APPENDIX E

California Environmental Quality Act

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Functional Equivalent Document

Renewable Electricity Standard

Prepared by:

California Air Resources Board

Prepared by:

Ascent Environmental, Inc.
455 Capitol Mall, Suite 210
Sacramento, CA 95814

June 2010

Functional Equivalent Document

Renewable Electricity Standard

Prepared by:
California Air Resources Board
1001 I Street
Sacramento, CA 95812

With Assistance From:

Ascent Environmental, Inc.
455 Capitol Mall, Suite 210
Sacramento, CA 95814

Contact:

Sydney Coatsworth
Project Manager
916/930-3185

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Ascent - 10010017.01 / 06.01.10

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Ascent Environmental, Inc.
Sydney B. Coatsworth, AICP, Project Principal
Amanda Olekszulin, Project Manager
Curtis E. Alling, AICP
Honey Walters
Linda Leeman
Kristen Stoner
Amber Giffin

Remy, Thomas, Moose, and Manley
James Moose, JD
Laura Harris
Jeannie Lee

POWER Engineers
Mike Strand

Synapse
Jeremy Fisher, Ph.D.

The Sanberg Group
Dale Schneeberger, PG, REA

Robertson-Bryan, Inc.
Michael Bryan, Ph.D.
Jeff Lafer

Applied Earthworks
M. Colleen Hamilton, RPA

Geografika Consulting
Megan Gosch

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ACRONYMS AND ABBREVIATIONS

AADT	average annual daily traffic
AB	Assembly Bill
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
AICUZ	Department of Defense Air Installations Compatible Use Zones
ALUC	Airport Land Use Commission
amsl	above mean sea level
APE	area of potential effect
APEFZ	Alquist-Priolo Earthquake Fault Zone
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BLM	U.S. Bureau of Land Management
BMPs	best management practices
bmsl	below mean sea level
BOR	U.S. Bureau of Reclamation
CAA	Clean Air Act
CAL FIRE	California, Department of Forestry and Fire Protection
Cal ISO	California Independent System Operator
CAL Recycle	State of California, Department of Resources Recycling and Recovery
Cal/EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CBC	California Building Code
CCCT	closed circuit cooling tower
CCNM	California Coastal National Monument
CCP	comprehensive conservation plans
CCR	California Code of Regulations
CDCA	California Desert Conservation Area
CDPA	California Desert Protection Act
CEC	California Energy Commission

CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFCP	California Farmland Conservancy Program
CFR	Code of Federal Regulations
CGS	California Geological Survey
CHP	combined heat and power
CI	Circulation and Infrastructure
CNEL	Community Noise Equivalent Level
CNRA	California Natural Resources Agency
CO	Conservation
CPUC	California Public Utilities Commission
CREZ	competitive renewable energy zones
CRHR	California Register of Historical Resources
CT	simple cycle cooling tower
CUPA	Certified Unified Program Agency
CVMSHCP/NCCP	Coachella Valley Multi-Species Habitat Conservation Plan/Natural Communities Conservation Plan
CVP	Central Valley Project
CWA	Clean Water Act
dB	decibel
dBA	A-weighted sound levels
Delta	Sacramento-San Joaquin Delta
DFG	Department of Fish and Game
DOGGR	California Division of Oil, Gas, and Geothermal Resources
DPR	Department of Parks and Recreation
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
E3	Energy and Environmental Economics, Incorporated
EDCs	endocrine disrupting compounds
EIRs	Environmental Impact Reports
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency

EPCRA	Environmental Planning and Community Right-to-Know Act
FAA	Federal Aviation Administration
FED	functionally equivalent document
FEMA	Federal Emergency Management Agency
FHA	Federal Highway Administration
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act
FMMP	Farmland Mapping and Monitoring Program
FPPA	Farmland Protection Policy Act
FRA	Federal Rail Administration
FTA	Federal Transit Administration
g	gravity
GC	Government Code
GHG	greenhouse gases
H	Housing
HCP	habitat conservation plan
HLRs	Hydrologic landscape regions
IEPR	Integrated Energy Policy Report
in/sec	inches per second
IOUs	investor owned utilities
ISEGS	Ivanpagh Solar Electric Generating Systems
kW	kilowatts
lb/MWh	pound per megawatt hour
L_{dn}	Day-Night Noise Level
LEA	local enforcement agencies
L_{eq}	Equivalent Noise Level
L_{max}	Maximum Noise Level
L_{min}	Minimum Noise Level
LOS	level of service
LU	Land Use
mg/L	milligrams per liter
Moyer program	ARB's Carl Moyer Program
MPOs	metropolitan planning organizations

MPS	modular pumped storage
MRDS	USGS Mineral Resource Data System
MRZ	Mineral Resource Zones
MUC	Multiple-Use Class
MW	megawatts
MWh	megawatt-hour
mya	million years ago
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NCAs	National Conservation Areas
NCCP	natural communities conservation plan
NCP	National Contingency Plan
NCPA	Northern California Power Agency
NECO	Northern and Eastern Colorado Desert
NEPA	National Environmental Policy Act [
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NLCS	National Landscape Conservation System
NPDES	National Pollution Discharge Elimination System
NPL	National Priority List
NPS	National Park Service
NRHP	National Register of Historic Places
NRPA	Archaeological Resources Protection Act of 1979
O_2	oxygen
O&M	operation and maintenance
OAQPS	Office of Air Quality Planning and Standards
OHMVR	off-highway motor vehicle recreation
OS	Open Space
OTC	once through cooling
OWTS	onsite wastewater treatment systems
oxide	aluminum
PA	Programmatic Agreements

PCBs	polychlorinated biphenyls
PEIS	Programmatic Environmental Impact Statement
PM	Particulate matter
POUs	publicly owned utilities
ppmv	parts per million by volume
PPV	peak particle velocity
PRC	Public Resources Code
PV	Photovoltaic
RCRA	Resource Conservation and Recovery Act
REC	renewable energy credit
RES	Renewable Electricity Standard
RETI	Renewable Energy Transmission Initiative
RMPs	Resource Management Plans
RMS	root-mean-square
ROWD	Report of Waste Discharge
ROWs	right-of-ways
RPS	Renewables Portfolio Standard
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SBE	State Board of Education
SCAQMD	South Coast Air Quality Management District
Scoping Plan	AB 32 Climate Change Scoping Plan
SCPPA	Southern California Public Power Authority
SCS	Sustainable Communities Strategy”
SDAPCD	San Diego Air Pollution Control District
SDWA	Safe Drinking Water Act
SERCs/TERCs	state/tribe emergency response commissions
SIC	Standard Industrial Classification
SIP	State Implementation Policy
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMARA	California Surface Mining and Reclamation Act
SMUD	Sacramento Municipal Utility District
solar DG	distributed solar generation

SVRA	State Vehicular Recreation Area
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TDS	Total dissolved solids
TMDL	Total Maximum Daily Load
tpy	tons per year
TRI	Toxics Release Inventory
TSCA	Toxic Substances Control Act
U.S. EPA	U.S. Environmental Protection Agency
UBC	Uniform Building Code
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
V/C	volume-to-capacity ratio
VC	Vehicle Code
VdB	vibration decibels
VOCs	volatile organic compounds
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WAPA	the Western Area Power Administration
WDRs	waste discharge requirements
WECC	Western Electricity Coordinating Council
WECO	Western Colorado
WEMO	West Mojave Habitat Conservation Plan
WSA	water supply assessment

I. INTRODUCTION AND BACKGROUND

A. INTRODUCTION

The California Environmental Quality Act (CEQA) and California Air Resources Board (ARB) policy require an analysis to determine any potentially significant adverse environmental impacts of ARB's regulations. The Renewable Electricity Standard (RES) is proposed to be adopted as a regulation. If adopted, it would advance the standard for the proportion of electricity generation by eligible renewable sources from 20 percent, as established in 2002 by the California Renewables Portfolio Standard (RPS), to 33 percent. The proposed 33 percent RES would modify other provisions contained in the existing RPS, as described in Chapter II.

RES is identified as one of the measures proposed in the Climate Change Scoping Plan (Scoping Plan), which was developed for the purpose of reducing emissions of greenhouse gases (GHG) in California, as directed by the California Global Warming Solutions Act of 2006 (AB 32, Chapter 488, Statutes of 2006). One of the key elements of the Scoping Plan recommendations is "Achieving a statewide renewables energy mix of 33 percent." As described in the Scoping Plan recommendations, "increasing the 20 percent RPS to 33 percent is designed to accelerate the transformation of the electricity sector, including investment in the transmission infrastructure and system changes to allow integration of large quantities of intermittent wind and solar generation," and other eligible renewable sources.

B. THE CALIFORNIA ENVIRONMENTAL QUALITY ACT AND FUNCTIONAL EQUIVALENCY

In PRC Section 21080(a) CEQA states, "Except as otherwise provided in this division, this division shall apply to discretionary projects proposed to be carried out or approved by public agencies, including but not limited to the enactment and amendment of zoning ordinances, the issuance of zoning variances, the issuance of conditional use permits, and the approval of tentative subdivision maps, unless the project is exempt from this division. " ARB determined that adoption and implementation of the proposed 33 percent RES constitutes a "project" as defined by Public Resources Code Section 21000 et seq. The CEQA Guidelines, Section 15378, define a project as:

(a) "Project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is any of the following:

(1) An activity directly undertaken by any public agency including but not limited to public works construction and related activities clearing or grading of land, improvements to existing public structures, enactment and amendment of zoning ordinances, and the adoption and amendment of

local General Plans or elements thereof pursuant to Government Code (GC) Sections 65100-65700.

(2) An activity undertaken by a person which is supported in whole or in part through public agency contacts, grants, subsidies, loans, or other forms of assistance from one or more public agencies.

(3) An activity involving the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

Although the policy aspects of the proposed RES do not directly change the physical environment, the regulation qualifies as a project under CEQA, because CEQA Guidelines Section 15378(a) specifically includes any action undertaken by a public agency that has the potential to result in a reasonably foreseeable indirect physical change in the environment.

When adopting a rule or regulation, Section 15187 of the State CEQA Guidelines provides direction to ARB and certain other state agencies. The guidelines require ARB to conduct "an environmental analysis of the reasonably foreseeable methods by which compliance with that rule or regulation will be achieved." The analysis shall include reasonably foreseeable environmental impacts of the methods of compliance, reasonably foreseeable feasible mitigation measures related to significant impacts, and reasonably foreseeable alternative means of compliance that would avoid or eliminate significant impacts. The analysis should not engage in speculation, nor is the detail of a project-level analysis required.

More specifically, CEQA discourages speculation (State CEQA Guidelines Section 15145), however, drafting an environmental document necessarily involves some degree of forecasting (State CEQA Guidelines Section 15144). While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can. If after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact.

ARB is the lead agency for the proposed adoption of the RES. This document presents ARB's analysis of potential significant environmental impacts of the proposed RES, and identifies potential mitigation that could feasibly be implemented to alleviate, minimize or avoid any potentially significant environmental impacts. This document contains an Environmental Checklist, a resource-based discussion of potential significant cumulative and project environmental impacts, and mitigations by resource category.

ARB's process of adopting regulations is a Certified State Regulatory Program equivalent to CEQA. PRC Section 21080.5 allows public agencies with regulatory programs to prepare a plan or other written document in lieu of an environmental impact report once the Secretary of the Natural Resources Agency has certified the regulatory program. The California Secretary for Natural Resources has determined that ARB meets the criteria for a Certified State Regulatory Program (Title 14, California Code of

Regulations [CCR] Section 15251[d]). This certification allows ARB to adopt rules, regulations, standards and plans, and exempts ARB from the requirement to prepare Initial Studies, Notices of Preparation, Negative Declarations or Environmental Impact Reports (EIRs). As a certified agency, however, ARB is required to prepare a substitute, functionally equivalent document (FED) subject to other provisions of CEQA, such as avoiding significant adverse effects on the environment where feasible.

This document is the FED for the RES. It is written to include the substantive features of an environmental impact report. ARB has used the Environmental Checklist as a guiding basis for assessing the potential significant adverse environmental impacts associated with adoption and implementation of the RES. A 45-day public review period is being provided and all comments received will be posted on the ARB website. ARB will respond to all significant environmental concerns raised by the public during this comment period and, at the Board Hearing; these responses will be included in the Final Statement of Reasons (FSOR).

At the conclusion of the Board Hearing, the Board may accept, modify, or reject the staff recommendation on the proposed RES. If modifications are requested, staff will address the changes and release the revised package for an additional 15 day review. At the conclusion of review, staff will respond to all comments received in the FSOR. The FSOR and complete regulatory package is transmitted for final consideration and action by the Executive Officer and forwarded to the Office of Administrative Law for processing.

C. SCOPE OF ANALYSIS AND ASSUMPTIONS

The degree of specificity required in a CEQA document corresponds to the degree of specificity involved in the underlying activity that it describes. The environmental analysis for certain types of projects cannot be as detailed as for other types of projects (CEQA Guidelines Section 15146). For example, the assessment of a construction project would necessarily be more detailed than for the adoption of a plan because the construction effects can be predicted with a greater degree of accuracy (CEQA Guidelines Section 15146 (a)). This analysis contains as much information as is currently available, without being speculative.

The scope of the analysis in this FED is intended to help focus public review and to assure that any questions and comments are appropriate and meaningful. This analysis specifically focuses on potential significant, adverse impacts on the physical environment in the context of changes from the existing State regulations and policy regarding renewable energy generation and transmission.

The analysis of potential significant, adverse environmental impacts from the proposed 33 percent RES is based on the following assumptions:

1. This analysis addresses the potential significant adverse environmental impacts resulting from implementing the proposed RES with its 33 percent target in

comparison to the existing provisions of the RPS with its 20 percent target along with other existing programs and initiatives for renewable energy generation.

