# FLOOD INSURANCE STUDY

VOLUME 1 OF 4

# SANTA CLARA COUNTY, CALIFORNIA

## AND INCORPORATED AREAS

| Community Name | Community Number |
|---|---|
| CAMPBELL, CITY OF | 060338 |
| CUPERTINO, CITY OF | 060339 |
| GILROY, CITY OF | 060340 |
| LOS ALTOS, CITY OF | 060341 |
| LOS ALTOS HILLS, TOWN OF | 060342 |
| LOS GATOS, TOWN OF | 060343 |
| MILPITAS, CITY OF | 060344 |
| MONTE SERENO, CITY OF | 060345 |
| MORGAN HILL, CITY OF | 060346 |
| MOUNTAIN VIEW, CITY OF | 060347 |
| PALO ALTO, CITY OF | 060348 |
| SAN JOSE, CITY OF | 060349 |
| SANTA CLARA, CITY OF | 060350 |
| SANTA CLARA COUNTY (UNINCORPORATED AREAS) | 060337 |
| SARATOGA, CITY OF | 060351 |
| SUNNYVALE, CITY OF | 060352 |


**PRELIMINARY**
**7/8/2015**

REVISED
Month Day, Year

## Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
06085CV001C

**NOTICE TO**
**FLOOD INSURANCE STUDY USERS**

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

This FIS report was revised on Month xx, 201x. Users should refer to Section 10.0, Revisions Description, for further information. Section 10.0 is intended to present the most up-to-date information for specific portions of this FIS report. Therefore, users of this FIS report should be aware that the information presented in Section 10.0 supersedes information in Sections 1.0 through 9.0 of this FIS report.

Initial Countywide FIS Effective Date: May 18, 2009

First Revised Countywide FIS Date: February 19, 2014

Second Revised Countywide FIS Date: Month xx, 201x

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### VOLUME 4

**FLOOD INSURANCE STUDY**

**SANTA CLARA COUNTY, CALIFORNIA, AND INCORPORATED AREAS**

# 1.0 INTRODUCTION

## 1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) investigates the existence and severity of flood hazards, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs), for the geographic area of Santa Clara County, California, including the Cities of Campbell, Cupertino, Gilroy, Los Altos, Milpitas, Monte Sereno, Morgan Hill, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale; the Towns of Los Altos Hills and Los Gatos; and the unincorporated areas of Santa Clara County (hereinafter referred to collectively as Santa Clara County).

This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS has developed flood risk data for various areas of the county that will be used to establish actuarial flood insurance rates. This information will also be used by Santa Clara County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and will also be used by local and regional planners to further promote sound land use and floodplain development. The minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations (CFR) at 44 CFR 60.3.

In some States or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence.

## 1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This FIS was prepared to include all jurisdictions within Santa Clara County. The authority and acknowledgments prior to this countywide FIS were compiled from the previously identified FIS reports for floodprone jurisdictions within Santa Clara County, as shown below:

Campbell, City of: The behind-levee analyses for this study were performed for the Federal Emergency Management Agency (FEMA) by URS Corporation, under Contract No. EMF-2003-CO-0047. This work was completed in October and November 2007.

Cupertino, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This work, which was completed in October

1978, covered all significant flooding sources affecting the City of Cupertino.

Gilroy, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte Associates, under Contract No. H-4035. This work, which was completed in January 1978, covered all significant flooding sources affecting the City of Gilroy.

This study was revised on September 4, 1987, to add approximate Zone A areas along Uvas Creek for an area west of Thomas Road to the railroad. The flood boundaries were delineated from information provided by the City of Gilroy, based on the February 1986 flood.

A third study revision on August 17, 1998, incorporated the results of restudies of Lions, Llagas, Uvas, and North and South Morey Creeks; West Branch Llagas Creek (upstream and downstream of Day Road); West Branch Llagas Creek- East Split; Llagas Overbank (Old Miller Slough); and Miller Slough.

The restudies were conducted for FEMA by Nolte and Associates, Inc., under Contract No. EMW-90-C-3108. This work also included a restudy of the lower portion of Uvas Creek, from the railroad to the downstream limit of the study conducted by the Santa Clara Valley Water District (SCVWD), and a portion of West Branch Llagas Creek, from the National Resources Conservation Service (NRCS), formerly the Soil Conservation Service, (SCS) PL566 interceptor project at Day Road to approximately 2,500 feet upstream of Coolidge Avenue. The area revised within the City of Gilroy includes the area from Golden Gate Avenue to a point approximately 600 feet upstream along West Branch Llagas Creek, and from the NRCS PL566 to a point approximately 650 feet upstream of Golden Gate Avenue along West Branch Llagas Creek-East Split.

Behind-levee analyses for this study were performed for FEMA by Nolte Engineering Company. This work was completed in June 2007.

Behind-levee analyses for this study were also performed for FEMA by URS Corporation, under Contract No. EMF- 2003-CO-0047. This work was completed in October and November 2007.

Los Altos, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This work, which was completed in December 1977, covered all significant flooding sources affecting the City of Los Altos.

Los Altos Hills, Town of: The hydrologic and hydraulic analyses for this study were performed for FEMA by the U. S. Geological Survey (USGS), under Inter-Agency Agreement No. IAA-H- 17-75, Project Order No. 12. This work, which was completed in November 1976, covered all significant flooding sources affecting the Town of Los Altos Hills.

Los Gatos, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This work, which was completed in December 1977, covered all significant flooding sources affecting the Town of Los Gatos.

Milpitas, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This study was completed in November 1978.

Revisions to riverine flooding adjacent to Coyote Creek in the vicinity of Nimitz Freeway (State Highway 17) between Montague Expressway and Dixon Road were based on information obtained from a report dated October 11, 1983, prepared by the SCVWD (Reference 1).

This study was revised on April 15, 1988, to incorporate detailed flooding information from a report entitled "Upper Penitencia Creek Floodplain Management Study, Santa Clara County, California," dated February 1985. This report was prepared by the NRCS, formerly the SCS, for Davis, California. Detailed flooding information from a report entitled "San Francisco Bay Tidal Stage vs. Frequency Study," dated October 1994, and prepared by the San Francisco District of the U.S. Army Corps of Engineers (USACE), was also incorporated in this revision. In addition, flooding from Line A-Zone 6 was updated to agree with contiguous areas on the FIRM for the City of Fremont, California.

A third study was revised on June 8, 1998, to show modifications to the flooding along an approximately 1.5- mile reach of Berryessa Creek from the confluence with Lower Penitencia Creek to the confluence with Arroyo De Los Coches, a 1.3-mile reach of Arroyo De Los Coches from the confluence with Berryessa Creek to approximately 200 feet upstream of Piedmont Road, and a 1.4-mile reach of Calera Creek from the confluence with Berryessa Creek to approximately 100 feet upstream of Old Piedmont Road. The study was performed using detailed methods. The hydraulic analyses were conducted by Nolte and Associates Consulting Engineers, for FEMA, under Contract No. EMW-90-C-3108.

Behind-levee analyses for this study were performed for FEMA by Nolte Engineering Company. This work was completed in June 2007.

Behind-levee analyses for this study were also performed for FEMA by URS Corporation, under Contract No. EMF- 2003-CO-0047. This work was completed in October and November 2007.

Monte Sereno, City of: No FIS available.

Morgan Hill, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This work, which was completed in May 1978, covered all significant flooding sources affecting the City of Morgan Hill.

This study was revised on December 22, 1998, to incorporate detailed flood hazard information along West Little Llagas Creek from approximately 0.89 mile downstream of Monterey Highway to approximately 0.23 mile upstream of Llagas Road; along Madrone Channel from approximately 420 feet downstream of East Dunne Avenue to approximately 1.02 miles upstream of East Main Avenue; along Tennant Creek, from approximately 0.44 mile downstream of Fountain Oaks Drive to approximately 0.27 mile upstream of Fountain Oaks Drive; and along the Watsonville Road Overflow Area from its convergence with Llagas Creek to its divergence from West Little Llagas Creek. The hydrologic and hydraulic analyses for this revision were performed for FEMA by Nolte and Associates, Inc., under Contract No. EMW-90-C-3108.

Mountain View, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This study was completed in October 1978.

Revisions to the riverine flooding adjacent to Stevens Creek in the vicinity of Evelyn Avenue were based on information obtained from a report prepared in June 1980 by the SCVWD (Reference 2). In addition, Base Flood Elevations (BFEs) along San Francisco Bay were revised as a result of a restudy of tidal elevations conducted by the USACE (Reference 3).

This study was revised on June 19, 1997, to modify the flood hazards shown along an approximately 1.5-mile reach of Permanente Creek from the downstream corporate limits at the inboard levee to U.S. Route 101 (Bayshore Freeway). The study was performed using detailed methods. The hydraulic analyses were conducted for FEMA by Nolte and Associates Consulting Engineers, the study contractor, under contract EMW-90-C-3108.

Behind-levee analyses for this study were performed for FEMA by Nolte Engineering Company. This work was completed in June 2007.

Palo Alto, City of: The hydrologic and hydraulic analyses for the initial study were performed for FEMA by George S. Nolte and Associates (GSN), under Contract No. H-4035. This work, which was completed in July 1978, covered all significant flooding sources affecting the City of Palo Alto.

The hydrologic and hydraulic analyses for this restudy were performed for FEMA by DMA Consulting Engineers, Inc. (DMA), under Contract No. EMW-86-C-2227. This work was completed in May 1987.

This study was revised on June 2, 1999, to incorporate the effects of a more detailed hydraulic analysis of the main channel and overflow areas of San Francisquito Creek in the City of Palo Alto. The study limits extend from the Bayshore Freeway (Highway 101) to the railroad, an area of approximately 3.7 miles. The hydraulic analysis for the restudy was prepared for FEMA by Ensign & Buckley, under Contract No. EMW-90-C-3133.

San Jose, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This study was completed in January 1979.

Revisions to riverine flooding in the northwest section of San Jose, in the vicinity of Coyote Creek and the Guadalupe River, were based on information obtained from a report dated October 11, 1983, prepared by the SCVWD (Reference 1).

This study was revised on December 16, 1988, to incorporate detailed flooding information from two reports: "Upper Penitencia Creek Floodplain Management Study, Santa Clara County, California," dated February 1985, and prepared by the NRCS, formerly the SCS, and "San Francisco Bay Tidal Stage vs. Frequency Study," dated October 1984, and prepared by the USACE, San Francisco District.

A third revision on July 17, 1998, incorporated detailed flooding information along Calabazas Creek, prepared for FEMA by Ensign & Buckley Consulting Engineers, the study contractor, under Contract No. EMW-90-C-3133. As part of this study, Calabazas Creek was studied from the northern corporate limit at Prospect Avenue to Wardell Road. Prospect Creek was studied from the confluence with Calabazas Creek to Prospect Avenue. In addition, approximately 1.5 miles of shallow flooding caused by the overtopping of Calabazas Creek were analyzed.

This study was also revised to show modifications to the flooding along Alamitos Creek, from the percolation pond to approximately 800 feet upstream of the Almaden Expressway; along South Babb Creek, from the confluence with Silver Creek to approximately 2,400 feet upstream of Clayton Road; along Berryessa Creek, from the confluence with Sierra Creek to approximately 200 feet upstream of Old Piedmont Road; and along Upper Silver Creek, from the confluence with Coyote Creek to approximately 2,800 feet upstream of Silver Creek Valley Road, in the City of San Jose.

The hydraulic analyses for this revision were performed for FEMA by Nolte and Associates, Consulting Engineers, under Contract No. EMW-90-C-3108. No new hydrologic analyses were performed.

Behind-levee analyses for this study were performed for FEMA by Nolte Engineering Company. This work was completed in June 2007.

Behind-levee analyses for this study were also performed for FEMA by URS Corporation, under Contract No. EMF- 2003-CO-0047. This work was completed in October and November 2007.

Santa Clara, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This work, which was completed in October 1978, covered all significant flooding sources affecting the City of Santa Clara, California.

This study was revised on January 20, 1999, to modify the flood hazards shown along San Tomas Aquino Creek, from just upstream of Old Mountain View Aviso Road to just upstream of Monroe Avenue in the City of Santa Clara. The hydraulic analyses for this revision were performed for FEMA by Nolte and Associates, Consulting Engineers, under Contract No. EMW-90-C-3108. No new hydrologic analyses were performed.

Saratoga, City of: The hydrologic and hydraulic analyses for the original study, dated July 1978, were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035 (Reference 4). This work, which was completed in December 1977, covered all significant flooding sources affecting the City of Saratoga.

The hydrologic and hydraulic analyses for this study were performed for FEMA by Ensign & Buckley Consulting Engineers, under Contract No. EMW-90-C-3133.

The SCVWD provided data and hydrologic and hydraulic models that were used for the previous FIS.

