

TABLE OF CONTENTS

Volume I: Report

List of Tables	x
List of Figures.....	xxiv
SUMMARY	S-1
S.1 Introduction and Background.....	S-1
S.2 the Draft Supplemental EIR/EIS as Part of Tiered Environmental Review	S-4
S.3 Issues Raised during Public Outreach on the Draft Supplemental EIR/EIS	S-5
S.4 Purpose of and Need for the HSR System and the Merced to Fresno Section.....	S-7
S.4.1 Purpose of the HSR System	S-7
S.4.2 Purpose of the Merced to Fresno HSR Section	S-7
S.4.3 CEQA Project Objectives for the HSR System in California and in the Central San Joaquin Valley Region	S-7
S.4.4 Need for the HSR System Statewide and within the Central San Joaquin Valley Region.....	S-8
S.4.5 HSR Benefits	S-9
S.5 Alternatives	S-9
S.5.1 Evaluation and Development of Alternatives	S-9
S.5.2 No Project Alternative	S-10
S.5.3 Central Valley Wye Alternatives	S-10
S.5.4 Central Valley Wye Alternatives Alignments	S-11
S.6 Impact Avoidance and Minimization Features	S-17
S.7 No Project Alternative Impacts	S-17
S.8 Central Valley Wye Alternatives Evaluation.....	S-18
S.8.1 Central Valley Wye Alternatives Benefits	S-19
S.8.2 Comparison of Impacts for the Central Valley Wye Alternatives.....	S-19
S.8.3 Summary of Cumulative Impacts under NEPA and CEQA.....	S-38
S.8.4 CEQA Summary of Impacts and Mitigation	S-38
S.8.5 Section 4(f) and Section 6(f)	S-44
S.8.6 Environmental Justice.....	S-45
S.8.7 Capital Cost	S-46
S.9 Areas of Controversy	S-46
S.10 Next Steps in the Environmental Process.....	S-47
S.10.1 Public and Agency Comment.....	S-47
S.10.2 Identification of Preferred Alternative	S-47
S.11 Project Implementation.....	S-48
1 INTRODUCTION AND PURPOSE, NEED, AND OBJECTIVES	1-1
1.1 Introduction	1-2
1.1.1 What is the Scope of this Draft Supplemental EIR/EIS?.....	1-2
1.1.2 What is a Wye?	1-3
1.1.3 What is Included in this Document?	1-3
1.2 Purpose of and Need for the HSR System and the Merced to Fresno HSR Section	1-6

1.2.1	Purpose of the HSR System.....	1-6
1.2.2	CEQA Project Objectives of the HSR System in California and in the Central Part of the San Joaquin Valley Region	1-6
1.2.3	Purpose of the Merced to Fresno HSR Section	1-7
1.2.4	the Merced to Fresno Section's Contribution to Meeting the Statewide and Regional Need for the HSR System.....	1-7
1.3	2016 Business Plan	1-21
1.4	Relationship to Other Agency Plans, Policies, and Programs	1-24
1.4.1	2014–2040 Regional Transportation Plan and Sustainable Communities Strategy for Merced County	1-24
1.4.2	Madera County 2014 Regional Transportation Plan	1-24
1.5	Lead Agencies, Cooperating Agencies, Responsible Agencies	1-25
2	ALTERNATIVES	2-1
2.1	Background	2-1
2.1.1	California HSR System—Tier 1 Programmatic Studies	2-2
2.1.2	the Wye Connection	2-2
2.2	Alternatives Evaluated in this Draft Supplemental EIR/EIS	2-11
2.2.1	Central Valley Wye Alternatives	2-11
2.2.2	No Project Alternative.....	2-13
2.2.3	Description of the Central Valley Wye Alternatives	2-22
2.3	Updated Travel Demand and Ridership Forecasts.....	2-51
2.4	Updated Operations and Service Plan	2-51
2.4.1	HSR Service.....	2-51
2.4.2	Maintenance Activities.....	2-52
2.5	Updated Construction Plan	2-53
2.5.1	Design/Build Project Delivery	2-53
2.5.2	General Construction Approach	2-53
2.5.3	Pre-Construction Activities	2-55
2.5.4	Major Construction Activities	2-55
2.6	Permits	2-56
3	AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES	3.1-1
3.1	Introduction.....	3.1-1
3.1.1	Chapter 3 Environmental Resource Topics	3.1-1
3.1.2	Changes in Analysis since the Merced to Fresno Final EIR/EIS	3.1-2
3.1.3	Chapter 3 Organization and Content	3.1-3
3.2	Transportation	3.2-1
3.2.1	Introduction	3.2-1
3.2.2	Laws, Regulations, and Orders	3.2-2
3.2.3	Compatibility with Plans and Laws	3.2-6
3.2.4	Methods for Evaluating Impacts	3.2-7
3.2.5	Affected Environment.....	3.2-17
3.2.6	Environmental Consequences.....	3.2-30
3.2.7	Mitigation Measures	3.2-61
3.2.8	Impacts Summary for NEPA Comparison of Alternatives	3.2-61
3.2.9	CEQA Significance Conclusions.....	3.2-65
3.3	Air Quality and Global Climate Change.....	3.3-1
3.3.1	Introduction	3.3-1
3.3.2	Laws, Regulations, and Orders	3.3-3

3.3.3	Compatibility with Plans and Laws	3.3-15
3.3.4	Methods for Evaluating Impacts.....	3.3-16
3.3.5	Affected Environment	3.3-34
3.3.6	Environmental Consequences	3.3-44
3.3.7	Mitigation Measures.....	3.3-81
3.3.8	Impacts Summary for NEPA Comparison of Alternatives	3.3-85
3.3.9	CEQA Significance Conclusions	3.3-89
3.4	Noise and Vibration.....	3.4-1
3.4.1	Introduction.....	3.4-1
3.4.2	Laws, Regulations, and Orders.....	3.4-4
3.4.3	Compatibility with Plans and Laws	3.4-8
3.4.4	Methods for Evaluating Impacts.....	3.4-9
3.4.5	Affected Environment	3.4-19
3.4.6	Environmental Consequences	3.4-23
3.4.7	Mitigation Measures.....	3.4-36
3.4.8	Impacts Summary for NEPA Comparison of Alternatives	3.4-39
3.4.9	CEQA Significance Conclusions	3.4-43
3.4.10	Unmitigated Severely Affected Noise-Sensitive Land Uses	3.4-44
3.5	Electromagnetic Fields and Electromagnetic Interference	3.5-1
3.5.1	Introduction.....	3.5-1
3.5.2	Laws, Regulations, and Orders.....	3.5-6
3.5.3	Compatibility with Plans and Laws	3.5-9
3.5.4	Methods for Evaluating Impacts.....	3.5-10
3.5.5	Affected Environment	3.5-13
3.5.6	Environmental Consequences	3.5-18
3.5.7	Mitigation Measures.....	3.5-26
3.5.8	Impacts Summary for NEPA Comparison of Alternatives	3.5-26
3.5.9	CEQA Significance Conclusions	3.5-29
3.6	Public Utilities and Energy.....	3.6-1
3.6.1	Introduction.....	3.6-1
3.6.2	Laws, Regulations, and Orders.....	3.6-2
3.6.3	Compatibility with Plans and Laws	3.6-7
3.6.4	Methods for Evaluating Impacts.....	3.6-9
3.6.5	Affected Environment	3.6-13
3.6.6	Environmental Consequences	3.6-22
3.6.7	Mitigation Measures.....	3.6-37
3.6.8	Impacts Summary for NEPA Comparison of Alternatives	3.6-37
3.6.9	CEQA Significance Conclusions	3.6-41
3.7	Biological Resources and Wetlands	3.7-1
3.7.1	Introduction.....	3.7-1
3.7.2	Laws, Regulations, and Orders.....	3.7-4
3.7.3	Compatibility with Plans and Laws	3.7-8
3.7.4	Coordination with Regulatory Agencies for NEPA and CEQA Compliance.....	3.7-9
3.7.5	Methods for Evaluating Impacts.....	3.7-12
3.7.6	Affected Environment	3.7-29
3.7.7	Environmental Consequences	3.7-50
3.7.8	Mitigation Measures.....	3.7-109
3.7.9	Impacts Summary for NEPA Comparison of Alternatives	3.7-139
3.7.10	CEQA Significance Conclusions	3.7-151