2. The renewable energy policy and regulatory condition that helps define the environmental baseline is the existing RPS. Therefore, the analysis of environmental impacts and determinations of significance will be based on a comparison of the reasonably foreseeable methods of compliance related to the 20 percent RPS now in effect with the reasonably foreseeable methods of compliance related to the proposed 33 percent RES.

3. Environmental analysis in this FED addresses impacts both within the State of California and outside the state to the extent they are reasonably foreseeable and do not require speculation.

4. The level of detail of impact analysis is necessarily general because of the programmatic nature of the 33 percent RES and the fact that specific renewable energy generation and transmission projects will not be authorized by the adoption of the 33 percent RES. Specific projects will undergo their normally required environmental review and compliance processes.

5. Because of the statewide reach of the RES and the longer-term future horizon of the achievement of the 33 percent proportion of renewable energy, the impact analysis is inherently cumulative in nature, rather than site or project specific. As a result, the character of the impact conclusions in the resource-oriented sections of Chapter III, Impact Assessment, are cumulative, considering the potential effects of the full range of reasonably foreseeable methods of compliance, along with expected background growth in California and the U. S. West, as appropriate. For the reader’s convenience, a summary of potential cumulative impacts is also provided in Chapter V.

D. INCORPORATION OF DOCUMENTS BY REFERENCE

1. SCOPING PLAN FED

ARB prepared an environmental document for the AB 32 Climate Change Scoping Plan (Scoping Plan). The analysis, prepared for the Scoping Plan as a FED, was necessarily programmatic. It provided a basis for the next phase of environmental analyses and allows future, project-specific environmental analysis to focus solely on the new effects or detailed environmental issues not previously considered. While a program environmental document allows consideration of broad policy alternatives and program-wide mitigation measures, this environmental document is intended to disclose additional detail and information than was available at the time ARB developed the Scoping Plan FED. This concept of covering broad policies in a program document and incorporating by reference the information contained therein into subsequent documents for specific projects is known as “tiering” (State CEQA Guidelines Section15152).

Although tiering may be a logical approach, the Scoping Plan FED is under legal challenge. Therefore, staff prepared this document as a stand-alone document, and *not* tiered off the Scoping Plan FED; however, the analysis pertaining to the 33 percent RES included in the Scoping Plan FED is hereby incorporated by reference in the scope of this document (State CEQA Guidelines Section 15150). This FED is intended to disclose potential adverse impacts and identify potential mitigation measures specific to the 33 percent RES. To summary the information incorporated from the Scoping Plan FED, it includes general analysis of foreseeable responses to the concept of increasing the renewable energy generation proportion to 33 percent and general discussions of potential environmental effects.

2. OTHER INCORPORATED DOCUMENTS

Several other documents provide useful information in support of this FED and are also incorporated by reference. All documents incorporated by reference are either available at the website addresses noted, or at the California Air Resources Board, Energy Section, 1001 "I" Street, Sacramento, CA. The following documents are incorporated by reference, in accordance with State CEQA Guidelines Section 15150.

ARB conducted health impact and public health assessments for the proposed regulation, which this FED hereby incorporates by reference (refer to Section VII of the FED and Section IX of the ARB Staff Report). A major assumption is that existing Federal and State programs to regulate and reduce criteria and toxic pollutants, as well as other climate policies are implemented. These include the most recent California State Implementation Plan (SIP) and the Scoping Plan.

ARB has also evaluated potential effects to disadvantaged communities, in accordance with Senate Bill 115, Solis, 1999; California Government Code Section 65040.12(c) and defined in statute by SB 115 (Solis, Chapter 690, Statutes 1999). California law requires state agencies to consider environmental justice in the rulemaking if such actions may have disproportionate effects on low-income or minority communities. This FED also incorporates by reference the discussion of impacts to disadvantaged communities (refer to Section VI of the FED and Section IX of the ARB Staff Report).

Staff evaluated the proposed 33 percent RES in order to analyze the proposed regulation's associated public health risks and any adverse impact to these communities. In considering the regulation's impacts, staff used the California Environmental Protection Agency's "Intra Agency Environmental Justice Strategy (2004)" and "Environmental Justice Action Plan (2004)" as guidance.

Several reports that address renewable energy development in California and/or the Western United States have been incorporated by reference, as noted below.

◢ U. S. Bureau of Land Management. 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 05-11 (June). http://windeis.anl.gov /documents /fpeis/index.cfm

The Wind Energy PEIS provides a programmatic environmental evaluation of the impacts of wind energy development in the West. Because environmental impacts addressed in this RES FED include effects of wind energy development, relevant resource and impact information from the PEIS has been referenced.

- U.S. Bureau of Land Management. 2008. *Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States.* FES 08-44 (October) http://www.blm.gov/wo/st/en/prog/energy/ geothermal/ geothermal_ nationwide/Documents/Final_PEIS.html

The Geothermal Energy PEIS provides a programmatic environmental evaluation of the impacts of geothermal energy development in the West. Because environmental impacts addressed in this RES FED include effects of geothermal energy development, relevant resource and impact information from the PEIS has been referenced.

- U.S. Bureau of Land Management and U.S. Department of Energy. 2008. *Final Programmatic Environmental Impact Statement – Designation of Energy Corridors on Federal Land in the 11 Western States* DOE/EIS-0386 (November) http://corridoreis. anl.gov/documents/fpeis/index.cfm#vol1

The Energy Corridor PEIS provides a programmatic environmental evaluation of the impacts of energy transmission in the West. Because environmental impacts addressed in this RES FED include effects of energy transmission projects, relevant resource and impact information from the PEIS has been referenced.

- RETI Coordinating Committee. 2010. Renewable Energy Transmission Initiative Phase 2B Final Report. RETI-1000-2010-002-F (May) http://www.energy.ca.gov/ 2010publications/RETI-1000-2010-002/RETI-1000-2010-002-F.PDF

The RETI report provides project information for renewable energy development expected in California and descriptions of the potentially expected locations. Because environmental impacts addressed in this RES FED include effects of California renewable energy development, resource and project information from the report has been referenced.

- RETI Coordinating Committee. 2010. Renewable Energy Transmission Initiative Phase 2 Updates Map (March 9, 2010). http://www.energy.ca.gov/reti/ documents/phase2B/ RETI-CREZ_Map_10_0309.pdf

The RETI map provides a graphic description of the potentially expected locations of renewable energy development in California. Because environmental impacts addressed in this RES FED include effects of California renewable energy development, the map has been referenced.

- California Energy Commission. 2009. Best Management Practices and Guidance Manual: Desert Renewable Energy Projects – Revised Draft Staff Report CEC-700-2009-016-SD-REV (December) http://www.energy.ca.gov/ 2009publications/CEC-700-2009-016/CEC-700-2009-016-SD-REV.PDF

The Best Management Practice manual presents an array of potential environmental protection and mitigation measures for renewable energy development in the California desert. Because mitigation for environmental impacts is addressed in this RES FED, the manual has been referenced.

E. BASELINE FOR ANALYSIS AND SIGNIFICANCE DETERMINATION

The policy and direction of the 20 percent RPS defines the existing requirements for compliance with renewable energy commitments in California. In addition, it is important to note that other existing measures that reduce GHGs are in place, as described in the Scoping Plan. These are called “reference measures” and also help define the existing baseline. The 20 percent RPS is one of these reference measures in the Scoping Plan.

CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected in the FED are based on changes from existing physical conditions, in keeping with CEQA requirements. It is important to note, however, that much of this environmental impact is expected to occur without the implementation of the RES. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent. The comparison of reasonably foreseeable methods of compliance under the proposed 33 percent RES with the expected response to the 20 percent RPS and other reference measures is also discussed where useful to understand the potential environmental effects attributable to the proposed RES.

Other reasonably foreseeable actions are defined to take place in the time frame of the 33 percent RES, as described in the Scoping Plan. These are called “complementary measures.” They help define the future, cumulative baseline of reasonably foreseeable compliance measures. The complementary measures are designed to reduce GHG by increasing the efficiency with which California uses all forms of energy and by reducing its dependence on the fossil fuels that produce GHGs.

Reference Measures (Already in Effect)

- Pavley I - California Light Duty Vehicle Greenhouse Gas Standards
- Renewable Portfolio Standard at 20 percent attainment
- Federal Energy Independence and Security Act/Renewable Fuels Standard

Complementary Measures (Reasonably Foreseeable Actions)

- Pavley II - Vehicle Efficiency Measures
- Cap-and-Trade Regulation, including offset quantification methods for the Forest, Urban Forest, Livestock (biodigesters), and Ozone-depleting Substance Projects
- Low Carbon Fuel Standard
- Vehicle Miles Travelled Reduction/Regional Transportation Greenhouse Gas Targets (in accordance with SB 375, Statutes of 2007)
- Reductions in electricity and natural gas demand through energy efficiency, combined heat and power
- Goods Movement (heavy duty vehicle efficiency and ship-shore electrification)
- Million Solar Roofs
- Medium and Heavy Duty Vehicles
- High Speed Rail
- The significance determinations in the FED reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance, i.e., the construction of additional generation capacity and transmission facilities for renewable energy. Because of this, the FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size and character, or site-specific environmental characteristics affected by the facilities. As a result, many impact issues are determined to be potentially significant because of the inherent uncertainties about the relationship between future renewable energy projects and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full-disclosure purpose of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts recognized as potentially significant in this FED can be avoided or maintained at a less-than-significant level.
- Another inherent uncertainty in the FED analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the RES as a regulation, it does not have authority over the proposal, approval, or implementation of renewable energy generation and transmission projects. Other agencies are responsible for the environmental analysis of proposed renewable energy projects, definition and adoption of project-specific feasible mitigation, and monitoring of mitigation implementation. For example, the California Energy Commission must approve thermal energy generation projects of 50 MW or greater capacity and local governments are often the lead

agencies approving wind, non-thermal solar projects, and smaller thermal generation projects. Additionally, Federal land management agencies must approve projects and require mitigation for impacts on their lands and state and/or Federal permits are needed for specific environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because ARB is not responsible for implementation of renewable energy project-specific mitigation and the programmatic analysis does not allow description of the details of project-specific mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable. It is expected that renewable energy projects will be able to feasibly avoid or mitigate to a less-than-significant level many of these potentially significant impacts as an outcome of their project-specific environmental review processes.

F. CEQA ENVIRONMENTAL CHECKLIST

An environmental checklist was used to identify and evaluate potential impacts of the proposed 33 percent RES. The environmental impacts checked below indicate those that may be affected by the proposed action. Further discussion is presented in Chapter III regarding the impacts of the proposed RES, and potential mitigation strategies that can be implemented to lessen the impacts.

This checklist identifies physical, biological, social, and economic factors that may be affected by the proposed RES. In many cases, background studies performed in connection with the projects indicate no impacts. A NO IMPACT answer in the last column reflects this determination. Where there is a need for clarifying discussion, the discussion is presented in the body of this report.

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
I. AESTHETICS: Would the project:				
a) Have a substantial adverse effect on a scenic vista	☒	☐	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway	☒	☐	☐	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☒	☐	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☒	☐	☐	☐
II. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☒	☐	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☒	☐	☐
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☒	☐	☐
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☒	☐	☐
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☒	☐	☐
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☒	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☒	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☒	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☒	☐	☐
IV. BIOLOGICAL RESOURCES: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☒	☐	☐
V. CULTURAL RESOURCES: Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☒	☐	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☒	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☒	☐	☐	☐
VI. GEOLOGY AND SOILS: Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☒	☐	☐	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?	☒	☐	☐	☐
ii) Strong seismic ground shaking?	☒	☐	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv) Landslides?	☒	☐	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
b) Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☒	☐	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☒	☐	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☒	☐	☐	☐
VII. GREENHOUSE GAS EMISSIONS: Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐
VIII. HAZARDS AND HAZARDOUS MATERIALS: Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☒	☐
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☒	☐
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
IX. HYDROLOGY AND WATER QUALITY: Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☒	☐	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☒	☐	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☒	☐	☐	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☒	☐	☐	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
f) Otherwise substantially degrade water quality?	☒	☐	☐	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☒	☐	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☒	☐	☐	☐
j) Inundation by seiche, tsunami, or mudflow	☒	☐	☐	☐
X. LAND USE AND PLANNING: Would the project:				
a) Physically divide an established community?	☐	☒	☐	☐
b)Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☒	☐	☐
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☒	☐	☐
XI. MINERAL RESOURCES: Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☒	☐	☐	☐
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☒	☐	☐	☐
XII. NOISE: Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☒	☐	☐	☐
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☒	☐	☐	☐
XIII. POPULATION AND HOUSING: Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XIV. PUBLIC SERVICES:				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	☒	☐	☐	☐
Fire protection?	☒	☐	☐	☐
Police protection?	☒	☐	☐	☐
Schools?	☐	☒	☐	☐
Parks?	☐	☒	☐	☐
Other public facilities?	☒	☐	☐	☐
XV. RECREATION:				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☒	☐	☐	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☒	☐	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XVI. TRANSPORTATION/TRAFFIC: Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☒	☐	☐	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☒	☐	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☒	☐	☐	☐
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☒	☐	☐	☐
e) Result in inadequate emergency access?	☒	☐	☐	☐
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☒	☐	☐	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XVII. UTILITIES AND SERVICE SYSTEMS: Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☒	☐	☐	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☒	☐	☐	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☒	☐	☐	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☒	☐

CEQA ENVIRONMENTAL CHECKLIST	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☒	☐	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

II. PROJECT DESCRIPTION

A. PROJECT OBJECTIVES

Under Assembly Bill (AB) 32 (Statutes of 2006), California must reduce greenhouse gas (GHG) emissions to 1990 levels by 2020. The Scoping Plan calls for a Renewable Electricity Standard (RES) to be adopted by the California Air Resources Board (ARB) that will reduce those emissions consistent with achieving 33 percent of total electricity generation from eligible renewable resources by December 31, 2020. The RES is one of the key measures that California will employ to reduce the State's impact on climate change.

The objectives of the proposed RES are influenced by the policy goals of AB 32. AB 32 expresses the following policy intent in Section 38501(h).

