

CENTRAL VALLEY FLOOD MANAGEMENT PLANNING PROGRAM



2012 Central Valley Flood Protection Plan Consolidated Final Program Environmental Impact Report

July 2012

SCH No.: 2010102044

This page left blank intentionally

Table of Contents

Prologue 1-1

1.0 Introduction..... 1-1

 1.1 CVFPP Background 1-2

 1.1.1 Legislation 1-3

 1.2 Development of the CVFPP 1-4

 1.3 Geographic Scope of the CVFPP 1-6

 1.3.1 CVFPP Planning Areas 1-6

 1.3.2 PEIR Study Area 1-9

 1.4 Public Participation in the CEQA Process 1-11

 1.5 Relationship to Other EIRs 1-12

 1.6 Roles of Other Entities 1-12

 1.7 Uses of the PEIR..... 1-13

 1.8 PEIR Organization..... 1-15

2.0 Program Description..... 2-1

 2.1 Purpose and Objectives of the Proposed Program 2-1

 2.1.1 Program Purpose 2-1

 2.1.2 Program Objectives..... 2-3

 2.2 Development of the Proposed Program 2-5

 2.2.1 Management Actions and Development of the Preliminary Approaches 2-6

 2.2.2 Key Implications for the Proposed Program..... 2-8

 2.3 Characteristics and Key Components of the Proposed Program 2-10

 2.3.1 Urban Flood Protection 2-11

 2.3.2 Small-Community Flood Protection..... 2-12

 2.3.3 Rural-Agricultural Area Flood Protection..... 2-13

 2.3.4 System Improvements 2-14

 2.3.5 Non-State Plan of Flood Control Levees 2-15

 2.3.6 Integrating Ecosystem Restoration Opportunities with Flood Risk Reduction Projects 2-16

 2.3.7 Vegetation Management Strategy and Life- Cycle Management 2-17

 2.3.8 Local Planning Obligations..... 2-20

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

2.3.9	Regional Planning	2-22
2.3.10	Early Implementation Projects and Other Accomplishments of the Past 5 Years.....	2-23
2.4	Proposed Management Activities	2-24
2.4.1	Near-Term Conveyance-Related Management Activities ..	2-25
2.4.2	Near-Term Storage-Related Management Activities.....	2-26
2.4.3	Other Near-Term Management Activities	2-26
2.4.4	Long-Term Conveyance-Related Management Activities ..	2-38
2.4.5	Long-Term Storage-Related Management Activities.....	2-40
2.4.6	Other Long-Term Management Activities.....	2-41
2.5	Implementation of the Proposed Program.....	2-47
2.5.1	Implementation in Accordance with Applicable Laws and Regulations	2-47
2.5.2	Financing Strategy for Implementing the Proposed Program	2-50
2.6	No Near- or Long-Term Reduction in Water or Renewable Electricity Deliveries	2-51
2.7	Typical Construction Activities and Methods	2-53
2.7.1	Construction Materials	2-54
2.7.2	Equipment Types	2-54
2.7.3	Construction Timing	2-56
2.7.4	Construction Activities.....	2-57
2.7.5	Environmental Considerations	2-61
3.0	Environmental Setting, Impacts, and Mitigation Measures	3.1-1
3.1	Approach to Environmental Analysis.....	3.1-1
3.1.1	Section Contents.....	3.1-1
3.1.2	Analysis Methodology	3.1-4
3.1.3	Terminology Used to Describe Impacts	3.1-9
3.1.4	Impact Mechanisms	3.1-11
3.2	Aesthetics.....	3.2-1
3.2.1	Environmental Setting.....	3.2-1
3.2.2	Regulatory Setting.....	3.2-22
3.2.3	Analysis Methodology and Thresholds of Significance ...	3.2-24
3.2.4	Environmental Impacts and Mitigation Measures for NTMAs	3.2-27
3.2.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMA's	3.2-34

- 3.3 Agriculture and Forestry Resources 3.3-1
 - 3.3.1 Environmental Setting 3.3-2
 - 3.3.2 Regulatory Setting..... 3.3-22
 - 3.3.3 Analysis Methodology and Thresholds of Significance ... 3.3-26
 - 3.3.4 Environmental Impacts and Mitigation Measures for NTMAs 3.3-30
 - 3.3.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs 3.3-43
- 3.4 Air Quality..... 3.4-1
 - 3.4.1 Environmental Setting 3.4-1
 - 3.4.2 Regulatory Setting..... 3.4-25
 - 3.4.3 Analysis Methodology and Thresholds of Significance ... 3.4-32
 - 3.4.4 Environmental Impacts and Mitigation Measures for NTMAs 3.4-36
 - 3.4.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs 3.4-56
- 3.5 Biological Resources—Aquatic 3.5-1
 - 3.5.1 Environmental Setting 3.5-1
 - 3.5.2 Regulatory Setting..... 3.5-26
 - 3.5.3 Analysis Methodology and Thresholds of Significance ... 3.5-36
 - 3.5.4 Environmental Impacts and Mitigation Measures for NTMAs 3.5-38
 - 3.5.5 Environmental Impacts and Mitigation Measures for LTMAs..... 3.5-55
- 3.6 Biological Resources—Terrestrial 3.6-1
 - 3.6.1 Environmental Setting 3.6-2
 - 3.6.2 Regulatory Setting..... 3.6-60
 - 3.6.3 Analysis Methodology and Thresholds of Significance ... 3.6-68
 - 3.6.4 Environmental Impacts and Mitigation Measures for NTMAs 3.6-71
 - 3.6.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs 3.6-95
- 3.7 Climate Change and Greenhouse Gas Emissions 3.7-1
 - 3.7.1 Environmental Setting 3.7-5
 - 3.7.2 Regulatory Setting..... 3.7-20
 - 3.7.3 Analysis Methodology and Thresholds of Significance ... 3.7-38

