209H[1] 06053C1226H 06053C1227H[1] 06053C1228H 06053C1229H 06053C1235H[1] 06053C1236H[1] 06053C1237H 06053C1239H 06053C1243H 06053C1244H 06053C1245H[1] 06053C1275G[1] 06053C1300G 06053C1325G 06053C1350G 06053C1375G 06053C1400G 06053C1425G 06053C1450G 06053C1475G[1]	

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Monterey County, Unincorporated Areas (continued)	060195	18060002, 18060004, 18060005, 18060006, 18060015	06053C1482H	
			06053C1501H	
			06053C1503H	
			06053C1505H[1]	
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			06053C1512H	
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			06053C1514H	
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			06053C1900G	
			06053C1925G	
			06053C1950G	
			06053C1975G	
			06053C2000G	
			06053C2025G	
			06053C2050G[1]	

Table 1: Listing of NFIP Jurisdictions, continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Pacific Grove, City of	060201	18060006, 18060015	06053C0164H 06053C0168H 06053C0302H 06053C0306H 06053C0307H	
Salinas, City of	060202	18060005, 18060015	06053C0206G 06053C0207G 06053C0208G 06053C0209G 06053C0216G 06053C0217G 06053C0218G 06053C0219G[1] 06053C0228G 06053C0230G 06053C0236G 06053C0238G 06053C0240G	
Sand City, City of	060435	18060015	06053C0188H 06053C0189H 06053C0326H 06053C0327G	
Seaside, City of	060203	18060015	06053C0189H 06053C0195H 06053C0326H 06053C0327G 06053C0331G[1]	
Soledad, City of	060204	18060005	06053C0612G 06053C0616G 06053C0625G	

[1] Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 31, "Map Repositories," within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

  The initial Countywide FIS Report for Monterey County became effective on April 02, 2009. Refer to Table 28 for information about subsequent revisions to the FIRMs.

- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels. In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

- FEMA does not impose floodplain management requirements or special insurance ratings based on Limit of Moderate Wave Action (LiMWA) delineations at this time. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. If the LiMWA is shown on the FIRM, it is being provided by FEMA as information only. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional Community Rating System (CRS) credits are available. Refer to Section 2.5.4 for additional information about the LiMWA.

  The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at www.fema.gov/national-flood-insurance-program-community-rating-system or contact your appropriate FEMA Regional Office for more information about this program.

- Previous FIS Reports and FIRMs may have included levees that were accredited as reducing the risk associated with the 1% annual chance flood based on the information available and the mapping standards of the NFIP at that time. For FEMA to continue to accredit the identified levees, the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems."

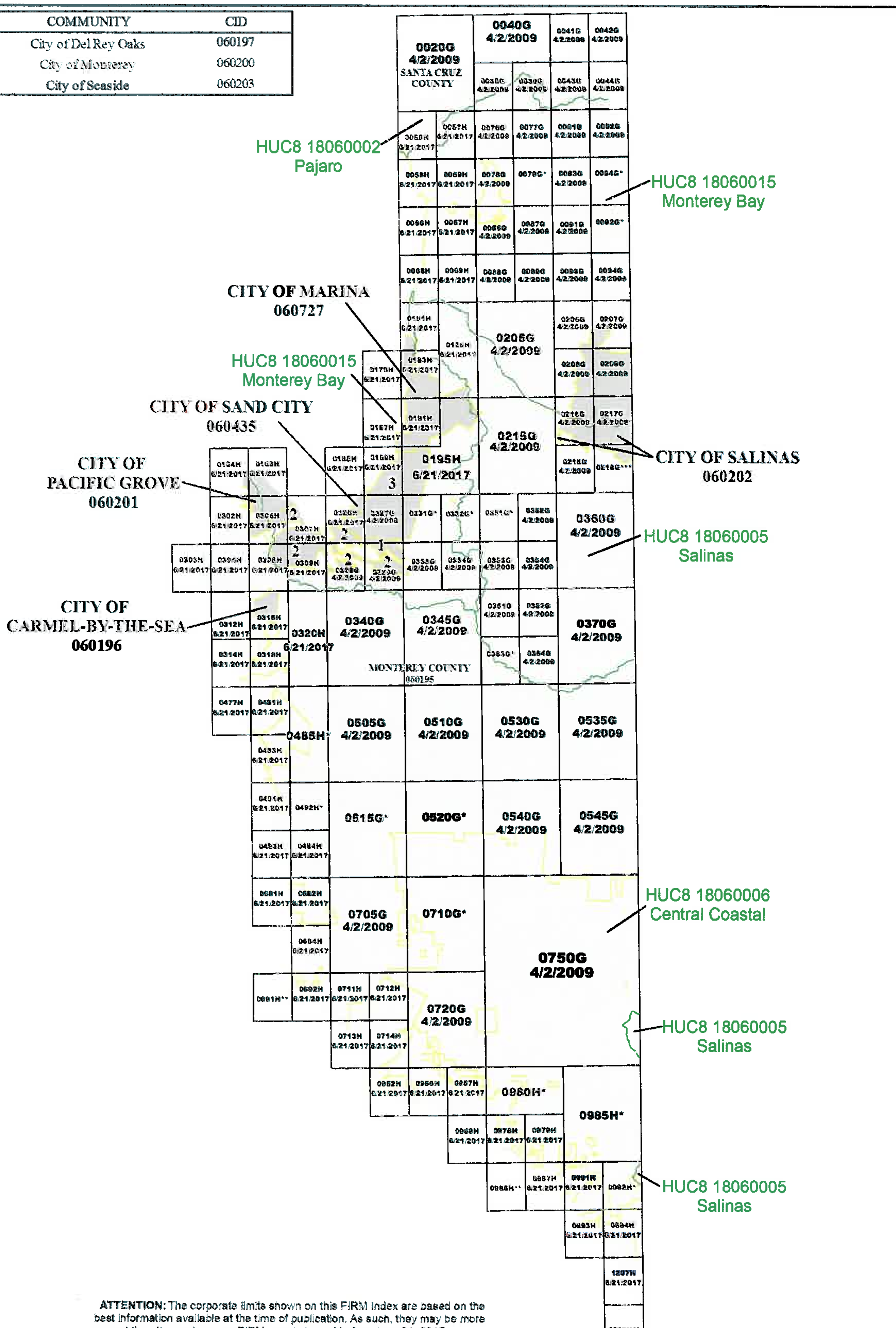
  Since the status of levees is subject to change at any time, the user should contact the appropriate agency for the latest information regarding levees presented in Table 9 of this FIS Report. For levees owned or operated by the U.S. Army Corps of Engineers (USACE), information may be obtained from the USACE national levee database (nld.usace.army.mil). For all other levees, the user is encouraged to contact the appropriate local community.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Monterey County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and United States Geological Survey (USGS) Hydrologic Unit Code – 8 (HUC-8) codes.

Figure 1: FIRM Panel Index

KEY NUMBER	COMMUNITY	CID
1	City of Del Rey Oaks	060197
2	City of Monterey	060200
3	City of Seaside	060203



ATTENTION: The corporate limits shown on this FIRM index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before June 21, 2017.

1 in = 6 miles

0 1 2 4 6 8 Miles

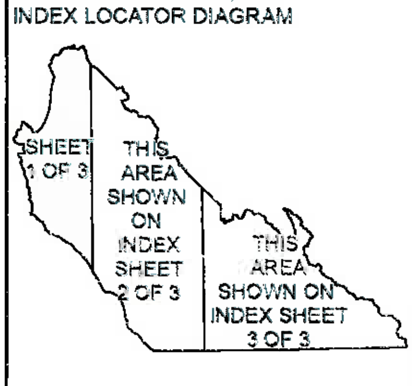
Map Projection:
Universal Transverse Mercator Zone 10 North;
North American Datum 1983

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 - OPEN WATER
***PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS; ALL AREAS WITHIN 0.2% ANNUAL CHANCE FLOODPLAIN



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

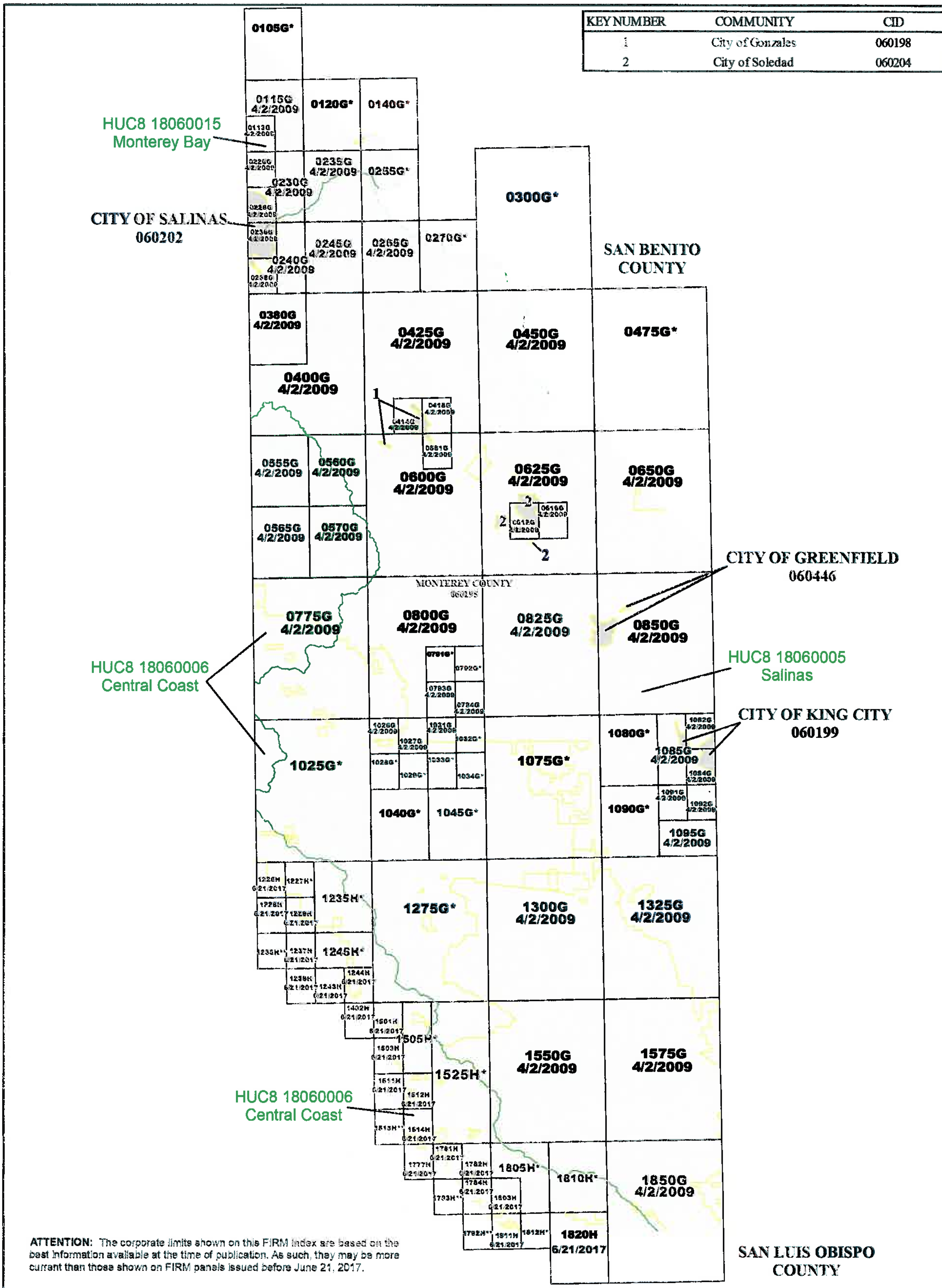
MONTEREY COUNTY, CALIFORNIA And Incorporated Areas
SHEET 1 OF 3
PANELS PRINTED:
0020, 0038, 0039, 0040, 0041, 0042, 0043, 0044, 0056, 0057, 0058, 0059, 0066, 0067, 0068, 0069, 0076, 0077, 0078, 0081, 0082, 0083, 0086, 0087, 0088, 0089, 0091, 0093, 0094, 0164, 0168, 0179, 0181, 0183, 0185, 0187, 0188, 0189, 0191, 0195, 0205, 0206, 0207, 0208, 0209, 0215, 0216, 0217, 0218, 0302, 0303, 0304, 0306, 0307, 0308, 0309, 0312, 0314, 0316, 0318, 0320, 0326, 0327, 0328, 0329, 0333, 0334, 0340, 0345, 0352, 0353, 0354, 0360, 0361, 0362, 0364, 0370, 0477, 0481, 0483, 0491, 0493, 0494, 0505, 0510, 0530, 0535, 0540, 0545, 0681, 0682, 0684, 0692, 0705, 0711, 0712, 0713, 0714, 0720, 0750, 0952, 0956, 0957, 0959, 0978, 0979, 0987, 0991, 0993, 0994, 1207

MAP NUMBER
06053CIND1B

MAP REVISED
June 21, 2017

Figure 1: FIRM Panel Index, continued

KEY NUMBER	COMMUNITY	CID
1	City of Gonzales	060198
2	City of Soledad	060204



ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before June 21, 2017.