> "It is the intent of the Legislature that the State Air Resources Board design emissions reduction measures to meet the statewide emissions limits for greenhouse gases established pursuant to this division in a manner that minimizes costs and maximizes benefits for California's economy, improves and modernizes California's energy infrastructure and maintains electric system reliability, maximizes additional environmental and economic co-benefits for California, and complements the state's efforts to improve air quality."

Recognizing the intent of AB 32 and the role of RES in contributing to greenhouse gas emissions reductions, the following project objectives are presented for this regulatory program:

- Reduce greenhouse gas emissions from the electricity sector
- Reduce California's reliance on fossil fuels
- Reduce emissions of criteria air pollutants
- Improve energy security, reliability, and diversity of supply
- Improve the California economy through job creation
- Implement in such a way that complements, and does not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions
- Implement in a way that considers overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health
- Implement in such a way as to not disproportionately affect low-income and traditionally burdened communities

B. PROJECT LOCATION

The proposed RES regulations apply statewide in California. As such, the primary project area is the State of California. However, as part of the Western Interconnection power grid (overseen by the Western Electricity Coordinating Council [WECC]), California is part of a service territory that extends from Canada to Mexico and includes the provinces of Alberta and British Columbia; the northern portion of Baja California, Mexico; and all or portions of the 14 states in between. As such, some of the renewable electricity that may contribute to compliance with the RES may be generated in out-of-state facilities. For purposes of this analysis, therefore, the project area is coincident with the WECC service area (See RES Staff Report Figure III-1).

C. PROPOSED PROJECT AND ALTERNATIVES

1. OVERVIEW

As described above, the proposed RES is designed to reduce greenhouse gas emissions from the electricity sector by achieving 33 percent of total electricity generation from eligible renewable energy resources by December 31, 2020. The RES is intended to be patterned after the existing Renewable Portfolio Standard (RPS), currently administered by the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC), which calls for the achievement of 20 percent of total electricity sales from eligible energy resources by the end of 2010. The RES would be administered in a way that complements the existing RPS program. Because the RPS requires electric corporations to increase procurement from eligible energy resources with the goal of achieving 20 percent of the total from those sources, the RES is essentially an extension of that program that sets a higher renewable electricity goal and applies to all load-serving entities.

As with the RPS, the RES would continue to encourage the development of renewable energy and transmission facilities within California and in out-of-state locations within the WECC. The RES is not prescriptive as to resource type and location, and nor is the ARB responsible for proposing, approving, or implementing specific renewable electricity projects. Rather, as under the RPS, renewable energy projects would continue to be proposed by energy developers and move through the approval process. Although the specific types, sizes, and locations of renewable facilities that may be constructed in support of the 33 percent goal cannot be known with certainty, substantial research and analysis has been conducted to identify the most promising locations for different renewable resources, and the likely transmission corridors that may be required. The Renewable Energy Transmission Initiative (RETI) is a statewide initiative to help identify the transmission projects needed to accommodate California's renewable energy goals, support future energy policy, and facilitate transmission corridor designation and transmission and generation siting and permitting.

RETI identifies and assesses all competitive renewable energy zones (CREZ) in California and in neighboring states that can provide significant electricity to California consumers by the year 2020. RETI also identifies zones that can be developed in the most cost effective and environmentally sensitive manner and details transmission plans for those zones identified for development. The RETI effort is overseen by a coordinating committee consisting of California entities responsible for ensuring the implementation of the state's renewable energy policies and development of electric infrastructure, namely: the CPUC; CEC; California Independent System Operator (Cal ISO); and Publicly-Owned Utilities (Southern California Public Power Authority [SCPPA], Sacramento Municipal Utility District [SMUD], and the Northern California Power Agency [NCPA]).

Based on information in the RETI and other sources, a model has been developed that creates scenarios used to illustrate a range of renewable energy alternatives. These scenarios serve as the basis for evaluating incremental differences between the RPS and proposed RES regulations using two different load-demand conditions. The model, known as the RES Calculator, and the model runs used as the basis for this analysis are described further below.

2. RELATIONSHIP TO THE RENEWABLE PORTFOLIO STANDARD

The proposed RES is being developed to utilize the structure, provisions, policies, and implementation mechanisms established by the CEC and CPUC for the RPS program. This includes carry-over of as many of the provisions of the RPS program as possible, such as:

- The definition of eligible renewable facilities or resources, including all of the conditions and limitations that currently apply to various resource types.
- Certification procedures and requirements for eligible facilities whether located in-state or out-of-state, including applicable California Environmental Quality Act (CEQA) compliance provisions.
- Procedures for verifying utility procurement and measuring compliance based on megawatt-hours.
- Continuing the same administrative roles for the CEC and CPUC, but also adding the projects of publicly owned utilities (POUs) with CEC taking on the compliance monitoring role for the POUs.
- Continuing all other basic monitoring and reporting procedures.

The RES differs from the RPS in the certain ways. As summarized below, the RES would:

- Add the POUs to program with the same compliance obligations and dates as the investor owned utilities (IOUs), consistent with the directive in Executive Order S-21-09.
- Provide a compliance exemption threshold for the smallest IOUs and POUs.

- Provide more flexible renewable energy credit (REC) trading options to maximize GHG reductions and increase the potential availability of renewable resources in the WECC.
- Establish multi-year compliance intervals.
- Include the California Department of Water Resources (DWR) and the Western Area Power Administration (WAPA) within the U.S. Department of Energy as additional “regulated parties.”
- Modify the penalty provisions for noncompliance and establish ARB as the enforcement entity.
- Include an appropriate regulatory structure for the operational nature of the electricity load served by DWR and WAPA.

A more detailed discussion of the relationship of the RES to other renewable energy programs and activities is provided in Chapters IV, V, and VII of the RES Staff Report.

3. DESCRIPTION OF RENEWABLE RESOURCES

Similar to the existing RPS, implementation of the RES is expected to result in the design, construction, and operation of additional renewable energy facilities and transmission facilities within and beyond California. The existing total-system electricity generation for use in California constitutes 306,600 gigawatt-hours (GWh, 2008 data), including both in-state and out-of-state generation. Of the total-system power, renewable generation provides approximately 33,000 GWh, or 10.6 percent (CEC 2009). General descriptions of the anticipated renewable resources and transmission facilities are as follows:

(a). WIND POWER

Wind power plants are turbines that use wind energy to make mechanical energy, which is then converted to electrical energy. The components of a utility-scale "wind farm" include wind turbines, an underground power transmission system, control and maintenance facilities, and a substation that connects the farm with the utility power grid. Utility-scale wind turbines are classified by size as small (less than 50 kilowatts [kW]); intermediate (50 to 500 kW); and large (above 500 kW). Total existing (2008) wind energy generation for use in California was approximately 7,300 GWh, which constitutes 22.5 percent of current renewable electricity and 2.4 percent of total system generation (CEC 2009).

Utility-scale wind farms are generally located in areas with average annual wind speeds of at least 13 miles per hour. Wind power is inherently variable with more available during certain seasons because of climatic conditions that affect wind speed. In California, wind speeds are highest in the hot summer months, and approximately three-fourths of all annual wind power output is produced during the spring and summer. Most of California's wind turbines and, therefore, most of California's wind generating capacity and output, are located in three primary regions: Altamont Pass (east of San Francisco), Tehachapi (southeast of Bakersfield) and San Gorgonio (near Palm Springs, east of Los Angeles).

Another application of wind is in small-scale, distributed generation systems, which provide on-site power in either stand-alone or grid-connected configurations. Most such systems range in size from one to 25 kW. Distributed wind systems are typically used by industry, water districts, rural residences, agricultural operations, and a wide variety of isolated power users located in good wind resource areas.

Wind power for utility-scale applications is considered to be commercially available under most conditions. The technology is considered to be mature, and there are several system suppliers. The federal government encourages electricity production from wind farms with a 1.5-cent per kilowatt-hour tax credit. California also offers incentives through existing and new renewable energy programs.

Wind power for distributed applications is considered to be commercially available under limited conditions. Distributed wind systems can be a cost-effective option in remote locations where a utility connection would not be economically feasible. The CEC supports grid-connected, small wind systems of 10 kW or less through the Emerging Renewable Rebate Program.

While the power produced by many of California's older wind turbines is not cost-competitive with other forms of electricity generation, some of the newest wind turbine designs may be able to match or beat the power generation costs of many coal and nuclear plants.

Advantages of wind power include:

- It forestalls or replaces the need to build potentially more polluting conventional power plants.
- It produces virtually no pollution of air, water, or soil.
- It is renewable (i.e., non-depletable). There is enough potential wind energy in the U.S. to provide for the electric power needs of the entire country.
- Because of its modular nature, it is easy to add capacity as needed.
- Installation of wind turbines is relatively quick, compared to fossil fuel and other utility-scale power generation facilities.
- While the power is currently more expensive than that produced by natural gas-fired plants, the price of wind power is not affected by fuel price increases or supply disruptions.
- There is currently an attractive federal tax credit for wind generation.

As described in Chapter I, Introduction, Section D, Incorporation of Documents by Reference, the Bureau of Land Management (BLM) has prepared a Programmatic Environmental Impact Statement (PEIS) on Wind Energy Development on Bureau of Land Management (BLM)-Administered Lands in the Western United States (BLM 2005). This document comprehensively evaluates three alternatives for managing wind development on BLM lands. Chapter 3 of the PEIS, Overview of Wind Energy Projects, describes the activities likely to occur during each of the major phases associated with the development of a wind energy project: site testing and monitoring, construction, operation, and decommissioning. Although wind energy projects that may ultimately contribute to contribute to compliance with the RES will not necessarily all occur on BLM lands, the description of project elements and environmental analysis in the PEIS are nonetheless applicable to this renewable resource in any location.

Site monitoring and testing involve the collection of sufficient meteorological data to characterize the wind regime and support decisions on whether the wind resources at a specific site are suitable for development and, if so, the appropriate number, type, and location of wind turbines. The collection of meteorological data to may involve:

- Construction of an access road or roads
- Limited site grading or preparation
- Subsurface foundations
- Erection of meteorological towers for data collection

Elements of wind energy project construction could vary substantially depending on site-specific conditions, facility size, and other variables. Project construction may involve:

- Construction/upgrade of access road or roads
- Site clearing, vegetation removal, tree removal
- Use of water trucks or wells for fugitive dust control
- Excavation, grading, installation of stormwater control features
- Transportation of rotors, towers, and other permanent and temporary equipment by ship, barge, rail, and/or road
- Road and bridge fortification or improvement
- Establishment and restoration of staging areas
- Construction of concrete tower foundations, which may involve drilling or blasting
- Construction of control building, materials storage building(s)
- Installation of electrical transformers, substations, power-conducting cables, and signal wires

- Construction of temporary offices and provision of potable water and sanitary facilities
- Erection of towers and installation of nacelles (structures that house generating components) and rotors

Operation of wind energy developments may be directed from on-site or from remote locations. Project operation may involve:

- Routine maintenance using greases, lubricants, paints, and/or coatings for corrosion control
- Periodic replacement of equipment
- On-site or off-site equipment repair
- Generation and disposal of small amounts of waste oil and coolant

Facility decommissioning may involve:

- Dismantling and removal of turbines and towers
- Reuse, recycling, or disposal of materials and equipment
- Restoration of access roads and other disturbed areas
- Inspection for, and clean-up of any spills or leaks of industrial contaminants

(b). Solar Thermal

Solar power generation in California is in its very early stages. As of 2008, existing electricity generation for use in the state was only 746 GWh, including both solar thermal and solar photovoltaic facilities (CEC 2009). Numerous solar power plants are in the planning and development process, so the total solar generation is increasing.

Solar thermal electric power plants generate heat by using lenses and reflectors to concentrate the sun's energy. The sun's heat can be collected in a variety of different ways. Because the heat can be stored, these plants can be more flexible than solar photovoltaic and wind energy projects, because they can generate power when solar energy is not available. By storing hot thermal energy delivered from the solar field, steam can be produced at will to meet later peak demands, such as during the evening. Also, thermal storage can be of use during intermittent disruptions in the solar resource, such as when clouds cover the sun, or can be used to provide a more uniform output over time. There is limited experience in California with thermal storage (CEC 2005b). .

Solar Parabolic Troughs consist of curved mirrors that form troughs to focus the sun's energy on a pipe. A fluid, typically oil, is circulated through the pipes to collect the solar heat. Parabolic trough systems use single-axis tracking parabolic trough arrays to collect solar energy. The solar system is essentially a steam producer, using the collector field, high temperature oil heat transport system and an oil-to-water/steam heat exchanger set to generate superheated steam. The steam is then used in a conventional steam turbine power process to generate electricity (CEC 2005b).

Solar Parabolic Dish systems consist of a parabolic-shaped concentrator (similar in shape to a satellite dish) that reflects solar radiation onto a receiver mounted at the focal point at the center. The collected heat is utilized directly by a heat engine mounted on the receiver, which generates electricity. The dish is pointed directly at the sun by use of a dual-axis tracking system consisting of a drive motor, gearing and controls. The parabolic shape of the reflective surface, which can be mirrored glass, mirrored film, or a polished metal such as aluminum, focuses the radiation onto the receiver aperture at the engine. For a 25 kW unit a typical dish diameter would be 35-40 feet (10-12 m), focusing into a receiver aperture of approximately 1.5 feet (0.5 m) diameter, with a focal point about 24 feet (7.3 m) from the dish vertex. Total unit height is on the order of 40-45 feet (12-14 m). Sun concentration ratios are 600 or more at the receiver, providing the ability to reach very high temperatures in the working fluid (CEC 2005b).