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

3.7.4	Environmental Impacts and Mitigation Measures for NTMAs	3.7-42
3.7.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.7-53
3.8	Cultural and Historic Resources	3.8-1
3.8.1	Environmental Setting	3.8-1
3.8.2	Regulatory Setting.....	3.8-16
3.8.3	Analysis Methodology and Thresholds of Significance ...	3.8-22
3.8.4	Environmental Impacts and Mitigation Measures for NTMAs	3.8-24
3.8.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.8-34
3.9	Energy	3.9-1
3.9.1	Environmental Setting	3.9-1
3.9.2	Regulatory Setting.....	3.9-14
3.9.3	Analysis Methodology and Thresholds of Significance ...	3.9-16
3.9.4	Environmental Impacts and Mitigation Measures for NTMAs	3.9-18
3.9.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.9-20
3.10	Geology, Soils, and Seismicity (Including Mineral and Paleontological Resources).....	3.10-1
3.10.1	Environmental Setting	3.10-1
3.10.2	Regulatory Setting.....	3.10-35
3.10.3	Analysis Methodology and Thresholds of Significance .	3.10-41
3.10.4	Environmental Impacts and Mitigation Measures for NTMAs	3.10-44
3.10.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.10-49
3.11	Groundwater Resources	3.11-1
3.11.1	Environmental Setting	3.11-1
3.11.2	Regulatory Setting.....	3.11-27
3.11.3	Analysis Methodology and Thresholds of Significance .	3.11-30
3.11.4	Environmental Impacts and Mitigation Measures for NTMAs	3.11-32
3.11.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.11-36
3.12	Hazards and Hazardous Materials	3.12-1
3.12.1	Environmental Setting	3.12-2

3.12.2	Regulatory Setting.....	3.12-14
3.12.3	Analysis Methodology and Thresholds of Significance .	3.12-20
3.12.4	Environmental Impacts and Mitigation Measures for NTMAs	3.12-22
3.12.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.12-33
3.13	Hydrology	3.13-1
3.13.1	Environmental Setting	3.13-2
3.13.2	Regulatory Setting.....	3.13-60
3.13.3	Analysis Methodology and Thresholds of Significance .	3.13-78
3.13.4	Environmental Impacts and Mitigation Measures for NTMAs	3.13-81
3.13.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.13-85
3.14	Land Use and Planning	3.14-1
3.14.1	Environmental Setting	3.14-2
3.14.2	Regulatory Setting.....	3.14-21
3.14.3	Analysis Methodology and Thresholds of Significance .	3.14-28
3.14.4	Environmental Impacts and Mitigation Measures for NTMAs	3.14-35
3.14.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.14-63
3.15	Noise	3.15-1
3.15.1	Environmental Setting	3.15-2
3.15.2	Regulatory Setting.....	3.15-14
3.15.3	Analysis Methodology and Thresholds of Significance .	3.15-18
3.15.4	Environmental Impacts and Mitigation Measures for NTMAs	3.15-22
3.15.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.15-36
3.16	Population, Employment, and Housing	3.16-1
3.16.1	Environmental Setting	3.16-2
3.16.2	Regulatory Setting.....	3.16-50
3.16.3	Analysis Methodology and Thresholds of Significance .	3.16-55
3.16.4	Environmental Impacts and Mitigation Measures for NTMAs	3.16-57
3.16.5	Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs	3.16-61

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

3.17 Public Services..... 3.17-1

- 3.17.1 Environmental Setting..... 3.17-2
- 3.17.2 Regulatory Setting..... 3.17-13
- 3.17.3 Analysis Methodology and Thresholds of Significance . 3.17-13
- 3.17.4 Environmental Impacts and Mitigation Measures for NTMAs 3.17-16
- 3.17.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs 3.17-17

3.18 Recreation..... 3.18-1

- 3.18.1 Environmental Setting..... 3.18-2
- 3.18.2 Regulatory Setting..... 3.18-31
- 3.18.3 Analysis Methodology and Thresholds of Significance . 3.18-44
- 3.18.4 Environmental Impacts and Mitigation Measures for NTMAs 3.18-47
- 3.18.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs 3.18-55

3.19 Transportation and Traffic 3.19-1

- 3.19.1 Environmental Setting..... 3.19-1
- 3.19.2 Regulatory Setting..... 3.19-12
- 3.19.3 Analysis Methodology and Thresholds of Significance . 3.19-13
- 3.19.4 Environmental Impacts and Mitigation Measures for NTMAs 3.19-17
- 3.19.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs 3.19-22

3.20 Utilities and Service Systems 3.20-1

- 3.20.1 Environmental Setting..... 3.20-2
- 3.20.2 Regulatory Setting..... 3.20-9
- 3.20.3 Analysis Methodology and Thresholds of Significance . 3.20-11
- 3.20.4 Environmental Impacts and Mitigation Measures for NTMAs 3.20-14
- 3.20.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs 3.20-17

3.21 Water Quality..... 3.21-1

- 3.21.1 Environmental Setting..... 3.21-1
- 3.21.2 Regulatory Setting..... 3.21-32