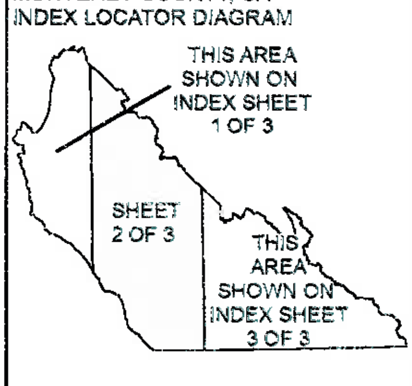
Map Projection:
Universal Transverse Mercator Zone 10 North
North American Datum 1983

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 - OPEN WATER

MONTEREY COUNTY, CA
INDEX LOCATOR DIAGRAM



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

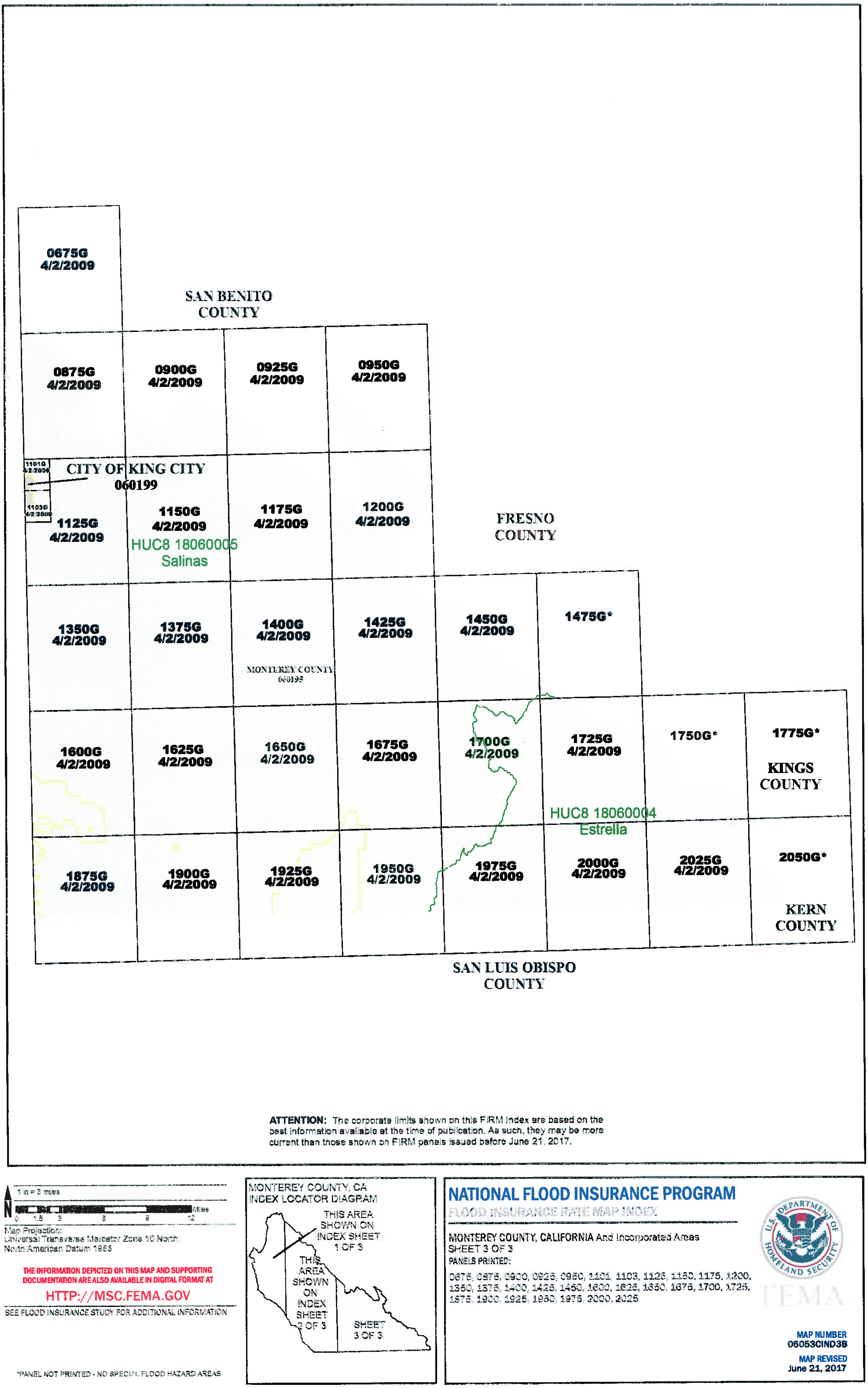
MONTEREY COUNTY, CALIFORNIA And Incorporated Areas
SHEET 2 OF 3
PANELS PRINTED:
0113, 0115, 0226, 0228, 0230, 0235, 0236, 0238, 0240, 0245, 0265, 0380, 0400, 0414, 0418, 0425, 0450, 0555, 0560, 0565, 0570, 0581, 0600, 0612, 0616, 0625, 0650, 0775, 0793, 0794, 0800, 0825, 0850, 1026, 1027, 1031, 1082, 1084, 1085, 1091, 1092, 1095, 1226, 1228, 1229, 1237, 1239, 1243, 1244, 1300, 1325, 1482, 1501, 1503, 1511, 1512, 1514, 1550, 1575, 1777, 1781, 1782, 1784, 1803, 1811, 1820, 1850.

FEMA

MAP NUMBER
06053CIND2B

MAP REVISED
June 21, 2017

Figure 1: FIRM Panel Index, continued



Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 28 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

Coastal Base Flood Elevations shown on the map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Coastal flood elevations are also provided in the Coastal Transect Parameters table in the FIS Report for this jurisdiction. Elevations shown in the Coastal Transect Parameters table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on the FIRM.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

Figure 2. FIRM Notes to Users

<u>PROJECTION INFORMATION</u>: The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 10N. The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

<u>ELEVATION DATUM</u>: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

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

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 31 of this FIS Report.

<u>BASE MAP INFORMATION</u>: Base map information shown on the FIRM was derived from Coastal California LiDAR and Digital Imagery dated 2011. USDA NAIP 2010 imagery is used in areas not covered by the Coastal California digital imagery. For information about base maps, refer to Section 6.2 "Base Map" in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Figure 2. FIRM Notes to Users

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Monterey County, CA, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 28 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Monterey County, California, effective June 21, 2017.

ACCREDITED LEVEE: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at www.fema.gov/national-flood-insurance-program.

PROVISIONALLY ACCREDITED LEVEE: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations by December 31, 2011. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at www.fema.gov/national-flood-insurance-program.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Monterey County.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Figure 3: Map Legend for FIRM

	Regulatory Floodway determined in Zone AE.
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood. See Notes to Users for important information.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.
NO SCREEN	Unshaded Zone X: Areas of minimal flood hazard.
FLOOD HAZARD AND OTHER BOUNDARY LINES	
(ortho) (vector)	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
Aqueduct Channel Culvert Storm Sewer	Channel, Culvert, Aqueduct, or Storm Sewer
Dam Jetty Weir	Dam, Jetty, Weir

Figure 3: Map Legend for FIRM

	Levee, Dike, or Floodwall
Bridge	Bridge
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA): *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.*	
CBRS AREA 09/30/2009	Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.
OTHERWISE PROTECTED AREA 09/30/2009	Otherwise Protected Area
REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)

Figure 3: Map Legend for FIRM

ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}E$	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16' 52.5"	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Monterey County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 23), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. Figure 3, "Map Legend for FIRM", describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Monterey County, California, respectively.

Table 2, "Flooding Sources Included in this FIS Report," lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 13. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Arroyo Seco	Monterey County, Unincorporated Areas	Approximately 17 miles upstream of confluence with Salinas River	Approximately 35 feet upstream of Arroyo Seco Road	18060005	9.8		Y	AE	
Arroyo Seco	Monterey County, Unincorporated Areas	Confluence with Salinas River	Approximately 17 miles upstream of confluence with Salinas River	18060005	17.0		N	A	
Arroyo Seco	Monterey County, Unincorporated Areas	Approximately 35 feet upstream of Arroyo Seco Road	Approximately 2,300 feet upstream of Arroyo Seco Road	18060005	0.4		N	A	
Big Sur River	Monterey County, Unincorporated Areas	At mouth	Approximately 2.5 miles upstream of Cabrillo Highway	18060006	8.3		N	A	
Bixby Creek	Monterey County, Unincorporated Areas	At mouth	Approximately 447 feet upstream of Highway 1	18060006	0.1		N	A	
Calera Creek	Monterey County, Unincorporated Areas	Confluence with El Toro Creek	Approximately 1.2 miles upstream of Robley Road	18060005	4.7		Y	AE, AO	
Canyon Del Rey	Del Rey Oaks, City of; Monterey, City of; Seaside, City of	Confluence with Monterey Bay	Approximately 65 feet upstream of State Highway 68	18060015	3.1		Y	VE, AE, AO	
Canyon Del Rey	Monterey County, Unincorporated Areas	At Blue Larkspur Lane	Approximately 1,580 feet upstream of State Highway 68	18060015	2.4		Y	AE	

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Canyon Del Rey	Del Rey Oaks, City of; Monterey, City of; Monterey County, Unincorporated Areas	Approximately 65 feet upstream of State Highway 68	At Blue Larkspur Lane	18060015	1.8		N	A	
Carmel River	Monterey County, Unincorporated Areas; Carmel-By-The-Sea, City of	Approximately 370 feet upstream of confluence with Pacific Ocean	Approximately 1,656 feet upstream of Access Road Bridge and Weir	18060006	18.9		Y	VE, AE	
Carmel River	Monterey County, Unincorporated Areas	Approximately 1,656 feet upstream of Access Road Bridge and Weir	Approximately 1.3 miles upstream of Nanson Road	18060006			N	A	
Carmel River Garland Ranch Overbank	Monterey County, Unincorporated Areas	Convergence with Carmel River main channel	Divergence from Carmel River main channel	18060006	0.6		N	AE	
Carmel River Hacienda Carmel Overbank	Monterey County, Unincorporated Areas	Convergence with Carmel River main channel	Approximately 3,250 feet upstream of convergence with Carmel River main channel	18060006	0.6		Y	AE	
Carmel River North Highway 1 Overbank	Monterey County, Unincorporated Areas; Carmel-By-The-Sea, City of	Confluence with Carmel River main channel	Approximately 1,285 feet upstream of Val Verde Drive	18060006	1.5		N	AE	
Carmel River Schulte Overbank	Monterey County, Unincorporated Areas	Confluence with Carmel River main channel	Approximately 1,250 feet upstream of Via Sereno Drive	18060006	0.6		N	AE	

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Carmel River South Highway 1 Overbank	Monterey County, Unincorporated Areas	Confluence with Carmel River main channel	Approximately 1 mile upstream of State Highway 1	18060006	1.7		N	AE	
Castroville Boulevard Wash	Monterey County, Unincorporated Areas	Approximately 890 feet downstream of Dolan Road	Approximately 1,900 feet upstream of Archer Road	18060015	2.0		Y	AE	
Corncob Canyon Creek	Monterey County, Unincorporated Areas	Confluence with Elkhorn Slough	Approximately 290 feet upstream of Jamison Court	18060015	2.7		Y	AE	
Del Monte Lake	Monterey County, Unincorporated Areas; Monterey, City of	At Garden Drive	At Del Monte Avenue	18060015		0.02	N	AE	
East Branch Gonzales Slough	Gonzales, City of	Confluence with Gonzales Slough	Approximately 870 feet upstream of confluence with Gonzales Slough	18060005	0.1		Y	AE	
East Branch Gonzales Slough	Monterey County, Unincorporated Areas	Approximately 870 feet upstream of confluence with Gonzales Slough	Approximately 2,600 feet upstream of el Camino Real	18060005	0.5		N	A	
El Estero Lake	Monterey, City of	At Lake Street	At Fremont Street	18060015		0.03	N	AE	
El Toro Creek	Monterey County, Unincorporated Areas	Confluence with Salinas River	Approximately 300 feet upstream of Highway 68	18060005	4.3		Y	AE	
Elkhorn Slough	Monterey County, Unincorporated Areas	Confluence with Pacific Ocean	Approximately 2,360 feet upstream of U.S. Highway 101	18060015	14.8		Y	AE	

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Gabilan Creek	Monterey County, Unincorporated Areas; Salinas, City of	Confluence with Reclamation Ditch	Approximately 50 feet upstream of Hebert Road	18060015	5.9		Y	AE	
Gonzales Slough	Gonzales, City of	Approximately 1,520 feet downstream of 7th Street	Approximately 1,380 feet upstream of Alta Street	18060005	1.5		Y	AE	
Harper Creek	Monterey County, Unincorporated Areas	At Paseo Verde Road	Approximately 760 feet upstream of Harper Canyon Road	18060005	1.2		Y	AE	
Josselyn Canyon Creek	Monterey, City of; Monterey County, Unincorporated Areas	Confluence with Monterey Bay	Approximately 15 feet upstream of Mark Thomas Drive	18060015	0.7		N	AE, AH	
Little Sur River	Monterey County, Unincorporated Areas	Confluence with Monterey Bay	Approximately 4,450 feet upstream of Highway 1	18060006	1.4		N	A	
Natividad Creek	Salinas, City of	Confluence with Reclamation Ditch	Approximately 4,870 feet upstream of Gee Street	18060015	2.1		Y	AE	
Pajaro River	Monterey County, Unincorporated Areas	Approximately 200 feet above mouth at Pacific Ocean	County boundary	18060002	14.9		Y	AE, AO	
Pajaro River - Without Consideration of Levee	Monterey County, Unincorporated Areas	Approximately 1.6 miles downstream of McGowan Road	Approximately 1.6 miles upstream of confluence of Thomasello Creek	18060002	10.3		Y	AE, AO	
Pine Canyon Creek	Monterey County, Unincorporated Areas	Confluence with Salinas River	Approximately 616 feet upstream of Pine Canyon Road	18060005	3.8		Y	AE	