Solar Central Receivers or "Power Towers" consist of a tower surrounded by a large array of heliostats. Heliostats are mirrors that track the sun and reflect its rays onto the receiver, which absorbs the heat energy that is then utilized in driving a turbine electric generator. The power tower solar system is essentially a steam producer that supplies a steam turbine power plant, or augments the steam turbine side of a combined-cycle power plant. Tower heights vary from 290 feet (88 m) for a 30 MW plant to 640 feet (195 m) for a 200 MW plant. Solar Two is a 10 MW demonstration project in the California desert. It uses a molten nitrate eutectic salt that flows through the receiver and into a hot storage tank. When steam generation is desired, the salt is pumped through a steam generator and returns to the cold tank. Because the salt is heated to such a high temperature, the steam can be produced at high pressures and temperatures, making the generation of electricity more efficient. Furthermore, the high temperature difference across the thermal storage system allows very cost effective storage of thermal energy (CEC 2005b).

Many large solar energy projects are being proposed in California's desert area on federal Bureau of Land Management (BLM) land. BLM has received right-of-way requests encompassing more than 300,000 acres for the development of approximately 34 large solar thermal power plants totaling approximately 24,000 megawatts. These projects are in various stages of the planning and approval process.

(c). SOLAR PHOTOVOLTAIC

A Solar Photovoltaic (PV) plant consists of an array of PV cells containing a material that converts solar radiation into direct current electricity. Photovoltaics can be used in a wide range of products, from small consumer items to large commercial solar electric systems. PV cells consist of several layers of different materials. The primary layer is a semiconductor material where the photoelectric effect takes place. Semiconductors in today’s commercial PV products are typically composed of silicon. The semiconductor is sandwiched between two metallic layers that provide a steady flow of electrons through the semiconductor and connect the cell to an external electrical circuit. These layers are sealed and protected from the environment by an encapsulant, such as glass. An antireflective film is deposited between the encapsulant and the photoactive surface of the cell to maximize light absorption (CEC 2005b).

PV systems can be classified into two general categories: flat-plate systems or concentrator systems. Flat-plate systems have panels that can either be fixed in place or allowed to track the movement of the sun and respond to sunlight that is either direct or diffuse. The simplest PV array consists of flat-plate PV panels in a fixed position. The advantages of fixed arrays are that they lack moving parts; there is virtually no need for extra equipment; and they are relatively lightweight. These features make them suitable for many locations, including most residential roofs. Because the panels are fixed in place, their orientation to the sun is usually at an angle that may be less than optimal for energy collection. However, these systems are simpler and less costly.

By virtue of their ability to concentrate the sun's energy, concentrator systems are able to use less solar cell material. A concentrator makes use of relatively inexpensive materials such as plastic lenses and metal housings to capture the solar energy shining on a fairly large area and focus that energy onto a smaller area that holds the solar cell. Concentrator systems increase the power output while reducing the size and number of cells needed, but they are typically more costly than a fixed array.

(d). Geothermal

Geothermal energy is produced by the heat of the earth and is often associated with volcanic and seismically active regions. California, with its location on the Pacific "Ring of Fire," has 25 known geothermal resource areas, 14 of which have temperatures of 300 degrees Fahrenheit or greater. Geothermal energy is the largest current source of renewable electricity generation in the state. Existing generation (as of 2008) is 13,662 GWh, or 42.0 percent of total renewable generation and 4.5 percent of existing total-system generation (CEC 2009).

Geothermal heat pumps can tap into this resource to heat and cool buildings. A geothermal heat pump system consists of a heat pump, an air delivery system (ductwork), and a heat exchanger-a system of pipes buried in the shallow ground near the building. In the winter, the heat pump removes heat from the heat exchanger and pumps it into the indoor air delivery system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water.

Wells can be drilled into underground reservoirs for the generation of electricity. Some geothermal power plants use the steam from a reservoir to power a turbine/generator, while others use the hot water to boil a working fluid that vaporizes and then turns a turbine. Hot water near the surface of Earth can be used directly for heat.

A total of 46 operating geothermal power plants with an installed capacity of nearly 1,870 megawatts are in California, about two-thirds of the total United States' geothermal generation (CEC 2005a). One of the values of geothermal energy is its role as a renewable source of baseload electricity. Electricity generation can occur any day regardless of weather or day/night cycles. Forty-six of California's 58 counties have lower temperature resources for direct-use geothermal.

The most developed of the high-temperature resource areas of the state is the Geysers. Located north of San Francisco, the Geysers was first tapped as a geothermal resource to generate electricity in 1960. It is one of only two locations in the world where a high-temperature, dry steam is found that can be directly used to turn turbines and generate electricity (the other being Larderello, Italy).

Other major geothermal locations in the state include the Imperial Valley area east of San Diego and the Coso Hot Springs area near Bakersfield. It is estimated that the state has a potential of more than 4,000 megawatts of additional power from geothermal energy, using current technologies.

Additionally, two forms of geothermal energy, hot dry rock and magma, have the potential to provide thousands of megawatts in California. Access to hot dry rock resources involves injecting cold water down one well, circulating it through hot fractured rock, and drawing off the heated water from another well. Investigations in hot dry rock were done in the Clear Lake area of Lake County. Magma research has occurred in the Long Valley Caldera of Mono County, but existing technology does not yet allow recovery of heat directly from magma, the very deep and most powerful resource of geothermal energy

Activities likely to occur during development of a geothermal energy project may involve:

- Geophysical exploration
- Well drilling
- Road construction
- Sump or pit construction
- Equipment installation including wellhead, valves, and control equipment casing
- Sludge removal and disposal
- Installation of Infrastructure
- Construction of facility structures and
- Installation/construction of electrical generation facilities
- Installation of pipelines, meters, substations, and transmission lines

Geothermal operations may last from 10 to 50 years, depending upon the size and temperature of the geothermal reservoir. Geothermal resources can be classified as low temperature (less than 90°C, or 194°F), moderate temperature (90°C to 150°C, or 194 to 302°F), and high temperature (greater than 150°C, or 302°F). Only the highest temperature resources are generally used for generating electrical power; however, with emerging technologies and in colder climates such as Alaska, even the lower temperature resources are proving usable for electrical generation.

Facility abandonment may include plugging, capping, and reclaiming the well site, equipment and facility removal, and restoration of disturbed areas.

(e). Solid-fuel Biomass

Biomass consists of organic residues from plants and animals that are obtained primarily from harvesting and processing of agricultural crops, forest products, and urban wastes. Biomass is waste and by-products that can be utilized as fuels for producing energy, instead of becoming landfill waste. Examples of some of the biomass residues that are utilized in direct combustion power plants are: forest slash, urban wood waste, lumber waste, and agricultural wastes.

Biomass resources can be used to generate renewable power, as well as to produce renewable fuels such as ethanol, methanol, hydrogen, biodiesel, syngas, synfuels, and biomethane, and as feedstock for products such as plastics, solvents, inks, and construction materials. For renewable power generation, biomass is typically combusted directly to generate heat to drive turbine electric generators. At the peak of the biomass industry, California's biomass power plants installed capacity totaled 800 megawatts (MW) of electricity from 66 direct-combustion biomass facilities. Existing biomass power plant generation of electricity for use in California provides 6,377 GWh, which is 19.6 percent of total existing renewable electricity generation (CEC 2009). Benefits of properly using biomass can include the following (CEC 2006):

- reducing the severity and risk of wildfire,
- improving forest health and providing watershed protection,
- improving air and water quality,
- restoring degraded soils and lands,
- reducing greenhouse gas emissions,
- improving management of residues and wastes,
- creating new economic opportunities for agriculture and other industries,
- improving electric power quality and supporting the power grid,
- creating jobs, and
- economically revitalizing many agricultural and rural communities.

California’s biomass resources are very diverse and complex. At present, the three principal resources are agricultural residues, forestry residues, and biomass from urban and industrial wastes. These resources are distributed variously throughout the state. Forest biomass is available mostly in the northern and central mountain areas, agricultural biomass in the Central Valley and coastal and southern valleys, and urban biomass in the main metropolitan regions of the Los Angeles basin, the San Francisco Bay area, San Diego, and the Bakersfield to Sacramento development corridor. A sizable number of facilities producing or utilizing biomass already exists. The amount of biomass available under sustainable use practices is less than gross production. At present, estimates accounting for soil conservation, protected forest lands, performance of collection and harvesting technologies, and other factors suggest that about 32 million tons may be feasible for commercial and industrial use, expanding to 48 million tons by 2050 (CEC 2006).

(f). BIOGAS

Anaerobic digestion is a biological process that produces a gas principally composed of methane and carbon dioxide, otherwise known as biogas. These gases are produced from organic wastes, such as livestock manure, and food processing waste. Organic wastes and are placed in an airtight container, known as a digester, where the process occurs. Depending on the waste feedstock and the system design, biogas is typically 55 to 75 percent pure methane. State-of-the-art systems report producing biogas that is more than 95 percent pure methane.

The process of anaerobic digestion consists of three steps: 1) decomposition (hydrolysis) of plant or animal matter, which converts the material into usable-sized molecules such as sugar; 2) conversion of decomposed matter to organic acids; and 3) conversion of the acids to methane gas.

Many anaerobic digestion technologies are commercially available and have been demonstrated for use with agricultural wastes and for treating municipal and industrial wastewater. Where unprocessed wastes cause odor and water pollution, such as in large dairies, anaerobic digestion reduces the odor and liquid waste disposal problems and produces a biogas fuel that can be used for process heating and/or electricity generation.

(g). SMALL HYDROELECTRIC

Hydroelectric power is a major source of California's electricity. In 2008, hydroelectric power plants (both large and small) produced approximately 38,000 GWh of electricity, or 12.4 percent of the State’s total-system generation (CEC 2009). Hydroelectric facilities larger and smaller than 30 megawatts capacity are considered "large" and “small” hydroelectric, respectively. The amount of hydroelectricity produced varies each year and is largely dependent on rainfall and reservoir operations.

California has nearly 400 hydroelectric plants, which are mostly located in the eastern mountain ranges and have a total dependable capacity of about 14,000 MW of capacity. The state also imports hydro-generated electricity from the Pacific Northwest.

The larger hydroelectric plants on dams in California (such as Shasta, Folsom, and Oroville) are operated by the U.S. Bureau of Reclamation and the California Department of Water Resources. Small hydroelectric plants are operated by utilities, including Southern California Edison, Pacific Gas and Electric Company and Sacramento Municipal Utility District.

Two types of conventional hydroelectric facilities are dams and run-of-river. Dams raise the water level of a stream or river to an elevation necessary to create a sufficient elevation difference (water pressure, or head). Dams can be constructed of earth, concrete, steel or a combination of such materials. Dams may create secondary benefits such as flood control, recreation opportunities and water storage. Run-of-river, or water diversion, facilities typically divert water from its natural channel to run it through a turbine, and then usually return the water to the channel downstream of the turbine.

Such conventional methods offer the potential for low-cost baseload electricity, but their output is dependent on the time of year, as well as annual precipitation. By contrast, pumped storage methods are typically used to provide power during peak demand periods on very short notice and are not dependent solely on runoff.

In a pumped storage facility, water is pumped during off-peak demand periods from a reservoir at a lower elevation for storage in a reservoir at a higher elevation. Electricity is then generated during peak demand periods by releasing the pumped water from the higher reservoir and allowing it to flow downhill through the hydraulic turbine(s) connected to generators.

During the off-peak pumping cycle, the pumped storage facility is a consumer of electricity: in fact, the amount of electricity required to pump the water uphill is greater than the amount of electricity that is generated when the water is released during peak demand periods. Pumped storage facilities, however, are economical because they consume low-cost off-peak electricity but generate high-value, on-peak electricity.

Pumped storage methods include both typical on-stream conventional and modular off-stream technologies. The major differences between modular pumped storage (MPS) and conventional pumped storage is that MPS systems are much smaller, use closed water systems that are artificially created instead of natural waterways or watersheds, and sites are selected with predetermined elevation differences so that modular pre-engineered equipment can be used. With the exception of evaporative losses, reservoirs are charged only once, either with groundwater or even municipal wastewater.

(h). TRANSMISSION

While details of location and total length are unknown at this time, implementation of new renewable energy projects necessary to comply with the proposed RES will require new and upgraded transmission lines to move the electricity from the source of generation to substations near population centers. As described above, the Renewable Energy Transmission Initiative (RETI) is a statewide initiative to help identify the transmission projects needed to accommodate California's renewable energy goals.

Planning for transmission line routing involves substantial research, modeling, public and agency outreach and stakeholder input, and constraints analyses. Transmission line construction may involve the following activities:

- Corridor clearing
- Grading and site preparation
- Foundation construction, including auguring of holes necessary for lattice or tubular structures
- Assembly and erection of steel structures, which may involve placement by crane and/or helicopter
- Wire installation and adjustment
- Placement of permanent transmission line fixtures

4. PROPOSED RENEWABLE ELECTRICITY STANDARD REGULATION

The proposed regulation, referred to as the Renewable Electricity Standard (RES), requires California's electricity providers to demonstrate, by 2020, that 33 percent of the electricity sold to their customers was generated from renewable energy resources. Increasing the portion of electricity supplied from renewable resources will reduce greenhouse gas (GHG) emissions by displacing electricity produced by fossil fuel-fired electrical generating facilities. The proposed regulatory language is contained in new sections 97000 through 97012 of Title 17, California Code of Regulations (see Appendix A of the RES Staff Report).

Achievement of the 33 percent renewable standard is phased in through multi-year compliance intervals starting with the 2012 to 2014 time period. The proposed regulation would establish a renewable electricity standard (RES) obligation that would be equal to the regulated party's sales to retail end-use customers, summed over a compliance interval and multiplied by the renewable energy credit (REC) percentage for the relevant compliance interval. Compliance with the obligation would be demonstrated by the retirement of Western Renewable Energy Generation Information System (WREGIS) certificates from eligible renewable energy resources. Parties that are subject to the regulation would meet the percentage of retail sales requirements if the amount of RECs at the end of the compliance period is equal to, or greater than, the percentage required during that period.

Chapters V and VI of the RES Staff Report contain a detailed discussion of the definition and role of RECs in the RES, and Chapter VIII contains a more detailed description of the proposed regulation, including applicability, definitions, and regulatory elements.