- 3.21.3 Analysis Methodology and Thresholds of Significance . 3.21-38
- 3.21.4 Environmental Impacts and Mitigation Measures for NTMAs 3.21-40
- 3.21.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAAs 3.21-44
- 4.0 Cumulative Impacts 4-1
 - 4.1 CEQA Requirements 4-1
 - 4.2 Geographic Scope of Effects of the Proposed Program 4-1
 - 4.3 Related Projects 4-3
 - 4.3.1 Past and Present Projects and Activities and Cumulative Context 4-3
 - 4.3.2 Reasonably Foreseeable Future Projects 4-5
 - 4.4 Cumulative Impacts Methodology and Analysis 4-13
 - 4.4.1 Methods and Assumptions 4-13
 - 4.4.2 Cumulative Impacts 4-13
- 5.0 Alternatives 5-1
 - 5.1 Introduction 5-1
 - 5.2 Alternatives Considered 5-2
 - 5.2.1 No-Project Alternative—Continued Operations Scenario 5-5
 - 5.2.2 No-Project Alternative—No Additional Activities Scenario ... 5-6
 - 5.2.3 Modified State Systemwide Investment Approach Alternative 5-6
 - 5.2.4 Achieve SPFC Design Flow Capacity Alternative 5-7
 - 5.2.5 Achieve SPFC Design Flow Capacity with Strict ETL Compliance Alternative 5-7
 - 5.2.6 Protect High-Risk Communities Alternative 5-8
 - 5.2.7 The Enhanced Flood System Capacity Alternative 5-8
 - 5.3 Alternatives Considered but Rejected 5-8
 - 5.3.1 Achieve SPFC Design Flow Capacity with Strict ETL Compliance Alternative 5-8
 - 5.3.2 Protect High-Risk Communities Alternative 5-10
 - 5.4 Alternatives Carried Forward for Analysis and Evaluation 5-10
 - 5.4.1 No-Project Alternative—Continued Operations Scenario... 5-15
 - 5.4.2 No-Project Alternative—No Additional Activities Scenario . 5-21
 - 5.4.3 Modified Systemwide Investment Approach Alternative 5-23
 - 5.4.4 Achieve SPFC Design Flow Capacity Alternative 5-25

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

5.4.5	Enhance Flood System Capacity Alternative	5-28
5.5	Impact Analysis	5-32
5.5.1	Aesthetics	5-36
5.5.2	Agriculture and Forestry Resources.....	5-40
5.5.3	Air Quality	5-45
5.5.4	Biological Resources—Aquatic	5-49
5.5.5	Biological Resources—Terrestrial.....	5-55
5.5.6	Climate Change and Greenhouse Gas Emissions	5-61
5.5.7	Cultural and Historic Resources.....	5-67
5.5.8	Energy.....	5-72
5.5.9	Geology, Soils, and Seismicity (Including Mineral and Paleontological Resources)	5-77
5.5.10	Groundwater Resources	5-83
5.5.11	Hazards and Hazardous Materials	5-87
5.5.12	Hydrology.....	5-92
5.5.13	Land Use and Planning.....	5-97
5.5.14	Noise.....	5-104
5.5.15	Population, Employment, and Housing	5-109
5.5.16	Public Services	5-113
5.5.17	Recreation.....	5-117
5.5.18	Transportation and Traffic	5-122
5.5.19	Utilities and Service Systems.....	5-128
5.5.20	Water Quality	5-132
5.6	Environmentally Superior Alternative	5-137
5.7	Analysis of the Achieve SPFC Design Flow Capacity with Strict ETL Compliance Alternative	5-142
5.5.1	Background.....	5-142
5.5.2	Reasons to Include More Detailed Analysis of the Achieve SPFC Design Flow Capacity with Strict ETL Compliance Alternative in the PEIR	5-143
5.5.3	Description of the Achieve SPFC Design Flow Capacity with Strict ETL Compliance Alternative	5-145
5.5.4	Impact Analysis.....	5-146
5.5.5	Summary Comparison of Alternatives.....	5-202
6.0	Other CEQA-Required Sections and Additional Material.....	6-1
6.1	Growth-Inducing Impacts	6-1
6.1.1	Employment Generation	6-2

6.1.2	Removal of Obstacles to Additional Growth.....	6-3
6.1.3	Growth Inducement Resulting from Changes in Water Supply.....	6-5
6.1.4	Growth Inducement Resulting from the 2007 Flood Legislation Requirements for an Urban Level of Flood Protection.....	6-5
6.2	Significant Irreversible Environmental Changes.....	6-6
6.3	Significant and Unavoidable Impacts.....	6-6
6.4	Impacts of Mitigation Measures.....	6-9
6.5	Environmental Justice.....	6-10
6.5.1	Background.....	6-10
6.5.2	California Natural Resources Agency Policy.....	6-10
6.5.3	Demographic and Income Profiles.....	6-11
6.5.4	Impact Analysis.....	6-18
6.6	Effects of Global Climate Change on Program Facilities and Operations.....	6-22
6.6.1	Potential Effects of Global Climate Change on Program Conveyance and Storage Facilities and Operations.....	6-23
6.6.2	Potential Effects of Global Climate Change on Operation and Maintenance of Other Management Actions.....	6-29
7.0	References.....	7-1
7.1	Executive Summary.....	7-1
7.2	Chapter 1.0, “Introduction”.....	7-1
7.3	Chapter 2.0, “Program Description”.....	7-2
7.4	Chapter 3.0, “Environmental Setting, Impacts, and Mitigation Measures”.....	7-2
7.4.1	Section 3.1, “Approach to the Environmental Analysis”.....	7-2
7.4.2	Section 3.2, “Aesthetics”.....	7-3
7.4.3	Section 3.3, “Agriculture and Forestry Resources”.....	7-5
7.4.4	Section 3.4, “Air Quality”.....	7-7
7.4.5	Section 3.5, “Biological Resources—Aquatic”.....	7-10
7.4.6	Section 3.6, “Biological Resources—Terrestrial”.....	7-17
7.4.7	Section 3.7, “Climate Change and Greenhouse Gas Emissions”.....	7-27
7.4.8	Section 3.8, “Cultural and Historic Resources”.....	7-33
7.4.9	Section 3.9, “Energy”.....	7-35