3.8	Hydrology and Water Resources	3.8-1
3.8.1	Introduction	3.8-1
3.8.2	Laws, Regulations, and Orders	3.8-2
3.8.3	Compatibility with Plans and Laws	3.8-12
3.8.4	Methods for Evaluating Impacts	3.8-13
3.8.5	Affected Environment	3.8-21
3.8.6	Environmental Consequences.....	3.8-31
3.8.7	Mitigation Measures	3.8-51
3.8.8	Impacts Summary for NEPA Comparison of Alternatives	3.8-51
3.8.9	CEQA Significance Conclusions.....	3.8-54
3.9	Geology, Soils, Seismicity, and Paleontological Resources	3.9-1
3.9.1	Introduction	3.9-1
3.9.2	Laws, Regulations, and Orders	3.9-4
3.9.3	Compatibility with Plans and Laws	3.9-8
3.9.4	Methods for Evaluating Impacts	3.9-11
3.9.5	Affected Environment	3.9-19
3.9.6	Environmental Consequences.....	3.9-43
3.9.7	Mitigation Measures	3.9-77
3.9.8	Impacts Summary for NEPA Comparison of Alternatives	3.9-77
3.9.9	CEQA Significance Conclusions.....	3.9-85
3.10	Hazardous Materials and Wastes	3.10-1
3.10.1	Introduction	3.10-1
3.10.2	Laws, Regulations, and Orders	3.10-3
3.10.3	Compatibility with Plans and Laws	3.10-7
3.10.4	Methods for Evaluating Impacts	3.10-8
3.10.5	Affected Environment	3.10-13
3.10.6	Environmental Consequences.....	3.10-28
3.10.7	Mitigation Measures	3.10-43
3.10.8	Impacts Summary for NEPA Comparison of Alternatives	3.10-44
3.10.9	CEQA Significance Conclusions.....	3.10-47
3.11	Safety and Security.....	3.11-1
3.11.1	Introduction	3.11-1
3.11.2	Laws, Regulations, and Orders	3.11-3
3.11.3	Compatibility with Plans and Laws	3.11-10
3.11.4	Methods for Evaluating Impacts	3.11-12
3.11.5	Affected Environment	3.11-15
3.11.6	Environmental Consequences.....	3.11-29
3.11.7	Mitigation Measures	3.11-42
3.11.8	Impacts Summary for NEPA Comparison of Alternatives	3.11-43
3.11.9	CEQA Significance Conclusions.....	3.11-47
3.12	Socioeconomics and Communities	3.12-1
3.12.1	Introduction	3.12-1
3.12.2	Laws, Regulations, and Orders	3.12-3
3.12.3	Compatibility with Plans and Laws	3.12-9
3.12.4	Methods for Evaluating Impacts	3.12-11
3.12.5	Affected Environment	3.12-20
3.12.6	Environmental Consequences.....	3.12-35
3.12.7	Mitigation Measures	3.12-70
3.12.8	Impacts Summary for NEPA Comparison of Alternatives	3.12-74
3.12.9	CEQA Significance Conclusions.....	3.12-83

3.13	Land Use and Development	3.13-1
3.13.1	Introduction	3.13-1
3.13.2	Laws, Regulations, and Orders	3.13-2
3.13.3	Compatibility with Plans and Laws	3.13-6
3.13.4	Methods for Evaluating Impacts	3.13-7
3.13.5	Affected Environment	3.13-10
3.13.6	Environmental Consequences	3.13-25
3.13.7	Mitigation Measures	3.13-36
3.13.8	Impacts Summary for NEPA Comparison of Alternatives	3.13-36
3.13.9	CEQA Significance Conclusions	3.13-39
3.14	Agricultural Farmland	3.14-1
3.14.1	Introduction	3.14-1
3.14.2	Laws, Regulations, and Orders	3.14-3
3.14.3	Compatibility with Plans and Laws	3.14-6
3.14.4	Methods for Evaluating Impacts	3.14-8
3.14.5	Affected Environment	3.14-12
3.14.6	Environmental Consequences	3.14-17
3.14.7	Mitigation Measures	3.14-28
3.14.8	Impacts Summary for NEPA Comparison of Alternatives	3.14-30
3.14.9	CEQA Significance Conclusions	3.14-33
3.15	Parks, Recreation, and Open Space	3.15-1
3.15.1	Introduction	3.15-1
3.15.2	Laws, Regulations, and Orders	3.15-2
3.15.3	Compatibility with Plans and Laws	3.15-5
3.15.4	Methods for Evaluating Impacts	3.15-6
3.15.5	Affected Environment	3.15-10
3.15.6	Environmental Consequences	3.15-23
3.15.7	Mitigation Measures	3.15-32
3.15.8	Impacts Summary for NEPA Comparison of Alternatives	3.15-33
3.15.9	CEQA Significance Conclusions	3.15-36
3.16	Aesthetics and Visual Resources	3.16-1
3.16.1	Introduction	3.16-1
3.16.2	Laws, Regulations, and Orders	3.16-3
3.16.3	Compatibility with Plans and Laws	3.16-4
3.16.4	Methods for Evaluating Impacts	3.16-6
3.16.5	Affected Environment	3.16-10
3.16.6	Environmental Consequences	3.16-33
3.16.7	Mitigation Measures	3.16-50
3.16.8	Impacts Summary for NEPA Comparison of Alternatives	3.16-53
3.16.9	CEQA Significance Conclusions	3.16-57
3.17	Cultural Resources	3.17-1
3.17.1	Introduction	3.17-1
3.17.2	Laws, Regulations, and Orders	3.17-3
3.17.3	Compatibility with Plans and Laws	3.17-6
3.17.4	Coordination of Section 106 with NEPA and CEQA Compliance	3.17-7
3.17.5	Methods for Evaluating Impacts	3.17-10
3.17.6	Affected Environment	3.17-21
3.17.7	Environmental Consequences	3.17-37
3.17.8	Mitigation Measures	3.17-45
3.17.9	Impacts Summary for NEPA Comparison of Alternatives	3.17-48

3.17.10	CEQA Significance Conclusions.....	3.17-50
3.18	Regional Growth.....	3.18-1
3.18.1	Introduction	3.18-1
3.18.2	Laws, Regulations, and Orders	3.18-2
3.18.3	Compatibility with Plans and Laws	3.18-8
3.18.4	Methods for Evaluating Impacts	3.18-10
3.18.5	Affected Environment.....	3.18-13
3.18.6	Environmental Consequences.....	3.18-18
3.18.7	Mitigation Measures	3.18-28
3.18.8	Impacts Summary for NEPA Comparison of Alternatives	3.18-28
3.19	Cumulative Impacts	3.19-1
3.19.1	Introduction	3.19-1
3.19.2	Laws, Regulations, and Orders	3.19-1
3.19.3	Methods for Evaluating Impacts	3.19-2
3.19.4	Cumulative Projects and Growth Forecasts.....	3.19-3
3.19.5	Organization of Cumulative Impacts Analysis.....	3.19-5
3.19.6	Cumulative Impacts Analysis.....	3.19-6
4	SECTION 4(F) AND SECTION 6(F) EVALUATIONS	4-1
4.1	Introduction.....	4-1
4.1.1	Section 4(f) and Section 6(f).....	4-1
4.1.2	Resource Study Area	4-2
4.1.3	Section 4(f) Applicability	4-4
4.1.4	Section 4(f) Use Definition.....	4-5
4.2	Coordination	4-6
4.3	Purpose and Need.....	4-8
4.4	Alternatives Descriptions	4-9
4.4.1	No Project Alternative.....	4-9
4.4.2	SR 152 (North) to Road 13 Wye Alternative	4-10
4.4.3	SR 152 (North) to Road 19 Wye Alternative	4-10
4.4.4	Avenue 21 to Road 13 Wye Alternative	4-11
4.4.5	SR 152 (North) to Road 11 Wye Alternative	4-11
4.5	Section 4(f) Applicability Analysis	4-12
4.5.1	Parks, Recreation, and Open Space	4-13
4.5.2	Cultural Resources.....	4-14
4.6	Preliminary Section 4(f) Use Assessment	4-24
4.6.1	Recreation and Open Space	4-24
4.6.2	Historic Properties	4-26
4.7	Avoidance Alternatives	4-29
4.7.1	Shifted Alignment	4-31
4.7.2	Profile Variation.....	4-31
4.8	Planning Measures to Minimize Harm.....	4-33
4.9	Preliminary Section 4(f) Least Harm Analysis	4-34
4.9.1	Preliminary Least Harm Analysis for the Central Valley Wye Alternatives	4-34
4.9.2	Net Harm to Section 4(f) Property	4-39
4.9.3	Impacts on Environmental Resources Outside of Section 4(f) Uses.....	4-39
4.10	Section 6(f)	4-39