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Reclamation Ditch	Monterey County, Unincorporated Areas; Salinas, City of	Confluence with Tembladero Slough	Approximately 3,050 feet upstream of Airport Boulevard	18060005 18060015	12.8		Y	AE, AO	
Salinas River	Marina, City of; Monterey County, Unincorporated Areas	Approximately 1.6 miles downstream of State Highway 1	Approximately 5.3 miles upstream of State Highway 68	18060005	18.4		Y	AE	
Salinas River	King City, City of; Monterey County, Unincorporated Areas	Approximately 1.1 miles downstream of Pine Canyon Creek	Approximately 4,874 feet upstream of confluence of San Lorenzo Creek	18060005	2.6		Y	AE	
Salinas River	Monterey County, Unincorporated Areas	Approximately 1 miles downstream of Cattlemen Road	Approximately 3,000 feet upstream of Cattlemen Road	18060005	1.6		Y	AE	
Salinas River	King City, City of; Monterey County, Unincorporated Areas	Approximately 5.3 miles upstream of State Highway 68	Approximately 1.1 miles downstream of Pine Canyon Creek	18060005	47.2		N	A	
Salinas River	Monterey County, Unincorporated Areas	Approximately 4,874 feet upstream of confluence of San Lorenzo Creek	Approximately 1 mile downstream of Cattlemen Road	18060005	19.5		N	A	
Salinas River	Monterey County, Unincorporated Areas	Approximately 3,000 feet upstream of Cattlemen Road	County boundary	18060005	20.3		N	A	
Salinas River Overbank	Monterey County, Unincorporated Areas	Convergence with Salinas River	Approximately 2,760 feet upstream of Blanco Road	18060005	4.7		Y	AE	
San Benancio Gulch	Monterey County, Unincorporated Areas	Confluence with El Toro Creek	Approximately 745 feet upstream of San Benancio Road	18060005	3.6		Y	AE	

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
San Jose Creek	Monterey County, Unincorporated Areas	At Highway 1	Approximately 2,462 feet upstream of Highway 1	18060006	0.4		N	A	
San Lorenzo Creek	King City, City of; Monterey County, Unincorporated Areas	Confluence with Salinas River	Approximately 4,740 feet upstream of Southern Pacific Railroad	18060005	2.4		Y	AE	
San Miguel Canyon Creek	Monterey County, Unincorporated Areas	At U.S. Highway 101	Approximately 270 feet upstream of confluence of North San Miguel Canyon Creek	18060015	4.5		Y	AE	
Santa Rita Creek	Monterey County, Unincorporated Areas; Salinas, City of	Approximately 1 mile downstream of U.S. Highway 101 (El Camino Real)	Approximately 1.5 miles upstream of Rogue Road	18060015	4.4		Y	AE	
Seal Rock Creek	Monterey County, Unincorporated Areas	Approximately 344 feet downstream of Highway 1	Approximately 163 feet upstream of Stevenson Drive	18060006	0.7		N	A	
Tembladero Slough	Monterey County, Unincorporated Areas	Approximately 1,265 feet downstream of State Highway 1	Approximately 20 feet upstream of Southern Pacific Railroad	18060015	2.0		Y	AE	
Thomasello Creek	Monterey County, Unincorporated Areas	Confluence with Pajaro River	Approximately 900 feet upstream of confluence with Pajaro River	18060002	0.1		N	AE	

Table 2: Flooding Sources Included in this FIS Report, continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Watson Creek	Monterey County, Unincorporated Areas	Approximately 20 feet downstream of Calera Canyon	Approximately 4,120 feet upstream of Corral de Tierra	18060005	4.0		Y	AE	

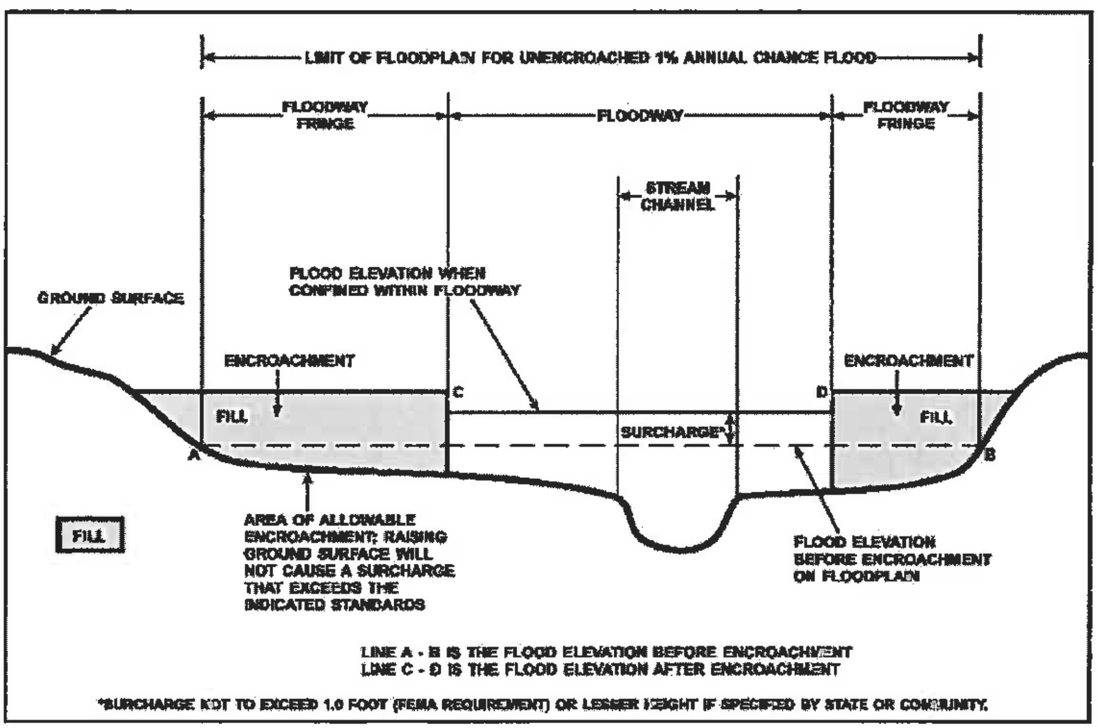
2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 24, "Floodway Data."

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and 1% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs 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.

2.4 Non-Encroachment Zones

Some States and communities use non-encroachment zones to manage floodplain development. For flooding sources with medium flood risk, field surveys are often not collected and surveyed bridge and culvert geometry is not developed. Standard hydrologic and hydraulic analyses are still performed to determine BFEs in these areas. However, floodways are not typically determined, since specific channel profiles are not developed. To assist communities with managing floodplain development in these areas, a "non-encroachment zone" may be provided. While not a FEMA designated floodway, the non-encroachment zone represents that area around the stream that should be reserved to convey the 1% annual chance flood event. As with a floodway, all surcharges must fall within the acceptable range in the non-encroachment zone.

General setbacks can be used in areas of lower risk (e.g. unnumbered Zone A), but these are not considered sufficient where unnumbered Zone A is replaced by Zone AE. The NFIP requires communities to ensure that any development in a non-encroachment area causes no increase in BFEs. Communities must generally prohibit development within the area defined by the non-encroachment width to meet the NFIP requirement.

Non-encroachment determinations may be delineated where it is not possible to delineate floodways because specific channel profiles with bridge and culvert geometry were not developed. Any non-encroachment determinations for this Flood Risk Project have been tabulated for selected cross sections and are shown in Table 25, "Flood Hazard and Non-Encroachment Data for Selected Streams." Areas for which non-encroachment zones are provided show BFEs and the 1% annual chance floodplain boundaries mapped as zone AE on the FIRM but no floodways.

2.5 Coastal Flood Hazard Areas

For most areas along rivers, streams, and small lakes, BFEs and floodplain boundaries are based on the amount of water expected to enter the area during a 1% annual chance flood and the geometry of the floodplain. Floods in these areas are typically caused by storm events. However, for areas on or near ocean coasts, large rivers, or large bodies of water, BFE and floodplain boundaries may need to be based on additional components, including storm surges and waves. Communities on or near ocean coasts face flood hazards caused by offshore seismic events as well as storm events.

Coastal flooding sources that are included in this Flood Risk Project are shown in Table 2.

2.5.1 Water Elevations and the Effects of Waves

Specific terminology is used in coastal analyses to indicate which components have been included in evaluating flood hazards.

The stillwater elevation (SWEL or still water level) is the surface of the water resulting from astronomical tides, storm surge, and freshwater inputs, but excluding wave setup contribution or the effects of waves.

- *Astronomical tides* are periodic rises and falls in large bodies of water caused by the rotation of the earth and by the gravitational forces exerted by the earth, moon and sun.
- *Storm surge* is the additional water depth that occurs during large storm events. These events can bring air pressure changes and strong winds that force water up against the shore.
- *Freshwater inputs* include rainfall that falls directly on the body of water, runoff from surfaces and overland flow, and inputs from rivers.

The 1% annual chance stillwater elevation is the stillwater elevation that has been calculated for a storm surge from a 1% annual chance storm. The 1% annual chance storm surge can be determined from analyses of tidal gage records, statistical study of regional historical storms, or other modeling approaches. Stillwater elevations for storms of other frequencies can be developed using similar approaches.

The total stillwater elevation (also referred to as the mean water level) is the stillwater elevation plus wave setup contribution but excluding the effects of waves.

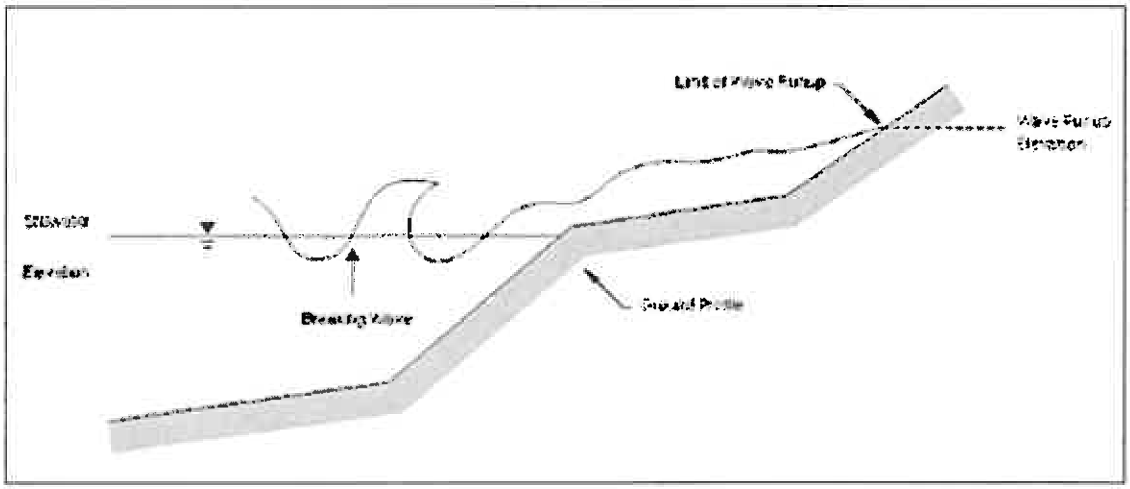
- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the reduction of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1% annual chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since tidal gages are often sited in areas sheltered from wave action and do not capture this information.

Coastal analyses may examine the effects of overland waves by analyzing storm-induced erosion, overland wave propagation, wave runup, and/or wave overtopping.

- *Storm-induced erosion* is the modification of existing topography by erosion caused by a specific storm event, as opposed to general erosion that occurs at a more constant rate.
- *Overland wave propagation* describes the combined effects of variation in ground elevation, vegetation, and physical features on wave characteristics as waves move onshore.
- *Wave runup* is the uprush of water from wave action on a shore barrier. It is a function of the roughness and geometry of the shoreline at the point where the stillwater elevation intersects the land.
- *Wave overtopping* refers to wave runup that occurs when waves pass over the crest of a barrier.

Figure 5: Wave Runup Transect Schematic



2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

For coastal communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea, flood hazards must take into account how storm surges, waves, and extreme tides interact with factors such as topography and vegetation. Storm surge and waves must also be considered in assessing flood risk for certain communities on rivers or large inland bodies of water.

Beyond areas that are affected by waves and tides, coastal communities can also have riverine floodplains with designated floodways, as described in previous sections.

Floodplain Boundaries

In many coastal areas, storm surge is the principle component of flooding. The extent of the 1% annual chance floodplain in these areas is derived from the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm. The methods that were used for calculation of total stillwater elevations for coastal areas are described in Section 5.3 of this FIS Report. Location of total stillwater elevations for coastal areas are shown in Figure 8, "1% Annual Chance Total Stillwater Levels for Coastal Areas."

In some areas, the 1% annual chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1% annual chance storm surge. The methods that were used for calculation of wave hazards are described in Section 5.3 of this FIS Report.

Table 26 presents the types of coastal analyses that were used in mapping the 1% annual chance floodplain in coastal areas.

Coastal BFEs

Coastal BFEs are calculated as the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm plus the additional flood hazard from overland wave effects (storm-induced erosion, overland wave propagation, wave runup and wave overtopping).