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

7.4.10	Section 3.10, “Geology, Soils, and Seismicity (Including Mineral and Paleontological Resources)”	7-36
7.4.11	Section 3.11, “Groundwater Resources”	7-41
7.4.12	Section 3.12, “Hazards and Hazardous Materials”	7-44
7.4.13	Section 3.13, “Hydrology”	7-46
7.4.14	Section 3.14, “Land Use and Planning”	7-51
7.4.15	Section 3.15, “Noise”	7-57
7.4.16	Section 3.16, “Population, Employment, and Housing”	7-59
7.4.17	Section 3.17, “Public Services”	7-60
7.4.18	Section 3.18, “Recreation”	7-62
7.4.19	Section 3.19, “Transportation and Traffic”	7-76
7.4.20	Section 3.20, “Utilities and Service Systems”	7-76
7.4.21	Section 3.21, “Water Quality”	7-77
7.5	Chapter 4.0, “Cumulative Impacts”	7-82
7.6	Chapter 5.0, “Alternatives”	7-86
7.7	Chapter 6.0, “Other CEQA-Required Sections”	7-86
7.8	Chapter 8.0, “List of Preparers”	7-89
7.9	Chapter 9.0, “Abbreviations and Acronyms”	7-89
8.0	List of Preparers	8-1
9.0	Abbreviations and Acronyms	9-1

List of Tables

Table 2.5-1. Possible Permits and Authorizations	2-48
Table 3.2-1. Officially Designated State Scenic Highways in the Extended Systemwide Planning Area and the Sacramento and San Joaquin Valley Watersheds.....	3.2-3
Table 3.2-2. Scenic Resources in the SoCal/Coastal CVP/SWP Service Areas	3.2-21
Table 3.3-1. Acreages of Important Farmland in the Study Area.....	3.3-5
Table 3.3-2. Acreage of Williamson Act Lands in the Study Area.....	3.3-7
Table 3.3-3. Acreage of California’s Forest Land by Owner in 2007	3.3-10
Table 3.3-4. Acreage of Timber Production Rezoned in the Study Area (2006–2008)	3.3-10
Table 3.3-5. Most Valuable Agricultural Products in 2009 in Counties within the Extended Systemwide Planning Area1	3.3-13
Table 3.3-6. Acreage of Important Farmland in the Sacramento and San Joaquin Valley and Foothills	3.3-15
Table 3.3-7. Habitats and Acreage of Forest Land in the Sacramento and San Joaquin Valley and Foothills	3.3-16
Table 3.3-8. Acreage of Important Farmland in the Delta and Suisun Marsh	3.3-17
Table 3.3-9. Habitats and Acreage of Forest Land in the Delta and Suisun Marsh	3.3-18
Table 3.3-10. Acreage of Important Farmland in the Sacramento and San Joaquin Valley Watersheds.....	3.3-19
Table 3.3-11. Habitats and Acreage of Forest Land in the Sacramento and San Joaquin Valley Watersheds.....	3.3-20

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

Table 3.3-12. Acreage of Important Farmland in the SoCal/Coastal CVP/SWP Service Areas..... 3.3-21

Table 3.3-13. Habitats and Acreage of Forest Land in the SoCal/Coastal CVP/SWP Service Areas..... 3.3-21

Table 3.4-1. Temperature and Precipitation of Representative Cities in Air Basins of the Extended SPA and Sacramento and San Joaquin Valley Watersheds¹ 3.4-5

Table 3.4-2. Ambient Air Quality Standards 3.4-11

Table 3.4-3. Summary of Annual Ambient Air Quality Data for the Extended SPA and Sacramento and San Joaquin Valley Watersheds (by Basin) 3.4-17

Table 3.4-4. Air Districts in the Extended SPA and Sacramento and San Joaquin Valley Watersheds and Standards Potentially Applicable to the Proposed Program 3.4-29

Table 3.4-5. Construction Emissions from Reclamation District 17 Levee Improvement Project and Applicable Thresholds of Significance 3.4-40

Table 3.4-6. Construction Emissions from Feather River Levee Repair Project and Applicable Thresholds of Significance 3.4-41

Table 3.4-7. Construction-Related Emissions of Criteria Air Pollutants and Ozone Precursors Associated with Avoiding a 100-Year Flood in Sacramento County, 2015¹ 3.4-43

Table 3.4-8. Construction Emissions from San Joaquin River Restoration Program (Example Project) and Applicable Thresholds of Significance 3.4-45

Table 3.5-1. Life History and Distributions of Life Stages for Key Fish Species in the Extended Systemwide Planning Area 3.5-15

Table 3.5-2. Special-Status Species and Occurrence Within the Extended Systemwide Planning Area 3.5-17

Table 3.6-1. Habitats and Acreage of Habitat Types Mapped in the Extended Systemwide Planning Area1 3.6-7

Table 3.6-2. Number of Sensitive Plant and Wildlife Species in the Extended Systemwide Planning Area, by Habitat Type 3.6-14