5	ENVIRONMENTAL JUSTICE	5-1
5.1	Introduction	5-1
5.1.1	Definition of Resources.....	5-2
5.2	Laws, Regulations, and Orders	5-2
5.2.1	Federal	5-2
5.2.2	State	5-3
5.2.3	Regional and Local	5-4
5.3	Methods for Evaluating Effects.....	5-4
5.3.1	Definition of Reference Community and Resource Study Area.....	5-4
5.3.2	Impact Avoidance and Minimization Features.....	5-7
5.3.3	Methods for Impact Analysis	5-8
5.4	Affected Environment	5-11
5.4.1	Overview	5-11
5.4.2	Low-Income Populations.....	5-16
5.4.3	Minority Populations	5-18
5.4.4	Other Sensitive Populations.....	5-21
5.5	Environmental Justice Engagement and Documentation.....	5-21
5.5.1	Affected Populations and Communities	5-21
5.5.2	Results of Public Outreach	5-25
5.6	Analysis of Adverse and Disproportionate Effects	5-27
5.6.1	Overview	5-27
5.6.2	No Project Alternative	5-27
5.6.3	Central Valley Wye Alternatives	5-28
5.7	Summary of Disproportionate Effects for NEPA Comparison of Alternatives	5-46
5.8	Environmental Justice Determination	5-54
6	PROJECT COSTS AND OPERATIONS.....	6-1
6.1	Introduction	6-1
6.2	Capital Costs.....	6-1
6.2.1	High-Speed Rail Alternatives	6-2
6.2.2	Light Rolling Stock Maintenance Facilities	6-4
6.3	Operations and Maintenance Costs	6-4
6.3.1	Operating Speeds.....	6-5
6.3.2	Travel Times.....	6-5
6.3.3	Development of Operation and Maintenance Costs	6-5
7	OTHER NEPA/CEQA CONSIDERATIONS	7-1
7.1	Unavoidable Adverse and Significant Unavoidable Impacts	7-1
7.1.1	Unavoidable Adverse Impacts under NEPA.....	7-1
7.1.2	Significant Unavoidable Impacts under CEQA	7-2
7.2	Relationship between Short-Term Use of the Environment and the Enhancement of Long-Term Productivity	7-3
7.3	Irreversible Environmental Changes and Commitment of Resources	7-3
8	PREFERRED ALTERNATIVE	8-1
8.1	Introduction	8-1
8.2	Summary of Stakeholder Meetings.....	8-3
8.3	Alternatives Considered	8-5
8.4	Factors Influencing the Identification of the Preferred Alternative	8-6
8.4.1	Key Transportation Planning Considerations	8-6

8.4.2	Key Environmental Considerations.....	8-7
8.4.3	Stakeholder Feedback	8-17
8.4.4	Preliminary Cost Estimate	8-18
8.5	Preferred Alternative	8-18
8.6	Environmentally Superior Alternative	8-20
8.7	Environmentally Preferable Alternative	8-21
8.8	Least Environmentally Damaging Practicable Alternative	8-21
9	PUBLIC AND AGENCY INVOLVEMENT	9-1
9.1	Environmental Justice Outreach	9-1
9.2	Outreach during the Alternatives Development and Analysis Process	9-2
9.2.1	Public Information Meetings and Materials during the Alternatives Development and Analysis Process	9-2
9.2.2	Farm Bureau Working Group Meetings during the Alternatives Analysis Process	9-3
9.2.3	Environmental Resource Agency Meetings during the Alternatives Analysis Process	9-3
9.3	Outreach during Development of Draft Supplemental EIR/EIS.....	9-4
9.3.1	Public Information Materials and Meetings	9-4
9.3.2	Tribal Coordination Meetings.....	9-4
9.3.3	Agency Meetings and Consultation	9-5
9.4	Notification and Circulation of Draft Supplemental EIR/EIS.....	9-5
10	DRAFT SUPPLEMENTAL EIR/EIS DISTRIBUTION	10-1
10.1	Repository Locations	10-1
10.2	Federal Agencies.....	10-2
10.3	State Agencies	10-3
10.4	Elected Officials.....	10-4
10.4.1	Federal Elected Officials	10-4
10.4.2	State Elected Officials	10-4
10.4.3	Regional County Board of Supervisors.....	10-4
10.4.4	Local Government Officials	10-5
10.4.5	Agricultural Commissioners.....	10-6
10.5	Regional/Local Agencies	10-6
10.6	Organizations and Businesses.....	10-7
10.7	Native American Contacts	10-7
10.8	Schools and Districts	10-8
11	LIST OF PREPARERS	11-1
11.1	California High-Speed Rail Authority.....	11-1
11.2	Federal Railroad Administration.....	11-1
11.3	List of Consultants	11-2
12	REFERENCES/SOURCES USED IN DOCUMENT PREPARATION	12-1
13	GLOSSARY OF TERMS	13-1
14	INDEX.....	14-1
15	ACRONYMS AND ABBREVIATIONS	15-1

Tables

Table S-1	Design Features of Alternatives Carried Forward	S-11
Table S-2	Comparison of Construction Impacts by Alternative.....	S-22
Table S-3	Comparison of Operations Impacts by Alternative	S-38
Table S-4	CEQA Summary of Resources with Significant Impacts and Applicable Mitigation Measures	S-39
Table S-5	Capital Cost by Alternative (2015\$ Thousands)	S-46
Table S-6	Central Valley Wye Alternatives Milestone Schedule	S-49
Table 1-1	Population Growth in California, the San Joaquin Valley, and Merced and Madera Counties.....	1-9
Table 1-2	Unemployment and Income in California, the San Joaquin Valley, and Merced and Madera Counties	1-10
Table 1-3	Annual Interregional and Intraregional Travel Patterns for 2010 and Projected 2040.....	1-11
Table 1-4	Current and Projected Vehicle Miles Traveled in Merced and Madera Counties	1-12
Table 1-5	Commercial Air Traffic and Central Valley Airports	1-15
Table 1-6	Estimated Total Travel Times (Door-to-Door in Hours and Minutes) Between City Pairs by Auto, Air, and Rail (Peak Conditions)	1-16
Table 2-1	Regional Projected and Induced Population and Employment	2-14
Table 2-2	Planned Residential Development Projects within the Vicinity of the Central Valley Wye Alternatives	2-15
Table 2-3	Planned Highway Improvements in Merced and Madera Counties	2-16
Table 2-4	Passenger Boardings for Merced Airports	2-19
Table 2-5	Programmed Improvements in 2013 California State Rail Plan	2-20
Table 2-6	San Joaquin Joint Powers Authority 2015 Business Plan Capital Projects	2-21
Table 2-7	Design Features of the Central Valley Wye Alternatives	2-40
Table 2-8	Anticipated Travel Times for the Central Valley Wye Alternatives.....	2-42
Table 2-9	Proposed Changes to California Department of Transportation State Facilities	2-43
Table 2-10	Proposed Freight or Passenger Railroad Modifications Required for Central Valley Wye Alternatives	2-48
Table 2-11	Right-of-Way Acquisition	2-50

Table 2-12	Potential Major Environmental Permits and Approvals	2-56
Table 3.2-1	Regional and Local Plans and Policies.....	3.2-4
Table 3.2-2	Definition of Resource Study Areas.....	3.2-8
Table 3.2-3	Level-of-Service Thresholds (LOS)	3.2-14
Table 3.2-4	Roadway Segment Level-of-Service Criteria	3.2-16
Table 3.2-5	Existing (2015) Roadway Operations Along SR 152 (North) to Road 13 Wye Alternative	3.2-20
Table 3.2-6	Existing (2015) Roadway Operations Along SR 152 (North) to Road 19 Wye Alternative	3.2-22
Table 3.2-7	Existing (2015) Roadway Operations Along Avenue 21 to Road 13 Wye Alternative.....	3.2-22
Table 3.2-8	Existing (2015) Roadway Operations Along SR 152 (North) to Road 11 Wye Alternative.....	3.2-23
Table 3.2-9	Educational Facilities with School Bus Transportation within RSA	3.2-27
Table 3.2-10	Central Valley Wye Alternatives Temporary Road Closures and Detours	3.2-33
Table 3.2-11	Existing (2015) Plus Project Peak-Hour Roadway Operations Along the SR 152 (North) to Road 13 Wye Alternative	3.2-51
Table 3.2-12	Existing (2015) Plus Project Peak-Hour Roadway Operations Along the SR 152 (North) to Road 19 Wye Alternative	3.2-54
Table 3.2-13	Existing (2015) Plus Project Peak-Hour Roadway Operations Along the Avenue 21 to Road 13 Wye Alternative	3.2-57
Table 3.2-14	Existing (2015) Plus Project Peak-Hour Roadway Operations Along the SR 152 (North) to Road 11 Wye Alternative	3.2-60
Table 3.2-15	Comparison of Central Valley Wye Alternative Impacts.....	3.2-62
Table 3.2-16	CEQA Significance Conclusions for Transportation for the Central Valley Wye Alternatives	3.2-65
Table 3.3-1	State and Federal Ambient Air Quality Standards	3.3-5
Table 3.3-2	Local Plans and Polices	3.3-12
Table 3.3-3	Definition of Resource Study Areas.....	3.3-18
Table 3.3-4	San Joaquin Valley Air Pollution Control District CEQA Construction and Operational Thresholds of Significance	3.3-33
Table 3.3-5	Sensitive Receptors within 1,000 Feet from the Footprint of the Central Valley Wye Alternatives	3.3-35