Sunnyvale, City of: The hydrologic and hydraulic analyses for this study were performed for FEMA by the USACE, San Francisco District, under Inter-Agency Agreement Nos. IAA-H-19- 74, Project Order No. 17, IAA-H-16-75, Project Order No. 4; and IAA-H-16-75, Project Order No. 4, Amendment No. 4. This work, which was completed in March 1977, covered all significant flooding sources affecting the City of Sunnyvale.

This study was revised on December 19, 1997, to show modifications to flood hazards along an approximate 1.9- mile reach of Sunnyvale East Channel, from the confluence with Guadalupe Slough to Bayshore Freeway, and an approximate 1.6-mile reach of Sunnyvale West Channel, from the confluence with Moffett Channel to just upstream of Orbit Court. This study was performed using detailed methods. The hydraulic analyses were conducted by Nolte and Associates, the study contractor, for FEMA, under Contract No. EMW-90-C-3108.

The behind-levee analyses for this study were performed by Nolte Engineering Company, for FEMA. This work was completed in June 2007.

Santa Clara County (Unincorporated Areas): The hydrologic and hydraulic analyses for this study were performed for FEMA by George S. Nolte and Associates, under Contract No. H-4035. This study was completed in 1979.

Revisions to riverine flooding in the northwest section of the county were based on information obtained from a report dated October 11, 1983, prepared by the SCVWD (Reference 1).

This study was revised on December 16, 1988, to incorporate detailed flood hazard information from two reports: "Upper Penitencia Creek Floodplain Management Study, Santa Clara County, California," dated February 1985, and prepared by the NRCS, formerly the SCS, and "San Francisco Bay Tidal Stage vs. Frequency Study," dated October 1984, and prepared by the USACE, San Francisco District. In addition, an approximate Zone A area along Uvas Creek was added from west of Thomas Road to the railroad. The flood boundaries in this area were delineated from information provided by the City of Gilroy, based on the February 1986 flood.

A second revision, on August 17, 1998, incorporated detailed flood hazard information from three sources. Flood hazard information for Calabazas and Prospect Creeks was prepared for FEMA by Ensign & Buckley Consulting Engineers, the study contractor, under Contract No. EMW-90-C-3133. Flood hazard information for Alamitos Creek, East Little Llagas Creek, Madrone Channel, Middle Avenue Overflow Area, San Tomas Aquino Creek, Tennant

Creek, Uvas Creek, Uvas Creek - East Overbank Above Highway 101, Uvas Creek - South Spill, Watsonville Road Overflow Area, West Branch Llagas Creek, West Branch Llagas Creek - Lower Split, West Branch Llagas Creek - Middle Split, West Branch Llagas Creek - Upper Split, and West Little Llagas Creek was prepared for FEMA by Nolte and Associates, Inc., under Contract No. EMW-90-C-3108. Information for the Pajaro River was prepared for FEMA by Schaaf & Wheeler Consulting Civil Engineers, under Contract No. EMF-87-C-0282.

Behind-levee analyses for this study were performed for FEMA by Nolte Engineering Company. This work was completed in June 2007.

Behind-levee analyses for this study were also performed for FEMA by URS Corporation, under Contract No. EMF- 2003-CO-0047. This work was completed in October and November 2007.

MAP IX-Mainland was contracted in February 2005 by FEMA, under Contract No. EMF-2003-CO-0047, to create a Santa Clara Countywide FIS and FIRM. Map IX completed its work, and the countywide FIRM and FIS became effective on May 18, 2009.

For the February 19, 2014 update, a new study of reaches in Santa Clara County included hydrologic and hydraulic analyses performed for FEMA by BakerAECOM, LLC, under Contract No. HSFEHQ-09-D-0368, Task Order HSFE09-09-J-0001. This study was completed in January 2012. BakerAECOM LLC was contracted by FEMA in September 2010, under Contract No. HSFEHQ-09-D-0368, Task Order HSFE09-10-J-0002, to revise Panels 0058, 0059, 0062, 0066, 0067, 0068, 0088, 0251, 0252, and 0238 of the FIRM for Santa Clara County. New detailed studies were performed for San Tomas Aquino Creek Reach 2, Upper Penitencia Creek Reach 2, and Upper Penitencia Creek Reach 2 Overflow (replacing Zone A areas), and for shallow breakout overflows from Coyote Creek in San Jose. In addition, most non-revised flooding sources on the above-mentioned panels were redelineated on new LiDAR-derived topography.

The base map information shown on the FIRMs for the February 19, 2014 update was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). This information was photogrammetrically compiled at a 1:24,000 scale from aerial photography dated 2005 for the 2009 FIS, and was also used for this revision, dated 2009.

The projection used in the preparation of all FIRMs was Universal Transverse Mercator (UTM) Zone 10N, meters. The horizontal datum was NAD83, GRS80 spheroid. The use of different datums, spheroids, projections, or UTM zones 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 information shown on the FIRM.

## 1.3 Coordination

Consultation Coordination Officer (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS and to identify the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meetings held for Santa Clara County and the incorporated communities within its boundaries are shown in Table 1, "Initial and Final CCO Meetings."

**Table 1: Initial and Final CCO Meetings**

| Community Name | Initial CCO Date | Final CCO Date |
|---|---|---|
| City of Cupertino | May 27, 1976 | April 5, 1979 |
| | * | December 13, 2008 |
| City of Gilroy | May 26, 1976 | January 18, 1979 |
| | July 1989 | November 26, 1996 |
| | * | December 13, 2008 |
| City of Los Altos | May 26, 1976 | March 13, 1979 |
| | * | December 13, 2008 |
| Town of Los Altos Hills | January 1975 | November 23, 1976 |
| | * | December 13, 2008 |
| Town of Los Gatos | May 28, 1976 | November 16, 1977 |
| | * | December 13, 2008 |
| City of Milpitas | N/A | N/A |
| | July 1989 | * |
| | * | December 13, 2008 |
| City of Morgan Hill | May 20, 1976 | January 17, 1979 |
| | July 1989 | November 26, 1996 |
| | * | December 13, 2008 |
| City of Mountain View | May 27, 1976 | February 14, 1983 |
| | July 1989 | * |
| | * | December 13, 2008 |
| City of Palo Alto | February 11, 1977 | December 18, 1986 |
| | August 18, 1990 | * |
| | * | December 13, 2008 |

* Date not available

**Table 1: Initial and Final CCO Meetings, continued**

| Community Name | Initial CCO Date | Final CCO Date |
|---|---|---|
| City of San Jose | May 27, 1976<br>August 12, 1992 | July 8, 1980<br>November 26, 1996 |
| City of Santa Clara | May 27, 1976<br>July 1989<br>* | May 30, 1979<br>*<br>December 13, 2008 |
| City of Saratoga | May 27, 1976<br>* | November 17, 1977<br>December 13, 2008 |
| City of Sunnyvale | June 18, 1974<br>July 1989<br>* | September 7, 1976<br>*<br>December 13, 2008 |
| Santa Clara County (Unincorporated Areas) | May 20, 1976<br>August 12, 1992<br>* | September 24, 1980<br>November 26, 1996<br>December 13, 2008 |

* Date not available

For the February 19, 2014 map revision, the final CCO meeting took place on August 29, 2012, and was attended by representatives of FEMA, the community, and the study contractor.

For this <date> PMR, the final CCO meeting took place on <date>, and was attended by representatives of FEMA, the community, and the study contractor.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

This FIS covers the geographic area of Santa Clara County, California.

All or portions of the flooding sources listed in Table 2 "Flooding Sources Studied by Detailed Methods" were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Published Separately).

**Table 2: Flooding Sources Studied by Detailed Methods**

| | |
|---|---|
| Adobe Creek | Calabazas Creek |
| Alamitos Creek | Canoas Creek |
| Alviso Slough | Concepcion Drain |
| Arastradero Creek | Coyote Creek |
| Arroyo Calero | Daves Creek |
| Barron Creek | East Little Llagas Creek |
| Berryessa Creek | East Penitencia Creek |

**Table 2: Flooding Sources Studied by Detailed Methods, continued**

| | |
|---|---|
| Evergreen Creek | Lions Creek |
| Fisher Creek | Llagas Creek |
| Fisher Creek Overbank | Llagas Overbank |
| Flint Creek | Los Gatos Creek |
| Fowler Creek | Lower Penitencia Creek |
| Guadalupe River | Matadero Creek |
| Guadalupe Slough | Miguelita Creek |
| Hale Creek | Miller Slough |
| North Morey Creek | Silver Creek |
| Permanente Creek | Smith Creek |
| Permanente Diversion | South Babb Creek |
| Purissima Creek | South Morey Creek |
| Quimby Creek | Stevens Creek |
| Ronan Channel | Sunnyvale East Channel |
| Ross Creek | Sunnyvale West Channel |
| Ruby Creek | Thompson Creek |
| San Francisco Bay | Upper Penitencia Creek |
| San Francisquito Creek | Upper Penitencia Creek Reach 2 |
| San Joaquin River | Upper Penitencia Creek Reach 2 Overflow |
| Santa Teresa Creek | Uvas Creek |
| San Tomas Aquino Creek | West Branch Llagas Creek |
| San Tomas Aquino Creek Reach 2 | West Little Llagas Creek |
| Saratoga Creek | Wildcat Creek |

All or portions of many flooding sources in the county were studied by approximate methods. Approximate analyses were used to study areas of low development potential or minimal flood hazard. The scope and method of study were agreed upon by FEMA and the communities. All or portions of the flooding sources listed in Table 3, "Flooding Sources Studied by Approximate Methods," were studied by approximate methods.

**Table 3: Flooding Sources Studied by Approximate Methods**

| | |
|---|---|
| Adobe Creek | Guadalupe Slough |
| Alamitos Creek | Hale Creek |
| Almendra Creek | Heney Creek |
| Arroyo Los Coches | Junipero Serra Creek |
| Berryessa Creek | Llagas Creek |
| Calera Creek | Los Gatos Creek |
| Corralitus Creek | Manuella Drainage |
| Coyote Creek | Matadero Creek |
| Cribari Creek | Miguelita Creek |
| Daves Creek | Moody Drainage |
| East Fork Greystone Creek | North Babb Creek |
| Golf Creek | North Branch Piedmont Creek |
| Greystone Creek | Norwood Creek |
| Guadalupe Creek | O'Keefe Drainage |
| Guadalupe River | Permanente Creek |

**Table 3: Flooding Sources Studied by Approximate Methods, continued**

| | |
|---|---|
| Permanente Diversion | Rodeo Creek |
| Piedmont Creek | Ross Creek |
| Prospect Creek | San Francisquito Creek |
| Randol Creek | San Tomas Aquino Creek |
| Regnart Creek | Saratoga Creek |
| Regnart Slough | Scott Creek |
| Robleda Drainage | Sierra Creek |
| Silver Creek | Thompson Creek |
| Smith Creek | Upper Silver Creek |
| Sobey Creek | Uvas Creek |
| South Branch Piedmont Creek | Vasona Creek |
| Stevens Creek | West Fork Greystone Creek |
| Sweigert Creek | Wildcat Creek |
| Tennant Creek | Yerba Buena Creek |

This countywide FIS also incorporates determinations of letters issued by FEMA resulting in map changes (Letter of Map Revision – LOMR), as shown in Table 4, "Letters of Map Change."

**Table 4: Letters of Map Change**

| Community | Case Number | Project Identifier | Effective Date |
|---|---|---|---|
| City of San Jose | 09-09-1204P | Bridge Channelization, Lower Silver Creek – Reaches 1, 2, and 3, panels 0251 and 0252 | July 24, 2009 |
| City of San Jose | 09-09-2839P | Silver Creek Map Update, from just upstream of Kammerer Avenue to just downstream of East San Antonio Street, panels 0251 and 0252 | March 30, 2010 |
| City of Milpitas | 10-09-1254P | Berryessa Pump Station Improvements affecting Calera Creek Overflow and Berryessa Creek, Panels 0058 and 0059 | September 30, 2010 |
| City of Milpitas | 11-09-1881P | Elmwood, Terra Serena Tract 9699 (CA), Upper Penitencia Creek Overflows – from approximately 1,700 feet southeast of the intersection of Corning Avenue and Ethyl Street to approximately 1,100 feet southeast of the intersection, panels 0066 and 0067 | March 29, 2011 |
| City of San Jose | 12-09-0140P | Pepper Lane Phase I LOMR | November 22, 2011 |
| City of Mountain View | 11-09-0246P | Levee Accreditation, Stevens Creek Santa Clara Update | November 23, 2010 |

**Table 4: Letters of Map Change, continued**

| Community | Case Number | Project Identifier | Effective Date |
|---|---|---|---|
| City of Cupertino, City of Santa Clara, City of Sunnyvale | 13-09-0871P | Calabazas Creek Summary of Discharges Table Update | March 14, 2013 |
| City of Santa Clara | 15-09-0127P | 4900, 4949 Marie P. DeBartolo Way & 5120 Stars and Stripes Drive | April 16, 2015 |

To avoid a "cascading LOMR" scenario for this <date> PMR, LOMR 09-09-0375P has been incorporated only on revised FIRM panel 06081C0063J. The remainder of LOMR 09-09-0375P remains effective.