Table 3.6-3. Sensitive Plant Species of Riparian and Wetland Habitats in the Extended Systemwide Planning Area..... 3.6-17

Table 3.6-4. Sensitive Wildlife Species of Riparian and Wetland Communities in the Sacramento and San Joaquin Valley and Foothills 3.6-22

Table 3.6-5. Habitats and Acreage of Habitat Types Mapped in the Sacramento and San Joaquin Valley (Upper) Watersheds1 3.6-52

Table 3.6-6. Number of Sensitive Plant and Wildlife Species in the Study Area, by Geographic Area1 3.6-55

Table 3.6-7. Habitats and Acreage of Habitat Types Mapped in the SoCal/Coastal CVP/SWP Service Areas..... 3.6-57

Table 3.7-1. Summary of State Laws and Executive Orders that Address Climate Change..... 3.7-23

Table 3.7-2. California Cities and Counties in the Study Area with Climate Action Plans and Sustainability Action Plans 3.7-34

Table 3.9-1. California Counties with Oil, Natural Gas, or Geothermal Production 3.9-4

Table 3.9-2. Capacities of CVP Power-Generating Facilities in the Sacramento and San Joaquin Valley and Foothills 3.9-7

Table 3.9-3. Capacities of SWP Power-Generating Facilities in the Sacramento and San Joaquin Valley and Foothills 3.9-9

Table 3.9-4. Local and Privately Owned Power Plants in the Sacramento and San Joaquin Valley and Foothills 3.9-9

Table 3.10-1. Geologic Time Scale 3.10-4

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

Table 3.10-2. Summary of Soils in the Study Area 3.10-21

Table 3.10-3. California Nonfuel Mineral Production, 2008 3.10-28

Table 3.10-4. Comparison of 50-Year Demand to Permitted Aggregate Resources for Aggregate Study Areas as of January 1, 2006..... 3.10-29

Table 3.11-1. Net Changes in Groundwater Storage in the Sacramento River Hydrologic Region, 1998–2005..... 3.11-7

Table 3.11-2. Groundwater Quality Data for the Sacramento Valley and Redding Area Groundwater Basins in the Sacramento River Hydrologic Region 3.11-12

Table 3.11-3. Net Changes in Groundwater Storage in the San Joaquin River Hydrologic Region, 1998–2005 3.11-17

Table 3.11-4. Groundwater Quality Data for the San Joaquin Valley Groundwater Basin in the San Joaquin River Hydrologic Region1..... 3.11-22

Table 3.13-1. Historic Flood Events by Basin (1850–2000)..... 3.13-5

Table 3.13-2. State Plan of Flood Control Facilities in the Sacramento Valley and Foothills 3.13-9

Table 3.13-3. State Plan of Flood Control Facilities in the San Joaquin Valley and Foothills 3.13-29

Table 3.13-4. Findings of the Flood Control System Status Report..... 3.13-41

Table 3.13-5. Historical Average Monthly Sacramento–San Joaquin Delta Inflow..... 3.13-51

Table 3.13-6. Calculated Average Monthly Sacramento–San Joaquin Delta Outflow..... 3.13-52

Table 3.14-1. Cities and Census-Designated Areas Within the Sacramento and San Joaquin Valley and Foothills 3.14-10

Table 3.14-2. Summary of Land Use by Category within the Sacramento and San Joaquin Valley and Foothills 3.14-12

Table 3.14-3. Cities and Census-Designated Areas within Counties in the Sacramento–San Joaquin Delta and Suisun Marsh 3.14-13

Table 3.14-4. Summary of Land Use by Category within the Sacramento–San Joaquin Delta and Suisun Marsh 3.14-16

Table 3.14-5. Land Uses in FEMA Flood Zones: City of Merced Example Area 3.14-54

Table 3.14-6. Land Use in FEMA Flood Zones: City of Ripon Example Area 3.14-55

Table 3.14-7. Land Uses and FEMA Flood Zones: Sacramento County South Example Area 3.14-57

Table 3.14-8. Land Uses with FEMA Flood Zones: Sacramento County North Example Area 3.14-59

Table 3.15-1. Subjective Reaction to Changes in Noise Levels of Similar Sources 3.15-7

Table 3.15-2. Human Response to Different Levels of Groundborne Noise and Vibration 3.15-8

Table 3.15-3. Vibration Damage/Annoyance Potential 3.15-9

Table 3.15-4. California General Plan Land Use Noise Compatibility Guidelines 3.15-16

Table 3.15-5. Significant Change in Ambient Noise Levels 3.15-18

Table 3.15-6. Construction Equipment Noise Emission Levels¹ 3.15-25

Table 3.15-7. Measured Levee Construction Noise Levels 3.15-26

Table 3.15-8. Summary of Modeled NTMA-Generated Noise Levels 3.15-27

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

Table 3.15-9. Heavy-Duty Truck Trips Needed to Increase Traffic Noise Levels by 3 dBA CNEL/Ldn..... 3.15-29

Table 3.15-10. Representative Vibration Source Levels for Construction Equipment 3.15-32

Table 3.15-12. Summary of Modeled Water Pump Noise Levels 3.15-34

Table 3.16-1. Population and Growth Rates, 2000–2030—Counties in the Sacramento and San Joaquin Valley and Foothills and Statewide..... 3.16-5

Table 3.16-2. Population and Growth Rates, 2000–2010—Cities and Other Communities in the Sacramento and San Joaquin Valley and Foothills with More than 10,000 Residents..... 3.16-9