5. Renewable Generation Methodology

The following discussion presents a summary of the methods used by ARB staff to estimate how renewable generation could be expanded by 2020 to meet the proposed 33 percent target. These methods are described in greater detail in Chapter V of the RES Staff Report.

(a). RES Calculator

The analysis of potential impacts of implementation of the RES is based on possible compliance scenarios developed by the ARB. To develop those scenarios, ARB used a model known as the RES Calculator. The model was originally developed by Energy and Environmental Economics, Incorporated (E3) in 2009 to conduct a 33 percent RPS Implementation Analysis for the CPUC. The calculator accomplishes the task by using a series of inputs related to the availability of renewable energy both inside and outside California, energy load demand forecast, transmission line requirements, cost impacts, and environmental rankings. (See Chapter V, Section F for more detail.)

(b). Plausible Compliance Scenarios

The RES calculator was used to generate different sets of plausible compliance scenarios used to illustrate a range of potential renewable resource mixes that could power the California grid in 2020 in compliance with the proposed 33 percent RES requirements. The scenarios reflect changes in retail loads due to varying degrees of energy efficiency, combined heat and power (CHP), and distributed solar generation (solar DG). Although the scenarios may not fully incorporate parameters related to permitting, construction, and ideal load balancing, these aspects are under evaluation and will be used to facilitate implementation of the 33 percent RES regulation.

The scenarios presented include 20 percent RPS and 33 percent RES requirements and an alternative that focuses new renewable development to in-state resources only. This not only provides a range of potential pathways to meet the proposed RES target, but allows for evaluating incremental differences between current and proposed renewable energy programs. See Table V-12 in Chapter V of the ARB Staff Report for the different scenarios developed for technical, environmental, and economic analyses.

High Load and Low Load Conditions

Each of the scenarios are based on RES calculator output that is separated into two primary categories referred to as the high and low load conditions. These conditions represent the highest and lowest amounts of energy expected in 2020 assuming varying degrees of Energy Efficiency, CHP, and Solar DG according to Scoping Plan measures. See Table V-13 in Chapter V of the ARB Staff Report for the details and assumptions of the two load conditions.

20 Percent RPS

The 20 percent scenarios, also referred to as the “reference scenarios,” were developed to serve as a benchmark for comparison between the 20 percent RPS and 33 percent RES programs in 2020. These scenarios incorporate use of the CEC’s 2009 Integrated Energy Policy Report (IEPR) forecast and represent California’s likely renewable energy mix in 2020 based on current state law and existing RPS contracts. As such, these scenarios provide the most relevant benchmark against which to measure incremental cost and environmental implications of increasing renewable resources to a 33 percent target.

33 Percent RPS

The 33 percent RES scenarios represent feasible pathways that state utilities can use to comply with a 33 percent renewable target in 2020. The results present two renewable pathways beyond 2008 renewable energy levels using the latest 2009 IEPR energy demand forecast. The High Net Load includes some embedded energy reduction strategies while the Low Net Load incorporates full implementation of AB 32 Scoping Plan measures. These results were calculated using the same methodology as used to develop the 20 percent scenarios. However, the RES calculator was re-programmed to estimate a 33 percent renewable energy need.

(c). RES CALCULATOR OUTPUT

Using the scenarios defined above, the RES Calculator identified probable in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Under the 33 percent RES, additional wind, solar thermal, and solar photovoltaic resources may or may not be developed in the Tehachapi CREZ; the 20 percent RPS high load scenario would be the same as the 33 percent scenarios for these resources in this location. The RES would drive additional wind, solar thermal, and solar photovoltaic development in the Mountain Pass and Fairmont areas; additional wind development in Solano; additional solar thermal and solar photovoltaic resources in Riverside East; additional solar thermal from the Pisgah area; and additional geothermal from Imperial East. Out-of-state resources could be substantially similar to the 20 percent RPS (20 percent high load is similar to 33 percent RES scenarios), with some additional wind power from Alberta and biomass from New Mexico.

General assumptions of land use per megawatt by resource type are as follows: solar thermal, 5 to 10 acres per MW; solar photovoltaic, 7 acres per MW; wind power, 50 acres per MW; and geothermal, 1 to 8 acres per MW) (RETI, Phase 1A Final Report, April 2008 and Final 1B Report, December 2008). Based on the RES Calculator output of electricity generation by resource type and assumptions of land use per megawatt by resource, the 33 percent RES high load scenario would require in-state land area of approximately 6,500 to 13,000 acres for solar thermal; approximately 1,800 acres for solar photovoltaic; approximately 54,000 acres for wind generation; and approximately 1,300 to 10,500 acres for geothermal.

Approximately 230 miles of additional transmission lines would be required within California under the 20 percent RPS, and an additional 360 would be required under the 33 percent RES by 2020. Most of the new transmission lines would be required for resources developed in the Mountain Pass, Pisgah, and Riverside East CREZs.

Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS, and the proposed RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

Table II-1. Electricity Generation (Actual and Projected) in 2008 and 2020 Low Load Scenario (GWh)

Resource	2008 Generation			2020 Generation					
				20% RPS			33% RES Scenario		
	California	Out-of-state	Total	California	Out-of-state	Total	California	Out-of-state	Total
Traditional Resources									
Natural gas	122,216	17,999	140,215	44,970	36,610	81,580	33,570	27,080	60,650
Nuclear	32,482	11,786	44,268	32,600	8,490	41,090	32,600	8,490	41,090
Large hydro	21,040	12,693	33,733	40,000	2,630	42,630	40,000	2,630	42,630
Coal	3,977	51,852	55,829	1,300	19,300	20,600	1,300	19,300	20,600
Existing Renewable Resources									
Wind	5,724	1,607	7,331	5,720	504	6,224	5,720	504	6,224
Solar	724	22	746	724	0	724	724	0	724
Geothermal	12,907	755	13,662	12,900	740	13,640	12,900	740	13,640
Biomass	5,720	657	6,377	5,720	536	6,256	5,720	536	6,256
Small Hydro	3,729	687	4,416	3,730	688	4,418	3,730	688	4,418
New Renewable Resources									
Wind	0	0	0	2,730	5,860	8,590	17,300	6,990	24,290
Solar thermal	0	0	0	1820	2440	4,260	13,000	2,440	15,440
Solar PV	0	0	0	999	22	1,021	3,170	22	3,192
Geothermal	0	0	0	6490	680	7,170	6,490	680	7,170
Solid fuel biomass	0	0	0	1,150	0	1,150	1,150	236	1,386
Biogas	0	0	0	1310	0	1,310	1310	16	1,326
Small hydro	0	0	0	214	478	692	214	543	757
TOTAL	**208,519**	**98,058**	**306,577**	**162,377**	**78,978**	**241,355**	**178,898**	**70,895**	**249,793**

Table II-2. Electricity Generation (Actual and Projected) in 2008 and 2020 High Load Scenario (GWh)

Resource	2008 Generation			2020 Generation					
				20% RPS			33% RES Scenario		
	California	Out-of-state	Total	California	Out-of-state	Total	California	Out-of-state	Total
Traditional Resources									
Natural gas	122,216	17,999	140,215	65,600	53,720	119,320	51,620	41,970	93,590
Nuclear	32,482	11,786	44,268	32,600	8,490	41,090	32,600	8,490	41,090
Large hydro	21,040	12,693	33,733	39,900	2,630	42,530	40,000	2,630	42,630
Coal	3,977	51,852	55,829	1,320	19,300	20,620	1,300	19,300	20,600
Existing Renewable Resources									
Wind	5,724	1,607	7,331	5,720	504	6,224	5,720	504	6,224
Solar	724	22	746	724	0	724	724	0	724
Geothermal	12,907	755	13,662	12,900	740	13,640	12,900	740	13,640
Biomass	5,720	657	6,377	5,720	536	6,256	5,720	536	6,256
Small Hydro	3,729	687	4,416	3,730	688	4,418	3,730	688	4,418
New Renewable Resources									
Wind	0	0	0	7,620	5,860	13,480	17,300	6,990	24,290
Solar thermal	0	0	0	2500	2440	4,940	13,800	2,440	16,240
Solar PV	0	0	0	1060	22	1,082	3,330	22	3,352
Geothermal	0	0	0	6,540	680	7,220	18,100	680	18,780
Solid fuel biomass	0	0	0	1,150	12	1,162	1,150	236	1,386
Biogas	0	0	0	1310	16	1,326	1,310	16	1,326
Small hydro	0	0	0	214	543	757	214	543	757
TOTAL	**208,519**	**98,058**	**306,577**	**188,608**	**96,181**	**284,789**	**209,518**	**85,785**	**295,303**

Table II-3. 20 Percent, Business as Usual, LOW LOAD								
	New Resources by Resource Type (GWh)							
	Biogas	Biomass	Geo-thermal	Hydro - Small	Solar PV	Solar Thermal	Wind	Total
Distributed CPUC Database	1,309	1,153	6,490	214	966	1,463	193	11,787
Tehachapi					34	354	2,536	2,924
Arizona-Southern Nevada - REC					22	2,442		2,464
British Columbia - REC				430				430
Montana - REC							1,016	1,016
Northwest - REC				48			4,503	4,551
Reno Area/Dixie Valley - REC			381					381
Utah-Southern Idaho - REC			299				34	333
Wyoming - REC							304	304
In-State	*1,309*	*1,153*	*6,490*	*214*	*999*	*1,817*	*2,729*	*14,712*
Out-of-State			*680*	*478*	*22*	*2,442*	*5,857*	*9,478*
Total	***1,309***	***1,153***	***7,170***	***692***	***1,021***	***4,259***	***8,586***	***24,190***

Table II-4. 33 Percent Proposed Regulation, LOW LOAD								
	New Resources by Resource Type (GWh)							
	Biogas	Biomass	Geo-thermal	Hydro - Small	Solar PV	Solar Thermal	Wind	Total
Distributed CPUC Database	1,309	1,153	6,490	214	966	1,463	193	11,787
Fairmont					504	225	4,015	4,743
Mountain Pass					657	1,180	2,445	4,282
Pisgah						4,395		4,395
Riverside East					950	4,719		5,669
Solano							3,189	3,189
Tehachapi					99	1,038	7,429	8,565
Alberta - REC							1,133	1,133
Arizona-Southern Nevada - REC					22	2,442		2,464
British Columbia - REC		12		430				442
Montana - REC							1,016	1,016
New Mexico - REC		224						224
Northwest - REC				48			4,503	4,551
Reno Area/Dixie Valley - REC			381					381
Utah-Southern Idaho - REC			299				34	333
Wyoming - REC	16			65			304	385
In-State	*1,309*	*1,153*	*6,490*	*214*	*3,175*	*13,021*	*17,270*	*42,631*
Out-of-State	*16*	*236*	*680*	*543*	*22*	*2,442*	*6,990*	*10,929*
Total	***1,325***	***1,389***	***7,170***	***757***	***3,196***	***15,462***	***24,260***	***53,560***

Table II-5. 20 Percent, Business as Usual, HIGH LOAD								
	New Resources by Resource Type (GWh)							
	Biogas	Biomass	Geo-thermal	Hydro - Small	Solar PV	Solar Thermal	Wind	Total
Distributed CPUC Database	1,309	1,153	6,490	214	966	1,463	193	11,787
Imperial North			48					48
Tehachapi					99	1,038	7,429	8,565
Arizona-Southern Nevada - REC					22	2,442		2,464
British Columbia - REC		12		430				442
Montana - REC							1,016	1,016
Northwest - REC				48			4,503	4,551
Reno Area/Dixie Valley - REC			381					381
Utah-Southern Idaho - REC			299				34	333
Wyoming - REC	16			65			304	385
In-State	*1,309*	*1,153*	*6,538*	*214*	*1,064*	*2,501*	*7,621*	*20,401*
Out-of-State	*16*	*12*	*680*	*543*	*22*	*2,442*	*5,857*	*9,571*
Total	***1,325***	***1,165***	***7,218***	***757***	***1,086***	***4,943***	***13,478***	***29,972***

Table II-6. 33 Percent Proposed Regulation, HIGH LOAD								
	New Resources by Resource Type (GWh)							
	Biogas	Biomass	Geo-thermal	Hydro - Small	Solar PV	Solar Thermal	Wind	Total
Distributed CPUC Database	1,309	1,153	6,490	214	966	1,463	193	11,787
Fairmont					504	225	4,015	4,743
Imperial North			11,577					11,577
Mountain Pass					657	1,180	2,445	4,282
Pisgah						4,395		4,395
Riverside East					1,109	5,514		6,623
Solano							3,189	3,189
Tehachapi					99	1,038	7,429	8,565
Alberta - REC							1,133	1,133
Arizona-Southern Nevada - REC					22	2,442		2,464
British Columbia - REC		12		430				442
Montana - REC							1,016	1,016
New Mexico - REC		224						224
Northwest - REC				48			4,503	4,551
Reno Area/Dixie Valley - REC			381					381
Utah-Southern Idaho - REC			299				34	333
Wyoming - REC	16			65			304	385
In-State	*1,309*	*1,153*	*18,068*	*214*	*3,334*	*13,815*	*17,270*	*55,163*
Out-of-State	*16*	*236*	*680*	*543*	*22*	*2,442*	*6,990*	*10,929*
Total	***1,325***	***1,389***	***18,747***	***757***	***3,356***	***16,257***	***24,260***	***66,092***