Where they apply, coastal BFEs are calculated along transects extending from offshore to the limit of coastal flooding onshore. Results of these analyses are accurate until local topography, vegetation, or development type and density within the community undergoes major changes.

Parameters that were included in calculating coastal BFEs for each transect included in this FIS Report are presented in Table 17, "Coastal Transect Parameters." The locations of transects are shown in Figure 9, "Transect Location Map." More detailed information about the methods used in coastal analyses and the results of intermediate steps in the coastal analyses are presented in Section 5.3 of this FIS Report. Additional information on specific mapping methods is provided in Section 6.4 of this FIS Report.

2.5.3 Coastal High Hazard Areas

Certain areas along the open coast and other areas may have higher risk of experiencing structural damage caused by wave action and/or high-velocity water during the 1% annual chance flood. These areas will be identified on the FIRM as Coastal High Hazard Areas.

- *Coastal High Hazard Area (CHHA)* is a SFHA extending from offshore to the inland limit of the primary frontal dune (PFD) or any other area subject to damages caused by wave action and/or high-velocity water during the 1% annual chance flood.
- *Primary Frontal Dune (PFD)* is a continuous or nearly continuous mound or ridge of sand with relatively steep slopes immediately landward and adjacent to the beach. The PFD is subject to erosion and overtopping from high tides and waves during major coastal storms.

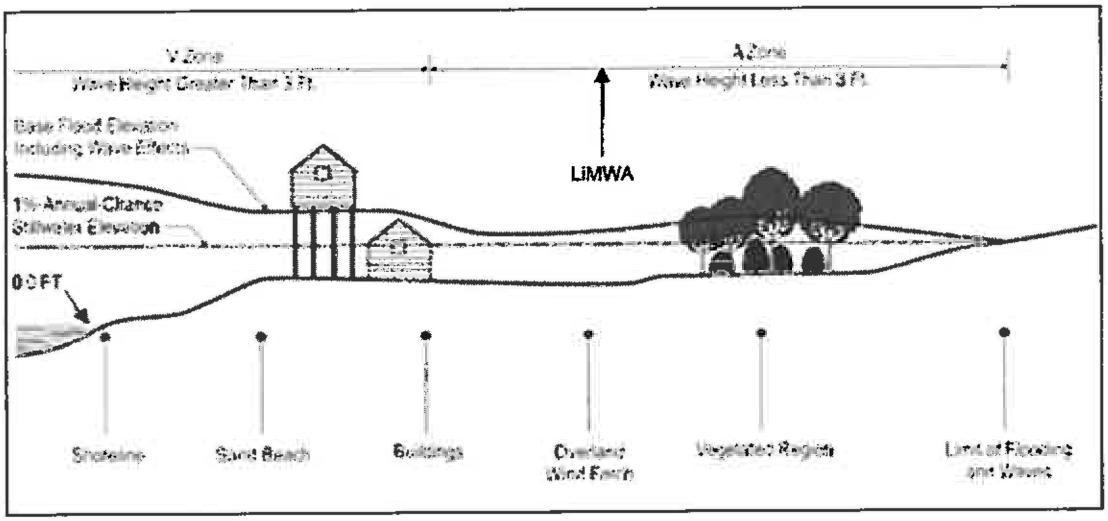
CHHAs are designated as "V" zones (for "velocity wave zones") and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the FIRM.

The landward limit of the PFD occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope; this point represents the landward extension of Zone VE. Areas of lower risk in the CHHA are designated with Zone V on the FIRM. More detailed information about the identification and designation of Zone VE is presented in Section 6.4 of this FIS Report.

Areas that are not within the CHHA but are SFHAs may still be impacted by coastal flooding and damaging waves; these areas are shown as "A" zones on the FIRM.

Figure 6, "Coastal Transect Schematic," illustrates the relationship between the base flood elevation, the 1% annual chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE areas in an area without a PFD subject to overland wave propagation. This figure also illustrates energy dissipation and regeneration of a wave as it moves inland.

Figure 6: Coastal Transect Schematic



Methods used in coastal analyses in this Flood Risk Project are presented in Section 5.3 and mapping methods are provided in Section 6.4 of this FIS Report.

Coastal floodplains are shown on the FIRM using the symbology described in Figure 3, "Map Legend for FIRM." In many cases, the BFE on the FIRM is higher than the stillwater elevations shown in Table 17 due to the presence of wave effects. The higher elevation should be used for construction and/or floodplain management purposes.

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, "Map Legend for FIRM." Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Monterey County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Carmel-by-the-Sea, City of	AE, VE, X
Del Rey Oaks, City of	A, AE, AO, X
Gonzales, City of	A, AE, AH, X
Greenfield, City of	A, X
King City, City of	A, AE, X
Marina, City of	A, AE, VE, X
Monterey, City of	A, AE, AH, D, VE, X
Monterey County, Unincorporated Areas	A, AE, AH, AO, D, VE, X
Pacific Grove, City of	D, VE, X
Salinas, City of	A, AE, AH, X
Sand City, City of	AE, VE, X
Seaside, City of	AE, AH, VE, X
Soledad, City of	A, X

3.2 Coastal Barrier Resources System

This section is not applicable to this Flood Risk Project.

Table 4: Coastal Barrier Resources System Information

[Not Applicable to this Flood Risk Project]

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 5 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 5: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Central Coast	18060006	Pacific Ocean	*	*
Estrella	18060004	*	*	*
Monterey Bay	18060015	Monterey Bay	*	*
Pajaro	18060002	Pajaro River	*	*
Salinas	18060005	Salinas River	*	*

*Data not available

4.2 Principal Flood Problems

Table 6 contains a description of the principal flood problems that have been noted for Monterey County by flooding source.

Table 6: Principal Flood Problems

Flooding Source	Description of Flood Problems
Pacific Ocean	Flooding along the coast is typically associated with the simultaneous occurrence of very high tides, large waves, and storm swells during the winter. Oceanfront development has been hampered by the natural instability of the shoreline and the intense winter weather conditions. The winter of 1983 brought an unusual series of high tides, storm surges, and storm waves (Ott Water Engineers, Inc., 1984). Tsunamis create some of the most destructive natural water waves. As tsunami waves approach shallow coastal water, wave refraction; shoaling, and bay resonance amplify the wave heights. Storm centers from the southwest produce the type of storm pattern most commonly responsible for the majority of the serious coastal flooding. The strong winds and high tides that create storm surges are also accompanied by heavy rains. In some instances, high tides back up riverflows, which causes flooding at the river mouths. The most severe storms to hit the California coast occurred in 1978 and 1983, when high water levels were accompanied by very large storm waves. Significant storms and associated damage strike the Monterey Bay communities with a frequency of one large storm every 3 to 4 years (Ott Water Engineers, Inc., 1984).
Pajaro River	The two largest floods on the Pajaro River occurred in 1955 and 1958. The associated discharges on the Pajaro River for these events were 24,000 cfs and 23,500 cfs, respectively, at the Chittenden gage. The estimated return periods for these floods are 27 years and 26 years, respectively.

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Salinas River	The Salinas River has a history of flooding dating back to 1911. In March of 1911, the Salinas River was said to have flooded from its source to its mouth at the Pacific Ocean. The Salinas Valley flooded again in January 1914, February 1938, and in January 1952. The January 1952 flood was reported in the Salinas Californian as the highest since the 1911 flood. The Salinas River also flooded in April 1958, January 1966, January and February 1969, and February 1978 (FEMA, 1986). The headline in the March 11, 1911, issues of the Salinas Valley Rustler described storm conditions in the area graphically; "Most Destructive Storm in the History of the Oldest Inhabitant." The following account in the paper described flood conditions within the general area: Many old timers who have talked with the Rustler during the past week personally and over the phone all agree that it was the worst storm that ever visited Monterey, San Benito, and San Luis Obispo counties. Old ravines and gullies were deepened and widened and new ones cut through; the mountain roads were converted into deep gullies through which the waters rushed down to the valleys in a wild race to swell the ever increasing turbulence of the violent storms. Tuesday morning it was found that the San Lorenzo Wagon Bridge was gone and a great slice of Charles Bischof's and Bruce Douglass' town property was carried away. Thompson's Gulch guided the mountain torrent that took out the bridge of the county road that crosses the gulch near the Salinas River, so it has been impossible without an airplane to go north for nearly a week. Reports from contiguous territory east are still very meager, but the fact that telephone lines are down and roads washed out is sufficient warrant for fearing the worst. It is hoped that the loss, when it becomes know, may not prove so great as all seem to fear. The waters are not receding and the storm is over. It will cost $500,000 to $600,000 to repair county bridges in the three adjoining counties mentioned. The storms of January 1914 did significant damage throughout Monterey County. Bridges in King City, Soledad, Gonzales, Chualar, San Ardo, and Nacimiento were all washed out by raging floodwaters. Damage to county bridges was estimated to exceed $300,000, and damage to properties throughout the county came to over $1 million. The Salinas Daily Index of January 27, 1914, summarized conditions as follows: Monterey County has suffered an enormous loss through the damage and destruction of bridges. Passengers arriving from Soledad and Gonzales say private reports received at those places indicate the loss of all the bridges south of Chualar. The Bradley, San Ardo, San Lucas, King City, Soledad bridges are gone. Two spans of the Gonzales bridge have gone out. At Chualar, one end of the bridge has sunk two feet and is one foot out of line. At Gonzales, the people were this morning

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Salinas River (continued)	constructing a cable line over which to send food and supplies on the other side. The following account appeared in the January 29, 1914, issue of the Salinas Valley Rustler: The storm Friday and Saturday two weeks ago, which gave 5.05 inches of rain to this valley, probably precipitated several times that amount of rainfall on the Salinas Valley watershed, which is the largest in the world for the length of the valley. The springs, feeder streams and all watersheds were filled to overflowing when the next big storm came last Saturday, which started the Salinas River and larger streams and watercourses connecting with it on the wildest rampage kwon in the life of the oldest settler. At this point, the temporary approach to the Salinas River Bridge, built after the previous flood, was washed away together with 60 feet of the bank for a couple hundred yards. The river was bank-full, over 20 feet deep and half a mile wide – a seething torrent with a roar that could be heard for miles, which carried out jetties and in some places carried off the houses, barns and lands of farmers. In February 1938, Salinas River again flooded. The headline in the Rustler-Herald of Monday, February 14, stated: "Flood Takes Out Soledad Bridge-Continued Rain Starts Salinas River on First Flood in Many Years." Roaring waters carried away two spans of the steel Soledad Bridge early Friday night and the old wooden bridge across the Salinas River at Chualar. Streams in the district were setting high water records for many years, some residents declaring that even Friday morning they were higher than at any time since 1916. As tributaries of the Salinas River poured turbulent waters into the main channel, that stream was nearing flood stage Friday morning with the entire east channel here in King City full and before noon it started running down the entire west channel as well. Thursday night the Arroyo Seco River was already at flood stages and had inflicted severe damages to resorts and ranches along the stream. Many ranchers throughout the area were said to be stranded at home by washed out and impassible roads. Among them was Mrs. Peter Duckworth, reported marooned Friday by rising waters in Chalone Creek Canyon near Metz without an adequate supply of food. Friday morning the San Lorenzo was roaring bank to bank and before the crest reached here was flooding portions of the Bengard orchard just west of the San Lorenzo Highway Bridge. As noted in the Salinas Californian of January 16, 1952, was another of the significant flood years within Monterey County. The rampaging Salinas River, swelled by 6 days of heavy rain,

Table 6: Principal Flood Problems, continued

<table>
<tr><th>Flooding Source</th><th>Description of Flood Problems</th></tr>
<tr><td>Salinas River (continued)</td><td>
<blockquote>today had left its banks, flooded Spreckels Junction and forced evacuation by boat of several families in that area and also in Salinas on East John Street. The Salinas-Monterey Highway was closed at Spreckels Junction bridge and probably will not be opened until tomorrow.

Old-timers said the river was the highest it has been since the 1911 flood, and reports this morning from King City said that the stream in that area was rough and high. A crest of the river was expected today when water from yesterday's rain in the mountains reaches this area.</blockquote>
The Salinas area of the county was threatened with potential flood conditions in January 1956. However, conditions never reached a critical stage as described in the <u>Salinas Californian</u> of January 26th.
<blockquote>Rainfall in the Salinas Valley yesterday and this morning has raised the level of the Salinas River to an all-time high. The crest passed Spreckels about 10:30 a.m. and forced the closing of the Hilltown bridge early this afternoon.

There was more water in the river now than was the case in the pre-Christmas storms (1955). However, the water is flowing faster this time, principally because most of the brush and leaves in the channel were washed away during the Christmas rains.</blockquote>
The Salinas Californian carried the following account of flood conditions on February 9, 1962:
<blockquote>Heavy rains fell on Monterey County last night and this morning, leaving more than an inch of water throughout the Salinas Valley...

In Salinas, there was some flooding along South Abbott Street, in front of the California Rodeo grounds, on North Main Street, along Nacional Street and Pacific park and at the end of Palma Drive in Serra Park.</blockquote>
The Salinas River did not leave its banks and the flooding described above was the result of localized drainage problems. Flood conditions along the length of the Salinas River caused extensive damage during the storm of January 1966. Most of this damage was to agricultural crops; over 32,000 acres were inundated, at an estimated loss of $6,572,000. The cities in the county experienced some flooding and damage, although the rural areas and agricultural production were the most affected. As noted in the <u>Salinas Californian</u> on December 7th:
<blockquote>The Salinas River came booming down its bed during the early morning hours today, and by 9:00 a.m. was flowing from abutment to abutment under the new bridge on the Monterey-Salinas Highway.