Table 3.3-6	Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations Closest to the Central Valley Wye Alternatives.....	3.3-38
Table 3.3-7	Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations Closest to the Central Valley Wye Alternatives.....	3.3-40
Table 3.3-8	Federal and State Attainment Status for the SJVAB	3.3-42
Table 3.3-9	Planning Documents Relevant to the Air Quality Resource Study Area.....	3.3-43
Table 3.3-10	No Project Alternative Estimated Statewide Emissions Without the Central Valley Wye Alternatives: Medium Ridership Scenario	3.3-45
Table 3.3-11	No Project Alternative Estimated Statewide Emissions Without the Central Valley Wye Alternatives: High Ridership Scenario	3.3-46
Table 3.3-12	No Project Alternative Statewide GHG Emissions Without the Central Valley Wye Alternatives under the Medium and High Ridership Scenarios	3.3-47
Table 3.3-13	SR 152 (North) to Road 13 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction (Tons/Year).....	3.3-51
Table 3.3-14	SR 152 (North) to Road 19 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction (Tons/Year).....	3.3-53
Table 3.3-15	Avenue 21 to Road 13 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction (Tons/Year).....	3.3-55
Table 3.3-16	SR 152 (North) to Road 11 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction (Tons/Year).....	3.3-57
Table 3.3-17	Central Valley Wye Alternatives Greenhouse Gas Construction Emissions (Metric Tons of CO ₂ e Per Year)	3.3-62
Table 3.3-18	Estimated Central Valley Wye Alternative Demolition Quantities in Cubic Yards	3.3-63
Table 3.3-19	Summary of Estimated Regional Emissions Changes (Project vs. No Project 2015 Existing and 2040 Future Conditions)	3.3-66
Table 3.3-20	On-Road Vehicle VMT for the No Project Alternative and the Central Valley Wye Alternatives (under the Medium and High Ridership Scenarios)	3.3-68

Table 3.3-21	On-Road Vehicle Emission Changes from Operation of the Central Valley Wye Alternatives vs. No Project (under the Medium and High Ridership Scenarios)	3.3-69
Table 3.3-22	Power Plant Emission Changes from Operation of the Central Valley Wye Alternatives vs. No Project (under the Medium and High Ridership Scenarios)	3.3-71
Table 3.3-23	Aircraft Flights for Operation of the Central Valley Wye Alternatives and the No Project Alternative (under the Medium and High Ridership Scenarios)	3.3-72
Table 3.3-24	Aircraft Emission Changes from Operation of the Central Valley Wye Alternatives vs. No Project (under the Medium and High Ridership Scenarios).....	3.3-73
Table 3.3-25	Annual Estimated Statewide Greenhouse Gas Emission Changes from the Central Valley Wye Alternatives under the Medium and High Ridership Scenarios.....	3.3-76
Table 3.3-26	Summary of Regional Annual Greenhouse Gas Emissions Changes from Operation of the Central Valley Wye Alternatives under the Medium and High Ridership Scenarios.....	3.3-76
Table 3.3-27	On-Road Vehicles Greenhouse Gas Emission Changes from Operation of the Central Valley Wye Alternatives under the Medium and High Ridership Scenarios.....	3.3-77
Table 3.3-28	Power Plant Greenhouse Gas Emission Changes from Operation of the Central Valley Wye Alternatives under the Medium and High Ridership Scenarios	3.3-78
Table 3.3-29	Aircraft Greenhouse Gas Emission Changes of the Central Valley Wye Alternatives under the Medium and High Ridership Scenarios	3.3-78
Table 3.3-30	Mitigation Program for Air Quality and Global Climate Change, Central Valley Wye Alternatives.....	3.3-81
Table 3.3-31	Comparison of Central Valley Wye Alternative Impacts.....	3.3-85
Table 3.3-32	CEQA Significance Conclusions for Air Quality and Global Climate Change for the Central Valley Wye Alternatives	3.3-89
Table 3.4-1	Local Plans and Policies	3.4-5
Table 3.4-2	Definition of Resource Study Area for Noise and Vibration.....	3.4-10
Table 3.4-3	Federal Railroad Administration Recommended Screening Distances for Evaluation of Noise Impacts	3.4-11
Table 3.4-4	Federal Railroad Administration Recommended Screening Distances for Evaluation of Vibration Impacts	3.4-11
Table 3.4-5	Federal Railroad Administration Construction Noise Assessment Criteria	3.4-14
Table 3.4-6	Construction Vibration Damage Criteria	3.4-14

Table 3.4-7	Federal Railroad Administration Ground-Borne Vibration and Ground-Borne Noise Impact Criteria	3.4-15
Table 3.4-8	Federal Highway Administration Traffic Noise Abatement Criteria.....	3.4-15
Table 3.4-9	Federal Railroad Administration Noise-Sensitive Land Uses	3.4-17
Table 3.4-10	Interim Criteria for High-Speed Train Noise Impacts on Wildlife and Domestic Animals	3.4-19
Table 3.4-11	Distance from Construction Activities at Which Noise Levels Would Exceed Federal Railroad Administration Noise Level Limits	3.4-25
Table 3.4-12	Construction Noise Impacts on Sensitive Receptors.....	3.4-26
Table 3.4-13	Construction Equipment Vibration Impact Distances for Buildings for the Central Valley Wye Alternatives	3.4-28
Table 3.4-14	Summary of Operational Noise Impacts for the Central Valley Wye Alternatives	3.4-31
Table 3.4-15	Screening Distances for Noise Impacts on Wildlife and Domestic Animals for the Central Valley Wye Alternatives.....	3.4-34
Table 3.4-16	Comparison of Central Valley Wye Alternative Impacts	3.4-41
Table 3.4-17	CEQA Significance Conclusions for Noise and Vibration for the Central Valley Wye Alternatives.....	3.4-43
Table 3.4-18	Summary of Severe Rail Noise Impacts for the Central Valley Wye Alternatives After Mitigation.....	3.4-44
Table 3.5-1	Relationship Between Typical Frequencies and Their Wavelengths.....	3.5-3
Table 3.5-2	Typical Magnetic Field Strengths	3.5-3
Table 3.5-3	Typical Emf Levels for Transmission/Power Lines	3.5-5
Table 3.5-4	Radio Frequency Emissions Safety Levels Expressed As Maximum Permissible Exposure.....	3.5-7
Table 3.5-5	Regional and Local Plans and Policies	3.5-8
Table 3.5-6	Summary Comparison of Measured and Calculated 60-Hertz Magnetic Fields for Central Valley Wye Alternatives.....	3.5-17
Table 3.5-7	Comparison of Central Valley Wye Alternative Impacts	3.5-27
Table 3.5-8	CEQA Significance Conclusions for Electromagnetic Fields and Electromagnetic Interference for the Central Valley Wye Alternatives	3.5-30
Table 3.6-1	Local Plans and Policies for Public Utilities and Energy	3.6-5
Table 3.6-2	Public Utilities and Energy Resource Study Area Definitions.....	3.6-9
Table 3.6-3	Summary of Utility and Energy Providers within the Resource Study Areas.....	3.6-13