LOMR 12-09-2856P has been superseded by this PMR.

LOMRs 09-09-1600P, 09-09-2342P, 09-09-1601P, 10-09-0251P, 09-09-2556P, 10-09-1997P, 10-09-2973P, 10-09-2408P, 11-09-0419P, 11-09-0649P, 11-09-1665P, 12-09-0791P, 12-09-0752P, 12-09-2587P, 13-09-0519P, 12-09-2521P, 13-09-1209P, 13-09-0070P, 13-09-1387P, 13-09-2773P, 14-09-1001P, 14-09-3167P, 14-09-3433P, 14-09-3877P, 12-09-2859P, 14-09-3550P, and 15-09-0041P are located outside the FIRM panels affected by this <date> PMR, and remain effective.

## 2.2 Community Description

Santa Clara County is in the central part of western California. It is bordered by Alameda County to the north, Stanislaus and Merced Counties to the east, San Benito County to the south, and Santa Cruz and San Mateo Counties to the west. Pockets of unincorporated county land are scattered throughout northern Santa Clara County. However, the major portion of unincorporated land is located in southern Santa Clara County.

The unincorporated areas in the southern portion of the county are located at the foot of the Santa Cruz Mountains and the Diablo Range. They are primarily situated midway between the Cities of Morgan Hill and Gilroy, encompassing what is known as San Martin, in the foothills on the alluvial plain of the Santa Clara Valley. San Martin is generally defined as the area along U.S. Highway 101 between East Middle Avenue on the north and Church Avenue on the south. The San Martin area, the major portion of unincorporated southern Santa Clara County, is approximately 70 miles south of the City of San Francisco, 15 miles south of the City of San Jose, and 20 miles east of the City of Santa Cruz and the Pacific Ocean.

Prehistorically, the region that would ultimately become San Martin was inhabited by Indians of the Costanoan group. The designation Costanoan is from the Spanish, Costanos, "coast people" (Reference 5). The descendants of these indigenous peoples preferred the name Ohlone, "people of the west," which was given to them by the Yokuts, the Indian group living to the east in the San Joaquin Valley (Reference 6). The Ohlone lived within the watershed lands from the Carquinez Straits in the north to the Carmel River in the south. Their eastern boundary was the interior chain of the California Coast Range, the Diablo Range. Thus, their territory included not only all of Santa Clara

County, but what are now San Francisco, San Mateo, Contra Costa, Alameda, San Benito, Santa Cruz, and Monterey Counties. It is likely that no more than 10,000 Ohlone people were living in this large area at any one time (Reference 5).

Recorded history began in the San Martin area with the coming of the Spanish. During the latter half of the 18th century, several Spanish expeditions were sent north from Mexico to strengthen Spain's hold on the Californias. In 1769, Gaspar de Portola led a party north along the California coast. Having passed Monterey Bay, the Portola expedition camped for a few days at Point San Pedro. On November 2, 1769, two of his men who were hunting for food climbed the northeastern hills and, from the summit, looked down on "a valley like a great inland sea, stretching northward and southeastward as far as the eye could reach" (Reference 7). These were the first Europeans to see the Santa Clara Valley. In March 1776, Captain Juan Bautista de Anza passed through what is now Santa Clara County during the expedition that ultimately selected the site for the City of San Francisco. The California missions were subsequently established, laying the foundation for Spanish influence in the area.

In 1821, Mexico gained independence, which was an event with far-reaching consequences for California. The missions were secularized, and, under Mexican law, private citizens could petition for lands previously belonging to the missions. Hundreds of large land grants were created throughout the territory. American interest in California increased steadily, and Mexico and the United States went to war. Mexico had little chance in this dispute, and, in the Treaty of Guadalupe- Hidalgo in 1848, it surrendered all of the California Territory to the United States.

A large land grant was created in 1834 in what is now the San Martin area. Carlos Castro was granted Rancho San Francisco de las Llagas (St. Francis of the Wounds), covering 22,283 acres between Morgan Hill and Gilroy (Reference 8). This was one of several land grants created in the general vicinity. To the south, in what is now Gilroy, the first land grant in the Santa Clara Valley created the rancho known as Las Animas (The Souls), which was granted to Mariano Castro in 1802. To the north, in present-day Morgan Hill, Rancho Ojo de Agua de la Coche was granted to Juan Maria Hernandez. Covering 8927 acres between Morgan Hill and Llagas Creek, this rancho was created in 1835 (Reference 8).

During this same period, American pioneers were beginning to penetrate the area. John Gilroy, a Scottish sailor and the first non-Spanish settler in California, came to the area in 1814. He settled in the southern portion of the Santa Clara Valley, where he married Maria Clara Ortega, a grantee of part of the San Ysidro land grant. This rancho had been created in 1809, when the eastern and northeastern portions of Rancho Las Animas were split off and granted to Ygnacio Ortega. The settlement that developed on the rancho became known as San Ysidro, and later as Gilroy (Reference 9).

To the north, in Morgan Hill, an Irish immigrant named Martin Murphy purchased the Rancho Ojo de Agua de la Coche in 1844. He built an adobe residence between what is now Morgan Hill and Murphy Peak, the cone-shaped hill west of town. Morgan Hill was named for Hirman Morgan Hill, who married Martin Murphy's granddaughter, Diana.

In the San Martin area, the Rancho San Francisco de las Llagas was divided and subdivided to form the still-existing orchards and individual parcels. Like the rest of the southern part of the county, the San Martin area supported a wide range of agricultural

activities. Livestock and grain, fruit, and vegetable crops were important in the local economy for many decades. Wine production was also a major activity in the area, and is the major industry in San Martin. The San Martin Winery traces its heritage to a cooperative winery started in the area in 1892. In 1908, the winery was incorporated as the San Martin Wine Company.

The agricultural nature of southern Santa Clara County has changed dramatically in the last 5 years. The continuing pressures of population growth in San Jose and the proximity of San Martin to this urban center will undoubtedly increase the rate of population growth in the vicinity.

After the completion of the South Valley Freeway between Morgan Hill and San Jose, the process is expected to accelerate. The pattern of rural residential development, which has become established in the last few years, is likely to continue. San Martin is expected to house large numbers of people seeking the economic and environmental advantages of suburban living. Development in the unincorporated areas of northern Santa Clara County has been increasing in the last decade and consists mainly of residential uses and some light industry along the major transportation routes.

The San Martin area has had a more even history of development than cities in the northern portion of the county. In 1920, the San Martin area had a population of approximately 500 (Reference 10). Through 1965, however, the population increased to only 3,500. Therefore, the post World War II boom, which radically altered northern portions of the county between 1945 and 1960, had little effect in San Martin. During this entire period, agriculture remained the predominant land use in the area. However, around 1965, a new pattern of development began to occur. Population and economic pressures led to the beginning of lot splits in San Martin. Rural residential parcels were created, with lots ranging from 1 to 2.5 acres. By 1972, the population of the area had increased to approximately 4,800. This process has been accelerating, and, by 1976, the estimated population of San Martin was 7,000 (Reference 10). Projections for the future indicate that this trend will continue, changing San Martin from an agricultural center to a rural residential area. In the next few years, the remaining large parcels of land will probably be split mainly into individual lots of 1 to 2.5 acres.

Commercial activities in San Martin are centered along Monterey Road, formerly the route of U.S. Highway 101. The construction of the South Valley Freeway, which runs parallel to and east of Monterey Road through San Martin from Cochran Road to south of Gilroy, has alleviated the severe traffic problems in the central area. Most existing commercial development in San Martin is contained within this general vicinity. However, as residential growth occurs, additional commercial shopping centers are likely to be located throughout the area.

Industry, as such, does not play an important role in the San Martin area. The San Martin Winery on Monterey Road is the principal business in the vicinity. It is unlikely that additional industry will locate in San Martin because neighboring communities are more logical locations. Thus, most of the San Martin area, with the exception of the commercial core along Monterey Road, will be devoted to residential use in the near future.

San Martin is linked with communities to the north and south by Monterey Road. This road follows the historic route of El Camino Real and formerly ran directly through the

center of San Martin. This situation changed with the completion of a segment of the South Valley Freeway (U.S. Highway 101). Starting at Cochran Road, this freeway runs parallel to and east of Monterey Road, intersecting Monterey Road (old U.S. Highway 101) south of Gilroy. San Martin is connected with Watsonville to the west and Los Banos to the east via California State Highway 152, which runs through Gilroy, 5 miles to the south.

Major arterials within San Martin running parallel to Monterey Road include Foothill Road; and Center, Colombet, Sycamore, Murphy, Llagas, Lincoln, and Depot Avenues to the east; and Colony, Harding, and Coolidge Avenues to the west. Major roads running perpendicular to Monterey Road include East Middle, California, Roosevelt, San Martin, Cox, Highland, and Church Avenues.

San Martin is served by the railroad mainline, which runs through town parallel to and between Monterey Road and the South Valley Freeway. The area is also served by several airports. The South County Airport, a general aviation facility, is located in San Martin. The Morgan Hill Airmen, Inc., Landing Strip, another general aviation facility, is located off Cochran Road, near the South Valley Freeway, 5 miles away in Morgan Hill. San Jose Metropolitan Airport is located approximately 20 miles to the north via U.S. Highway 101.

Santa Clara County is primarily in a flat alluvial plain that lies between the Santa Cruz Mountains and the Diablo Range. Most of the area consists of basically level terrain; toward the east and west, this gives way to rolling foothills. These foothill areas, in turn, become steeper and graduate into the mountain ranges that flank Gilroy. San Francisco Bay and the San Jose metropolitan area are to the north, and the Salinas Valley is to the south. The elevations in Santa Clara County range from 140 feet to 1,200 feet. The land slopes toward the south.

The climate of Santa Clara County is characterized by warm, dry summers and cool, moist winters. Periodically, summer temperatures may rise above 100°F, and, although the winters are generally mild, temperatures may drop below 20°F for short periods of time. There is a greater variance in temperature in the southern portion of the county than in the northern portion of the county, as a result of its greater distance from San Francisco Bay.

In the early days, Santa Clara County was recognized for its beneficial climate; its fruit-growing prowess attests to the general mildness of the weather. This beneficial environment continues. Annual precipitation in the area averages approximately 20 inches; however, in some years, more than 35 inches has been recorded. Most of the annual precipitation, approximately 98 percent, occurs during the period from October through May. Violent thunderstorms, snowfalls, and other extreme weather conditions are rare.

The soils in the Santa Clara County area are rich alluvial deposits suitable for growing numerous crops. Erosion of the Diablo Range to the east and the Santa Cruz Mountains to the west has been the source of the soils that now form the alluvial plain in the area. To the west, the San Andreas Fault extends through the Santa Cruz Mountains, which are crossed by rift zones and fracture lines. Meandering creeks that have their headwaters in the surrounding mountains cross the foothills and the flat alluvial portions of Santa Clara County on their way to San Francisco Bay. The soils that have been deposited in the area

are from the most recent epoch of geological history, the Pleistocene. The alluvial and sedimentary deposits consist of alternating layers of loam, clay, gravel, sand, and various mixtures of each.

The vegetation in Santa Clara County is varied. There is a wide range of trees, including some redwoods, and thick brush cover. The valley floor has oaks, eucalyptus, and various fruit trees. Numerous cultivated trees and plants, including citrus, flourish throughout the area. Reflecting its climate, almost anything can be grown in the area.

The mountains and foothills in the northern portion of Santa Clara County are the sources of the watercourses that flow thru northern Santa Clara County. Near San Jose, the major waterways include Los Gatos, Guadalupe, and Alamitos Creeks flowing out of the Santa Cruz Mountains; Coyote Creek and a host of tributaries, including Upper Penitencia and Silver Creeks, flowing out of the Diablo Range; and Fisher Creek with headwaters on the western side of the Coyote Creek Valley (Reference 11). The 75-mile-long Coyote Creek is the primary natural drainage facility for the eastern side of the Santa Clara Valley.

Permanente and Stevens Creeks, which flow northerly through Santa Clara County near Mountain View, provide the primary runoff drainage channels in that area. In addition to providing flood control, these creek beds provide gravel lenses that penetrate the impervious underground clay layers. These lenses allow rain runoff to percolate down to replenish the underground water supply (Reference 12). This process aids in retarding land subsidence, which has been occurring on the valley floor over the last 40 years. The rapid urbanization of the Santa Clara Valley has lowered the water table, with resulting subsidence of the lands adjacent to San Francisco Bay. Subsidence ceased after 1970 when water was brought into the area. The Santa Clara County Flood Control and Water Conservation District periodically releases water from reservoirs into the stream channels and percolation basins, so it can percolate down to the water table.