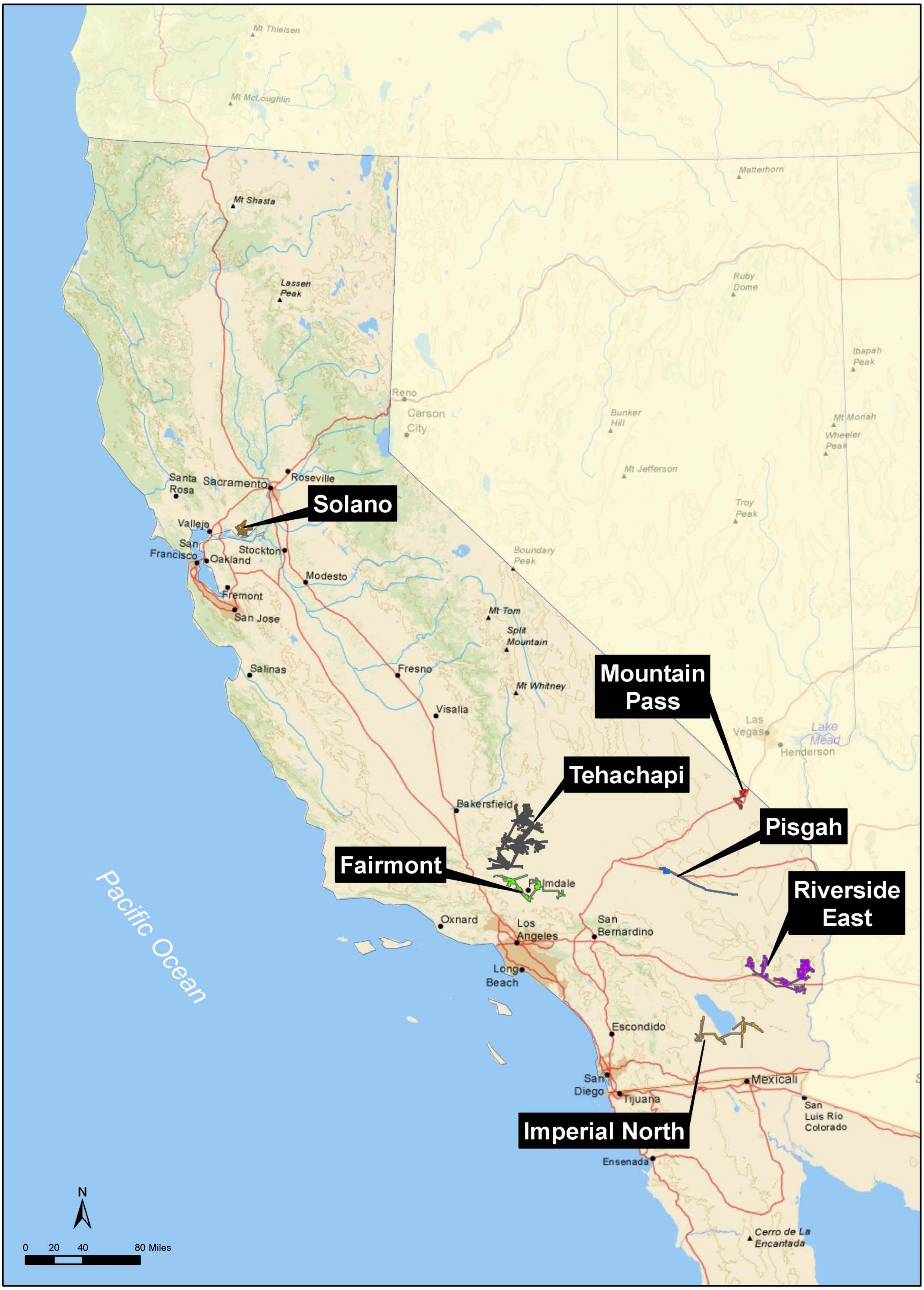

Figure II-1. California Competitive Renewable Energy Zones (CREZ) Identified for the 33 Percent RES

Legend

California Competitive Renewable Energy Zones (CREZ)

- Fairmont
- Imperial North - B
- Mountain Pass
- Pisgah - A
- Riverside East
- Solano
- Tehachapi

Source: Synapse Energy Economics, 2010; DeLorme World Base Map 2010

Geografika Consulting 2010.05.20

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

D. PROJECT ALTERNATIVES

1. REGULATORY CONSIDERATIONS

The California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines) (Section 15126.6[a]) require evaluation of “a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives.” The purpose of the alternatives analysis is to determine whether or not a variation of the project would reduce or eliminate significant project impacts, within the basic framework of the objectives.

Thus, alternatives considered in an environmental document should be feasible and should attain basic project objectives. The objective of the RES is primarily to reduce GHG emissions from providers of electricity for use in California.

The range of alternatives studied in an environmental document is governed by the “rule of reason,” requiring evaluation of only those alternatives “necessary to permit a reasoned choice” (State CEQA Guidelines Section 15126.6[f]). Further, an agency “need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative” (State CEQA Guidelines Section 15126.6[f][3]). The analysis should focus on alternatives that are feasible (i.e., that may be accomplished in a successful manner within a reasonable period of time) and that take economic, environmental, social, and technological factors into account. Alternatives that are remote or speculative need not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project as proposed.

The State CEQA Guidelines (Section 15126.6[e]) require that, among other alternatives, a “no-project” alternative be evaluated in comparison to the project and that it “discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with the available infrastructure and community services.” Accordingly, a No Project Alternative, described below, is analyzed in this draft FED.

2. Alternatives Considered but Rejected

In considering alternatives to the proposed project, ARB is constrained in several important ways. The basic objective of the proposed regulation is to reduce GHG emissions from generation of electricity consumed in California, with the more specific objective of doing so in a manner consistent with the 33 percent renewable energy target. The basic objective is already embodied in current law in the form of the RPS and its goal of achieving 20 percent from renewable resources. While selection of a target below 33 percent may reduce the potential for significant environmental effects through reduced construction of new renewable projects, facilities, and transmission, the proposed RES goal of 33 percent is in response to an Executive Order issued for the purposes of meeting California's GHG emissions reduction goals. As such, selection of a different target or timeline would be infeasible.

Other reasonable alternatives that could feasibly meet the basic project objectives would normally include other programs and policies designed to reduce GHG emissions in California. However, with the passage of AB 32 in September 2006 and adoption of the Climate Change Scoping Plan in December 2008, ARB committed to developing and implementing a comprehensive set of actions designed to reduce GHG emissions to 1990 levels by the year 2020. This substantial effort involved input from other State agencies, the legislature, local government, community groups, environmental groups, labor, business, and the general public. The recommendations included in the adopted plan were vetted through a rigorous and extensive public process. It can be reasonably concluded, therefore, that other feasible alternatives capable of meeting the basic objectives of the RES are already on track for development and implementation by 2012 in accordance with the Scoping Plan.

3. Alternatives Carried Forward for Analysis

(a). No Project, Continuation of 20 Percent RPS

CEQA requires a specific alternative of "No Project" to be evaluated, and this alternative essentially serves as ARB's baseline for analysis. CEQA documents typically assume that the adoption of a "no project" alternative would result in no further action by the project proponent or lead agency. This would mean that there would be no Renewable Electricity Standard regulation, but the Renewable Portfolio Standard, which requires that 20 percent of California's electricity come from renewable resources, would still be in effect. Under this Alternative, ARB's legal mandate to reduce GHG emissions to 1990 levels would be jeopardized.

Some of the measures that would reduce GHG emissions that are included in ARB's Scoping Plan are already underway and would not be expected to change as a result of the RES regulation. These measures are commonly referred to as "reference measures" and "complementary measures", and are identified below:

Reference Measures

- Pavley I - California Light Duty Vehicle GHG Standards
- Renewable Portfolio Standard at 20 percent attainment
- Federal Energy Independence and Security Act/Renewable Fuels Standard

Complementary Measures

- Pavley II - Vehicle Efficiency Measures
- California Cap and Trade Program
- Low Carbon Fuel Standard
- Vehicle Miles Travelled Reduction/Regional Transportation GHG Targets
- Reductions in electricity and natural gas demand through energy efficiency, combined heat and power
- Goods Movement (heavy duty vehicle efficiency and ship-shore electrification)
- Million Solar Roofs
- Medium and Heavy Duty Vehicles
- High Speed Rail

(b). Incremental In-State Generation

The In-State Generation alternative considers a scenario in which the incremental difference in energy between the 20 percent RPS program and the proposed 33 percent RES comes from resources within California; no out-state resources would be used. Therefore, these scenarios (Incremental In-State high and low load) represent the use of up to 20 percent in-state and out-of-state bundled resources with an energy delivery requirement, and 13 percent renewable resources from within California.

Tables II-7 and II-8 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS, proposed RES and the incremental in-state generation alternative RES under low and high load conditions, respectively. Tables II-9 and II-10 illustrate electricity generation by resource type, by CREZ, for the In-State Generation alternative, low and high load scenarios, respectively.

Table II-7. Electricity Retail Sales (Actual and Projected) in 2008 and 2020 California Power Generation Low Load Scenario (GWh)												
Resource	2008 Generation			2020 Generation								
				20% RPS			33% RES Scenario			33% In State		
	California	Out-of-state	Total	California	Out-of-state	Total	California	Out-of-state	Total	California	Out-of-state	Total
Traditional Resources												
Natural gas Peaker	20,776	3,059	23,835	7,570	5,810	13,380	5,870	4,480	10,350	5,760	4,400	10,160
Natural gas Baseload	101,440	14,940	116,380	37,400	30,800	68,200	27,700	22,600	50,300	27,300	22,300	49,600
Nuclear	32,482	11,786	44,268	32,600	8,490	41,090	32,600	8,490	41,090	32,600	8,490	41,090
Large hydro	21,040	12,693	33,733	40,000	2,630	42,630	40,000	2,630	42,630	40,000	2,630	42,630
Coal	3,977	51,852	55,829	1,300	19,300	20,600	1,300	19,300	20,600	1,300	19,300	20,600
Existing Renewable Resources												
Wind	5,724	1,607	7,331	5,720	504	6,224	5,720	504	6,224	5,720	504	6,224
Solar	724	22	746	724	0	724	724	0	724	724	0	724
Geothermal	12,907	755	13,662	12,900	740	13,640	12,900	740	13,640	12,900	740	13,640
Biomass	5,720	657	6,377	5,720	536	6,256	5,720	536	6,256	5,720	536	6,256
Small Hydro	3,729	687	4,416	3,730	688	4,418	3,730	688	4,418	3,730	688	4,418
New Traditional												
Natural gas Peaker	0	0	0	8,520	2910	11,430	4,620	2280	6,900	4,260	2240	6,500
Natural gas Baseload	0	0	0	20,900	8890	29,790	20,900	6700	27,600	20,900	6600	27,500
New Renewable Resources												
Wind	0	0	0	2,730	5,860	8,590	17,300	6,990	24,290	17,300	5,860	23,160
Solar thermal	0	0	0	1820	2440	4,260	13,000	2,440	15,440	14,300	2,440	16,740
Solar PV	0	0	0	999	22	1,021	3,170	22	3,192	3,420	22	3,442
Geothermal	0	0	0	6490	680	7,170	6,490	680	7,170	6,490	680	7,170
Solid fuel biomass	0	0	0	1,150	0	1,150	1,150	236	1,386	1,150	0	1,150
Biogas	0	0	0	1310	0	1,310	1310	16	1,326	1310	0	1,310
Small hydro	0	0	0	214	478	692	214	543	757	214	478	692
TOTAL	**208,519**	**98,058**	**306,577**	**191,797**	**90,778**	**282,575**	**204,418**	**79,875**	**284,293**	**205,098**	**77,908**	**283,006**

Table II-8. Electricity Retail Sales (Actual and Projected) in 2008 and 2020 California Power Generation High Load Scenario (GWh)

Resource	2008 Generation			2020 Generation								
				20% RPS			33% RES Scenario			33% In State		
	California	Out-of-state	Total	California	Out-of-state	Total	California	Out-of-state	Total	California	Out-of-state	Total
Traditional Resources												
Natural gas Peaker	20,776	3,059	23,835	10,500	8,120	18,620	8,420	6,470	14,890	8,340	6,410	14,750
Natural gas Baseload	101,440	14,940	116,380	55,100	45,600	100,700	43,200	35,500	78,700	42,700	35,100	77,800
Nuclear	32,482	11,786	44,268	32,600	8,490	41,090	32,600	8,490	41,090	32,600	8,490	41,090
Large hydro	21,040	12,693	33,733	39,900	2,630	42,530	40,000	2,630	42,630	40,000	2,630	42,630
Coal	3,977	51,852	55,829	1,320	19,300	20,620	1,300	19,300	20,600	1,300	19,300	20,600
Existing Renewable Resources												
Wind	5,724	1,607	7,331	5,720	504	6,224	5,720	504	6,224	5,720	504	6,224
Solar	724	22	746	724	0	724	724	0	724	724	0	724
Geothermal	12,907	755	13,662	12,900	740	13,640	12,900	740	13,640	12,900	740	13,640
Biomass	5,720	657	6,377	5,720	536	6,256	5,720	536	6,256	5,720	536	6,256
Small Hydro	3,729	687	4,416	3,730	688	4,418	3,730	688	4,418	3,730	688	4,418
New Traditional												
Natural gas Peaker	0	0	0	16,600	3970	20,570	11,600	3190	14,790	11,400	3150	14,550
Natural gas Baseload	0	0	0	20,900	12800	33,700	20,900	10000	30,900	20,900	9930	30,830
New Renewable Resources												
Wind	0	0	0	7,620	5,860	13,480	17,300	6,990	24,290	18,100	5,860	23,960
Solar thermal	0	0	0	2500	2440	4,940	13,800	2,440	16,240	14,300	2,440	16,740
Solar PV	0	0	0	1060	22	1,082	3,330	22	3,352	3,430	22	3,452
Geothermal	0	0	0	6540	680	7,220	18,100	680	18,780	18,100	680	18,780
Solid fuel biomass	0	0	0	1,150	12	1,162	1,150	236	1,386	1,150	12	1,162
Biogas	0	0	0	1310	16	1,326	1310	16	1,326	1310	16	1,326
Small hydro	0	0	0	214	543	757	214	543	757	214	543	757
TOTAL	**208,519**	**98,058**	**306,577**	**226,108**	**112,951**	**339,059**	**242,018**	**98,975**	**340,993**	**242,638**	**97,051**	**339,689**