Table 3.16-3. Population by Age of Residents, 2000—Counties in the Sacramento and San Joaquin Valley and Foothills and Statewide..... 3.16-11

Table 3.16-4. Employment Trends, 2000 and 2009—Counties in the Sacramento and San Joaquin Valley and Foothills and Statewide..... 3.16-15

Table 3.16-5. Employment by Industry, 2008—Counties in the Sacramento and San Joaquin Valley and Foothills and Statewide..... 3.16-17

Table 3.16-6. Income and Poverty Levels, 1999—Counties in the Sacramento and San Joaquin Valley and Foothills and Statewide..... 3.16-19

Table 3.16-7. Number of Housing Units and Growth Rates, 2000 and 2009—Counties in the Sacramento and San Joaquin Valley and Foothills and Statewide 3.16-20

Table 3.16-8. Number of Housing Units and Growth Rates, 2000 and 2009—Cities and Other Communities in the Sacramento and San Joaquin Valley and Foothills..... 3.16-24

Table 3.16-9. Housing Unit Types and Growth Rates, 2000 and 2009—Counties in the Sacramento and San Joaquin Valley and Foothills and Statewide 3.16-27

Table 3.16-10. Housing Unit Types and Growth Rates, 2000 and 2009—Cities and Other Communities in the Sacramento and San Joaquin Valley and Foothills..... 3.16-28

Table 3.16-11. Population and Growth Rates, 2000–2030—Counties in the Sacramento and San Joaquin Valley Watersheds and Statewide* 3.16-35

Table 3.16-12. Population by Age of Residents, 2000—Counties in the Sacramento and San Joaquin Valley Watersheds and Statewide* 3.16-39

Table 3.16-13. Employment Trends, 2000 and 2009—Counties in the Sacramento and San Joaquin Valley Watersheds and Statewide* 3.16-39

Table 3.16-14. Employment by Industry, 2008—Counties in the Sacramento and San Joaquin Valley Watersheds and Statewide* 3.16-43

Table 3.16-15. Income and Poverty Levels, 1999—Counties in the Sacramento and San Joaquin Valley Watersheds and Statewide* 3.16-45

Table 3.16-16. Number of Housing Units and Growth Rates, 2000 and 2009—Counties in the Sacramento and San Joaquin Valley Watersheds and Statewide* 3.16-45

Table 3.16-17. Housing Unit Types and Growth Rates, 2000 and 2009—Counties in the Sacramento and San Joaquin Valley Watersheds and Statewide* 3.16-48

Table 3.16-18. Population and Growth Rates, 2000–2030—Counties in the SoCal/Coastal CVP/SWP Service Areas and Statewide* 3.16-49

Table 3.16-19. Employment Trends, 2000 and 2009—Counties in the SoCal/Coastal CVP/SWP Service Areas and Statewide* 3.16-51

Table 3.16-20. Income and Poverty Levels, 1999—Counties in the SoCal/Coastal CVP/SWP Service Areas and Statewide* 3.16-53

Table 3.16-21. Number of Housing Units and Growth Rates, 2000 and 2009—Counties in the SoCal/Coastal CVP/SWP Service Areas and Statewide* 3.16-54

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

Table 3.18-1. Multipurpose Reservoirs and Associated Recreation Amenities in the Sacramento and San Joaquin Valley and Foothills 3.18-4

Table 3.18-2. Locations and Recreational Facilities of Wildlife Refuges and Wildlife Areas on the Sacramento River 3.18-15

Table 3.18-3. Locations and Recreational Facilities of Wildlife Areas on the Feather River..... 3.18-17

Table 3.18-4. Locations and Recreational Facilities of Wildlife Refuges and Wildlife Areas on Sacramento River Flood Bypasses 3.18-26

Table 3.18-5. Management Plans and Related Documents for Federal Reservoirs in the Sacramento and San Joaquin River Basins 3.18-32

Table 3.18-6. Management Plans and Other Related Documents for State and Local Reservoirs in the Sacramento and San Joaquin River Basins 3.18-37

Table 3.21-1. Clean Water Act Section 303(d) List of Water Quality– Limited Water Bodies—Upper Sacramento River and Its Tributaries 3.21-6

Table 3.21-2. Clean Water Act Section 303(d) List of Water Quality– Limited Water Bodies—Lower Sacramento River and Its Tributaries 3.21-10

Table 3.21-3. Clean Water Act Section 303(d) List of Water Quality– Limited Water Bodies—Upper San Joaquin River and Its Tributaries 3.21-17

Table 3.21-4. Clean Water Act Section 303(d) List of Water Quality– Limited Water Bodies—Lower San Joaquin River and Its Tributaries 3.21-21

Table 3.21-5. 2010 Clean Water Act Section 303(d) List of Water Quality– Limited Water Bodies—San Joaquin River Eastside Tributaries to the Delta 3.21-24

Table 4.2-1. Geographic Context for Cumulative Analysis 4-2

Table 5.4-1. Summary of Proposed Program and Alternatives..... 5-13

Table 5.6-1. Comparison of Impact Levels of the Proposed Program
and the Alternatives..... 5-139

Table 6.5-1. Environmental Justice Demographics for the Extended
Systemwide Planning Area and the Sacramento and San Joaquin
Valley Watersheds 6-12

Table 6.5-2. Environmental Justice Demographics for the SoCal/
Coastal CVP/SWP Service Areas 6-13

Table 6.5-3. Impacts Potentially Causing Adverse Environmental
Justice Effects 6-18

Table 6.6-1. Estimates of Future Sea-Level Rise by the California
Ocean Protection Council..... 6-28