The principal watercourses in southern Santa Clara County are Llagas, Uvas, and Coyote Creeks. Edmundson (Little Llagas), Church, Center, Tennant, Maple, and Foothill Creeks also flow through the area. The area is unusual in that creeks originate in both the Diablo Range, to the east, and the Santa Cruz Mountains, to the west. Waters originating in the area are conveyed to Monterey Bay via the Pajaro River.

Drainageways in the county are a combination of natural channels (creek beds) and channels altered by man. Runoff drains to these channels through an underground storm drainage system.

Drainage patterns in the county have been altered by urbanization, and the runoff, which has increased, is a greater flood threat than in previous years. The construction of water-conservation flood retention facilities has also altered the drainage pattern.

All surface water originating or passing through Santa Clara County ultimately discharges to the Pacific Ocean at Monterey Bay via the Pajaro River or to San Francisco Bay via Coyote Creek.

## 2.3 Principal Flood Problems

A variety of conditions cause flooding in Santa Clara County. In the smaller drainage basins, flooding is usually the result of intense storms. In the larger basins, flooding

results from storms of long duration. Shallow overland flooding often occurs due to the small capacity of the creeks.

City of Campbell

There are no known principal flood problems within the City of Campbell.

City of Cupertino

The severity of past floods, and the relative development of the area, varies from year to year. Both 1955 and 1958 were serious flood years in the county, and Cupertino experienced significant damage, although it fared better than many neighboring areas.

Flooding in Cupertino and Monta Vista was less severe in 1962 than it had been in the early spring of 1958. Damage from the storm was due primarily to high winds, coupled with soggy soil conditions. The downpour brought 3.46 inches of rain to the Cupertino area, causing minor flooding in several places. The intersection of McClellan and Lonna Roads was one area that experienced high waters.

As was the case in 1955, the Cupertino area was not hit as hard as other areas of Santa Clara County by the late January storm in 1963. According to the City Engineering Department, the community only suffered minor street damage and flooding during the Thursday downpour. Worse flooding was along the Stevens Creek and McClellan Road area in Monta Vista, where extensive damage was done. The Cupertino Water Department reported that more than 6 inches of rain fell during the 2-day storm.

Although other areas in Santa Clara County experienced various levels of minor flooding during January 1968, the Cupertino-Monta Vista area was essentially free of flooding. There were no flood-related damage reports of any consequence in Cupertino for 1968.

The rains in January and February 1973 were steady. By January 18, Stevens Creek Reservoir spilled over as a result of 3.78 inches of rain during 1 week. The area suffered very little flooding, however, with only occasional reports of minor flood conditions.

City of Gilroy

Information on flooding of the Uvas-Carnadero and Llagas Creeks covers the years from 1889 through 1973. During this period, the Gilroy area experienced floods of varying severity.

The flood conditions of January 1914 were considerably more severe than in previous years. Greater development of the downtown area accounted for the increased damage.

The winter storms of 1931 to 1932 were well received in the Gilroy area. Heavy precipitation affected the watercourses on both sides of the valley. Damage in the central section of town was not a factor during this flood. Additional areas in Gilroy experienced flooding, but again, the accounts suggested no appreciable damage.

The storm of mid-December 1937 brought record-breaking rainfall to the Gilroy area. This exceptional precipitation was accompanied by significant flooding. The outlying areas received even heavier precipitation. An extremely large area was affected by the floodwaters from this storm. This flooding in 1937 was the most severe until the flood of

record, which occurred in December 1955.

On February 1 and 2, 1945, Gilroy had 3.31 inches of rain during 24 hours. The resulting floodwaters, although not as severe as those of 1937, caused significant damage.

As previously noted, the storms of December 16 to 28, 1955, produced the flood of record in the Gilroy area. The heaviest precipitation occurred during the 3-day period ending December 23. The 12.9 inches of rain reported in the Gilroy area resulted in the Uvas and Carnadero Creeks creating a flow of 14,000 cubic feet per second (cfs) at U.S. Highway 101.

Completion of the Uvas Dam, in 1957, was a contributing factor in minimizing flood levels in the Gilroy area during the April storms in 1958. Alviso and other areas within Santa Clara County suffered extensive damage from rampaging floodwaters during this storm, but Gilroy proper was not appreciably affected. Conditions were more severe, however, south of town.

Miller Slough was the principal flood problem in January 1963. A rainfall of 3.21 inches during 24 hours caused severe flooding of Forest Street, Church Street, and Sixth Street, with all of the water flowing from Miller Slough.

Mild flooding occurred in the Gilroy area in January 1968. The Uvas and Llagas Creeks did not overflow their banks, but flooding did occur on Carnadero Creek.

Miller Slough was again a source of extensive floodwaters in January 1969. Damage was not confined to this area alone. Auto dealerships on North Monterey Street suffered broken windows caused by the waves, which were created by heavy trucks moving through the 3 feet of water standing in the street. Carnadero Creek flooded, as it had in 1968.

The winter of 1972 to 1973 produced high levels of precipitation in Gilroy. The rains in January and February 1973 were steady, however, and did not create local flood conditions. Although some areas of Santa Clara County did experience mild levels of flooding during this winter, Gilroy was spared.

City of Los Altos

The following are descriptions of the flood years in Los Altos. The severity of the floods, and the relative development of the area, varies from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Both 1955 and 1958 were serious flood years in the county, and Los Altos experienced significant damage, although faring better than many neighboring areas. Other years, marked by more serious flood conditions in the Los Altos area, were 1950 and 1952.

Although various areas of Santa Clara County suffered from flood conditions in 1931, the Los Altos area was not appreciably affected.

Heavy rains (2.35 inches during 24 hours) and the accumulation of debris contributed to significant flooding in the Los Altos area in November 1950. Agricultural areas were affected; however, the bulk of the damage was in the commercial area.

In January 1952, stormwaters caused significant damage in the Los Altos area. Flooding

occurred in the San Ramon-San Luis Avenue section of Rex Manor, at El Camino Real and Caldera Avenue, near the El Monte Avenue intersection with El Camino, and on San Ramon Avenue off Permanente Creek.

As was the case with nearly all of Santa Clara County, the Los Altos area suffered flood damage from the pre-Christmas storms of 1955. A large lake was formed where Springer Road enters El Camino Real. Todd Street was flooded, and "...Permanente Creek, where it flows under El Camino Real west of El Monte Avenue was overflowing its banks to cause some evacuations in that area. The same creek caused serious damage in the Tulane Court-Barber Avenue area" (Reference 13). Flood conditions also closed Bayshore Highway from Mountain View-Alviso Road south to Santa Clara-Alviso Road.

In the Los Altos area, Permanente Creek was the primary source of flood damage in 1958. Los Altos, in general, fared well, with its runoff causing problems further toward San Francisco Bay.

The Los Altos area was spared much damage during the flooding of January 1963. The principal problem was standing water in the streets.

On January 29, 1968, the Los Altos area received 1.48 inches of rain in a 24-hour period. There were no reports of appreciable flood damage in the area.

Town of Los Altos Hills

In general, local temporary flooding occurs at many of the older culverts in most channels during the heavier rain periods. Damage to existing roads occurs in the areas where these culverts are unable to carry the larger flows considered in this study.

Major flooding occurred in the area in 1940, 1950, 1955, 1958, 1963, and 1974. Matadero Creek is the only drainage considered in this study that is gaged. The gage is located downstream from the corporate limits in the City of Palo Alto. The flood of record occurred in 1973, and the previous peak flow occurred in 1955. Other streams in the immediate vicinity had peak flows in 1955.

Flooding from the base flood occurs in the upper reaches of Adobe Creek near Adobe Creek Lodge and Los Altos Hills Country Club, where the channel is a 4- foot by 6-foot wooden canal. Flooding also occurs in the low, flat areas near Rhus Ridge Drive, as well as in the Foothill College area above Junipero Serra Freeway (Interstate Highway 280). Local flooding occurs near O'Keefe Lane downstream of Junipero Serra Freeway and in low areas along Fremont Road, particularly near Edith Road.

Barron Creek floods both above and below Fremont Road. There are no definite channels in some open field areas. Cross sections are generally wide and flat, and the flow is not well confined. Flooding also occurs on Fremont Road south of Arastradero Road.

Matadero Creek overflows at the culverts at Page Mill Road and Moon Lane, and Arastradero Creek overflows at the Page Mill Road culvert.

Flooding occurs in the lower end of Moody Drainage upstream of Moody Road and in Hale Creek above Magdalena Avenue. Concepcion Drainage has local flooding near Fremont Road, and O'Keefe Drainage has some flooding downstream of the Junipero Serra Freeway.

Town of Los Gatos

Los Gatos has experienced flood problems on several occasions. However, due to its topography and water retention facilities, such as Lexington Dam, the Town of Los Gatos has not been as severely inundated as several of its neighbors closer to San Francisco Bay.

The severity of the floods and the relative development of the area vary from year to year. The damage resulting from these floods reflects the prevailing conditions. Years marked by more serious flooding in Los Gatos include 1952, 1955 (the worst flood year countywide), 1958, and 1963.

Until mid-January, the winter of 1910 to 1911 had been extremely dry. Then, on January 13 and 14, a storm dropped approximately 4 inches of rain in the Los Gatos-Saratoga area within 24 hours. Damage from this precipitation seems to have been slight, perhaps because of the dry soil conditions, but local watercourses were affected. Later in the season, during the first week of March 1911, another storm brought intense precipitation to the Los Gatos-Saratoga area. Runoff from this storm appears to have been greater than in January.

During a 24-hour period on December 27, 1931, Los Gatos received 3.24 inches of rain. However, damage from this storm was confined to the lowlands toward the bay. "The Los Gatos Creek, running bank to bank... had overflowed in several places below Campbell. San Tomas Creek had overflowed on Latimer Avenue" (Reference 14). The Alviso area and bayside lowlands around Milpitas were the ultimate recipients of these waters. Vast lakes were created, covering hundreds of acres and marooning farmhouses and dairies; and in the mountains above Los Gatos, mudslides closed many roads.

The storms of February 1938 produced extensive damage in the Santa Clara Valley, but not in the Town of Los Gatos. However, on February 11, 1938, the Los Gatos area received 1.93 inches of rain in 24 hours, and Los Gatos Creek carried large volumes of water toward the bay.

The rainfall of February 28 and 29, 1940, broke previous records. At Howell Reservoir, above Los Gatos, 10.2 inches fell during that 2-day period.

Ten inches of rain were recorded again during a 2-day period on November 18 and 19, 1950. This precipitation occurred at Chemeketa Park.

In January 1952, stormwaters caused significant damage in the central district of Los Gatos. The Main Street Bridge suffered damage "...when earth, made soggy by the storm, dropped out from under the north sidewalk, and part of the street approaching the bridge" (Reference 15). Road scrapers were required to remove extensive deposits of mud and silt from North Santa Cruz Avenue. Los Gatos Creek "...flooded over its bank at lower Park Avenue" (Reference 15).

In addition, Chemeketa Park Bridge completely collapsed. "The demolished bridge was on the lower road leading from the Old Los Gatos-Santa Cruz Highway into Chemeketa Park" (Reference 15). Aldercroft Road was closed by earthslides, and Montevina, Montezuma, and Soda Springs Roads were all slide- ridden.

As was the case with most of north-central California, the floods of December 1955

brought damage to the Los Gatos area. The intersection of North Santa Cruz Avenue and Main Street flooded, causing damage to commercial establishments. In addition to the downtown area, the rains caused damage in the foothills. The Lexington Reservoir played an important role during the 1955 storms. The previous high-water mark had represented a volume of 10,000 acre/feet of a total capacity of 25,100 acre-feet. By December 23, 1955, the volume in the reservoir had reached 22,400 acre/feet.

By 1962, drainage improvements had reached a point where their influence was readily apparent during heavy rainfall. During a 3-day period on October 10 through 12, the Los Gatos area received 11.26 inches of rain. Landslides occurred at Kennedy Road on the Santa Cruz Highway; Vasona Park was flooded, with water covering picnic areas and roads.

The storm of January 29 through February 1, 1963, brought 11.87 inches of rain to the Los Gatos-Saratoga area. Flooding had a drastic effect on the local road system. The biggest problem was 'water' which caused floods on roads, and fallen trees; but because of channel improvements, water damage was not as severe as in 1958, although there was more water flowing (Reference 16).

On January 29, 1968, the Los Gatos-Saratoga area received approximately 4.13 inches of rain within 24 hours. This produced minor flooding of roads and house basements.