Table II-9. 33 Percent RES IN-STATE, LOW LOAD								
	New Resources by Resource Type (GWh)							
	Biogas	Biomass	Geo-therma	Hydro - Small	Solar PV	Solar Thermal	Wind	Total
Distributed CPUC Database	1,309	1,153	6,490	214	966	1,463	193	*11,787*
Fairmont					504	225	4,015	*4,743*
Mountain Pass					657	1,180	2,445	*4,282*
Pisgah						4,395		*4,395*
Riverside East					1,192	5,927		*7,119*
Solano							3,189	*3,189*
Tehachapi					99	1,038	7,429	8,565
Arizona-Southern Nevada - REC					22	2,442		*2,464*
British Columbia - REC				430				*430*
Montana - REC	-	-	-	-	-	-	1,016	*1,016*
Northwest - REC	-	-	-	48	-	-	4,503	*4,551*
Reno Area/Dixie Valley - REC	-	-	381	-	-	-	-	*381*
Utah-Southern Idaho - REC	-	-	299	-	-	-	34	*333*
Wyoming - REC	-	-	-	-	-	-	304	*304*
In-State	*1,309*	*1,153*	*6,490*	*214*	*3,418*	*14,228*	*17,270*	*44,082*
Out-of-State	*-*	*-*	*680*	*478*	*22*	*2,442*	*5,857*	*9,478*
Total	***1,309***	***1,153***	***7,170***	***692***	***3,439***	***16,670***	***23,127***	**53,560**

Table II-10. 33 Percent RES IN-STATE, HIGH LOAD								
	New Resources by Resource Type (GWh)							
	Biogas	Biomass	Geo-thermal	Hydro - Small	Solar PV	Solar Thermal	Wind	Total
Distributed CPUC Database	1,309	1,153	6,490	214	966	1,463	193	*11,787*
Fairmont					504	225	4,015	*4,743*
Imperial North			11,577					*11,577*
Mountain Pass					657	1,180	2,445	*4,282*
Palm Springs							790	*790*
Pisgah						4,395		*4,395*
Riverside East					1,205	5,986		*7,191*
Solano							3,189	*3,189*
Tehachapi					99	1,038	7,429	*8,565*
Arizona-Southern Nevada - REC					22	2,442		*2,464*
British Columbia - REC		12		430				*442*
Montana - REC							1,016	*1,016*
Northwest - REC				48			4,503	*4,551*
Reno Area/Dixie Valley - REC			381					*381*
Utah-Southern Idaho - REC			299				34	*333*
Wyoming - REC	16			65			304	*385*
In-State	*1,309*	*1,153*	*18,068*	*214*	*3,430*	*14,288*	*18,060*	*56,520*
Out-of-State	*16*	*12*	*680*	*543*	*22*	*2,442*	*5,857*	*9,571*
Total	***1,325***	***1,165***	***18,747***	***757***	***3,451***	***16,730***	***23,917***	***66,092***

III.A. AESTHETICS

This section describes the existing visual conditions of regions where renewable energy development is expected to occur, presents the regulatory framework under which visual resources are protected, and evaluates the potential changes to the existing visual characteristics of likely areas of renewable energy development.

1. ENVIRONMENTAL SETTING

Development of renewable energy resources is expected to occur in various locations throughout California, and based on output from the RES Calculator (see Chapter II, Project Description), are likely to include the following general areas identified as Competitive Renewable Energy Zones (CREZs): Tehachapi, Pisgah, Solano, Mountain Pass, Fairmont, Riverside East, and Imperial North. In addition, some out-of-state renewable energy projects would be developed. Renewable energy projects could be developed in most western U.S. states, but is more likely occur in states with favorable conditions for specific renewable resources (e.g., Arizona Nevada, Utah for solar and geothermal; Wyoming, Montana, Northwest for wind; British Columbia and Northwest for small hydroelectric).

As described in the Project Description, the RES Calculator was used to model anticipated in- and out-of-state electricity generation by resource type for: 2008 conditions; 20% RPS in 2020 under low and high load conditions; and 33% RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data with which to characterize the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The plausible compliance scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

The existing visual character can be described within the context of the regional viewshed. The character of these geographical areas identified by the RES Calculator is described below.

(a). TEHACHAPI

The Tehachapi project area is located within the Tehachapi Wind Resource Area, situated at the southern junction of the Coast Range and the Sierra Nevada, on the southern side of the San Joaquin Valley in Kern County. The Tehachapi Mountains generally create the western boundary of the Mojave Desert. The Tehachapi Mountain area is one of California's largest areas for wind energy development and parts of the Tehachapi Mountains are already used for that purpose. The region's natural features range from high desert floor to mountain pass, to tall mountains. Oak Creek Canyon dissects the Tehachapi Mountain hillsides in a southwest to northeast direction. Oak Creek Canyon is joined by Cameron Canyon coming from the northeast, at which point Oak Creek Canyon turns east and separates the main Tehachapi Mountain range from the California Portland Cement Company. Oak Creek turns into a desert wash as it runs south into the Mojave Desert, with its relatively flat landforms. The Pacific Crest Trail, which extends from Mexico to Canada through California, Oregon, and Washington, meanders through the Tehachapi Mountains.

In the southeastern part of the region are the Edwards Air Force Test Flight Center and the China Lake Naval Weapons Center. The major thoroughfares that provide viewing opportunities of the project area are State Route 58 and State Route 14, which are both eligible for designation as a State scenic highway. Nearby communities that may have views of the Tehachapi project area include the communities of Golden Hills, Mojave, North Edwards, Rosamond and Boron, as well as the Cities of California City and Tehachapi.

(b). PISGAH

The Pisgah area lies approximately 30 miles southeast of Barstow in the Mojave Desert of central San Bernardino County. The visual character of this region is defined by its arid landscape consisting of sparsely vegetated, rugged mountain ranges and broad alluvial valleys. Specific scenic qualities include vast open space, expansive bajadas (coalescing alluvial fans) debris flows, lava beds, and scattered dry lakes. The visual environment is scenically diverse with expansive views. The region includes a great diversity of plant communities that include white fir woodland, pinion/juniper woodland, desert sage shrub, Joshua tree woodland, Mojave Desert scrub, saltbush scrub, alkali sink, dunes and wetlands. The Pisgah area lies in the vicinity of Interstate 40 and Highway 66.

(c). MOUNTAIN PASS

The Mountain Pass area lies in the Mojave Desert near the Nevada border in San Bernardino County. The area includes the Ivanpah Valley, notable for the dry lakebed of Ivanpah Lake, which crosses the eastern edge of the project area in a north-south direction. The area also includes the steep, barren slopes and ridges of the Clark, Spring, and Ivanpah Mountains to the south, west, and north, respectively. The Lucy Gray, McCullough, and New York Mountains are to the east. Because these mountains flank the Mountain Pass area, views of the Ivanpah Valley floor are generally restricted from outside of the region. Immediately across the state border in the vicinity of the project area is the community of Primm, Nevada. The Primm Valley Golf Club is located in northern part of the project area and golfers would have open views of the Ivanpah Valley and surrounding mountains. A few local roads in addition to Interstate 15 transect this area and motorists traveling along Interstate 15 also would have open views of the Mountain Pass area. Interstate 15 is a principal route for visitors traveling to Las Vegas from southern California. Existing transmission lines going east-west and northeast-southeast traverse the project area.

(d). FAIRMONT

The Fairmont area is located in the High Desert region of Los Angeles County and lies most immediately near the foothills of the Sierra Pelona Mountains and to the north of the northwest of the San Gabriel Mountains. The San Andreas fault runs along the eastern edge of these mountains. The Mojave Desert is to the north and east of the area. Portions of the area include Joshua trees and desert scrub plants. The overall topography of the area east of the Sierra Pelona is mostly flat and includes some active and inactive farmland. The area is surrounded by developed areas, including the City of Palmdale to the southwest and the City of Lancaster to the west. The community of Little Rock also may have views of the Fairmont project area. In the western region of the Fairmont project area is U.S. Air Force Plant 42. Additionally, the area is bounded by State Route 138 to the south and State Route 14 to the west, neither of which are officially designated State scenic routes.

(e). RIVERSIDE EAST

The regional viewshed of the Riverside East area in Riverside County is dominated by a desert landscape and is part of a larger basin characterized by periodic north-south trending, highly eroded mountain ranges that rise sharply from and are separated by broad, flat desert valleys. The Riverside East region marks the transition zone between the high elevation Mojave Desert to the north and the arid, lower elevation Sonoran Desert to the south and east. Mountainous areas include the McCoy Mountains in the west, Little Maria Mountains in the north, Big Maria Mountains in the northeast, and the Mule Mountains in the south. The mountain ranges add visual variety to the otherwise flat, undeveloped desert landscape. Joshua Tree National Forest is to the west and north of the project area. Motorists traveling along Interstate 10, which bisects the project area, would have views of this area. A large swath of agricultural lands along the Colorado River is nearby to the east, in addition to the City of Blythe.

(f). IMPERIAL NORTH

Imperial North in the County of Imperial is located in the Salton Trough, a low-lying sedimentary basin once comprising a lakebed as recently as 300 years ago, which currently includes the Salton Sea. The regional viewshed includes a landscape that is relatively level, though becoming more topographically varied moving southward into the Yuha Desert. The Salton Trough landscape is bounded to the west by the Jacumba and Coyote Mountains, each comprising Bureau of Land Management (BLM) Wilderness Areas. The Salton Trough is also bounded to the northwest by the mountains of Anza-Borrego Desert State Park and BLM's Fish Creek Mountains Wilderness Area. The central portion of the Salton Trough includes flat agricultural lands supported by water from the Colorado River. The topography of trough is generally flat with slight rolling hills. Another characteristic element seen throughout the region is large expanses of nearly vegetation-free desert pavement. Desert pavement consists of large areas of naturally exposed small rocks and gravel, which have been darkly colored by weathering, forming a distinct visual surface image typical of the region.

The major thoroughfares that provide viewing opportunities of the region include State Routes 78, 86, and 111. Portions of State Routes 78 and 111 are eligible for designation as State scenic highways. The communities of Niland and Salton City, and the Cities of Calipatria and West Moreland may have views of the project area.

(g). SOLANO

The Solano area is located in Solano County, just north of the Sacramento River where it flows into the Suisun Bay. Solano County contains an area of 910 square miles, 80 of which are under water. Agricultural landscapes, the Sacramento–San Joaquin Delta and marshlands, and oak- and grass-covered hills are the primary aesthetic resources in the Solano area and in Solano County, in general. include Marshlands, Delta waters, and expanses of agricultural lands are prominent scenic resources in the Solano area. Agricultural lands account for more land than any other land use, which in turn defines much of the county's visual character, supports wildlife habitats and migration corridors, and provides open space and recreational amenities for residents and visitors.

2. REGULATORY SETTING

Applicable laws and regulations associated with aesthetics and scenic resources are discussed in Table III.A-1.

Table III.A-1. Applicable Laws and Regulations for Aesthetic Resources

Applicable Regulation	Description
Federal	
Federal Land Policy and Management Act of 1976 (FLPMA)	FLPMA is the enabling legislation establishing the Bureau of Land Management's responsibilities for lands under its jurisdiction. Section 102 (a) of the FLPMA states that ". . . . the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values …. " Section 103 (c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201 (a) states that "The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including ... scenic values) ...." Section 505 (a) requires that "Each right-of-way shall contain terms and conditions which will...minimize damage to the scenic and esthetic (sic) values...." Section 601 includes direction on the California Desert Conservation Area (CDCA). Plans are established for different areas with the goal of providing for the use public lands, and resources of the CDCA, including economic, educational, scientific, and recreational uses, in a manner which enhances wherever possible—and which does not diminish, on balance—the environmental, cultural, and aesthetic values of the Desert and its productivity.

Table III.A-1. Applicable Laws and Regulations for Aesthetic Resources	
Applicable Regulation	Description
California Desert Conservation Area (CDCA) Plan	Areas of California are located within the California Desert Conservation Area Plan, which is the BLM Resource Management Plan applicable to the project site (USDOI, 1980, as amended). The CDCA Plan did not include Visual Resource Management (VRM) inventory or management classes. However, BLM developed updated Visual Resource Inventory (VRI) mapping in 2008 (USDOI, 2008). The Ivanpagh Solar Electric Generating Systems (ISEGS) site is classified in the CDCA Plan October 2009 6.12-5 VISUAL RESOURCES as Multiple-Use Class (MUC) L (Limited Use). Multiple-Use Class L, the most restrictive under the plan, "protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished." The CDCA Plan includes a table (Table 1) which illustrates the types of allowable land uses by MUC Class. The table specifically includes Electrical Power Generation Facilities including Wind/Solar facilities.
Bureau of Land Management Contrast Rating System	The contrast rating system is a systematic process used by BLM to analyze visual impacts of proposed projects and activities. It is primarily intended to assist BLM personnel in the resolution of visual impact assessment.
National Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's "setting . . .[or] . . . feeling" in a way that affects the property's eligibility for listing, may result in a potentially significant adverse effect. "Examples of adverse effects . . . include . . .: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features." (36 CFR Part 800.5.)
State	
California Streets and Highways Code, Sections 260 through 263 – Scenic Highways	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform with requirements of the State program.

3. PROJECT IMPACTS

This section describes the project's effects on aesthetics by renewable resource type and by plausible compliance scenario. The discussion includes the criteria for determining the level of significance of the effects and a description of the methods used to conduct the analysis.

As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their specific locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

(a). METHODOLOGY

Potential impacts to visual resources within the project area were evaluated based on the following criteria: (1) existing visual quality and scenic attributes of the landscape; (2) location of sensitive receptors in the landscape; (3) assumptions about receptors' concern for scenery and sensitivity to changes in the landscape; and, (4) the magnitude of visual changes in the landscape that would be brought about by implementation, construction, and operation of the projects necessary for RES compliance.