The river peaked at Bradley at 4:30 a.m. this morning, some three feet above the level reached in the 1958 floods. The crest is expected to hit Salinas about 11 o'clock tonight according to Loran Bunte of the Monterey County Flood Control and Water Conservation District.</blockquote>
</td></tr>
</table>

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Salinas River (continued)	The mouth of the river is free, however, Bunte said, and flooding if any, will be minor. Conditions within the county were described as follows in the Salinas Californian on January 27th: The Salinas River cut a multi-million dollar swath of damage through the Salinas Valley from Bradley to the Pacific Ocean today. The valley has been awash in what County Water Engineer Loran Bunte calls the 1 -percent annual chance flood since Saturday evening. A flood crest only slightly lower than that which passed Spreckels at 40,000 cfs early this morning, is rolling up river from King City this afternoon. The Monterey County Flood Control and Water Conservation District office and the USACE say flooding will continue through Wednesday. Monterey County Administrator and Civil Defense Director Walter Mansfield declared the county a disaster area Sunday. His declaration triggers the mechanism through which the county may be compensated with federal funds for public facilities damaged by the flood. Salinas Valley agriculture, which sustained a $3,755,000 loss in the 1966 flood, will almost certainly be hit harder this year. One month later, the Salinas River again flooded. Once more, much damage occurred, as noted in the Salinas Californian on February 26th: The Salinas River, fast, deep and a mile wide, flowed at flood crest through the Salinas Valley this morn1ng, cutting a swath of muddy destruction. Route 1 was closed at 10:30 a.m. at Twin Bridges near Nashua Road as the river's crest surged toward the ocean, overflowing the highway and drowning the artichoke field delta around Mulligan Hill. The City of Salinas, which underwent some anxious moments fretting about the possibility of urban flooding last night, remained high and dry as the crest passed. City and county officials had feared a breakthrough by the river in the old Alisal Slough near the Firestone Tire & Rubber Company plant south of town, and the possible intrusion of flood water into the city's industrial area. But it didn't come, although lake-like ponds of surface water now ring the entire Salinas area. Flood conditions occurred again in the Salinas area and other portions of the county in February 1973, as noted in the Salinas Californian on February 13th: A fifth straight day of rain in the Salinas Valley created power failures, closed some Monterey County schools, and added to the mounting alarm of local farmers who face substantial revenue losses from the delay in planting spring crop. The principal flooding problem in Salinas has occurred on Williams Road near Alisal High School, according to Tom Wong, of the City Public Works Department. The water has been

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Salinas River (continued)	channeled down Williams Road from the foothills and nearby farmland, Wong said. But so far the flooding within the city hasn't been serious. In 1978, flood conditions again occurred in many areas of Monterey County, as noted in the Salinas Californian on February 13th: Pounding weekend rains have left Salinas Valley farmers looking at an estimated $20,000,000 in flood damages today. Damage was concentrated along the banks of the Salinas River from San Ardo out to the sea. More than 20,000 of the valley's 200,000 irrigated acres of land were covered with overflow waters from the Salinas River at some point Saturday or yesterday. As much as 1,000 acres of the valley's prime farmlands could be flooded beyond agricultural use this year. The assessment of damages, exceeding those of even the valley's 1969 flood, comes today from Flood Control Engineer Loran Bunte and Agricultural Commissioner Richard Nutter. Bunte said the $20,000,000 estimate is based upon his staff s assessment of damages as extensive but perhaps not quite as severe as those of 1969, placed at about $16,000,000. Allowing for inflation, that puts the new flood at about $20,000,000 he said. Damage would have been far more severe if not for the flood control capacities of both Nacimiento and San Antonio damns, Bunte said. Two dams, almost bone dry just two months ago, were holding 290,000 acre feet of water at Nacimiento and 137,500 acre feet at San Antonio this afternoon. That puts Nacimiento at peak holding capacities already, and with some waters being released over the weekend to leave required flood control storage reserves.
Sources within the City of Del Rey Oaks	In the City of Del Rey Oaks, excessive rainfall is the principal cause of flooding. Almost all of the city is subject to shallow sheet flow during the 100-year (1-percent annual chance) flood due to limited capacity of the storm drainage system. Floodwaters in excess of the storm-drain capacity will flow down the streets. Within the City of Del Rey Oaks, the most significant flood conditions occurred in 1938, 1952, 1958, and 1966. However, there are no historic records for the detailed study area. Therefore, information on the maximum flood of record and frequencies for other significant floods is unavailable. Following are descriptions of several floods affecting the Del Rey Oaks area. The severity of the floods and the relative development of the area have determined the extent of damage. The year 1969 was perhaps the most severe flood year for Monterey County. There were two distinct floods, one at the end of January and the second a month later at the end of February; each of these resulted in Monterey County being declared a disaster area. In each flood, both Salinas and Carmel Rivers went on a rampage. Damage from the storms was extremely costly. As noted in the Monterey Peninsula Herald of January 27, 1969: "County officials said they were certain that the $6.5 million flood damage caused along the Salinas River in 1966, of which 4 million was in Monterey County alone, would be

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within the City of Del Rey Oaks (continued)	exceeded." As previously noted, the storms of February 1969 also resulted in Monterey County being declared a disaster area. The City of Del Rey Oaks was not as seriously affected as other parts of the county. However, localized flooding did occur.
Sources within the City of Gonzales	In the City of Gonzales, the severity of floods and the relative development of the area vary from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Within the Gonzales area, the most significant flood conditions occurred in 1911, 1914, 1941, 1958, 1966, 1969, and 1978. The storms of January 1914 did significant damage throughout Monterey County. Bridges in Gonzales were all washed out by raging floodwaters. The winter of 1940-1941 produced record precipitation in the Gonzales area. As recorded in the March 6, 1941, issue of the Rustler-Herald: Clear skies and bright sunshine were welcomed here Wednesday, following a rainstorm which left 3.15 inches of precipitation. Water drained into the Soledad underpass Monday at such a rate that the pumping equipment was overtaxed and highway 101 was flooded to the height of 4 feet at the low point of the underpass. Traffic in both directions was halted for 5 hours and stretched a distance of several miles, until auxiliary pumps cleared the road's surface. Some traffic to King City was diverted over the Metz Road. Streets were flooded at Soledad, and old timers said the water was highest since 1910. In 1952, there was more significant precipitation in the Gonzales area. In spite of the heavy rainfall, damage in the area was not severe. As noted in the Rustler-Herald of January 17, 1952: The turbulent Salinas River, swollen by the heaviest rainfall in 10 years, is flowing bank to bank the length of the Salinas Valley. Through Paso Robles, where the Salinas is about 400 feet across, the river is described as flowing at a furious pace. Some damage has been done to shanties and the river bottom, livestock have been lost and properly threatened. According to rain figures compiled by the Rustler-Herald from L. Ray Milling Company records, this year to date has 8.69 inches. In 1914, the year the King City Bridge went out 5.7 inches had fallen by January 17. In February of 1938 the year the Soledad Bridge went out twice, 8.49 inches was recorded. This year the total to date is ahead of those record years. The torrential rains of early April 1958 brought flood conditions to numerous counties in northern California. Monterey County was no exception. As recorded in the Rustler-Herald of April 10, 1958, the Gonzales area was threatened by high water levels: Residents of SoMoCo were enjoying the first real run of sunshine in nearly a month this week following a series of damaging storms. Rainfall, which approached the all-time high of 1940-41,

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within the City of Gonzales (continued)	raised all streams in the area to flood levels. Flood conditions along the length of Salinas River caused extensive damage during the storms of January 1966. Most of this damage was to agriculture crops. Over 32,000 acres were inundated at an estimated damage of $6,572,000. The City of Gonzales was spared significant flooding as the water receded without leaving the banks of Salinas River near the city. Perhaps the most severe flood year in Monterey County was 1969. There were two floods, one at the end of January and the second at the end of February. Each of these resulted in Monterey County being declared a disaster area. Damage from the storms was extremely costly. As noted in the Monterey Peninsula Herald of January 27, 1969: County officials said they were certain that the 6.5 million flood damage caused along the Salinas River in 1966, of which 4 million was in Monterey County alone, would be exceeded. Conditions within the Gonzales area, though not as severe as in some places, were significant. As described in the Rustler, on January 23, 1969: In a county where rain is priceless, SoMoCo folks today were yelling uncle looking hopefully for a respite from the 4-day storm that plummeted the area with anywhere from 3.27 inches (City of King) to 16.04 inches (the Indians) during a 72-hour period from Saturday through Tuesday. On January 30, 1969, the Rustler summarized conditions in the area as follows: Flood damage in the County, when all figures are in, is expected to top the $10 million mark. Road Commissioner Bruce McLain set damage to County roads and bridges at $985,000. Damage to the county-owned sewage facility at Chualar is expected to send this figure over $1 million. City Manager Karel Swanson (King City) estimated damage to City property at $35,000. Hardest hit was the golf course where three holes were flooded and two bridges washed out. There was also extensive damage to city-owned sewage settling ponds near the San Lorenzo Creek and the road to the ponds was washed out. Swanson said an effort will be made to secure State and Federal funds for repair of City facilities. Damage to farmlands and crops is expected to be in the millions of dollars. Hundreds of acres of land along the Salinas River and the South County were flooded and there are reports of pumps inundated by flood waters. Gonzales' sewer system was also hard hit by the flood and preliminary estimate of damage was set at $125,000 by City Manager Irvin Goldman.
Sources within City of King City	The storms of January 1914 did significant damage throughout Monterey County. Bridges in King City were all washed out by raging floodwaters. Within King City, flood conditions were significant. In December 1931, the King City area received record precipitation. However, this rain was welcome in the area and did not cause flood conditions. The headlines in the Salinas Valley Rustler of January 1, 1932, noted: "Downpour

Table 6: Principal Flood Problems, continued

<table>
<tr><th>Flooding Source</th><th>Description of Flood Problems</th></tr>
<tr><td>Sources within City of King City (continued)</td><td>
Breaks December Record in King City, With Total for Month registering 5.67 Inches."
In February 1938, Salinas River again flooded. The headline in the Rustler-Herald of Monday, February 14, stated: "Flood Takes Out Soledad Bridge – Continued Rain Starts Salinas River on First Flood in Many Years."
Conditions with the city itself were not severe; however, flood conditions existed very near the corporate limits.
The winter of 1940-1941 produced record precipitation in the King City area, as recorded in the March 6, 1941, issue of the Rustler-Herald:
<blockquote>
Clear skies and bright sunshine were welcome here Wednesday, following a rainstorm which left 3.15 inches of precipitation.
This brings the total for the 1940-1941 season to 19.35 inches at King City. Not since in the 1890's has so much rain fallen here. Previous record rainfall for any one season locally was 17.21 inches recorded in 1910-1911.
Water drained into the Soledad underpass Monday at such a rate that the pumping equipment was overtaxed and Highway 101 was flooded to the height of 4 feet at the low point of the underpass. Traffic in both directions was halted for 5 hours and stretched a distance of several miles, until auxiliary pumps cleared the road's surface. Some traffic to King City was diverted over the Metz Road. Streets were flooded at Soledad, and old timers said the water was highest since 1910.
</blockquote>
Another year of significant precipitation in the King City area was 1952. In spite of the heavy rainfall, damage in the area was not severe. As noted in the Rustler-Herald of January 17, 1952:
<blockquote>
The San Lorenzo River was a regular torrent early this week and, according to Geraldine McCoy, of Metz, Chalone Creek is flowing for the first time since 1941. Water was in Monroe Canyon for the first time in 10 years.
King City and vicinity has little time to wring itself out between storms as the region is being pelted with the heaviest rainfall in 10 years. Already the total to date has surpassed the season total for last year and is ahead of the wettest year on record since 1909.
According to rain figures compiled by the Ruslter-Herald from L. Ray Milling Company records, this year to date has 8.69 inches. In 1914, the year King City bridge went out, 5.72 inches had fallen by January 17. In February of 1938, the year the Soledad Bridge went out twice, 8.49 inches was recorded. This year the total to date is ahead of those record years.
</blockquote>
The torrential rains of early April 1958 brought flood conditions to numerous counties in northern California. Monterey County was no exception. As recorded in the Rustler-Herald of April 10, 1958, King City received its share of flood damage.
<blockquote>
Residents of SoMoCo were enjoying the first real run of sunshine in nearly a month this week following a series of damaging
</blockquote>
</td></tr>
</table>