There were steady rains in January and February 1973. By February 13, the Los Gatos-Saratoga area had accumulated a total of 28.49 inches, which was nearly twice the yearly average. The wet winter had caused Lexington Reservoir to reach capacity on February 11, sending water over the spillway. "As for roads, Santa Clara public works reported that all west valley roads were open but there were slides and muddy conditions on Black and Bear Creek Roads south of Los Gatos, and Hicks Road and Stevens Canyon Road." (Reference 17).

Frequency estimates of historic floods were based on the analysis of gage records from Los Gatos and Saratoga Creeks. The gages, installed in the 1930s, are both outside of the corporate limits. Construction of the Austrian and Lexington Dams has altered the floodflow frequency regime on Los Gatos Creek, thus complicating frequency-estimating procedures.

The 1940 flood was the largest gaged on Los Gatos Creek. No major dams existed in the watershed at that time. It is estimated that the 1940 flood was a 20- to 30- year event. The concurrent flood on Saratoga Creek is estimated to have been a 40- to 50-year event.

While the 1955 flood was the largest recorded on Saratoga Creek and is estimated to have been a 40- to 50-year flood, the 1955 flood on Los Gatos Creek was less than a 10-percent-annual-chance flood event. Available storage in Lexington Reservoir provided a substantial reduction in peak flow rate on Los Gatos Creek during that flood.

The 1958 flood was the largest recorded on Los Gatos Creek subsequent to the construction of the dams. It is estimated that this flood was a 20- to 30-year event. The 1958 flood on Saratoga Creek, however, is estimated to have been less than a 5-year event.

<u>City of Milpitas</u>

Information on past flooding of the streams under investigation is somewhat limited in Milpitas because of the small population and rural nature of the floodplain areas prior to 1950. Investigation of flooding since 1889 indicates that flood conditions and flood damage were experienced in portions of Santa Clara County in December 1889, January 1911, December 1931, December 1937, February 1940, April 1941, November 1950, January 1952, December 1955, April 1958, October 1962, January 1963, January 1968, February 1973, and January, February, and March 1983. However, for the area under study, the flood conditions that existed in 1955, 1958, 1962, 1963, 1973, and 1983 produced the only appreciable flooding.

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, damage became a more important consideration. The increase in population between 1950 and 1970, coupled with the installation of water retention facilities in the area, drastically altered the profile of potential flooding.

The severity of floods, and the relative development of the area, varies from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Both 1955 and 1958 were serious flood years in the county; Milpitas experienced some damage but fared better than many neighboring areas.

Until mid-January, 1910 to 1911 had been an extremely dry year. Then on January 13, a downpour hit the area. Virtually all of the watercourses in the area were affected by the storm, causing widespread flooding.

In early March 1911, another storm brought intense precipitation to San Jose.

The Santa Clara Valley received heavy precipitation in the winter of 1913 to 1914. The watercourses in the area ran full, but basically stayed within their banks.

Milpitas enjoyed a considerable degree of immunity from the December 1955 floodwaters. Not only was the central section of Milpitas spared damage, but the surrounding residential areas were also untouched.

Unlike conditions in most of the county, flooding in Milpitas was more severe in 1958 than in 1955. Principally as a result of the lateness of the storm, damage to agricultural crops was high.

The early storm of October 1962 caused some minor flooding in Milpitas. As in previous years, Milpitas experienced less damage than the majority of neighboring communities.

The February 6, 1963, issue of the Milpitas Post described flooding in the Alviso area as a result of a storm in the last week of January 1963. While other areas of the county suffered from flood conditions of varying severity during this storm, Milpitas experienced only nuisance variety flooding, such as standing water and puddles at intersections. No damage was reported in Milpitas.

In contrast to previous years, Milpitas had more serious flood conditions in 1973 than many other areas in the county. The downtown section of town was affected, as were residential areas.

In early 1983, a series of storms caused extensive flooding in Milpitas, as well as in Santa

Clara County as a whole. The first of these storms, which occurred in late January, caused street flooding along most of the drainageways in Milpitas. Flooding along Berryessa Creek between Yosemite Drive and Calaveras Boulevard caused water and sediment damage to businesses in this area (Reference 1).

The second in this series of storms, which occurred in early February, only caused flooding of streets and yards. No flood damage was reported (Reference 1).

The third storm occurred in late February and early March. Again, most flooding was confined to streets, parking areas, and yards; however, damage in many areas was averted only through emergency sandbagging (Reference 1).

City of Monte Sereno

There are no known principal flood problems within the City of Monte Sereno.

City of Morgan Hill

Information on flooding of the streams under investigation covers the years from 1914 through 1973. During this period, the Morgan Hill area experienced 13 floods of varying severity.

The severity of flooding, and the relative development of the area, varies from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Years marked by more serious flood conditions in Morgan Hill include 1937, 1945, 1958, and 1963. The 1955 flood, which produced the flood of record in neighboring Gilroy (an inundation that caused the most extensive damage in Santa Clara County of any recorded flood), was not severe in Morgan Hill. The frequencies of the following flood events could not be estimated due to a lack of long-term stream gage records in the area.

The winter storms of 1931 to 1932 were well received in the Morgan Hill area, because local agriculture had suffered a series of dry years prior to these storms. Flooding did occur, however, in the central area of the city. Morgan Hill received 5.50 inches of rain during a 24-hour period on December 10 to 11, 1937. This extreme precipitation flooded both Morgan Hill and Gilroy.

The flood conditions resulting from this storm were the most severe experienced in Morgan Hill for floods recorded through 1937.

The storm of early April 1941, during which 34.70 inches of rain had fallen in Morgan Hill by April 10, 1941, came at the end of a very wet year. This was approximately 9 inches more than at the same time in the previous year. During the heaviest precipitation, the central section of the city experienced mild flooding.

Nearly 7 inches of rain fell in Morgan Hill on the first 2 days of February 1945.

Early precipitation in the winter of 1950 gave Morgan Hill a total of 8.59 inches of precipitation by November 21. Of this amount, over 4 inches fell during a 3- day period (November 17 to 19). This storm produced localized flooding, but negligible damage in Morgan Hill.

The storm, which began on January 10, 1952, produced 5.78 inches of rain in the Morgan Hill area during a period of 1 week. This heavy precipitation, occurring prior to construction of Chesbro Dam, caused considerable flooding in orchard lands along Llagas Creek; damage, however, was minimal.

Although suffering some flood conditions, Morgan Hill fared much better than many neighboring communities during the Christmas storm of 1955. In a 4-day period, ending December 25, Morgan Hill received 8.06 inches of rain. During the same period, Gilroy had 12.9 inches of precipitation. One beneficial influence in the Morgan Hill area was the installation of the Chesbro Dam, which absorbed some of the runoff. Unlike in 1952, there was now a manmade check on the Llagas watershed.

The storms in March and April 1958 came at the end of a wet winter. Approximately 8 inches of rain fell in Morgan Hill during a 5-day period ending on April 3.

On October 13 and 14, 1962, Morgan Hill received 4.13 inches of rain. Although other parts of the county suffered flood conditions as a result of this storm, no flooding was reported in Morgan Hill.

Extreme precipitation, accompanied by heavy winds, hit the Morgan Hill area on January 31, 1963. Previous dry weather moderated the impact of the storm. Many trees and power lines came down during the storm as a result of the high winds. However, flooding was the principal problem.

Another January storm hit Morgan Hill in 1967. Although less severe than the deluge in 1963, the storm did produce localized flooding. The city's storm sewer system was able to cope with the runoff for the most part, and flooding occurred only in isolated areas.

The winter of 1972-1973 produced high levels of precipitation in Morgan Hill. For the most part, the rainfall was steady, and it did not produce storms reaching the intensity of previous years. However, 1.76 inches of rain fell on Morgan Hill on February 6, 1973, resulting in some localized flooding.

City of Mountain View

The principal watercourses in Mountain View are Adobe, Permanente, and Stevens Creeks. Mountain View has experienced flood conditions on several occasions. However, because of its topography and precipitations extremes, Mountain View has not been as severely inundated as several of its neighboring communities in Santa Clara County. The areas in Mountain View nearest San Francisco Bay are characteristically the most floodprone.

The Bayshore Area depends on an extensive diking system for its protection from salt-water flooding. The construction of the Shoreline Regional Park, with its attendant filling operation, also aids in the prevention of tidewater flooding (Reference 12).

The severity of the floods, and the relative development of the area, varies from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Both 1955 and 1958 were serious flood years in the county, and Los Altos experienced significant damage, although faring better than many neighboring areas. Other years marked by more serious flood conditions in the Los Altos area were 1950 and 1952.

Some of the earliest reported flooding in the Mountain View-Los Altos area occurred on Saturday, January 14, 1911, when 4.60 inches, the greatest recorded in the history of Mountain View, dropped on the city. In March 1911, various areas in Santa Clara County again received heavy precipitation. Although Mountain View had 2.5 inches of rain during a 2-day period (March 6 and 7), the city was relatively undisturbed.

Although various areas of Santa Clara County suffered from flood conditions in 1931, the Mountain View area was not appreciably affected.

Heavy rains (2.35 inches during 24 hours) and the accumulation of debris contributed to significant flooding in the Mountain View area during November 1950. Agricultural areas were affected; however, the bulk of the damage was in the commercial area.

In January 1952, stormwaters caused significant damage in the Mountain View area. Flooding occurred in the San Ramon-San Luis Avenue section of Rex Manor, at El Camino Real and Caldera Avenue, near the El Monte Avenue intersection with El Camino, and on San Ramon Avenue off Permanente Creek.

As was the case with nearly all of Santa Clara County, the Mountain View area suffered flood damage from the pre-Christmas storms of 1955. A large lake was formed where Springer Road enters El Camino Real. Todd Street was flooded, and "...Permanente Creek, where it flows under El Camino Real west of El Monte Avenue was overflowing its banks to cause some evacuations in that area. The same creek caused serious damage in the Tulane Court-Barber Avenue area" (Reference 18). Flood conditions also closed Bayshore Highway from Mountain View-Alviso Road south to Santa Clara-Alviso Road.

In the Mountain View area, Permanente Creek was the primary source of flood damage in 1958. Mountain View fared well in general, with its runoff causing problems further toward San Francisco Bay. The two hardest hit areas in Mountain View were along Barbara Avenue, where street flooding was extensive, and at the intersection of El Camino Real and El Monte Avenue, where the water was over 2 feet deep. Rock Avenue and Plymouth Avenue near Bayshore Highway were also flooded. The Evelyn Avenue and Franklin area in downtown Mountain View was also victimized, with water reaching a depth of 1 foot.

The Mountain View area was spared much damage during the flooding of January 1963. The principal problem was standing water in the streets.

On January 29, 1968, the Mountain View area received 1.48 inches of rain during 24 hours. There were no reports of appreciable flood damage in the area.

City of Palo Alto

Palo Alto has experienced flood conditions on several occasions. However, due to its topography and its precipitation average and extremes, Palo Alto has not been as severely inundated as several of its neighboring communities in Santa Clara County.

Flooding information for the originally studied streams covered the years from 1911 through 1973. During this period, the Palo Alto area experienced 12 floods of varying severity.

The years 1953 and 1958 were serious flood years in Santa Clara County, and Palo Alto experienced significant damage, although it fared better than many neighboring areas. Other years marked by more serious flood conditions in the Palo Alto area were 1950 and 1952.

One of the earliest reports of flooding in Palo Alto appeared in the January 14, 1911, issue of the Palo Alto Times. Despite the amount of precipitation, damage was not reported as consequential, due in part to the rural nature of the area.

In 1940, Palo Alto was again plagued by exceptional rainfall. During the 5-day period from February 24 to 28, the area received 4.02 inches of rain. Damage was primarily confined to channel beds and roadways.

In 1941, areas in Palo Alto were threatened when a sudden intense rainstorm occurred. On April 4, 1941, in 13 hours, 1.57 inches of rain fell.

Rains were again heavy in 1943, with a large storm occurring in late January. Over a 2-day period, 2.78 inches of rain were recorded on January 20 and 21. The major problems occurred on San Francisquito Creek, which had an estimated peak flow of 4,000 cfs. Just west of the Bayshore highway, the creek overflowed for a period of 3 or 4 hours, the water running along the highway as far as East Willow Road and piling up at the Embarcadero Road intersection, where it was about 6 inches deep.

The worst storm of record, as of that date, hit Palo Alto in the winter of 1950. At Searsville Lake, water rose nine feet before it reached the top of the dam and began pouring over into San Francisquito Creek. Due to the early arrival of the storm and dry soil conditions, damage was surprisingly light. Generally, creeks and drainage canals were able to hold the storm runoff. At the height of the storm, San Francisquito Creek was running close to full at the Newell Road Bridge. Some flooding was reported along the creek near Bayshore Highway, but the dykes protecting the Green Gables area held throughout the heaviest part of the storm.