List of Figures

Figure 1.1-1. Central Valley Flood Management Planning Program Efforts that Collectively Meet the Requirements of the Central Valley Flood Protection Act of 2008 1-4

Figure 1.2-1. Plan Development Process for the 2012 CVFPP 1-5

Figure 1.2-2. CVFPP Study Area..... 1-8

Figure 1.2-3. PEIR Study Area 1-10

Figure 2.4-1. DWR Vegetation Inspection Criteria for Standard Levees—Long Waterside Slope and Landside Berm 2-28

Figure 2.4-2. DWR Vegetation Inspection Criteria for Standard Levees—Short Waterside Slope and Short Unsubmerged Waterside Slope 2-28

Figure 3.2-1. State-Designated Scenic Highways in the Extended SPA and the Sacramento and San Joaquin Valley Watersheds 3.2-5

Figure 3.2-2. Rivers in the Extended SPA and the Sacramento and San Joaquin Valley Watersheds that Are Included in the National or State Wild and Scenic Rivers System 3.2-7

Figure 3.2-3a. Representative Photograph of the Sacramento and San Joaquin Valley Foothills: South Fork of the Yuba River in the Sierra Nevada Foothills 3.2-10

Figure 3.2-3b. Representative Photograph of the Sacramento and San Joaquin Valley Foothills: Millerton Lake 3.2-10

Figure 3.2-3c. Representative Photograph of the Sacramento and San Joaquin Valley: Streamside Vegetation along the San Joaquin River 3.2-11

Figure 3.2-3d. Representative Photograph of the Sacramento and San Joaquin Valley: Agriculture along the Sacramento River Levee 3.2-11

Figure 3.2-3e. Representative Photograph of the Sacramento and San Joaquin Valley: Arroyo Canal 3.2-12

Figure 3.2-3f. Representative Photograph of the Delta–Suisun Marsh: Views near a Delta Slough 3.2-12

Figure 3.2-3g. Representative Photograph of the Delta–Suisun Marsh: Views near a Delta Slough 3.2-13

Figure 3.3-1. Important Farmland in the Study Area..... 3.3-6

Figure 3.3-2. Williamson Act Lands in the Study Area..... 3.3-8

Figure 3.4-1. Overview of Air Basins and Districts in the Extended SPA and Sacramento and San Joaquin Valley Watersheds 3.4-4

Figure 3.4-2. Attainment Designations for Air Basins in the Extended SPA and Sacramento and San Joaquin Valley Watersheds— State Standards..... 3.4-19

Figure 3.4-3. Attainment Designations for Air Basins in the Extended SPA and Sacramento and San Joaquin Valley Watersheds— Federal Standards 3.4-20

Figure 3.4-4. Criteria Pollutants by Emission Source for Air Basins in the Extended SPA and Sacramento and San Joaquin Valley Watersheds 3.4-21

Figure 3.4-5. Areas More Likely to Contain Naturally Occurring Asbestos in the Extended SPA and Sacramento and San Joaquin Valley Watersheds 3.4-24

Figure 3.6-1a. Habitats of the Extended Systemwide Planning Area (Northern Portion)..... 3.6-5

Figure 3.6-1b. Habitats of the Extended Systemwide Planning Area (Southern Portion) 3.6-6

Figure 3.6-2. Representative Photograph of Riparian Habitat along the Sacramento River (at River Mile 71) 3.6-27

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

Figure 3.6-3. Public Lands that Provide Biological Resources
Conservation Wildlife..... 3.6-66

Figure 3.6-4. Habitat Conservation Plans and Natural Community
Conservation Plans in the Study Area..... 3.6-67

Figure 3.6-5. Critical Habitat in the Study Area..... 3.6-73

Figure 3.7-1. 2008 California GHG Emissions by Sector (2000–2008
Emission Inventory) 3-3.7-14

Figure 3.7-2. Complementary and Conflicting Adaptation and
Mitigation Actions 3-3.7-31

Figure 3.8-1. Boundaries of Archaeological Regions within the CVFPP
Study Area..... 3.8-5

Figure 3.8-2. Tribal Areas within the CVFPP Study Area 3.8-7

Figure 3.9-1. Power-Generating Facilities in the Extended Systemwide
Planning Area..... 3.9-6

Figure 3.10-1. Geomorphic Provinces of California Related to the
Study Area..... 3.10-3

Figure 3.10-2. Fault Activity in the Study Area..... 3.10-17

Figure 3.10-3. Faults in the Delta, with Chances of a Magnitude 6.7 or
Greater Earthquake Between 2002 and 2031 3.10-19

Figure 3.10-4. Soil Types in the Study Area, by Physiographic Region..... 3.10-22

Figure 3.10-5. Approximate Eras Associated with Rock Formations in
California 3.10-34

Figure 3.11-1. Groundwater Basins and Subbasins of the Sacramento
River, San Francisco Bay, and San Joaquin River Hydrologic
Regions 3.11-3

Figure 3.11-2. Groundwater Elevations in the Sacramento Valley
Groundwater Basin (Spring 1997) 3.11-10

Figure 3.11-3. Groundwater Elevations in the San Joaquin Valley
Groundwater Basin (Spring 2007) 3.11-21

Figure 3.12-1. Sites Included on the Cortese List that are Located in
the Study Area..... 3.12-5

Figure 3.12-2. Schools Located in the Sacramento and San Joaquin
Valley and Foothills, the Delta and Suisun Marsh, and the
Sacramento and San Joaquin Valley Watersheds 3.12-8