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within City of King City (continued)	storms. Rainfall, which approached the all-time high of 1940-1941, raised al streams in the area to flood levels. In King City, where the season total reached 21.81 inches, the San Lorenzo Creek overran its banks and inflicted heavy damage on the golf course and Tulio Bacciarini's adjacent field. The sixth and seventh holes are still unplayable and Bacciarini will have to replant seven of his ten acres which were sugar beets. At the North Hatchery, 23,000 two-week old chicks were drowned April 2. Mr. and Mrs. Harlo Orr who operate the hatcher, estimated damage at approximately $9,500. Flood conditions along the length of Salinas River caused extensive damage during the January 1966 storms. Most of this damage was to agricultural crops; over 32,000 acres were inundated, and damage was estimated at $6,572,000. King City experienced some flooding and damage, although the rural areas and agricultural production were affected most. As noted in the Rustler of December 8, 1966: Yards and yards of fill dirt were swept away as the San Lorenzo Creek climbed over its banks and flooded large portions of the King City golf course Tuesday. Most of the sixth and all of the seventh fairway were inundated as was much of Tulio Bacciarini's adjoining farmland. Portions of the eighth and ninth fairways were also flooded. Conditions within King City although not as severe as in some other areas, were significant. As described in the Rustler, January 23, 1969: Ironically, King City with the lightest rainfall in the area, was probably the hardest hit by the storm. Flood waters from the raging San Lorenzo Creek poured over the sixth, seventh, and eighth fairways at the King City Golf Course taking out the bridge at the sixth and stripping another at the seventh. Receding waters left tons of silt and debris on the fairways and greens. Heavy damage was also reported at Stephens' Repair Shop east of the railway tracks where flood waters ripped away large areas of the fence, ruined several motor cars, and actually carried away a complete 1957 Plymouth sedan and a Volkswagen. "They are probably on their way to the Pacific Ocean," reported Buck Stephens, co-owner of the business. The rampant San Lorenzo left untold damage in its wake, taking out a footbridge in the vicinity of Joaquin Murietta labor Camp on Bitterwater Road and overflowing into several farm fields east of King City. The Salinas River was also flowing bank to bank with the Highway 101 bridges in King City and took on additional force downstream when joined by the raging Arroyo Seco near Soledad. One week later, on January 30, 1969, the Rustler summarized conditions in the area as follows: Flood damage in the County, when all figures are in is expected to top the $10 million mark. Road Commissioner Bruce McLain

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within City of King City (continued)	set damage to County roads and bridges at $985,000. Damage to the county-owned sewage facility at Chualar is expected to send this figure over $1 million. City manager Karel Swanson (King City) estimated damage to City property at $35,000. Hardest hit was the golf course where three holes were flooded and two bridges washed out. There was also extensive damage to city-owned sewage settling ponds near the San Lorenzo Creek and the road to the ponds was washed out. Swanson said an effort will be made to secure State and Federal funds for repair of City facilities. Villa Way through the new Bengard subdivision in King City, was covered with flood water when San Lorenzo Creek, at its all-time high, poured over its banks and an adjacent manmade levee. Damage to farmlands and crops is expected to be in the millions of dollars. Hundreds of acres of land along the Salinas River and the South County were flooded and there are reports of pumps inundated by flood waters. Gonzales' sewer system was also hard hit by the flood and preliminary estimate of damage was set at $125,000 by City Manager Irvin Goldman. The winter of 1972-73 again brought flood conditions to the King City area, as recorded in the Rustler of February 15, 1973: City crewman and a handful of volunteers made an attempt to save the King City Golf Course from flood damage Saturday afternoon as the raging San Lorenzo Creek lapped onto the fairway just off the sixth green. However, heavy rains through the night pushed the creek level ever higher and Sunday morning water poured over and around the sandbag barricade, inundating the green and portions of the fairway. In 1978, flood conditions once more occurred in the King City area. As noted in the Rustler of February 16, 1978: The Salinas River as seen from the old San Lucas Bridge, looked like the muddy Mississippi last weekend as it stretched bank to bank. At the Allen Giudici Ranch just north of the bridge, the river overflowed its east bank flooding about 40 acres of farmland. Considerable flooding was also reported from the Mission District north. The article stated that flood damage in King City proper was minimal. The rural areas along Salinas River received the brunt of the storm runoff.
Sources within the City of Marina	In the City of Marina, sources of flooding come from the Salinas River, tsunami (sea waves generated from oceanic earthquakes, submarine landslides; and volcanic eruptions) run-up, Pacific Ocean storms which hit the coast, and blocked storm drains.
Sources within the City of Monterey	In the City of Monterey, the El Estero area was again victimized by the March floods of 1941. The March 3 issues of the Monterey Peninsula Herald carried the following description of flood conditions in this area: El Estero swept over its banks Saturday and threatened to assume even more damaging proportions today as local rain

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within the City of Monterey (continued)	gauges ticked off a record precipitation of nearly 3-1/2 inches of continuous rainfall in the past four days... Del Monte Avenue has been completely closed since Saturday, with traffic detoured around Fremont Street, as El Estero flood waters made a canal of the first aerial out of Monterey. Roads around El Estero are navigable only by submarine and basements and first floors in Oak Grove are inundated. A dramatic storm hit the Monterey Peninsula in January 1943. The City of Monterey itself was more fortunate than some surrounding areas. Local street flooding was experienced in the city at the height of the downpour, but it did not create lingering flood conditions. However, precipitation that occurred nearby was especially dramatic. The following description appeared in the January 22 issue of the Monterey Peninsula Herald: A downpour of cloudburst proportions flooded upper reaches of the Carmel Valley during Monterey Peninsula's worst storm in a quarter century, it was revealed as reports began coming in from the outlying regions today. While counting the storm damage continued to occupy local residents, it was reported that 5.40 inches of rain had fallen at San Clemente Dam in the 48-hour period ending at 9 a.m. today. During most of yesterday, over 6 feet of water was thundering over the spillway at the rate of 8,000 cubic feet per second (cfs), enough to fill the dam 7 times each day. It is estimated by water company engineers that enough water passed over the spillway during the storm to supply the Monterey Peninsula for the next four years. The traditional areas of the city that were flood prone again experienced severe conditions in 1952. As noted in the January 15 issue of the Monterey Peninsula Herald: Monterey police barricaded Del Monte Avenue below El Estero at 9 a.m. today after El Estero overflowed its banks on two sides. Traffic later was closed over the Pear Street Extension and the two bridges across El Estero when flood waters completely inundated Camino Aguajito near third Street. Fremont remained the one road north off the Peninsula, and pumps were keeping portions of Fremont open where the runoff from Iris Canyon and other streams overflowed their normal drainage... City manager Walter Hahn, Jr., today warned Monterey motorists to be extremely cautious while driving. The storms have damaged the street system seriously, he said, and it may be weeks before they can be repaired. Hahn said the damage to Monterey streets would amount to between $50,000 and $100,000. Moderate flood conditions occurred within the City of Monterey in January 1956. The Monterey Peninsula Herald carried the following account on January 26: A car stalled on Josselyn Canyon Road near the entrance to Santa Catalina School nearly disappeared under flood waters this morning. The car's owner, Kelsey Williams of 1243 Josselyn

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within the City of Monterey (continued)	Canyon Road, said his brakes failed and the car ran into the lake at about 10:15 a.m. Then the water backed up from a clogged was only up to the hubcaps of the car. He went home for his jeep, but when he got back, the water had risen almost to the windows of the car. Elsewhere in Monterey, gullies on San Bernabe Drive and on Via Paraiso in the Monte Regio area caused bad flooding in low spots on those streets. Isabella Street in the Monte Vista section of Monterey and County Road at the railroad crossing near Pacific Grove were reported seriously washed away by heavy water flow. The torrential rains of early April 1958 brought flood conditions to numerous counties in northern California. Monterey County was no exception. The following account in the Monterey Peninsula Herald on April 3 gives a vivid pictures of conditions in the City of Monterey: The Monterey Peninsula's worst storm of modern times smashed the area yesterday and last night and caused untold thousands of dollars of damage… Hardest hit of the Peninsula communities was Monterey. El Estero spilled out onto Del Monte Avenue, closing the thoroughfare… Streets were broken in several spots in the Monte Vista and Monte Regio areas. In addition, virtually every street in the two hilly areas this morning was covered with remnants of debris and mud that were spilled onto them during the intense storm. At Pearl and Houston Streets, the pavement broke over a storm drain and exposed a hole about four feet wide and four feet deep. A motorist told police his car ran into the hole, but bounced in and out of it. Of a somewhat humorous note was the fact that the Chamber of Commerce office at El Estero was flooded out this morning and could not be opened for business. As a result, records of past rainfalls kept in the office were inaccessible.. The basement of Larket House, state monument at Jefferson and Calle Principal, was flooded. The raging water on city streets nearly caused a tragedy involving a public employee who was trying to keep the culverts clear of debris. A Monterey public works department employee narrowly escaped death during last night's torrential rains when he accidentally was swept into a culvert. The man, William Scopell, 46, of 230 Foam Street, Monterey, was carried about 40 feet through the culvert. He was rescued by Monterey Police Captain Robert Trenner. Trenner said Scopell jetted out of the lower end of the 30-inch pipe 'like a bullet." As the storm subsided, estimates of damage were calculated. As noted in the April 7 issue of the Monterey Peninsula Herald, City Manager Alfred D.

Table 6: Principal Flood Problems, continued

<table>
<tr><th>Flooding Source</th><th>Description of Flood Problems</th></tr>
<tr><td>Sources within the City of Monterey (continued)</td><td>Coons guessed that total flood damage in Monterey alone might amount to between $300,000 and $400,000.

Although not as serious as the 1958 flooding (or that to come in 1969), flood conditions did exist within the City of Monterey in December 1966. As chronicled in the December 6 issues of the <u>Monterey Peninsula Herald</u>:

> Highway warning signs tell the story at several spots along Fremont in both Seaside and Monterey this morning. Lanes of traffic were closed at El Estero in Monterey and other intersections in Seaside.

> The flood conditions also affected other areas of the city: In Monterey, the most serious flooding problem occurred during the night in the Fremont-Perry Land area where water entered the basements of several businesses and houses.

The year 1969 was perhaps the most severe flood year for Monterey County. There were two distinct floods, one at the end of January and the second a month later at the end of February; each of these resulted in Monterey County being declared a disaster area. In each flood, both Salinas and Carmel Rivers went on a rampage. Damage from the storms was extremely costly. As noted in the <u>Monterey Peninsula Herald</u> of January 27, 1969; "County officials said they were certain that the $6.5 million flood damage caused along the Salinas River in 1966, of which 4 million was in Monterey County alone, would be exceeded."

Although the City of Monterey received extreme precipitation, over 8.5 inches for the month of January compared to less than 4 inches in a normal year, the City of Monterey itself fared much better than unincorporated areas of the county and some other surrounding communities. Results of the January deluge within the city caused localized flooding of streets, partial flooding of El Estero, and closing of Del Monte Avenue for short periods of time.

As previously noted, the storms of February 1969 also resulted in Monterey County being declared a disaster area. Once again, the City of Monterey was not as seriously affected as other parts of the county. However, localized flooding did occur.

In February 1978, moderate flood conditions again occurred in Monterey. This precipitation produced moderate flooding in downtown streets, which cleared within 1 or 2 hours.</td></tr>
<tr><td>Sources within Monterey County, Unincorporated Areas</td><td>In Monterey County, investigation of flooding from 1911 through 1978 indicates that flood conditions and flood damage were experienced in portions of the county in March 1911, January 1914, February 1922, November 1926, December 1931, February 1937, February 1938, March 1941, January 1943, February 1945, January 1952, December 1955, January 1956, April 1958, February 1962, December 1966, January and February 1969, February 1973, and February 1978. In rural areas, flooding in early years was often viewed as an asset rather than a liability. The need for water to irrigate agricultural crops outweighed the damage done by floodwaters. In later years, as development increased, flood damage became a more important consideration.

Following are descriptions of the flood years in Monterey County. The severity</td></tr>
</table>

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within Monterey County, Unincorporated Areas (continued)	of the floods, and the relative development of the area, vary from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Within the county, the most significant flood conditions occurred in 1911, 1914, 1938, 1941, 1952, 1958, 1966, 1969, and 1978. The headline in the March 8, 1911, issue of the Salinas Daily Index described storm conditions in the area graphically: "Disastrous effects of the storm in the Salinas Valley is unprecedented." The following account in the paper described the flood conditions within the general area: This storm was the most disastrous in the history of Monterey County and the damaged property is unprecedented. It is reported that more than 2,000 acres of valuable farming land has been destroyed along the course of the Salinas River by the cutting away of the banks of that stream, which is now a raging torrent, freighted with debris, from its source to its mouth on the Bay of Monterey, near Moss Landing. At 10 o'clock the river was said to be higher than at any time since the winter of 1862. Flood conditions in the Spreckles area were representative of many sections of the county, as described in the Salinas Daily Index. At Spreckles, all the lowlands are flooded and the water comes to within thirty feet of the end of the factory, which is protected by a heavy rock embankment. The river is nearly a mile wide at some points there. The electric light plant and the pumping plant, as well as two large oil tanks near the factory, are half submerged. The No. 2 tank has been torn loose... Barns and outbuildings and farmhouses all along the river bottom south of Spreckles are under water, and tops of a few being all that remain. Everything not securely anchored has been swept away. The storms of January 1914 did significant damage throughout Monterey County. The following account appeared in the January 26th issue of the Salinas Daily Index: Flood conditions prevailed today everywhere throughout the Salinas Valley. Bridges have been carried away, railroad trains tied up, telephone and telegraph service interrupted, and inestimable damage done as a result of the torrential rains of Saturday night and Sunday. Salinas has been isolated as far as communications south to Soledad and north to Castroville is concerned... Damage to bridges in the county was staggering. On January 27th, the Salinas Daily Index described conditions as follows: Monterey County has suffered an enormous loss through the damage and destruction of bridges. Passengers arriving from Soledad and Gonzales say private resorts received at those places indicate the loss of all the bridges south of Chualar. The Bradley, San Ardo, San Lucas, King City, Soledad bridges are gone. Two spans of the Gonzales bridge have gone out. At Chualar, one end of the bridge has sunk two feet and is one foot