Table 3.6-4	Landfill Facility Summary	3.6-16
Table 3.6-5	Electricity Consumption in Merced and Madera Counties in 2014.....	3.6-18
Table 3.6-6	Fuel Sources for Electric Power in California in 2014	3.6-19
Table 3.6-7	Impacts on Major Utilities by Alternative	3.6-24
Table 3.6-8	Construction Water Use by Wye Alternative and Activity	3.6-28
Table 3.6-9	Solid and Hazardous Waste Estimates by Alternative	3.6-30
Table 3.6-10	Construction Energy Consumption Assumptions for the Central Valley Wye Alternatives	3.6-35
Table 3.6-11	2040 Estimated Change in Energy Consumption Caused by the Central Valley Wye Alternatives (Medium Ridership to High Ridership Scenarios).....	3.6-37
Table 3.6-12	Comparison of Central Valley Wye Alternative Impacts.....	3.6-38
Table 3.6-13	CEQA Significance Conclusions for Public Utilities and Energy for the Central Valley Wye Alternatives	3.6-42
Table 3.7-1	Regional and Local Plans and Policies.....	3.7-6
Table 3.7-2	Definitions of Resource Study Areas	3.7-12
Table 3.7-3	Wildlife Habitat Types, Land Uses, and Typical Vegetation in the Habitat Study Area of All Central Valley Wye Alternatives	3.7-18
Table 3.7-4	Standard Terms Used for Wetland Condition Assessment of All Central Valley Wye Alternatives	3.7-26
Table 3.7-5	Land Cover Types in the Habitat Study Area by Central Valley Wye Alternative (Acres)	3.7-31
Table 3.7-6	Special-Status Plant Species with Moderate to High Potential to Occur in the Special-Status Plant Study Area of All Central Valley Wye Alternatives	3.7-36
Table 3.7-7	Special-Status Wildlife Species with Moderate to High Potential to Occur in the Habitat Study Area of All Central Valley Wye Alternatives.....	3.7-37
Table 3.7-8	Special-Status Plant Communities Occurring in the Special-Status Plant Study Area of All Central Valley Wye Alternatives	3.7-41
Table 3.7-9	Jurisdictional Aquatic Resources within the Wetland Study Area by Central Valley Wye Alternative (Acres)	3.7-43
Table 3.7-10	Critical Habitat in Core Habitat Study Area by Central Valley Wye Alternative (Acres)	3.7-45
Table 3.7-11	Wildlife Movement Corridors Crossed by the Central Valley Wye Alternatives (Miles).....	3.7-49
Table 3.7-12	Direct Impacts on Special-Status Plant Species Habitat by Central Valley Wye Alternative (Acres).....	3.7-54

Table 3.7-13	Direct Impacts on Special-Status Wildlife Species Habitat by Central Valley Wye Alternative (Acres)	3.7-58
Table 3.7-14	Direct Impacts on Special-Status Plant Communities by Central Valley Wye Alternative (Acres)	3.7-82
Table 3.7-15	Direct Impacts on Wetlands and Other Waters by Central Valley Wye Alternative (Acres)	3.7-87
Table 3.7-16	Direct Impacts on Streams, Rivers, and Lakes (Including Riparian Areas) by Central Valley Wye Alternative (Acres)	3.7-88
Table 3.7-17	Potential Nonbiological Impacts of Off-Site Mitigation Activities	3.7-115
Table 3.7-18	Comparison of Central Valley Wye Alternatives Impacts	3.7-140
Table 3.7-19	CEQA Significance Conclusions for Biological Resources and Wetlands for the Central Valley Wye Alternatives	3.7-151
Table 3.8-1	Local Plans and Policies.....	3.8-7
Table 3.8-2	Definition of Resource Study Areas	3.8-14
Table 3.8-3	Waterbodies Crossed by the Central Valley Wye Alternatives.....	3.8-22
Table 3.8-4	Beneficial Uses and 303(D) Listed Pollutants within the Surface Water Resource Study Area	3.8-25
Table 3.8-5	Groundwater Subbasins within the Resource Study Area	3.8-27
Table 3.8-6	Depth to Groundwater in the Vicinity of the Central Valley Wye Alternatives.....	3.8-27
Table 3.8-7	Flood Zone Designations in the Floodplain Resource Study Area.....	3.8-29
Table 3.8-8	Flow Data for Streams in Flood-Prone Areas (Zone A)	3.8-29
Table 3.8-9	Floodplains and Floodways Crossed by the Central Valley Wye Alternatives.....	3.8-30
Table 3.8-10	Acres of Land Disturbed During Construction by Central Valley Wye Alternative.....	3.8-34
Table 3.8-11	Types of Crossings Installed During Construction by Central Valley Wye Alternative	3.8-37
Table 3.8-12	Area of Project Footprint in the Special Flood-Hazard Area (100-Year Federal Emergency Management Area Flood Zones) by Central Valley Wye Alternative	3.8-43
Table 3.8-13	Comparison of Central Valley Wye Alternative Impacts	3.8-52
Table 3.8-14	CEQA Significance Conclusions for Hydrology and Water Resources for the Central Valley Wye Alternatives	3.8-55
Table 3.9-1	Local Plans and Policies.....	3.9-5
Table 3.9-2	Local Plans and Policies.....	3.9-7

Table 3.9-3	Definition of Resource Study Areas for Geology, Soils, and Seismicity.....	3.9-11
Table 3.9-4	Definition of Resource Study Area for Paleontological Resources.....	3.9-15
Table 3.9-5	Paleontological Potential/Sensitivity Categories Used in This Analysis.....	3.9-18
Table 3.9-6	Summary of Mapped Surficial Geologic Units Near the Central Valley Wye Alternatives	3.9-21
Table 3.9-7	Depth to Groundwater Near the Central Valley Wye Alternatives	3.9-23
Table 3.9-8	Soil Types in the Resource Hazards RSA.....	3.9-26
Table 3.9-9	Active Faults within 65 Miles of the Central Valley Wye Alternatives	3.9-29
Table 3.9-10	Gas and Oil Wells in the Resource Hazards Resource Study Area	3.9-35
Table 3.9-11	Affected Geologic Units – Central Valley Wye Alternatives	3.9-37
Table 3.9-12	Area of Impact by Alternative, Soils with High Susceptibility to Erosion (Acres)	3.9-45
Table 3.9-13	Area of Impact by Alternative, Soils with Moderate and High Expansion Potential (Acres).....	3.9-47
Table 3.9-14	Area of Impact by Alternative, Corrosive Soils (Acres)	3.9-52
Table 3.9-15	Areas of Moderate or Highly Difficult Excavation by Alternative (Acres).....	3.9-66
Table 3.9-16	Number of Oil and Gas Wells by Alternative.....	3.9-67
Table 3.9-17	Comparison of Central Valley Wye Alternative Impacts.....	3.9-78
Table 3.9-18	Comparison of Surface Disturbance within Paleontologically Sensitive Geologic Units	3.9-84
Table 3.9-19	CEQA Significance Conclusions for Geology, Soils, Seismicity, and Paleontological Resources for the Central Valley Wye Alternatives.....	3.9-85
Table 3.10-1	Local Plans and Policies	3.10-5
Table 3.10-2	Hazardous Materials and Wastes Resource Study Area Definitions	3.10-8
Table 3.10-3	Educational Facilities within 0.25 Mile of the Central Valley Wye Alternatives	3.10-19
Table 3.10-4	Sites of Potential Environmental Concern within the Pec Sites RSA.....	3.10-21
Table 3.10-5	Maximum Amount of Agricultural Land Permanently Converted by Central Valley Wye Alternative (Acres).....	3.10-33
Table 3.10-6	Estimated Demolition Area Per Alternative.....	3.10-34

Table 3.10-7	Comparison of the Central Valley Wye Alternatives Impacts from Construction on or Near Pec Sites	3.10-36
Table 3.10-8	Comparison of the Central Valley Wye Alternatives Impacts from Construction on or Near Schools and Recreational Areas	3.10-38
Table 3.10-9	Comparison of Central Valley Wye Alternative Impacts Associated with Risks During Construction on or Near Landfills and Oil and Gas Wells	3.10-40
Table 3.10-10	Comparison of Central Valley Wye Alternative Impacts	3.10-45
Table 3.10-11	CEQA Significance Conclusions for Hazardous Materials and Wastes for the Central Valley Wye Alternatives	3.10-48
Table 3.11-1	Regional and Local Plans and Policies	3.11-6
Table 3.11-2	Definitions of Safety and Security Facility Resource Study Area Boundaries.....	3.11-13
Table 3.11-3	Fire Departments and Equipment	3.11-18
Table 3.11-4	Airports and Airstrips within 2 Miles of the Central Valley Wye Alternatives.....	3.11-24
Table 3.11-5	Educational Facilities within 0.25 Mile of the Central Valley Wye Alternatives.....	3.11-26
Table 3.11-6	High-Risk Facilities within Safety and Security RSA of the Central Valley Wye Alternatives.....	3.11-28
Table 3.11-7	Comparison of Central Valley Wye Alternative Impacts	3.11-43
Table 3.11-8	CEQA Significance Conclusions for Safety and Security for the Central Valley Wye Alternatives.....	3.11-47
Table 3.12-1	Regional and Local Plans and Policies	3.12-4
Table 3.12-2	Definition of Resource Study Areas	3.12-11
Table 3.12-3	Past, Present and Projected Populations.....	3.12-22
Table 3.12-4	Minority Group Representation 2010–2014	3.12-24
Table 3.12-5	Housing Characteristics in 2014 (Estimated)	3.12-26
Table 3.12-6	Housing Tenure and Vacancy (2014)	3.12-26
Table 3.12-7	Land under Williamson Act and Fsz Contracts in Merced and Madera Counties (Acres)	3.12-29
Table 3.12-8	Analysis of General Fund Revenues for Fiscal Year 2012/2013	3.12-31
Table 3.12-9	Cities and Communities within the Central Valley Wye Alternatives' Communities Resource Study Areas	3.12-32
Table 3.12-10	Estimated Number of Residential Displacements by Alternative	3.12-45
Table 3.12-11	Gap Analysis of Residential Developments by Alternative	3.12-46