In January 1952 a phenomenal deluge of rain fell in Palo Alto. During a 24-hour period at the height of the storm, 2.72 inches of rain fell. This precipitation brought dramatic changes to previously dry creeks.

The city was also affected by another storm late in the season. On March 14, 1952, another 1.61 inches of rain fell in 24 hours, causing flooding in Palo Alto and Barron Park. Palo Alto's heaviest damage resulted when swirling water tore a 15-foot gap in the dike of the deep ditch paralleling Alma Street, south of Page Mill Road. The ditch emptied its contents onto Alma Street, necessitating its closing, and rushed through grounds and houses to Emerson Street, where water flowed more than 3 feet deep.

As was the case with nearly all of Santa Clara County, the Palo Alto area suffered significant flood damage from the pre-Christmas storms of 1955. Flooding was widespread, affecting all local watercourses and several residential areas. On San Francisquito Creek, the December 1955 flood had the largest recorded peak flow rate, as of that date.

In many respects, the flood of early April 1958 was a repeat of the 1955 deluge. Conditions, however, were less severe. Nearly 1,000 residents of Palo Alto, East Palo

Alto, Atherton, and North Mountain View fled their homes as floodwaters rose. However, few residences actually had water inside.

In February 1973, Palo Alto received another drenching. During the storm, Matadero, Adobe, and Barron Creeks all reached near-flood stages at the height of the downpour, but none overtopped its banks. Flooding of streets and roadways, however, was commonplace.

The lowlands along Matadero Creek, north of El Camino Real and south of the railroad, experienced minor flooding during the January 24, 1983, storm. The USGS gaging station, located at the upstream side of El Camino Real, reported a record peak discharge of 1,500 cfs for that storm, corresponding to approximately a 20-year flood frequency.

Stream gages on San Francisquito Creek and Matadero Creek began operations in 1930 and 1953, respectively; the peak flow rates from these gages were used to correlate observed flood events to the recurrence interval of those events. Flood events, which occurred prior to gage installation, have no recurrence interval designated.

On February 2 to 3, 1998, San Francisquito Creek overbanked at numerous locations in Santa Clara County: upstream of the Middlefield Road Bridge at Byron Street; at the Seneca Street and Palo Alto Avenue intersection; upstream of the Chaucer Street Bridge; immediately downstream of Highway 101; further downstream of Highway 101, where the golf course and baseball field meet; and at Palo Street. More than 400 homes in Palo Alto were flooded. In East Palo Alto, 325 people were evacuated. The flowrate at the USGS streamflow station near the Stanford golf course was estimated by the USGS to be between 6,500 cfs and 8,000 cfs. This is the highest flowrate ever recorded at that station since its installation in the 1930s. The previous historic record was 5,560 cfs in 1955. On February 3, the Palo Alto Unified School District closed all schools for the day. Duveneck Elementary, Escondido Elementary, and Jordan Middle Schools were flooded. Classes at Stanford University were canceled for the day. Commuting and transportation were severely limited due to the closure of the Bayshore Freeway (Highway 101) and other major arteries. Several major underpasses flooded, including both Oregon Expressway and Embarcadero Road under Alma Street, University Avenue under the railroad tracks, and El Camino Real under University Avenue.

City of San Jose

Descriptions of the flood years in San Jose are listed below. The severity of the floods and the development of the area vary from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Both 1955 and 1958 were serious flood years in the county, and San Jose experienced significant damage, though it fared better than many neighboring areas. Other years marked by flood conditions were 1911, 1952, 1962, and 1983.

Some of the earliest accounts of flooding in the San Jose area are from 1889. Another flood occurred in 1906; however, the scope of the storm was considerably less than in 1889. All of 1910 was an extremely dry year.

On January 13, 1911, a downpour hit the area. Virtually all of the watercourses in the area were affected by the storm, which caused widespread flooding. In early March 1911, another storm brought more intense precipitation to San Jose.

The Santa Clara Valley received heavy precipitation in the winter of 1913 to 1914. However, while Gilroy and Saratoga had appreciable flooding, San Jose was not affected. The watercourses in the area ran full but generally stayed within their banks.

The storms of mid-December 1937 caused extensive flooding in the southern Santa Clara County Towns of Morgan Hill and Gilroy. Extreme precipitation occurred in various parts of the county, with 5.80 inches in Los Gatos and 5.50 inches in Morgan Hill during a 24-hour period. However, San Jose was spared this rainfall, and was one of the least wet areas.

The storm of early April 1941 came at the end of a very wet year. Thus, unlike several previous floods, which were regarded as beneficial due to water shortages, this flood was altogether negative in its effects. The hardest hit areas in the county were Alviso and the Agnew State Hospital vicinity. San Jose escaped damage on the whole, but the surrounding agricultural areas fared poorly.

Although the Alviso area and southern portions of the county were the most seriously affected by floodwaters in February 1945, San Jose did not escape entirely.

The storm which started on Thursday, January 10, 1952, dumped 4.61 inches of rain on San Jose during its 6-day duration. As was the case in 1945, San Jose fared much better than several adjacent communities. Campbell and Alviso were the most severely damaged. The Evergreen area of San Jose was inundated during this winter storm. As much of the Evergreen area was undeveloped in 1952, crop damage was the principal loss resulting from this flood.

The storms of December 21 through 24, 1955, did more damage in Santa Clara County than any other recorded flood. San Jose, however, suffered far less damage than most of its neighbors. The upstream Guadalupe River basin reservoirs were almost empty in 1955; thus, flooding was significantly reduced on the Guadalupe River. Flooding on all of the other watersheds was more serious, partly due to the uneven distribution of the precipitation. While Santa Clara and Los Gatos received 3.29 and 8.48 inches of rain, respectively, only 2.75 inches of rain fell on San Jose.

The flooding of April 1958 was more severe on the Guadalupe River than the inundation of 1955. As a result, bridges and roads in San Jose were threatened. Damage to homes and property was not widespread as a result of this storm, but damage did occur.

The early storm of October 1962 had an appreciable effect in San Jose. Unlike 1955, there was heavier precipitation in San Jose itself. Campbell and Santa Clara, in the areas adjacent to San Jose, had the worst conditions.

A downpour on January 30 and 31, 1963, ended 42 days of drought in the San Jose area. San Jose received 1.95 inches of rain in this 24-hour period. Unlike the previous year, the most extensive flood conditions occurred in the eastern part of town.

The San Jose area did not have significant flooding as a result of the late January rains in 1968. During the storm, Saratoga received 6.57 inches of rain, Los Gatos 5.56 inches, and San Jose 3.60 inches. However, the effects of this precipitation were felt as far east as downtown San Jose, where three key underpasses were filled with water. These were

the grade separations of The Alameda and the railroad tracks, Taylor Street and the railroad tracks, and the intersection of The Alameda and Park Avenue.

In early 1983, a series of storms caused extensive flooding in the City of San Jose, as well as in Santa Clara County as a whole. The first of these storms, which occurred in late January, caused street flooding along many of the drainage ways in the city. Damage to homes and businesses was reported along sections of the Guadalupe River and Calabazas Creek (Reference 1). The second in this series of storms, which occurred in early February, only caused flooding of streets and yards. No flood damage was reported (Reference 1). The third storm occurred in late February and early March. Flooding from this storm caused extensive damage along Coyote Creek. In addition, most homes and businesses in the Alvisio area had to be temporarily evacuated (Reference 1).

The maximum flow recorded at a USGS gage on the Guadalupe River, 100 feet downstream of Los Gatos Creek, was 9,150 cfs in April 1958. It has a return period of approximately 20 years. A number of water-supply reservoirs constructed above the gage, however, preclude the systematic analysis of the gage records.

The largest flow recorded on Coyote Creek, 1.2 miles downstream of Anderson Dam, was 25,000 cfs in 1911. This flow was recorded prior to the construction of the two water-supply reservoirs. Under existing conditions, that value is in excess of the 1-percent-annual-chance flood. Since the construction of the reservoirs, the largest flow on record was 5,750 cfs, with a recurrence interval of approximately 15 years, in April 1958. Because of these reservoirs, a systematic analysis of the gage records was impossible.

City of Santa Clara

Information on early flooding of the streams under investigation is somewhat limited in Santa Clara because of the small population and rural nature of the floodplain areas prior to 1950. Investigation of flooding from 1889 through 1976 indicates that flood conditions and flood damage were experienced in portions of Santa Clara County in December 1889, January 1911, December 1931, December 1937, February 1940, April 1941, November 1950, January 1952, December 1955, April 1958, October 1962, January 1963, January 1968, and February 1973. However, for the area under study, the flood conditions, which existed during the years from 1911 through 1963, produced the only appreciable flooding in the Santa Clara area.

The severity of the floods in Santa Clara and the relative development of the area vary from year to year. Accordingly, the damage resulting from these floods reflects the prevailing conditions. Both 1955 and 1958 were serious flood years in the county, and Santa Clara experienced some damage, although faring better than many neighboring areas. Other years marked by flood conditions were 1911, 1931, 1941, 1952, 1962, and 1963.

Until mid-January, 1910 to 1911 had been an extremely dry period in the Santa Clara Valley. Then on January 13, a downpour hit the area. Virtually all of the watercourses in and around Santa Clara were affected by the storm, causing widespread flooding.

In early March 1911, another storm brought intense precipitation to the Santa Clara/San Jose area.

The rainfall in December 1931 was well received in the Santa Clara area; However, Santa Clara proper was one of the areas that experienced flood conditions.

The storm of early April 1941 came at the end of a very wet year. Thus, unlike several previous storms, which were regarded as beneficial because of water shortages, this flood was altogether negative in its effects. At the height of this storm, Santa Clara received 1.43 inches of precipitation during 24 hours. While the City of Santa Clara escaped damage on the whole, the surrounding agricultural areas fared poorly.

The largest flow recorded at the Saratoga Creek stream gage was 2,730 cfs in December 1955. This disastrous flood year in Santa Clara County was 1955, and the City of Santa Clara did not escape damage. Flooding was widespread throughout the city, affecting many residential areas. Although damage in Santa Clara was not as severe as in some other areas of the county, it was consequential and many people were affected.

The flooding of April 1958 was not as serious in Santa Clara as the inundation of December 1955. Although damage to storm drain channels and other public facilities approached 1955 levels, damage to private property and homes was considerably less.

The early winter storm of October 1962 was accompanied by extremely high winds. Although short in duration, the storm was potent. Some residential areas were flooded, but these were smaller in number than in 1955 and 1958.

January and February 1963 were marked by heavy precipitation. Minor flooding occurred several times during these months, but did not reach levels of previous flood years. The 1963 flood increased water levels on the San Tomas Aquino Creek.

During the most recent flood, in January 1968, Calabazas Creek overflowed at the Kifer Road Bridge, and some thoroughfares had mild flooding conditions for short periods of time. However, residential areas, which were flooded in 1955, 1958, and 1963, did not experience damage during the 1968 storm.

City of Saratoga

Until mid-January, the winter of 1910 to 1911 had been extremely dry. Then, on January 13 and 14, a storm dropped approximately 4 inches of rain in the Saratoga-Los Gatos region within 24 hours. Damage from this precipitation seems to have been slight, perhaps because of the dry soil conditions, but local watercourses were affected. Later in the season, during the first week of March 1911, another storm brought intense precipitation to the Saratoga-Los Gatos area. Runoff from this storm appears to have been greater than in January.

The City of Saratoga, unlike neighboring Los Gatos, suffered some flooding in January 1914. Damage was primarily confined to bridges and other structures that were affected by high winds.

During a 24-hour period on December 27, 1931, Los Gatos received 3.24 inches of rain. Damage from this storm was confined to the lowlands toward the bay. The Alviso area and bayside lowlands around Milpitas were the ultimate recipients of these waters. Vast lakes were created, covering hundreds of acres and marooning farmhouses and dairies.

The rainfall of February 28 and 29, 1940, broke all previous records. Various areas of the hills above the City of Saratoga and Los Gatos received up to 10.2 inches of rain during that 2-day period.

Again, in 1950, 10 inches of rain were recorded during a 2-day period of November 18 and 19 in the Saratoga-Los Gatos area. This precipitation caused minor flooding in both the City of Saratoga and Los Gatos. The greatest flooding from these storms occurred in the south County area, around Gilroy.

The storm, which began on January 10, 1952, dumped 11.48 inches of rain on the City of Saratoga in 1 week. Despite the fact that this was the heaviest precipitation within the county, the City of Saratoga proper experienced little damage. However, the runoff caused havoc in those communities closer to the bay.

As was the case with most of north-central California, the floods of December 1955 brought damage to the City of Saratoga area. Numerous private bridges also washed out on Saratoga Creek.

For the City of Saratoga and most of Santa Clara County, 1958 was an unfortunate repeat of 1955.