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within Monterey County, Unincorporated Areas (continued)	out of line. At Gonzales, the people were this morning constructing a cable line over which to send food and supplies on the other side. Damage to these bridges was estimated to exceed $300,000, and damage to properties throughout the county came to over $1 million. A Christmas storm in 1931 brought flood conditions to many portions of Monterey County. Precipitation was dramatic; on the Carmel River the San Clemente Dam overflowed capacity. As noted in a December issue of the Monterey Peninsula Herald: "Fed by storm swollen streams, San Clemente Dam staged the most sensational rise in history last night, climbing 25 feet in 15 hours." The storm continued for 5 days, bringing damage to Carmel Valley, big Sur, and the Monterey area. In February 1938, the Salinas River again flooded. The headline in the Salinas Index-Journal of February 12th stated: "No, not the Mississippi – just the Salinas River." Conditions in the county were serious. Going out with a roar that was hardly heard above the driving rain and lashing flood waters of the Salinas River, 208 feet (2 spans) of the Soledad bridge on U.S. Highway 101 was swept downstream at 9:15 p.m. Friday night, adding wreckage to the swollen river which by Saturday afternoon appeared to have reached the peak of one of the severest floods in the valley in years. At a dozen points along the 70-mile river front from King City to the coast, the churning waters brought to an unprecedented high by the heavy rains in the mountains and valley, brought damage to bridges, crops and roads, halted traffic and marooned an estimated 60 families along the River Road on the west side of the river. The winter of 1940-41 produced flood conditions within several areas of Monterey County, as recorded in the March 4, 1941, issue of the Salinas Index-Journal. The River Road a half-mile south of Spreckels was flooded and motorists were advised not to attempt to negotiate it as it also was under water at other points southward. The Arroyo Seco Road is closed to traffic as is the Piooacles route out of Soledad. A washout also has blocked the Jamesburg Road in the upper Carmel Valley. Both the piers and the foundations of the approaches to the Toro Creek bridge have been washed out by flood waters, making the span unsafe for traffic. Streets were flooded at Soledad, and old-timers said that the water was the highest since 1910. At the Trescony Ranch in the San Lucas district, 23 inches or rain has fallen this year to make it the wettest sustained period in history and the largest amount of rainfall for any season since 1890. A dramatic storm hit Monterey County in February 1945. However, due to the prevailing dry conditions, no appreciable damage resulted from this downpour. The following account appeared in the Salinas Californian on February 2:

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within Monterey County, Unincorporated Areas (continued)	Heavy rains which drenched Salinas and Monterey county yesterday and last night brought a total of 1.69 inches of rainfall in a 36-hour period... The heavy rainfall was general all over the county, including the southern section of the county, with a report from San Lucas of 3.82 inches for the entire storm. The downpour ended one of the driest spells on record for this time of year and was welcomed by farmers and cattlemen all through the state. Little damage was reported in this locality, all creeks were up but there were no floods. As noted in the Salinas Californian of January 16, 1952, was another of the significant flood years within Monterey County. The rampaging Salinas River, swelled by 6 days of heavy rain, today had left its banks, flooded Spreckles Junction and forced evacuation by boat of several families in that area and also in Salinas on East John Street. The Salinas-Monterey highway was closed at Spreckles Junction bridge and probably will not be opened until tomorrow... Old-timers said the river was the highest it has been since the 1911 flood, and reports this morning from King City said that the stream in that area was rough and high. A crest of the river was expected today when water from yesterday's rain in the mountains reaches this area... The Salinas area of the county was threatened with potential flood conditions in January 1956. However, conditions never reached a critical stage as described in the Salinas Californian of January 26th. Rainfall in the Salinas Valley yesterday and this norming has raised the level of the Salinas River to an all-time high. The crest passed Spreckles about 10:30 a.m. and forced the closing of the Hilltown bridge early this afternoon... There was more water in the river now than was the case in the pre-Christmas storms (1955). However, the water is flowing faster this time, principally because most of the brush and leaves in the channel were washed away during the Christmas rains. The torrential rains of early April 1958 brought flood conditions to numerous counties in northern California. Monterey was no exception, as outlined in the Salinas Californian on April 3rd. Flood waters swept through Monterey County today as streams in the Salinas and Carmel Valley watersheds overflowed their banks, closed roads, endangering residents, drowning poultry, and damaging homes. The disaster proclaimed through the state yesterday by Governor Goodwin knight became a reality early this morning after a near record cloudburst slashed across the county, accompanied by high winds. This was the overall picture today, even as the weatherman warned that additional heavy rain squalls are expected tonight:

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
Sources within Monterey County, Unincorporated Areas (continued)	1. The Carmel River has gone over its banks flooding numerous home tracks bordering the river the length of the valley. 2. The Nacimiento Dam was reported filled and water is being released slowly to take off the peak. 3. Nearly 3-1.2 inches of rain in 24 hours in the Arroyo Seco has turned the placid stream into a raging torrent ripping through summer cabin sites on its way to the already swollen Salinas River. In the Greenfield area, a marooned family was rescued by Army helicopters. 4. The Salinas River has overflowed its banks in numerous places, causing the closing of the River and East Garrison Roads. Water may overflow the Salinas-Monterey Highway as a result of the record flow in the Arroyo Seco River. 5. San Lorenzo Creek overflowed its banks in King City and spread through a chicken ranch, drowning 23,000 birds. 6. Coast Highway 1 to the Big Sur area was closed to automobile traffic by numerous slides. The Salinas Californian carried the following account of flood conditions on February 9, 1962: Heavy rains fell on Monterey County last night and this morning, leaving more than an inch of water throughout the Salinas Valley... In Salinas, there was some flooding along South Abbott Street, in front of the California Rodeo grounds, on North Main Street, along Nacional Street and Pacific Park and at the end of Palma Drive in Serra Park. The year 1969 was perhaps the most severe flood year for Monterey County. There were two distinct floods, one at the end of January and the second a month later at the end of February; each of these resulted in Monterey County being declared a disaster area. In each flood, both Salinas and Carmel Rivers went on a rampage. Damage from the storms was extremely costly. As noted in the Monterey Peninsula Herald of January 27, 1969; "County officials said they were certain that the $6.5 million flood damage caused along the Salinas River in 1966, of which 4 million was in Monterey County alone, would be exceeded." In 1978, flood conditions again occurred in many areas of Monterey County, as noted in the Salinas Californian on February 13th: Pounding weekend rains have left Salinas Valley farmers looking at an estimated $20,000,000 in flood damages today. Damage was concentrated along the banks of the Salinas River from San Ardo out to the sea. More than 20,000 of the valley's 200,000 irrigated acres of land were covered with overflow waters from the Salinas River at some point Saturday or yesterday. As much as 1,000 acres of the valley's prime farmlands could be flooded beyond agricultural use this year.

Table 6: Principal Flood Problems, continued

Flooding Source	Description of Flood Problems
	The assessment of damages, exceeding those of even the valley's 1969 flood, comes today from Flood Control Engineer Loran Bunte and Agricultural Commissioner Richard Nutter. Bunte said the $20,000,000 estimate is based upon his staff s assessment of damages as extensive but perhaps not quite as severe as those of 1969, placed at about $16,000,000. Allowing for inflation, that puts the new flood at about $20,000,000 he said. Damage would have been far more severe if not for the flood control capacities of both Nacimiento and San Antonio damns, Bunte said. Two dams, almost bone dry just two months ago, were holding 290,000 acre feet of water at Nacimiento and 137,500 acre feet at San Antonio this afternoon. That puts Nacimiento at peak holding capacities already, and with some waters being released over the weekend to leave required flood control storage reserves. Heavy rains caused extensive flooding and erosion on March 3, 1983, in the Salinas River Valley. Farmland and roadways were damaged, and Monterey County was declared a disaster area. The unofficial peak discharge at the Spreckels gage was 63,172 cfs, close to a 50-year (2-percent annual chance) flood. (The USGS has not verified the Spreckels gage discharge.) The San Antonio and Nacimiento Dams and associated reservoirs aided in attenuating the flows that occurred in the valley.

Table 7 contains information about historic flood elevations in the communities within Monterey County.

Table 7: Historic Flooding Elevations

[Not Applicable to this Flood Risk Project]

4.3 Non-Levee Flood Protection Measures

Table 8 contains information about non-levee flood protection measures within Monterey County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 8: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Carmel River	Los Padres Dam	Dam	Upper reach of river basin	Operated by the California American Water Company of Monterey, California. No flood-control storage is allocated in reservoir.

Table 8: Non-levee Flood Protection Measures, continued

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Carmel River, continued	Los Padres Dam	Dam	Upper reach of river basin	The dam has little effect on reducing peak discharges downstream late in the flood season when storage space is available as a result of summer drawdown for water supply. The dam has little effect on reducing peak discharges downstream late in the flood season once they have become full. Los Padres Dam is operated in a manner to maintain as much water as possible in San Clemente Dam.
Carmel River	San Clemente Dam	Dam	Approximately 1,875 feet upstream of San Clemente Road	Operated by the California American Water Company of Monterey, California. No flood-control storage is allocated in reservoir. The dam has little effect on reducing peak discharges downstream late in the flood season when storage space is available as a result of summer drawdown for water supply. The dam has little effect on reducing peak discharges downstream late in the flood season once they have become full. After the flood season has passed, flashboards are installed to raise the spillway crest elevation by 12 feet. The flashboards are removed on approximately October 1 of each year, prior to flood season.
Carmel River	N/A	Dike	*	*
Nacimiento River	Nacimiento Dam	Dam	Lake Nacimiento, Approximately 15 miles northwest of El Paso de Robles in San Luis Obispo County	Constructed in 1957 by Monterey County and intercepts runoff from a drainage area of 319 square miles. The reservoir impounds 350,000 acre-feet, 150,000 acre-feet of which is for flood control.

Table 8: Non-levee Flood Protection Measures, continued

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Nacimiento River, continued	Nacimiento Dam	Dam	Lake Nacimiento, Approximately 15 miles northwest of El Paso de Robles in San Luis Obispo County	Ten thousand acre feet of dead storage lies below the outlet works invert level. The 150,000 acre-foot flood-control storage is equivalent to 8.76 inches of runoff. A total of 200,000 acre-feet (including the 10,000 acre-feet dead storage) are for water conservation and recreation. The water is stored during dry periods. Most of the released water percolates into the gravelly streambed and goes into underground storage in the Salinas Valley, from which it is pumped primarily for irrigation. Storage greater than 200,000 acre-feet occurs in the reservoir only during and just after major storms. Following a flood, the reservoir is drawn down to the 200,000 acre-foot level to provide storage for subsequent flood flows. Nacimiento Dam has a significant effect on the 1- and 500-year (0.2-percent annual chance) flood flows.
Salinas River	Salinas Dam	Dam	Lake Santa Margarita, Near Santa Margarita in San Luis Obispo County	Completed in 1942 as a water-supply facility for Camp San Luis Obispo. The dam is approximately 2 miles upstream from Pilitas Creek and 7.5 miles northwest of the Town of Pozo, and intercepts runoff from a drainage area of 112 square miles. The reservoir, Lake Santa Margarita, is operated for water conservation purposes only and has an estimated average annual yield of 14,000 acre-feet.

Table 8: Non-levee Flood Protection Measures, continued

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Salinas River, continued	Salinas Dam	Dam	Lake Santa Margarita, Near Santa Margarita in San Luis Obispo County	The dam impounds a usable water-supply capacity of approximately 26,000 acre-feet to its spillway crest and has a maximum capacity of 44,500 acre- feet to the dam crest. The only dependable storage for flood control is spillway surcharge. The effect of reservoir operation on the discharge hydrograph near King City is negligible
San Antonio River	San Antonio Dam	Dam	Approximately 7 miles southwest of Bradley on the San Antonio River in Monterey County	Constructed by the Monterey County in 1965 the dam intercepts runoff from a drainage area of 330 square miles. The dam impounds 350,000 acre-feet below its spillway crest. San Antonio Reservoir has 300,000 acre feet of storage for water conservation, including 20,000 acre-feet of dead storage and 50,000 acre-feet storage for flood control. The flood-control storage is equivalent to 2.89 inches of runoff. The San Antonio Dam has a significant effect on the 100- (1-percent annual chance) and 500-year (0.2-percent annual chance) flood flows.
San Miguel Canyon Creek	Check Dam	Dam	Approximately 640 feet upstream of Blackie Road	*
Santa Rita Creek	N/A	Concrete Lined Channel	Between U.S. Highway 101 and Santa Rita Street	The concrete lining on Santa Rita Creek has the effect of confining the 1- and 0.2-percent annual chance flow along the channel between U.S. Highway 101 and Santa Rita Street.

*Data not available

4.4 Levees

For purposes of the NFIP, FEMA only recognizes levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with comprehensive floodplain management criteria. The Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10) describes the information needed for FEMA to determine if a levee system reduces the risk from the 1% annual chance flood. This information must be supplied to FEMA by the community or other party when a flood risk study or restudy is conducted, when FIRMs are revised, or upon FEMA request. FEMA reviews the information for the purpose of establishing the appropriate FIRM flood zone.

Levee systems that are determined to reduce the risk from the 1% annual chance flood are accredited by FEMA. FEMA can also grant provisional accreditation to a levee system that was previously accredited on an effective FIRM and for which FEMA is awaiting data and/or documentation to demonstrate compliance with Section 65.10. These levee systems are referred to as Provisionally Accredited Levees, or PALs. Provisional accreditation provides communities and levee owners with a specified timeframe to obtain the necessary data to confirm the levee's certification status. Accredited levee systems and PALs are shown on the FIRM using the symbology shown in Figure 3 and in Table 9. If the required information for a PAL is not submitted within the required timeframe, or if information indicates that a levee system not longer meets Section 65.10, FEMA will de-accredit the levee system and issue an effective FIRM showing the levee-impacted area as a SFHA.