Table 3.12-12	Estimated Number of Displaced Commercial and Industrial Units.....	3.12-49
Table 3.12-13	Estimated Agricultural Impacts by Alternative.....	3.12-50
Table 3.12-14	Estimated Reduction in Property Tax Revenue Due to Property Acquisition	3.12-59
Table 3.12-15	Dairies Affected by Temporary Noise and Vibration by Alternative	3.12-60
Table 3.12-16	Projected Economic and Employment Impacts of Changes in Agricultural Production	3.12-62
Table 3.12-17	Williamson Act and Fsz Remnant Parcels Below County Thresholds, by Alternative	3.12-63
Table 3.12-18	Annual Lost Property Tax Revenues (2015).....	3.12-64
Table 3.12-19	Grazing Land Affected by Noise and Vibration under Each Central Valley Wye Alternative	3.12-69
Table 3.12-20	Comparison of Central Valley Wye Alternative Impacts.....	3.12-74
Table 3.12-21	CEQA Significance Conclusions for Socioeconomics and Communities for the Central Valley Wye Alternatives.....	3.12-83
Table 3.13-1	Regional and Local Plans and Policies.....	3.13-3
Table 3.13-2	Definition of Resource Study Areas.....	3.13-8
Table 3.13-3	Land Uses within the City of Chowchilla, Planning Area, Secondary Planning Area, and Draft Fairmead Colony Area Plan (Acres).....	3.13-20
Table 3.13-4	Temporary Use of Land Outside of the Right-of-Way by Central Valley Wye Alternative (Acres).....	3.13-27
Table 3.13-5	Permanent Road Closures, Overcrossings, and Undercrossings by Central Valley Wye Alternative	3.13-30
Table 3.13-6	Maximum Amount of Land Use Permanently Converted by Central Valley Wye Alternative (Acres).....	3.13-32
Table 3.13-7	Direct Impacts on Existing Land Uses within the City of Chowchilla Planning Boundaries, by Central Valley Wye Alternative (Acres).....	3.13-33
Table 3.13-8	Miles of Land Use Types Traversed by Central Valley Wye Alternatives	3.13-34
Table 3.13-9	Comparison of Central Valley Wye Alternative Impacts.....	3.13-37
Table 3.13-10	CEQA Significance Conclusions for Land Use and Development for the Central Valley Wye Alternatives	3.13-40
Table 3.14-1	Regional and Local Plans and Policies.....	3.14-5
Table 3.14-2	Total Acreage and Agricultural Land Acreage in Merced, Madera, Fresno, and Stanislaus Counties, 2014.....	3.14-13

Table 3.14-3	Important Farmland in Merced, Madera, Fresno, and Stanislaus Counties (Acres) in 2008 and 2014	3.14-13
Table 3.14-4	Important Farmland within the Project Footprints by Alternative (Acres)	3.14-15
Table 3.14-5	Farmland Protected under Williamson Act and Farmland Security Zone Contracts in Merced, Madera, Fresno, and Stanislaus Counties (Acres).....	3.14-15
Table 3.14-6	Williamson Act and Farmland Security Zone Lands within the Permanent Impact Area of the Project Footprints.....	3.14-17
Table 3.14-7	Important Farmland Temporarily Used for Construction of the Central Valley Wye Alternatives (Acres)	3.14-19
Table 3.14-8	Maximum Acreage of Important Farmland Directly Permanently Converted to Nonagricultural Use by Each Alternative Project Footprint (Acres)	3.14-20
Table 3.14-9	Farmland Conversion Rating Scores for Alternative by County	3.14-21
Table 3.14-10	Number of Remnant Parcels and Acreage of Important Farmland Potentially Indirectly Permanently Converted to Nonagricultural Use As A Result of Parcel Severance by Alternative	3.14-22
Table 3.14-11	Major Utility Crossings by Alternative.....	3.14-23
Table 3.14-12	Central Valley Wye Alternatives Temporary Road Closures and Detours.....	3.14-24
Table 3.14-13	Important Farmland Mitigation Calculations	3.14-29
Table 3.14-14	Comparison of the Central Valley Wye Alternatives Impacts on Agricultural Farmland	3.14-30
Table 3.14-15	CEQA Significance Conclusions for Agricultural Farmland for the Central Valley Wye Alternatives.....	3.14-33
Table 3.15-1	Local Plans and Policies	3.15-3
Table 3.15-2	Definition of Parks, Recreation, and Open-Space Resource Study Area.....	3.15-7
Table 3.15-3	Parks, Recreation, and Open-Space Resources Available for Public Use in the Resource Study Area	3.15-11
Table 3.15-4	Comparison of Central Valley Wye Alternative Impacts	3.15-34
Table 3.15-5	CEQA Significance Conclusions for Parks, Recreation, and Open Space for the Central Valley Wye Alternatives	3.15-37
Table 3.16-1	Regional and Local Plans and Policies	3.16-4
Table 3.16-2	Landscape Units and Key Viewpoints for Each Central Valley Wye Alternative	3.16-11
Table 3.16-3	Landscape Unit Names – Central Valley Wye Alternatives vs. 2012 Merced to Fresno Final EIR/EIS	3.16-14

Table 3.16-4	Comparison of Central Valley Wye Alternative Impacts	3.16-54
Table 3.16-5	CEQA Significance Conclusions for Aesthetics and Visual Resources for the Central Valley Wye Alternatives	3.16-58
Table 3.17-1	Local Plans and Policies	3.17-5
Table 3.17-2	Summary of Outreach Efforts to Identify Other Consulting/Concurring Parties.....	3.17-9
Table 3.17-3	Summary of Evaluation Efforts in the Historic Architectural Survey Reports	3.17-19
Table 3.17-4	Summary of Evaluation Efforts in the Archaeological Survey Reports	3.17-20
Table 3.17-5	Comparison of Central Valley Wye Alternative Impacts	3.17-49
Table 3.17-6	CEQA Significance Conclusions for Cultural Resources for the Central Valley Wye Alternatives	3.17-51
Table 3.18-1	Local Plans and Policies	3.18-5
Table 3.18-2	Civilian Labor Force Average Annual Employment by Industry, 2000-2015	3.18-14
Table 3.18-3	Average Annual Civilian Unemployment, 2000-2015.....	3.18-15
Table 3.18-4	Near-Term and Long-Term Employment Projections, 2015-2040.....	3.18-16
Table 3.18-5	Historical Population Increases, 2000-2015	3.18-16
Table 3.18-6	Population Projections, 2010 and 2040	3.18-17
Table 3.18-7	Historical and Projected Housing Units, 2000-2040.....	3.18-18
Table 3.18-8	Cost Estimates by Alternative (2015\$ Thousands)	3.18-21
Table 3.18-9	Construction Employment Effects by Alternative	3.18-22
Table 3.18-10	Peak Demand for Workers by Alternative.....	3.18-23
Table 3.18-11	Comparison of Central Valley Wye Alternative Impacts in the RSA	3.18-29
Table 4-1	Central Valley Wye Alternatives Section 4(f) Evaluation Consultation Summary	4-7
Table 4-2	Recreation and Open Space Evaluated for Section 4(f) Use	4-12
Table 4-3	Resources Listed in, or Determined or Recommended Eligible for, the National Register of Historic Places	4-13
Table 4-4	Measures to Minimize Harm.....	4-34
Table 4-5	Preliminary Least Harm Analysis for the Central Valley Wye Alternatives	4-35
Table 5-1	Reference Community Demographic Characteristics (2014)	5-12
Table 5-2	Resource Study Area Demographic Characteristics.....	5-13