Figure 3.12-3. Airports and Airstrips Located in the Study Area 3.12-9

Figure 3.12-4. California Fire Hazard Severity Zones in Local and
State Responsibility Areas..... 3.12-12

Figure 3.12-5. Historic/Abandoned Oil Pipelines 3.12-13

Figure 3.13-1. Locations of Multipurpose Dams and Reservoirs and
State Plan of Flood Control Levees in the Sacramento Valley and
Foothills 3.13-8

Figure 3.13-2. Locations of Multipurpose Dams and Reservoirs, and
State Plan of Flood Control and Stanislaus Local Interest Project
Levees in the San Joaquin Valley and Foothills 3.13-28

Figure 3.13-3. Relative Physical Condition of Levees in the
Sacramento and San Joaquin River Watersheds..... 3.13-46

Figure 3.13-4. Delta Hydrologic Features 3.13-48

Figure 3.13-5. Historical Diversions, In-Delta Uses, and Exports and
Outflows from the Delta Watershed..... 3.13-53

Figure 3.13-6. Suisun Marsh Hydrologic Features 3.13-54

Figure 3.14-1. Land Uses in the Extended Systemwide Planning Area
(Overview) 3.14-7

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

Figure 3.14-1a. Land Uses in the Extended Systemwide Planning Area (Northern Portion) 3.14-8

Figure 3.14-1b. Land Uses in the Extended Systemwide Planning Area (Southern Portion)..... 3.14-9

Figure 3.14-2. CVFPP Study Area..... 3.14-18

Figure 3.14-3. City of Merced Example Area..... 3.14-48

Figure 3.14-4. City of Ripon Example Area 3.14-49

Figure 3.14-5. Sacramento County—North Example Area 3.14-50

Figure 3.14-6. Sacramento County—South Example Area 3.14-51

Figure 3.15-1. Common Noise Sources and Levels 3.15-3

Figure 3.15-2. Major Sources of Mobile-Source Noise in the Extended Systemwide Planning Area..... 3.15-10

Figure 3.15-3. Major Sources of Stationary-Source Noise in the Extended Systemwide Planning Area 3.15-13

Figure 3.16-1. Annual Percentage Growth Rates, 2000–2010, with Line of Best Fit—Counties in the Sacramento and San Joaquin Valley and Foothills and County Total 3.16-6

Figure 3.16-2. Cities and Other Communities with More than 10,000 Residents 3.16-8

Figure 3.16-3. Annual Percent Change in Housing Types, 2000 through 2010—All Counties in the Sacramento and San Joaquin Valley and Foothills (Total) 3.16-23

Figure 3.16-4. Share of Annual Growth Attributable to Multifamily/Attached Housing Units, 2000 through 2010—All Counties in the Sacramento and San Joaquin Valley and Foothills (Total) 3.16-23

Figure 3.17-1. California Fire Protection Responsibility Map 3.17-4

Figure 3.17-2. The California Emergency Management Agency’s
Administrative Regions for Emergency Services..... 3.17-6

Figure 3.17-3. The California Department of Fish and Game’s Law
Enforcement Districts 3.17-8

Figure 3.19-1. Major Roads and Rail Lines in the Study Area 3.19-4

Figure 3.19-2. Major Caltrans Lifeline Routes in the Study Area 3.19-5

Figure 3.19-3. Major Ports and Airports in the Extended Systemwide
Planning Area..... 3.19-6

Figure 3.20-1. Power Plants Located in the Study Area 3.20-6

Figure 3.20-2. Major Electrical Transmission Lines Located in the
Study Area..... 3.20-7

Figure 3.20-3. Major Oil and Natural Gas Infrastructure Located in the
Study Area..... 3.20-8

Figure 3.21-1. Hydrologic Features of the Sacramento Valley and
Foothills 3.21-4

Figure 3.21-2. Hydrologic Features of the San Joaquin Valley and
Foothills 3.21-15

Figure 3.21-3. Hydrologic Features of the Delta 3.21-27

Figure 3.21-4. Hydrologic Features of the Suisun Marsh 3.21-31

Figure 4.3-1a. Housing Density—North 4-9

Figure 4.3-1b. Housing Density—South 4-10

Figure 6.5-1. Census Tracts in the Study Area with Minority
Populations..... 6-16

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

Figure 6.5-2. Census Tracts in the Study Area with Low-Income Populations..... 6-17

Figure 6.6-1. Seasonal Flood-Control Space Requirements for Lake Oroville 6-25

Figure 6.6-2. American River Runoff, Annual Maximum 3-Day Flow..... 6-26

Figure 6.6-3. Sea level Rise Projections Based on Air Temperatures from 12 Future Climate Scenarios..... 6-27

Appendices

Appendix A2012 Central Valley Flood Protection Plan (June 2012)

Appendix B2012 Central Valley Flood Protection Plan: Management Actions Report

Appendix C2012 Central Valley Flood Protection Plan: Program Environmental Impact Report, Final Scoping Report

Appendix DCALFED Bay-Delta Program Final Programmatic Environmental Impact Statement/Environmental Impact Report: Executive Summary

Appendix E2012 Central Valley Flood Protection Plan (June 2012): Conservation Framework

Appendix FClimate Change – Key Scoping Plan Elements, Best Management Practices, and Thresholds

Appendix GCentral Valley Flood Protection Plan: Glossary

Appendix HFinal Program Environmental Impact Report (June 2012)

**2012 Central Valley Flood Protection Plan
Consolidated Final Program Environmental Impact Report**

This page left blank intentionally.