By 1962, drainage improvements had reached a point where their influence was readily apparent during a heavy rainfall. During a 3-day period of October 10 to 12, the Saratoga-Los Gatos area received 11.26 inches of rain. Although never serious, flooding did occur in restricted areas.

The storm of January 29 to February 1, 1963, brought 11.87 inches of rain to the Saratoga-Los Gatos area. Flooding had a drastic effect on the local road system.

On January 29, 1968, the Saratoga-Los Gatos area received approximately 4.13 inches of rain within 24 hours. This produced minor flooding of roads and house basements. Damage was considerably below the 1963 levels.

The rains in January and February of 1973 were steady. By February 13, the Saratoga-Los Gatos area had accumulated a total of 28.49 inches - nearly twice the yearly average to that date of 15.63 inches. The wet winter had caused Lexington Reservoir to reach capacity on February 11, sending water over the spillway.

Return periods of the historic floods described above are, in general, difficult to establish. The USGS stream-gage record on Saratoga Creek was used as the basis for estimates of the return period for floods after 1934, the installation date of the gage. For preceding floods, no estimate of return period was attempted. For floods after 1934, the flow rate recorded at the Saratoga Creek stream gage was used as the basic indicator of the return period for the floods experienced in the City of Saratoga.

The two largest floods recorded, December 1955 and February 1940, both had return periods in the range of 40 to 50 years. The 1973 flood had a return period of between 10 and 20 years. All other noted post-1934 flood events had return periods of less than 10 years.

Due to limited capacity of the storm drainage system in the City of Saratoga, the 1-percent-annual-chance flood will subject almost the entire city to shallow sheetflow as floodwaters in excess of the storm drain capacity flow down the streets.

City of Sunnyvale

Information on past flooding of the streams under investigation is very limited due to the small population and rural nature of the floodplain areas prior to 1950.

However, after 1950, four significant flooding events were recorded in the City of Sunnyvale; these occurred in 1955, 1958, 1963, and 1968. The frequencies of these floods were not determined.

The storm of December 21 through 24, 1955, was the maximum storm of record in the City of Sunnyvale area and produced the most significant damage. Of the streams in the City of Sunnyvale area, only Stevens Creek has a gage. Calabazas Creek has a gage, but it is unreliable; therefore, gage records were not used in studying this creek. At Stevens Creek near the Cupertino gage, (drainage area 17.1 square miles) a discharge of 1,420 cfs was recorded on December 23, 1955. According to local residents, the major cause of overflow on Calabazas Creek was debris that blocked the stream channel under the Railroad Bridge.

The worst damage caused by the December 1955 flood was recorded at the northwestern corner of the Green Vale Manor tract, when a storm drainage dike along the eastern side was breached in the vicinity of Chromite and Pilot Knob Drives. More than 100 families living in the Green Vale Manor development were evacuated as floodwaters poured into residential streets and into many of the homes. The fast-flowing stream continued to cross Lawrence Station Road during the duration of the storm and hollowed out a streambed more than 1 foot deep in the center of the road. Most of the damage from this storm was produced by the bursting of drainage dikes.

The flood of 1958 was in most respects a repeat of the 1955 flood, but of a less intense nature. The Green Vale Manor area was again affected by floodwaters. Kifer Road, Agate Avenue, and Pilot Knob Drive were all flooded. In a quote from the Thursday, April 3, 1958, issue of the Sunnyvale Standard, the following comparison was made: “For some residents it was a new experience. For others who remember a similar experience in December 1955, it was an old story but one less painful.”

Although the January 1963 storm was described as worse than the area’s 1958 deluge, few sections of the City of Sunnyvale itself were flooded during this storm. Parts of Kifer Road and segments of other main thoroughfares were inundated for short periods of time. Damage in the City of Sunnyvale was principally confined to the loss of large trees from the drenching rains and high winds. Residential streets were flooded in some areas, but little or no damage was done to homes.

The January 1968 storm did little damage in the City of Sunnyvale. Calabazas Creek overflowed at the Kifer Road Bridge, and some thoroughfares had mild flooding conditions for short periods of time. However, residential areas that were flooded in 1955, 1958, and 1963 did not experience damage in the 1968 storm.

Santa Clara County (Unincorporated Areas)

Information on flooding of the streams under investigation covers the years since 1889. During this period, Santa Clara County experienced 16 floods of varying severity. Due to its size and the fact that it is not incorporated, flood history for the unincorporated areas of Santa Clara County is essentially a composite of flood information on San Jose, Gilroy, and Morgan Hill. The following descriptions of floods refer specifically to conditions in Gilroy, Morgan Hill, and San Jose. However, the picture of flooding created by these accounts describes conditions in the unincorporated areas of Santa Clara County.

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, damage became a more important consideration. In addition, population growth and the completion of water-retention facilities in the area, combined to alter the profile of potential flooding.

The severity of the floods and the relative development of the area vary from year to year. Accordingly, the damage resulting from floods reflects the prevailing conditions. More serious flooding occurred in 1911, 1937, 1945, 1952, 1955, 1962, and 1983.

As was the case with most of Santa Clara County at the time, the rural/agricultural nature of the area precluded heavy damage from floodwaters.

In early March 1911, a storm brought intense precipitation to San Jose. To the west and south, the Guadalupe, Canoas, Los Gatos, and Almaden Creeks rushed along and eddied into the streets and around homes of the city; the overflow from Silver and Coyote Creeks could be seen to the east; and to the north in the dim distance toward Agnew was a vast lake caused by the junction and overflow of the Coyote and Guadalupe Creeks, swelled to rivers by the flood waters of their many tributaries - Silver Creek, the Penitencia, Canoas, and Almaden.

Morgan Hill received 5.50 inches of rain during a 24-hour period on December 10 to 11, 1937. This extreme precipitation flooded both Morgan Hill and Gilroy. The flood conditions resulting from this storm were the most severe experienced in the Morgan Hill and Gilroy area for floods recorded through 1937.

Nearly 7 inches of rain fell in Morgan Hill on the first 2 days of February 1945. Levees were reported washed out on the Uvas Creek, floodwaters were out of bounds on the Llagas, and some bridges were weakened. Several west side homes were flooded with water on the floors, and basements were flooded in several sections of town, resulting in disrupting basement furnaces. Inundated property and flooded highways were reported in the Madrone and Coyote Sections.

A storm that started on Thursday, January 10, 1952, dumped 4.61 inches of rain on San Jose during its 6-day duration. As was the case in 1945, San Jose fared much better than several adjacent communities. Campbell and Alviso were the most severely damaged. The Evergreen Area of San Jose was inundated during this winter storm. As much of the Evergreen Area was undeveloped in 1952, crop damage was the principal loss resulting from this flood.

The storms of December 21 to 25, 1955, did more damage in Santa Clara County than any other recorded flood. The upstream Guadalupe River basin reservoirs were almost

empty in 1955; thus, flooding was significantly reduced on the Guadalupe River. Flooding in all of the other watersheds was more serious, partly due to the uneven distribution of the precipitation. While Santa Clara and Los Gatos received 3.29 and 8.48 inches of rain, respectively, only 2.75 inches of rain fell on San Jose. During this same storm, Morgan Hill received 8.06 inches of rain. The Chesbro Dam in the Morgan Hill area absorbed some of the runoff and provided a manmade check on the Llagas watershed.

In Gilroy, the conditions were more severe. The storms of December 16 to 28, 1955, produced the flood of record in the Gilroy area. The heaviest precipitation occurred during the 3-day period ending December 23. The 12.9 inches of rain reported in the Gilroy area resulted in Uvas and Carnadero Creeks creating a flow of 14,000 cfs at U.S. Highway 101.

The storms in March and April 1958 came at the end of a wet winter. Approximately 8 inches of rain fell in Morgan Hill during a 5-day period ending on April 3. Due to the saturated condition of the soil, runoff from these rains caused problems in many parts of town. In the San Jose area, the flooding of April 1958 was more severe on the Guadalupe River than the inundation of 1955. As a result, bridges and roads in San Jose were threatened.

In the Gilroy area, Miller Slough was the principal flood problem in January 1963. A rainfall of 3.21 inches during 24 hours and the water that flowed from Miller Slough caused severe flooding of Forest Street, Church Street, and Sixth Street. The Church Street Bridge was completely underwater, and the Walnut Lane tract was flooded.

Another January storm hit Morgan Hill in 1967. Although less severe than the deluge in 1963, the storm did produce localized flooding. The city's sewer system was able to cope with the runoff for the most part, and flooding occurred only in isolated areas.

Miller Slough was again a source of extensive floodwaters in January 1969. Five inches of rain were dumped into an already swollen Miller Slough, causing it to rush over its banks and flood several sections of town. On Murray Avenue, water rose to 4 feet in some areas. Damage, however, was not confined to this area alone. Carnadero Creek flooded as well.

The winter of 1972 to 1973 produced high levels of precipitation in the county. The rains in January and February 1973 were steady; however, they did not create local flood conditions. Although some areas of Santa Clara County did experience mild levels of flooding during this winter, Gilroy and the San Martin area were spared.

In early 1983, a series of storms caused extensive flooding in most areas of Santa Clara County. The first of these storms, which occurred in late January, caused street flooding in most low-lying areas of the county. Damage to homes and businesses were reported in some areas (Reference 1).

The second in this series of storms, which occurred in early February, caused only local flooding of streets, yards, and parking areas. No flood damage was reported (Reference 1).

The third storm occurred in late February and early March. Flooding from this storm was particularly severe in the northwest portion of the county, causing extensive damage and some evacuations (Reference 1).

## 2.4 Flood Protection Measures

The rapid residential development of central Santa Clara County communities during the 1950s and 1960s brought about a rapid increase in runoff. To cope with the increased runoff, the USACE has proposed, designed, and partially constructed the Walnut Creek Project. Elements of the project include channel shaping, concrete channel lining, improved bridge designs, new culverts and culvert entrances, and levee improvement and construction. To date, the project is completed through Phase II, which includes, among other things, concrete lining on much of Walnut Creek; 1-percent-annual-chance flood capacity culverts and channels on the lowermost portions of Pine and Galindo Creeks; and 1-percent- annual-chance flood levees along portions of Grayson Creek. As a separate project, the USACE constructed a flood channel with a 2-percent-annual-chance nominal capacity on Rodeo Creek.

The Santa Clara County Flood Control and Water Conservation District, with the assistance of the NRCS, formerly the SCS, have completed a number of projects throughout the county. Among these is the Marsh-Kellogg Watershed Plan (Reference 19) in the eastern, or delta, region. This consists principally of the Marsh Creek flood detention reservoir located at the edge of the foothills south of Brentwood and improvement of 36 miles of channel on Marsh, Sand, and Deer Creeks. These channels were designed to carry the 2-percent-annual-chance flood. Channel improvements have been made on various segments of San Ramon and Las Trampas Creeks. Grayson Creek channelization was also a NRCS, formerly the SCS, project before it was incorporated into the Walnut Creek Project. A flood detention basin was recently completed on Pine Creek.

Levees exist in the study area, which provides the community with some degree of flood protection. However, it has been ascertained that some of these levees may not protect the community from rare events such as the 1-percent-annual- chance flood. The criteria used to evaluate protection against the 1-percent- annual-chance flood are 1) adequate design, including 3 feet of freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect from the 1-percent-annual-chance flood are not considered in the hydraulic analysis of the 1-percent-annual-chance floodplain.

### City of Campbell

There are no known principal flood protection measures within the City of Campbell.

### City of Cupertino

No Federal flood-control facilities exist on the streams in Cupertino. However, local interests have provided drainage or reservoir projects, which affect flood damages within the town.

These improvements have consisted of bridge and culvert construction, and, in some cases, are not adequate to contain the 1-percent-annual-chance floodflow.

City of Gilroy

No Federal flood-control facilities exist on the streams in Gilroy. However, local interests have provided drainage projects that affect flood damages within the city.

Llagas Creek, from immediately south of Buena Vista Avenue to Pacheco Pass Road, was realigned and improved to provide barrow material for the recently completed South Valley Freeway through the City of Gilroy. This work was done in conformance with the proposed channel improvements and bridge reconstruction planned for Uvas Creek as part of the Watershed Protection and Flood Protection Act (Public Law 566).

The Ronan channel, partially complete with respect to construction of bridges, was built to intercept floodwaters north of the City of Gilroy. Initial work on the Ronan Channel was done to provide barrow material for the South Valley Freeway. With the exception of a project sponsored by the City of Gilroy to divert some flow from West Branch Llagas Creek by lengthening the Ronan Channel and adding a 60-inch culvert at Monterey Highway, the Ronan Channel has not significantly relieved the potential flooding through Gilroy. Ronan Channel construction and improvement are part of the Public Law 566 program.