Table 5-3	Low-Income Populations within the Reference Community.....	5-16
Table 5-4	Low-Income Populations within the Resource Study Area	5-16
Table 5-5	Estimated Percent of Households Participating in the Supplemental Nutrition Assistance Program within the Resource Study Area (2014)	5-18
Table 5-6	Minority Group Representation in the Reference Community	5-18
Table 5-7	Minority Group Representation in the Resource Study Area	5-19
Table 5-8	Public Involvement Activities and Outreach to Low-Income and Minority Populations at Key Project Milestones.....	5-23
Table 5-9	Operations Noise Impacts for the Central Valley Wye Alternatives within Fairmead.....	5-43
Table 5-10	Comparison of Central Valley Wye Alternative Impacts	5-47
Table 6-1	Capital Cost of the Hsr Alternatives (2015\$ Thousands).....	6-3
Table 6-2	Optimal Hsr Express Travel Times from Merced and Fresno to Other Cities (Hours:Minutes).....	6-5
Table 6-3	Medium Scenario Revenue and Annual O&M Costs.....	6-7
Table 8-1	Comparison of Central Valley Wye Alternatives Key Natural Environment and Community Resource Factors	8-10
Table 8-2	Feedback on Alternatives Received During Public Meeting on December 8, 2016	8-17
Table 8-3	Capital Costs of Central Valley Wye Alternatives (2015 U.S. Dollars)	8-18
Table 9-1	Public and Agency Meetings.....	9-6

Figures

Figure S-1	California High-Speed Rail Statewide System	S-2
Figure S-2	Central Valley Wye Alternatives	S-3
Figure S-3	SR 152 (North) to Road 13 Wye Alternative Alignment and Key Design Features.....	S-13
Figure S-4	SR 152 (North) to Road 19 Wye Alternative Alignment and Key Design Features.....	S-14
Figure S-5	Avenue 21 to Road 13 Wye Alternative Alignment and Key Design Features.....	S-15
Figure S-6	SR 152 (North) to Road 11 Wye Alternative Alignment and Key Design Features.....	S-16
Figure 1-1	Hybrid Alternative and Wye Area Deferred for Further Study in the 2012 Merced to Fresno Final Eir/Eis.....	1-4
Figure 1-2	Central Valley Wye Alternatives	1-5
Figure 1-3	Merced to Fresno Section Corridor	1-8
Figure 1-4	Interregional Travel Patterns—2010 (Left) and Projected 2040 (Right)	1-11
Figure 1-5	California Hsr System Phase I Implementation	1-23
Figure 2-1	Program-Level Wye Connection.....	2-3
Figure 2-2	History of Wye-Related Studies.....	2-4
Figure 2-3	Fourteen Central Valley Wye Alternatives Initially Identified for Evaluation in Supplemental Alternatives Analysis Report (April 2013)	2-7
Figure 2-4	Four Central Valley Wye Alternatives Carried Forward in Supplemental Alternatives Analysis Report (April 2013)	2-8
Figure 2-5	Proposed Central Valley Wye Alternative High-Speed Rail Alignments	2-10
Figure 2-6	Relationship of Central Valley Wye to Extent of Merced to Fresno Wye Design Options	2-12
Figure 2-7	Planned Highway Improvements in Merced and Madera Counties.....	2-18
Figure 2-8	SR 152 (North) to Road 13 Wye Alternative Alignment and Key Design Features.....	2-24
Figure 2-9	SR 152 (North) to Road 13 Wye Alternative Electrical Interconnections and Network Upgrades.....	2-26
Figure 2-10	SR 152 (North) to Road 19 Wye Alternative Alignment and Key Design Features.....	2-28
Figure 2-11	SR 152 (North) to Road 19 Wye Alternative Electrical Interconnections and Network Upgrades.....	2-31

Figure 2-12	Avenue 21 to Road 13 Wye Alternative Alignment and Key Design Features	2-33
Figure 2-13	Avenue 21 to Road 13 Wye Alternative Electrical Interconnections and Network Upgrades	2-35
Figure 2-14	SR 152 (North) to Road 11 Wye Alternative Alignment and Key Design Features	2-37
Figure 2-15	SR 152 (North) to Road 11 Wye Alternative Electrical Interconnections and Network Upgrades	2-39
Figure 2-16	Location of Proposed Changes to State Transportation Facilities from Central Valley Wye Alternatives	2-46
Figure 2-17	Location of Railroad Facilities Crossed by Central Valley Wye Alternatives.....	2-49
Figure 2-18	Typical Construction Durations	2-54
Figure 3.1-1	Typical Resource Study Area	3.1-5
Figure 3.2-1	Regional Road Network.....	3.2-9
Figure 3.2-2	Existing Airports and Rail Networks in the Resource Study Area.....	3.2-10
Figure 3.2-3	Existing Vehicular and Truck Volumes in the Resource Study Area.....	3.2-19
Figure 3.2-4	Roadway Segments Selected for Traffic Analysis	3.2-21
Figure 3.2-5	Existing Bus Networks in the Resource Study Area	3.2-26
Figure 3.2-6	SR 152 (North) to Road 13 Wye Alternative Permanent Design Features	3.2-50
Figure 3.2-7	SR 152 (North) to Road 19 Wye Alternative Permanent Design Features	3.2-53
Figure 3.2-8	Avenue 21 to Road 13 Wye Alternative Permanent Design Features	3.2-56
Figure 3.2-9	SR 152 (North) to Road 11 Wye Alternative Permanent Design Features	3.2-59
Figure 3.3-1	San Joaquin Valley and San Francisco Bay Air Basins.....	3.3-19
Figure 3.3-2	Projected National Mobile Source Air Toxic Emission Trends (2010–2050) for Vehicles Operating on Roadways Using USEPA's Moves2014a Model	3.3-29
Figure 3.3-3	Air Quality Ambient Air Monitors	3.3-37
Figure 3.4-1	Federal Railroad Authority Noise Impact Criteria for Human Annoyance	3.4-18
Figure 3.4-2	Operational Noise Impacts on Sensitive Receptors in the Central Valley Wye Alternatives Noise Resource Study Area.....	3.4-33
Figure 3.5-1	Regional and Local Sources of EMF and EMI.....	3.5-15

Figure 3.5-2	EMF and EMI Measurement Sites.....	3.5-16
Figure 3.6-1	California Energy Consumption by Sector, 2014	3.6-17
Figure 3.6-2	California Energy Consumption Estimates by Type, 2014.....	3.6-18
Figure 3.6-3	Statewide Baseline Annual Electricity Consumption.....	3.6-20
Figure 3.6-4	California Natural Gas Demand by Sector, 2012.....	3.6-21
Figure 3.6-5	Major Utility and Energy Facilities in the Project Vicinity	3.6-25
Figure 3.7-1	Central Valley Wye Schematic of Biological Resource Study Areas	3.7-14
Figure 3.7-2	Habitats of Concern in the Habitat Study Area	3.7-42
Figure 3.7-3	Wildlife Movement Corridors in the Wildlife Movement Study Area	3.7-48
Figure 3.8-1	San Joaquin River Basin Subwatersheds within the Surface Water Resource Study Area.....	3.8-15
Figure 3.8-2	San Joaquin Valley Groundwater Subbasins within the Groundwater Resource Study Area.....	3.8-16
Figure 3.8-3	Federal Emergency Management Agency Flood Zones in the Floodplain Resource Study Area.....	3.8-17
Figure 3.9-1	Local Geological Map.....	3.9-22
Figure 3.9-2	Soil Associations	3.9-25
Figure 3.9-3	Regional Faults	3.9-30
Figure 3.9-4	Regional Earthquakes 1800–2000	3.9-32
Figure 3.9-5	Oil, Gas, and Geothermal Wells in the Resource Hazards Resource Study Area	3.9-36
Figure 3.9-6	Paleontological Sensitivity of Surface-Exposed Geologic Units.....	3.9-39
Figure 3.9-7	Expansive Soils in the Resource Hazards Resource Study Area	3.9-48
Figure 3.9-8	Susceptibility of Uncoated Steel to Corrosion When in Contact with the Soil	3.9-50
Figure 3.9-9	Susceptibility of Concrete to Corrosion When in Contact with the Soil.....	3.9-51
Figure 3.9-10	Areas of Difficult Excavation.....	3.9-65
Figure 3.10-1	Sensitive Resources and General Environmental Concern Sites Resource Study Area	3.10-15
Figure 3.10-2	Potential Environmental Concern Sites within the Hazardous Materials and Wastes Resource Study Area	3.10-27
Figure 3.11-1	Safety and Security Existing Conditions	3.11-17
Figure 3.12-1	Central Valley Wye Alternatives' Communities Resource Study Areas	3.12-21