FEMA coordinates its programs with USACE, who may inspect, maintain, and repair levee systems. The USACE has authority under Public Law 84-99 to supplement local efforts to repair flood control projects that are damaged by floods. Like FEMA, the USACE provides a program to allow public sponsors or operators to address levee system maintenance deficiencies. Failure to do so within the required timeframe results in the levee system being placed in an inactive status in the USACE Rehabilitation and Inspection Program. Levee systems in an inactive status are ineligible for rehabilitation assistance under Public Law 84-99.

FEMA coordinated with the USACE, the local communities, and other organizations to compile a list of levees that exist within Monterey County. Table 9, "Levees," lists all accredited levees, PALs, and de-accredited levees shown on the FIRM for this FIS Report. Other categories of levees may also be included in the table. The Levee ID shown in this table may not match numbers based on other identification systems that were listed in previous FIS Reports. Levees identified as PALs in the table are labeled on the FIRM to indicate their provisional status.

Please note that the information presented in Table 9 is subject to change at any time. For that reason, the latest information regarding any USACE structure presented in the table should be obtained by contacting USACE and accessing the USACE national levee database. For levees owned and/or operated by someone other than the USACE, contact the local community shown in Table 31.

Table 9: Levees

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Monterey County, Unincorporated Areas	Bennett Slough	North Bank	*	No	73	*	06053C0058H
Monterey County, Unincorporated Areas	Bennett Slough	South Bank	*	No	74	*	06053C0058H 06053C0059H
Monterey County, Unincorporated Areas	Bennett Slough	North Bank	*	No	75	*	06053C0058H 06053C0059H
Monterey County, Unincorporated Areas	Carmel River	North Bank	Private Owner	No	10125B2_2392	*	06053C0316H
Monterey County, Unincorporated Areas	Carmel River	South Bank	Private Owner	No	10125B_4457	*	06053C0316H 06053C0320H
Monterey County, Unincorporated Areas	Elkhorn Slough	South Bank	Private Owner	No	10125B2_278	*	06053C0078G
Monterey County, Unincorporated Areas	Elkhorn Slough	South Bank	Private Owner	No	10125B2_927	*	06053C0057H
Monterey County, Unincorporated Areas	Elkhorn Slough	South Bank	Private Owner	No	10125B2_1912	*	06053C0067H
Monterey County, Unincorporated Areas	Elkhorn Slough	South Bank	Private Owner	No	10125B2_2618	*	06053C0059H 06053C0067H
Monterey County, Unincorporated Areas	Elkhorn Slough	South Bank	Private Owner	No	10125B2_5515	*	06053C0059H 06053C0067H
Monterey County, Unincorporated Areas	Moro Cojo Slough	South Bank	*	No	29	*	06053C0067H
Monterey County, Unincorporated Areas	Moro Cojo Slough	South Bank	*	No	30	*	06053C0067H

Table 9: Levees, continued

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Monterey County, Unincorporated Areas	Moro Cojo Slough	South Bank	*	No	31	*	06053C0067H
Monterey County, Unincorporated Areas	Moro Cojo Slough	South Bank	*	No	82	*	06053C0067H
Monterey County, Unincorporated Areas	Pajaro River	South Bank	*	Yes	10125B2_1295	*	06053C0020G 06053C0056H
Monterey County, Unincorporated Areas	Pajaro River	South Bank	*	Yes	10125B2_2256	*	06053C0020G 06053C0038G 06053C0040G
Monterey County, Unincorporated Areas	Pajaro River	South Bank	*	Yes	10125B2_2305	*	06053C0040G
Monterey County, Unincorporated Areas	Pajaro River	North Bank	*	Yes	10125B2_2622	*	06053C0039G 06053C0040G 06053C0043G
Monterey County, Unincorporated Areas	Pajaro River	South Bank	*	Yes	10125B2_2919	*	06053C0020G
Monterey County, Unincorporated Areas	Pajaro River	South Bank	*	Yes	10125B2_2961	*	06053C0040G
Monterey County, Unincorporated Areas	Pajaro River	North Bank	*	Yes	10125B2_3578	*	06053C0040G
Monterey County, Unincorporated Areas	Pajaro River	South Bank	*	Yes	10125B2_4514	*	06053C0040G
Monterey County, Unincorporated Areas; Soledad, City of	Salinas River	North Bank	*	*	10125B2_2014	*	06053C0612G 06053C0625G

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.

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
Arroyo Del Rey	At Laguna Del Rey Inflows	14.3	265	*	480	560	*	1,130
Arroyo Del Rey	At Roberts Lake Outflow	14.3	110[1]	*	310[1]	480[1]	*	1,020[1]
Arroyo Del Rey	At Fremont Boulevard	13.1	250[1]	*	490[1]	675[1]	*	1,410[1]
Arroyo Del Rey	At Kolb Avenue	13.1	240[1]	*	450[1]	525[1]	*	1,090[1]
Arroyo Del Rey	At Fort Ord South Boundary Road	10.0	250	*	565	720	*	1,450
Arroyo Seco	At Soledad gage	244	20,500	*	34,200	40,100	*	53,700
Arroyo Seco	At Greenfield gage	113	14,900	*	24,100	28,000	*	37,100
Calera Creek	At Confluence with San Benancio Creek	25.4	464	*	1,274	1,768	*	3,305
Calera Creek	At Confluence with Watson Creek	12.7	249	*	689	962	*	1,824
Canyon Del Rey	At Blue Larkspur Lane	5.3	120	*	210	295	*	990
Canyon Del Rey	Downstream of Laguna Seca Ranger Station	2.2	30[1]	*	230[1]	275[1]	*	440[1]

*Not Calculated for this Flood Risk Project

[1]Reduced or constant flow values due to capacity restrictions

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
Canyon Del Rey	At Laguna Seca Ranger Station	2.2	140	*	300	365	*	600
Carmel River	Pacific Ocean	254	9,800	*	19,000	23,300	*	33,500
Carmel River	Below Potrero Creek (USGS Gage near Carmel)	246	9,500	*	18,500	22,700	*	32,600
Carmel River	Below Robinson Canyon Creek	228	9,300	*	17,300	20,900	*	29,200
Carmel River	Below Los Garzas Creek	210	8,600	*	16,100	19,400	*	27,200
Carmel River	Below Hitchcock Creek (USGS Gage Robles Del Rio)	193	8,400	*	14,900	17,700	*	24,100
Carmel River	Below Tularcitos Creek	184	8,000	*	14,300	16,900	*	23,100
Carmel River	Below San Clemente Dam	125	5,700	*	10,200	12,100	*	16,600
Castroville Boulevard Wash	At Elkhorn Road	3.5	25	*	80	125	*	270
Cornecob Canyon Creek	At Confluence with Elkhorn Slough	3.0	85	*	875[1]	970[1]	*	1,560[1]

*Not calculated for this Flood Risk Project

[1]Reduced or constant flow values due to capacity restrictions

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
Cornecob Canyon Creek	At Elkhorn Road (upstream crossing)	2.9	85	*	1,075[1]	1,350[1]	*	2,200[1]
Corncob Canyon Creek	At Lewis Road	1.5	10	*	65	95	*	190
Del Monte Lake	Total Inflow	2.9	105	*	285	340	*	550
Del Monte Lake	At Josselyn Canyon Creek	1.3	40	*	110	145	*	250
Del Monte Lake	At State Highway 68 Canyon	0.8	45	*	100	120	*	200
East Branch Gonzales Slough	At U.S. Highway 101	2.3	55	*	135	195	*	260
El Estero Lake	Total Inflow	4.2	210	*	460	550	*	930
El Estero Lake	East Inflow	2.4	90	*	220	270	*	465
El Estero Lake	West Inflow	1.2	60	*	130	160	*	270
El Toro Creek	At El Toro Gage (11152540)	31.9	574	*	1,560	2,160	*	4,020
Elkhorn Slough	At State Highway 1	48.7	370[2]	*	960[2]	1,200[2]	*	2,330[2]
Elkhorn Slough	At Elkhorn Road	34.0	475	*	1,370	1,740	*	3,460
Elkhorn Slough	At Maher Road	22.0	410	*	1,200	1,530	*	3,021

*Not calculated for this Flood Risk Project

[1]Includes discharge from Pajaro River spill

[2]Reduction in flow values due to overbank storage in tidal flats

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
Elkhorn Slough	At U.S. Highway 101	4.4	120	*	325	400	*	760
Gabilan Creek	At Herbert Road	36.7	600	*	1,500	2,000	*	3,100
Gonzales Slough	Below football field	17.6	40[1]	*	75[1]	230[1]	*	290[1]
Gonzales Slough	Below 7th Street	17.5	45[1]	*	150[1]	250[1]	*	320[1]
Gonzales Slough	Below 1st Street	17.4	65[1]	*	230[1]	310[1]	*	420[1]
Gonzales Slough	Below Confluence with East Branch Gonzales Slough	17.4	160	*	300	360	*	430
Gonzales Slough	Below Monterey Vineyard Culvert	15.1	120[2]	*	165[3]	165[3]	*	165[3]
Gonzales Slough	Above Monterey Vineyard Culvert	15.1	120[2]	*	250[2]	400[2]	*	690[2]
Harper Creek	At San Benancio Gulch	2.21	50	*	143	202	*	390
Josselyn Canyon Creek	At Del Monte Lake	1.3	40	*	110	145	*	250
Natividad Creek	At Laurel Drive	10.0	190	*	560	700	*	1,330

*Not calculated for this Flood Risk Project

[1]Flow values reduced due to channel and overbank storage

[2]Flow values reduced due to upstream diversions

[3]Flow values reduced due to capacity restriction

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
Pajaro River	Downstream of confluence with Salsipuedes Creek	1,275	14,300	*	32,500	43,600	*	76,200
Pine Canyon Creek	At Jolon Road	15.6	650	*	1,200	1,500	*	2,200
Reclamation Ditch	At confluence with Tembladero Slough	124	**	*	**	1,300	*	**
Reclamation Ditch	At Espinosa Drain	108	**	*	**	1,125	*	**
Reclamation Ditch	Downstream of Carr Lake	100	610	*	910	1,050	*	1,300
Reclamation Ditch	Downstream of Heinz Lake (southeast of City of Salinas)	39	330	*	430	470	*	540
Salinas River	At Bradley	2,536	35,000	*	67,000	88,000	*	124,000
Salinas River	At King City	3,220	35,000[1]	*	66,000[1]	86,000[1]	*	123,000[1]
Salinas River	At Spreckels	4,156	35,000[1]	*	64,000[1]	85,000[1]	*	121,000[1]

*Not calculated for this Flood Risk Project

**Data not available

[1]Constant or reduced flows due to infiltration into riverbed

[2]Reduction in flow due to spill over Nashua Road

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
Salinas River	Downstream of Salinas River overbank	4,156	35,000[1]	*	64,000	81,000[2]	*	121,000
San Benancio Gulch	At El Toro Creek	5.86	132	*	360	499	*	936
San Benancio Gulch	At Harper Creek	3.25	74	*	206	289	*	552
San Lorenzo Creek	At First Street	260	7,090	*	14,800	18,700	*	28,800
San Miguel Canyon Creek	At downstream crossing of U.S. Highway 101	12.8	145	*	490	690	*	1,460
San Miguel Canyon Creek	At upstream crossing of U.S. Highway 101	8.2	90	*	305	440	*	940
San Miguel Canyon Creek	At State Highway 156	6.0	65	*	250	300	*	750
San Miguel Canyon Creek	At Echo Valley Pond	1.5	15	*	50	80	*	160
Santa Rita Creek	At Main North Street (in City of Salina)	4.2	160	*	400	465	*	810
Tembladero Slough	At State Highway 1	135	960	*	1,110	4,000	*	4,000

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges, continued

			Peak Discharge (cfs)					
Flooding Source	Location	Drainage Area (Square Miles)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Thomasello Creek	At Confluence with Pajaro River	3.6	370	*	590	850	*	1,560
Watson Creek	At Confluence with Calera Creek	7.5	155	*	430	604	*	1,157

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 11: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Carr Lake	Northeast of U.S. Highway 101	42.8	*	45.4	46.6	48.9
El Estero Lake	At shoreline	8.3	*	10.5	11.4	13.8

*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
Arroyo Del Rey	*	*	Del Rey Park	*	1967	1978
Arroyo Seco	*	*	Near Greenfield	*	1962	1978
Arroyo Seco	*	*	Near Soledad	*	1906	1978
Carmel Lagoon	9413450	NOAA	Monterey Harbor	*	1992	2005
Carmel River	11143250	USGS	Near Carmel, City of	*	1963	1978
Carmel River	11143200	USGS	At Robles del Rio	*	*	*
El Toro Creek	*	*	Mount Toro	*	1973	1973
El Toro Creek	11152540	USGS	Near Spreckles	*	1930	1956
Pajaro River	*	*	Chittenden	*	*	*
Salinas River	*	*	Spreckles	*	1930	1956
Salinas River	*	*	Bradly	*		
San Lorenzo Creek	*	*	Below Bitterwater Creek	*	1959	1978
San Lorenzo Creek	*	*	Below Bitterwater Creek	*	1943	1945