Improvements along Uvas Creek through the City of Gilroy have been carried out primarily by local developers in conjunction with the SCVWD and the City of Gilroy, Department of Public Works. The north levee of Uvas Creek has been strengthened from Miller Avenue to a point 3,500 feet upstream. A USACE levee improvement project for the north bank between Thomas Road and Miller Avenue is in the planning stage.

Other local improvements have consisted of bridge and culvert construction and, in some cases, are not adequate to contain the 1-percent-annual-chance floodflow.

Subsequent to the original FIS, additional measures have been constructed, including the following:

Lions, Llagas, and North and South Morey Creeks, West Branch Llagas Creek (downstream of Day Road), Llagas Overbank (Old Miller Slough), and Miller Slough

- Construction of a levee system along both banks of Llagas Creek from approximately 1,620 feet upstream to approximately 6,250 feet upstream of Bloomfield Avenue; and
- Construction of a levee along the south bank of West Branch Llagas Creek from its confluence with Llagas Creek to the South Valley Freeway.

The levee system constructed along Llagas Creek serves only to contain the 1-percent-annual-chance flood and does not eliminate any Special Flood Hazard Areas (SFHAs) inundated by other flooding sources.

Additional measures have also been constructed for the following:

Uvas Creek

- Levee improvements along the left bank of Uvas Creek from approximately 2,000 feet downstream of Thomas Road to approximately 4,500 feet upstream of Miller Avenue.

City of Los Altos

No Federal flood-control facilities exist on the streams in Los Altos. However, local interests have provided drainage projects that affect flood damages within the city.

These improvements have consisted of bridge and culvert construction and, in some cases, are not adequate to contain the 1-percent-annual-chance floodflow.

In 1959, the Permanente Diversion was constructed. This facility diverts high floodflow from the upper portions of the Permanente Creek watershed to Stevens Creek. Low flows continue down Permanente Creek and are not diverted.

Town of Lost Altos Hills

Flooding near the Moody Road-El Monte Avenue intersection on Adobe Creek was reduced by the installation of an 8-foot diameter concrete pipe bypass in 1974. The pipe inlet is located approximately 250 feet upstream of Tepa Way. Length of the bypass is approximately 2,000 feet. It rejoins Adobe Creek approximately 400 feet below the El Monte Avenue culvert after the main creek makes two 90-degree turns.

To reduce flooding, a trapezoidal concrete-lined channel was built in the lower section of Purissima Creek along the Junipero Serra Freeway between Rhoda Drive and Arastradero Road.

Town of Los Gatos

No Federal flood-control facilities exist on the streams in Los Gatos. However, local interests have provided drainage and reservoir projects, which affect flood damages within the town.

On Los Gatos Creek, three water conservation reservoirs have been constructed. Elsman Reservoir is owned and operated by the San Jose Water Works for water-supply purposes. Lexington and Vasona Reservoirs are owned and operated by the SCVWD to provide storage for ground-water recharge. These three reservoirs have a total storage capacity of 27,000 acre-feet, which provides incidental flood-control benefits for the Town of Los Gatos. Only Vasona Reservoir is located within Los Gatos.

Los Gatos Creek has also been improved within Los Gatos by the SCVWD. The project consisted of a trapezoidal concrete-lined channel in the portion upstream of Saratoga-Los Gatos Road.

Drainage improvements for other streams within Los Gatos have been conducted by local interests on a selective basis. These improvements have consisted of bridge and culvert construction, and in general, are not adequate to contain the 1-percent-annual-chance floodflow.

No floodplain management ordinances are in effect in the Town of Los Gatos.

City of Milpitas

No Federal flood-control facilities exist on the streams of Milpitas. However, local interests have provided drainage or reservoir projects, which affect flood damages within the town.

Berryessa Creek, from the confluence with Lower Penitencia Creek to Calavaras Boulevard, was realigned and improved by local developers in conjunction with the SCVWD and the Milpitas Department of Public Works.

Calera Creek, from the confluence with Berryessa Creek to Escuela Parkway, was improved in a manner similar to Berryessa Creek.

Other local improvements have consisted of bridge and culvert construction, and, in some cases, they are not adequate to contain the 1-percent-annual-chance floodflow.

City of Monte Sereno

There are no known principal flood protection measures within the City of Monte Sereno.

City of Morgan Hill

No Federal flood-control facilities exist on the streams in Morgan Hill. However, it should be noted that a NRCS, formerly the SCS, project has been approved for extensive improvement of West Little Llagas Creek. Also, local interests have provided drainage or reservoir projects, which affect flood damages within the city. Included in these projects is the recently completed channel improvement and realignment of Edmundson Creek at the confluence with West Little Llagas Creek.

These improvements have consisted of bridge and culvert construction, and in some cases, are not adequate to contain the 1-percent-annual-chance floodflow.

The Madrone Channel south of Cochran Road to the confluence with East Little Llagas Creek and East Little Llagas Creek from the confluence with Madrone Channel to the confluence with Llagas Creek was improved to provide fill material for the recently completed South Valley Freeway. This work was done in conformance with the impending channel improvements and bridge reconstruction planned for Llagas Creek as part of the Watershed Protection and Flood Prevention Act (Public Law 566).

City of Mountain View

No Federal flood-control facilities exist on the streams in Mountain View. However, local interests have provided drainage or reservoir projects that affect flood damages within the town. These improvements consisted of bridge and culvert construction and, in some cases, were not adequate to contain the 1-percent-annual-chance floodflow.

In 1959, the Permanente Diversion was constructed. This facility diverts high floodflow from the upper portions of the Permanente Creek watershed to Stevens Creek. Low flows continue down Permanente Creek and are not diverted.

City of Palo Alto

No Federal flood-control facilities exist on the streams affecting the City of Palo Alto. However, local interests have provided drainage and improvement projects that reduce flood damages within the city.

The Palo Alto Flood Basin, located in the wetland east of Bayshore Freeway, was constructed in 1956 to provide storage for flood discharges from Adobe, Barron, and Matadero Creeks. The stored floodwaters are discharged into San Francisco Bay during low-tide periods. The flood basin has a total storage capacity of 3,000 acre-feet below an elevation of 3.2 feet.

Projects recently constructed or being constructed by the SCVWD on Adobe, Barron, and Matadero Creeks in Palo Alto are designed to carry the 1-percent-annual- chance floodplains. Other drainage improvements for streams within Palo Alto, such as channel lining and bank protection, are generally not adequate to contain the 1-percent-annual-chance floodflow.

In addition to flooding caused by local watercourses, flooding potential exists in Palo Alto if the levees along the San Francisco Bay side of the city fail. The Palo Alto Comprehensive Plan, 1977-1990 describes this condition.

The levees around most of the south bay were originally built to create evaporation ponds for salt production, but now serve as protection for developed lands. The SCVWD has jurisdiction over and maintains the levees in Palo Alto. Most of the levees are constructed of compacted bay mud. The levee elevation estimated, as necessary, by the Bay Conservation and Development Commission, in its Bay Plan Supplement, is 10 feet above sea level in the south bay. This height includes 7 feet for water and 3 feet for protection against storm waves. This implies that without the levee system, Palo Alto would be subject to salt-water inundation at high tide to an elevation of 7 feet (Reference 20).

City of San Jose

No Federal flood-control facilities exist on the streams affecting San Jose. However, local interests have provided drainage and improvement projects, which affect flood damage within the city.

These improvements have consisted of channel lining, bridge, culvert, and levee construction and bank and erosion protection. The improvements are generally not adequate to contain the 1-percent-annual-chance floodflow.

In addition to the channel improvements, a number of reservoirs have been constructed for water-supply purposes. No flood-control pool is available in these reservoirs; thus, only an incidental flood-control function is available. These reservoirs include Coyote and Anderson in the Coyote Creek basin and Almaden, Calero, Guadalupe, Elsman, and Lexington in the Guadalupe River basin.

City of Santa Clara

No Federal flood-control facilities exist on the streams affecting the City of Santa Clara. However, local interests have provided drainage and improvement projects that affect flood damages within the city.

Other drainage improvements for streams within Santa Clara have been conducted by local interests on a selective basis. These improvements have consisted of channel lining, bridge, culvert and levee construction, and bank and erosion protection. These

improvements are generally not adequate to entirely contain the 1-percent-annual-chance floodflow.

City of Saratoga

No Federal flood-control facilities exist on the streams in the City of Saratoga. However, local interests have provided drainage projects that affect flood damages within the city.

These improvements consist of bridge and culvert construction, but in some cases, they are not adequate to contain the 1-percent-annual-chance floodflow.

Subsequent to the original FIS, additional measures have been constructed, including the following:

Calabazas Creek

- Channel excavation and relocation between Saratoga-Sunnyvale Road and the railroad;
- The channel immediately upstream of the railroad has been relocated for a length of approximately 100 feet; and
- Rock riprap slope protection has been installed over approximately 100 feet of channel, starting approximately 100 feet upstream of the railroad.

Prospect Creek

In conjunction with land development, substantial modifications of the creek have been made between the confluence with Calabazas Creek and Beauchamp Lane. These modifications include:

- Channel excavation
- Sacked concrete slope protection
- Rock riprap slopes
- Compacted earthen berms
- Concrete and timber retaining walls

The earthen berms and retaining walls were evaluated relative to the FEMA levee policy. The following conclusions were reached:

- Through most of the length of the study, it was determined that the calculated 1-percent-annual-chance water surface was at or below the natural ground line.
- At some localized areas where the 1-percent-annual-chance water-surface elevation is above natural ground at the waterside toe of the berm, it was determined that the berm was extended at a positive slope on the landside until it daylighted with natural ground.
- At one location immediately upstream of Arroyo de Arguello, the concrete and timber wall located on the land side of the earthen berm was determined

to provide the freeboard required by the levee policy and to be stable and structurally adequate.

City of Sunnyvale

No Federal flood-control facilities exist on the streams in the City of Sunnyvale. However, local interests have provided many facilities to mitigate the damage caused by flooding.

Stevens Creek Dam, located on Stevens Creek 2.5 miles south of the City of Sunnyvale corporate limits, is an earthfill dam approximately 135 feet in height. Constructed in 1936, the dam's principal purpose is water supply. The waters impounded in the reservoir are released at a rate such that the waters will percolate into the ground, thus recharging the ground water aquifer. Though no flood-control facilities are available at the dam, Stevens Creek Dam does offer incidental flood- control benefits to the downstream area. No major channel modifications have been performed on Stevens Creek along the City of Sunnyvale corporate limits.

Manmade alterations to the drainage regimen have primarily been in the form of open channels. However, levee systems have been constructed along San Francisco Bay, originally to form and protect the salt evaporators and concentrators that ring the southernmost arm of the bay. To allow use of lands that were subject to tidal flooding and subsidence, the levee systems have been extended and strengthened to protect these low-lying lands.

Both the Sunnyvale East Channel and the Sunnyvale West Channel were constructed to convey internal drainage from the City of Sunnyvale and surrounding areas to San Francisco Bay. The Sunnyvale West Channel was constructed by the SCVWD in the early 1960s. The project consisted of a trapezoidal open channel from San Francisco Bay to just upstream of U.S. Highway 101. A closed conduit system to Maude Avenue constituted the remainder of the project. The channel was built to convey a 10-percent-annual-chance flood from the tributary storm drain system.

The Sunnyvale East Channel was also constructed by the SCVWD in the late 1960s. The channel was constructed in four increments from the bay to Inverness Way. From upstream of Inverness Way to IH-280, a closed conduit system was constructed. The channel was built to convey a 10-percent-annual- chance flood from the tributary storm drain system.

Calabazas Creek was aligned prior to 1950 to flow into Saratoga Creek between El Camino Real and the railroad. The creek was constructed on its present alignment during the middle 1950s. The SCVWD has completed construction of a flood-control channel improvement on Calabazas Creek between Bayshore Freeway and SH-237 (Reference 21). This improvement is capable of containing the 1- percent-annual-chance flood. A concrete-lined channel now exists or is under construction from Lawrence Expressway down to the Bayshore Freeway. Additional capacity will ultimately be added upstream of Lawrence Expressway, but this modification is not anticipated in the near future.

Santa Clara county (Unincorporated Areas)

Subsequent to the original FIS, additional measures have been constructed, including the following:

Lions, Llagas, and North and South Morey Creeks, West Branch Llagas Creek (downstream of Day Road), Llagas Overbank (Old Miller Slough), and Miller Slough

- Construction of a levee system along both banks of Llagas Creek from approximately 1,620 feet upstream to approximately 6,250 feet upstream of Bloomfield Avenue; and

- Construction of a levee along the south bank of West Branch Llagas Creek from its confluence with Llagas Creek to the South Valley Freeway.

Additional measures have also been constructed for the following:

Uvas Creek

- Levee improvements along the left bank of Uvas Creek from approximately 2,000 feet downstream of Thomas Road to approximately 4,500 feet upstream of Miller Avenue.