Figure 3.12-2	Community and Public Facilities within the Communities Resource Study Area.....	3.12-30
Figure 3.12-3	Potential Community Improvements to Fairmead	3.12-73
Figure 3.13-1	Central Valley Wye Alternatives—Existing Land Uses	3.13-11
Figure 3.13-2	Existing Land Uses—Chowchilla and Fairmead.....	3.13-12
Figure 3.13-3	Existing Land Uses—Site 7—Le Grand Junction/Sandy Mush Road, Warnerville-Wilson 230 Kv Transmission Line and Site 7—Wilson, 230 Kv Tie-Line	3.13-13
Figure 3.13-4	Existing Land Uses—Site 7—Le Grand Junction/Sandy Mush Road, Warnerville-Wilson 230 Kv Transmission Line (City of Waterford)	3.13-14
Figure 3.13-5	Existing Land Uses— Site 7—Le Grand Junction/Sandy Mush Road, Warnerville-Wilson 230 Kv Transmission Line and Site 7—Wilson, 230 Kv Tie-Line (City of Merced)	3.13-15
Figure 3.13-6	Existing Land Uses—Site 6—El Nido Substation and Site 7—Le Grand Junction/Sandy Mush Road, Dutchman Switching Station, 115 Kv Tie-Line, Wilson—Dairyland (Idle) 115 Kv Power Line	3.13-16
Figure 3.13-7	Existing Land Uses—Site 6—El Nido, Los Banos-Oro Loma-Canal 70 Kv Power Line and Oro Loma - Panoche Junction 115 Kv Power Line	3.13-17
Figure 3.13-8	SR 152 (North) to Road 13 Wye Alternative Land Use	3.13-21
Figure 3.13-9	SR 152 (North) to Road 19 Wye Alternative Land Use	3.13-22
Figure 3.13-10	Avenue 21 to Road 13 Wye Alternative Land Use	3.13-23
Figure 3.13-11	SR 152 (North) to Road 11 Wye Alternative Land Use	3.13-24
Figure 3.14-1	Important Farmland, Other Agricultural Land, Urban Land, and Other Land Uses in Merced, Madera, Stanislaus, and Fresno Counties in 2014.....	3.14-14
Figure 3.14-2	Protected Farmland	3.14-16
Figure 3.14-3	Important Farmland Mitigation Ratios	3.14-29
Figure 3.15-1	Parks, Recreation, and Open Space Resource Study Area	3.15-8
Figure 3.15-2	Berenda Slough at Road 19.....	3.15-12
Figure 3.15-3	Berenda Slough at State Route 152	3.15-13
Figure 3.15-4	Ash Slough at Road 13.....	3.15-14
Figure 3.15-5	Ash Slough at Road 19.....	3.15-15
Figure 3.15-6	Ash Slough at SR 152	3.15-16
Figure 3.15-7	Fairmead Elementary School.....	3.15-18
Figure 3.15-8	Washington Elementary School	3.15-19
Figure 3.15-9	EI Capitan High School.....	3.15-21

Figure 3.15-10	Richard Bernasconi Neighborhood Park	3.15-22
Figure 3.16-1	1988 Federal Highway Administration Visual Assessment Model	3.16-7
Figure 3.16-2	Central Valley Wye Alternatives – Landscape Units and Key Viewpoints	3.16-13
Figure 3.16-3	2012 Merced to Fresno Landscape Units	3.16-15
Figure 3.16-4	KVP 1: Henry Miller Road Between Carlucci and Elgin Roads (Eastward View)	3.16-17
Figure 3.16-5	KVP 7: Avenue 25 Near Road 13 (Westward View)	3.16-18
Figure 3.16-6	KVP 8: Road 13 Near Ash Slough (Southward View)	3.16-19
Figure 3.16-7	KVP 9: SR 152 Near Kingwood Road/Road 6 (Eastward View)	3.16-20
Figure 3.16-8	KVP 10: SR 152 Near Road 17-1/2 (Westward View)	3.16-21
Figure 3.16-9	KVP 11: SR 99 South of Ranch Road (Southward View)	3.16-21
Figure 3.16-10	KVP 13: SR 233 / Robertson Boulevard Near SR 152 (Southward View)	3.16-23
Figure 3.16-11	Typical Fairmead Residential Views	3.16-24
Figure 3.16-12	KVP 5: Road 19-1/2 Near Avenue 24, Fairmead, (Southward View)	3.16-25
Figure 3.16-13	KVP 6: Avenue 23 Near Road 19-1/2, Fairmead (Eastward View)	3.16-25
Figure 3.16-14	KVP 4: Minturn Road Near Porters Road (Northward View)	3.16-27
Figure 3.16-15	KVP 1: Henry Miller Road Between Carlucci and Elgin Roads (Eastward View)	3.16-28
Figure 3.16-16	KVP 2: Indiana Road, North of Hutchins Road (Northward View)	3.16-28
Figure 3.16-17	KVP 3: Avenue 21 Near Road 7 (Eastward View)	3.16-29
Figure 3.16-18	KVP 12: SR 99 Near Avenue 21 (Frontage Road Looking Southward)	3.16-30
Figure 3.16-19	KVP 14: Avenue 25 Near Road 11 (Eastward View)	3.16-32
Figure 3.16-20	KVP 13: Photosimulation, SR 152 (North) to Road 13 Wye Alternative, SR 233/Robertson Boulevard Near SR 152 (Southward View)	3.16-38
Figure 3.16-21	KVP 13: Photosimulation, SR 152 (North) to Road 19 Wye Alternative, Robertson Boulevard Near SR 152 (Southward View)	3.16-40
Figure 3.16-22	KVP 13: Photosimulation, SR 152 (North) to Road 11 Wye Alternative, Robertson Boulevard Near SR 152 (Southward View)	3.16-42

Figure 3.16-23	KVP 6: Photosimulation, Fairmead, Avenue 23 Near Road 19 1/2 (Eastward View).....	3.16-44
Figure 3.16-24	KVP 9: Photosimulation, SR 152 Near Kingwood Road/Road 6 (Eastward View).....	3.16-46
Figure 3.16-25	KVP 10: Photosimulation, SR 152 Near Road 17-1/2 (Westward View)	3.16-48
Figure 3.16-26	KVP 12: Photosimulation, SR 99 Near Avenue 21 (Frontage Road Looking Southward)	3.16-49
Figure 3.17-1	Ape Overview with Historic Properties Locations	3.17-13
Figure 3.17-2a	Chowchilla Canal.....	3.17-25
Figure 3.17-2b	Chowchilla Canal.....	3.17-26
Figure 3.17-3a	Overview, Robertson Boulevard Tree Row	3.17-27
Figure 3.17-3b	Robertson Boulevard Tree Row.....	3.17-28
Figure 3.17-3c	Robertson Boulevard Tree Row.....	3.17-29
Figure 3.17-3d	Robertson Boulevard Tree Row.....	3.17-30
Figure 3.17-3e	Robertson Boulevard Tree Row.....	3.17-31
Figure 3.17-3f	Robertson Boulevard Tree Row.....	3.17-32
Figure 3.17-3g	Robertson Boulevard Tree Row.....	3.17-33
Figure 3.17-4a	Delta-Mendota Canal.....	3.17-34
Figure 3.17-4b	Delta-Mendota Canal.....	3.17-35
Figure 3.17-5	California Aqueduct	3.17-36
Figure 4-1	Locations of Section 4(f) Properties	4-3
Figure 4-2	Section 4(f) Properties, Fairmead Elementary School.....	4-15
Figure 4-3	Section 4(f) Properties, Chowchilla Canal.....	4-16
Figure 4-4	Section 4(f) Properties, Chowchilla Canal.....	4-17
Figure 4-5	Section 4(f) Properties, Robertson Boulevard Tree Row.....	4-18
Figure 4-6	Section 4(f) Properties, Robertson Boulevard Tree Row.....	4-19
Figure 4-7	Section 4(f) Properties, Robertson Boulevard Tree Row.....	4-20
Figure 4-8	Section 4(f) Properties, Robertson Boulevard Tree Row.....	4-21
Figure 4-9	Section 4(f) Properties, Robertson Boulevard Tree Row.....	4-22
Figure 5-1	Environmental Justice Reference Community and Resource Study Area.....	5-5
Figure 5-2	Environmental Justice Resource Study Area for Direct and Indirect Effects.....	5-6
Figure 5-3	Low-Income and Minority Populations in the Resource Study Area.....	5-14
Figure 5-4	Low-Income Population in the Resource Study Area	5-17

Figure 5-5	Minority Population in the Resource Study Area.....	5-20
Figure 5-6	Community Cohesion Mitigation, Fairmead	5-35
Figure 8-1	SR 152 (North) to Road 11 Wye Alternative and Associated Electrical Interconnections and Network Upgrades	8-2