(b). THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance based on Appendix G of the CEQA Guidelines were used to determine whether approval of the proposed regulation and implementation of projects necessary to comply with the regulation would result in a significant impact related to aesthetics:

- Create a substantial adverse effect on a scenic vista,
- Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway,
- Substantially degrade the existing visual character or quality of the site and its surroundings, or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

IMPACT A-1 **Adverse Effects on Scenic Vistas, Scenic Resources, and Visual Character. Depending upon their location, size, and character, development of renewable energy projects and transmission lines necessary for compliance with the 33 percent RES may result in adverse effects on designated scenic vistas, scenic resources, and visual character by degrading or substantially modifying the visual environment of renewable development areas. Scenic resources, including trees, rock outcroppings, and historic buildings within a State scenic highway could be directly or indirectly impaired. Therefore, this would be a potentially *significant* impact.**

The following presents a general discussion of whether renewable energy development in some areas would create an adverse effect on the visual environment. As described above and in Section II, Project Description, this analysis is a programmatic assessment of the RES regulation; project-specific environmental review would be conducted for proposed renewable energy projects prior to their approval, construction, and operation.

Wind Power

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Wind development would introduce into the visual environment large, vertical towers, turbines with revolving turbine blades, access roads, transmission lines, substations, rights-of-way, and other associated facilities. Construction activities associated with wind energy development would introduce temporary, adverse visual obstructions. Construction activities may also require the removal of existing vegetation. Throughout the State, some distributed wind energy development would occur under the 20 percent RPS for both high and low load conditions. While there is uncertainty as to the locations of distributed wind energy projects, they could occur in areas with national, state, or county designated scenic vistas and important scenic resources visible from State scenic highways. Such development could impair the quality of those vistas, and damage scenic resources. The visual impact of such development depends on several variables, including size of the facilities, viewing distance, angle of view, visual absorption capacities, and structure placement in the landscape.

Tehachapi – Low and High Load Conditions

Under the 20 percent RPS wind energy and transmission development is expected to occur in the Tehachapi area under both low and high load conditions. High load conditions under the RPS would require approximately three times the wind generation from this area. With implementation of wind energy facilities, lands that are currently undeveloped open space in the area would be transformed into commercial-scale wind farms, substantially affecting the visual landscape. Although there are no officially designated State scenic highways in the Tehachapi area, portions of State Routes 14 and 58, which intersect near the Tehachapi Mountains, are eligible for designation. Depending on the locations of wind turbine development, they may extend into the viewsheds of State Routes 14 and 58. For wind farms that would be sited along ridgelines and open plains, the wind turbines would be more prominent and would further increase the contrast between the natural and artificial visual environment, potentially damaging the visual character of the area. Views of construction and operation activities may be visible to some viewer groups in the area, including motorists along State Routes 14 and 58, residents in nearby communities, and recreationists using the Pacific Crest Trail. Residents and recreationists would be expected to experience a longer duration of views as opposed to motorists who would be passing through the Tehachapi area at higher speeds. However, the visual impact of wind turbines and associated facilities depends on several variables, including viewing distance, angle of view, and structure placement in the landscape. Because the Tehachapi Wind Resource Area already includes wind farms, it is possible that wind energy development in this area would not substantially exacerbate scenic impacts of State Routes 14 and 58. However, because specific locations are unknown, it is possible that wind turbines could be constructed in more pristine areas, resulting in significant scenic impacts.

Out of State – Low and High Load Conditions

Under the 20 percent low and high load conditions, implementation of the same degree of wind energy resource projects in Montana, the Pacific Northwest, Utah, Southern Idaho, and Wyoming may result in significant adverse effects on scenic vistas, scenic resources, and visual character in these areas. Some of these projects may occur on federal lands, which would subject such projects to environmental review of aesthetic impacts under NEPA. In some cases, renewable energy resource projects may also occur in states where such projects would be subject to the state's environmental review process. In any case, however, implementation of renewable energy resource projects in out-of-state locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land and would result in substantial alteration of the visual landscape. Implementation of Mitigation A-1 through A-10 would reduce scenic impacts, but it is uncertain whether mitigation would be sufficient to reduce the impact to a less than significant level.

Scenic impacts of wind energy development under the 20 percent RPS low and high load conditions would be potentially significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed wind energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Tehachapi – Low and High Load Conditions

Under the 33 percent RES, wind energy and transmission development in the Tehachapi area would be the same under both low and high load conditions, and the same as the high load condition under the 20 percent RPS. As such, scenic impacts of the 33 percent RES would be the same as the high load RPS case described above, resulting in significant scenic impacts.

Mountain Pass – Low and High Load Conditions

The 33 percent RES would result the same amount of wind energy and transmission development the Mountain Pass area for both the low and high load conditions. While no national, state, or county designated scenic vistas or State-designated scenic highways exist in the Mountain Pass area, San Bernardino County has designated portions of Interstate 15 that pass through the project area as having scenic character of visual importance. Construction activities would create a temporary, adverse change in the visual character of the Mountain Pass area from the introduction of heavy equipment and wind energy facilities. Operation of the proposed project would introduce new, long-term, and artificial elements to this desert landscape, which has few pockets of development, including the Primm Valley Golf Club and the community of Primm. Although some transmission lines already pass through the Ivanpah Valley, the wind turbines would introduce new artificial elements that would result in strong vertical forms and line contrast as well as strong spatial and scale dominance. Wind energy development would be located in an area with a large rock outcropping that is a prominent landmark for viewers throughout the viewshed. Development would not substantially damage views of this rock outcropping, but would alter its visual setting. Wind farms sited along ridgelines in the Mountain Pass area would result in a strong level of contrast in this area that is dominated by the largely undeveloped desert environment.

Solano – Low and High Load Conditions

The 33 percent RES would result the same amount of wind energy and transmission development the Solano area for both the low and high load conditions. While there are no State-designated scenic highways in Solano County, SR 160, directly adjacent to the county border in Sacramento County, is a State-designated scenic highway. Because views of potential future wind power facilities may be visible from SR 160 in Sacramento County, such development in the Solano area could damage or interrupt the viewshed, detracting from the scenic qualities of the designated highway. In addition, because of their size and scale, construction and operation of wind power facilities in the Solano area has the potential damage or interrupt the viewshed, changing the scenic character of the area and detracting from scenic qualities.

Fairmont –Low and High Load Conditions

The 33 percent RES would result the same amount of wind energy and transmission development the Fairmont area for both the low and high load conditions. Wind energy development would occur within the vicinity of State Routes 14 and 138, which are not designated State scenic highways. However, wind turbines and associated facilities on the eastern edge the Sierra Pelona Mountains would be introduced and may substantially damage scenic views of these mountains. Los Angeles County considers the hillsides of the Sierra Pelona Mountains a scenic resource. The precise visual impact of such development depends on several variables, including viewing distance, angle of view, and structure placement in the landscape. The visible changes to these scenic resources would be significant.

Out of State – Low and High Load Conditions
Under the 33 percent low and high load conditions, implementation of the same degree of wind energy resource projects in Montana, the Pacific Northwest, Utah, Southern Idaho, Wyoming, and Alberta may result in significant adverse effects on scenic vistas, scenic resources, and visual character in these areas. (See Out of State – Low and High Load Conditions for wind energy, above.) In addition, wind projects in Alberta or other areas in Canada would require compliance with applicable environmental laws.

Scenic impacts of wind energy and transmission line development under the 33 percent RES low and high load conditions would be significant.

Solar Thermal

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions
Development of solar thermal energy would occur in various locations throughout the State under the 20 percent RPS low and high conditions. Artificial elements, including curved mirrors, parabolic-shaped concentrators, receivers, access roads, and associated facilities, would intrude into viewsheds. Such elements may be introduced in undeveloped areas, which would make these elements more obvious to viewers, and may highly visible to viewer groups. Construction of solar thermal facilities, including site clearing and grading, would require the use of heavy construction equipment, which would alter the visual character of a site and may require removal of vegetation. Construction and operation of the solar thermal energy development may be visible from certain public vantage points and may affect some viewer groups, including motorists, recreationists, and residents of nearby communities. Solar thermal facilities have the potential to substantially damage existing scenic vistas, scenic resources within State scenic highways, and aesthetic character. Because of the large size of many solar thermal facilities, these changes would be significant.

Tehachapi – Low and High Load Conditions
Under the 20 percent RPS solar thermal energy and transmission development is expected to occur in the Tehachapi area under both low and high load conditions. High load conditions under the RPS would require approximately three times the solar thermal generation from this area. Although there are no officially designated State scenic highways in the Tehachapi area, portions of State Routes 14 and 58, which intersect near the Tehachapi Mountains, are eligible for designation. Depending on the locations of solar thermal development, they may extend into the viewsheds of State Routes 14 and 58. Because specific locations of solar thermal projects are unknown, it is possible that facilities could be constructed in pristine areas, resulting in significant scenic impacts.

Out of State – Low and High Load Conditions
Under the 20 percent low and high load conditions, implementation of the same degree of solar thermal energy projects in Arizona/Southern Nevada may result in significant adverse effects on scenic resources in these areas. Projects may occur on federal

lands, in which case they would be subject to environmental review of aesthetic impacts under NEPA, and projects may also be subject to state environmental policies, rules, and regulations. In any case, however, implementation of solar thermal projects in out of state locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land. IScenic impacts of solar thermal development under the 20 percent RPS low and high load conditions would be significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed solar thermal energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Tehachapi – Low and High Load Conditions

Under the 33 percent RES, solar thermal energy and transmission development in the Tehachapi area would be the same under both low and high load conditions, and the same as the high load condition under the 20 percent RPS. As such, scenic impacts of the 33 percent RES would be the same as the high load RPS case described above, resulting in significant scenic impacts.

Riverside East– Low and High Load Conditions

Under the 33 percent RES low and high load conditions, a similar amount of solar thermal energy and transmission development is expected to occur in the Riverside East area. Construction activities would create a temporary, adverse change in the visual character of the area due to the introduction of heavy equipment in addition to site clearing and grading activities. Operation would introduce new solar thermal energy facilities, low-lying troughs, dishes, or tall power towers, into the largely undeveloped desert landscape. These visual elements would be visible primarily to motorists traveling on Interstate 10, which passes through the project area, but which is not listed as a State scenic highway. The proposed project would introduce prominent solar thermal structures with an industrial character into the foreground of motorists and into the background of residents in the nearby City of Blythe. Some recreationists at Joshua Tree National Forest to the west of the Riverside East area may also be affected by the substantial visual change in the desert landscape. Construction and operation of solar thermal development would substantially degrade the Riverside East area and its existing natural surroundings by changing the environment to an industrial landscape.

Fairmont –Low and High Load Conditions

Under the 33 percent RES, low and high load conditions, a modest amount of solar thermal energy and transmission would be developed in the Fairmont area. Facilities would occur within the vicinity of State Routes 14 and 138, which are not designated State scenic highways. Construction activities would create an adverse temporary change in views and permanent facilities could impair scenic vistas, resources, and aesthetic character on the eastern edge the Sierra Pelona Mountains, which Los Angeles County considers a scenic resource. These elements would be visible to motorists traveling on State Route 138 as it passes through the community of Little Rock and the Cities of Lancaster and Palmdale, and State Route 14 as it passes through the Sierra Pelona Mountains. However, motorists are considered to have a low sensitivity to change of existing visual character because of their distance, angle, duration of views in this area. Views by residents would be dependent on their distance from development areas and angle of views. Because of the precise locations of development are uncertain, the proposed project may substantially damage existing scenic resources.

Mountain Pass – Low and High Load Conditions

In the Mountain Pass area, the level of solar thermal energy and transmission development is anticipated to remain the same under both the 33 percent low and high scenarios. Construction activities and introduction of new solar thermal energy facilities into the desert landscape may impair scenic vistas, resources, and aesthetic character. These visual elements would be visible primarily to motorists traveling on Interstate 15, which passes through the Mountain Pass project area and is a popular route for travelers to Las Vegas, and recreationists at the Primm Valley Golf Course. While not a State-designated scenic highway, San Bernardino County has designated portions of Interstate 15 that pass through the area as having scenic character of visual importance. Motorists are considered to have a low sensitivity to change of existing visual character because of their distance, angle, and duration of views in this area. Construction and operation activities may also be visible to residents in the nearby community of Primm, Nevada, although views may be minimal because of the community's distance from the area.

Although some transmission lines already pass through the Ivanpah Valley, the solar thermal energy facilities would introduce new artificial elements that would contrast strongly with the existing natural environment as well as strong spatial and scale dominance. The proposed renewable energy project would result in a significant visual change in the site and its surroundings.

Pisgah – Low and High Load Conditions

Under the 33 percent RES low and high load conditions, solar thermal energy and transmission development would occur in the Mojave Desert of central San Bernardino County. The San Bernardino County General Plan states that a feature or vista can be considered scenic if it provides a vista of undisturbed natural areas, includes a unique or unusual feature that comprises an important or dominant portion of the viewshed, or offers a distant vista that provides relief from less attractive views of nearby features (such as views of mountain backdrops from urban areas). Therefore, solar thermal development components, such as power towers sited in the Pisgah area would result in a strong level of contrast in this area that is dominated by the largely undeveloped desert environment and could result in a significant impact on scenic vistas. Solar thermal energy development in Pisgah would occur in the vicinity of Interstate 40, which is not listed as a State scenic highway, but is a County-designated scenic route from Ludlow to Needles. While the precise locations of solar thermal development are uncertain, the proposed project may substantially damage existing scenic resources. In some locations, the visible changes to these scenic resources may be potentially significant.

Out of State – Low and High Load Conditions

Out-of-state scenic impacts under the 33 percent RES, high and low load, for solar thermal would be identical to the 20 percent RPS, high and low load, described above.

Scenic impacts of solar thermal and transmission line development under the 33 percent RES low and high load conditions would be significant.

Solar Photovoltaic

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Development of solar photovoltaic energy would occur in various locations throughout the State under the 20 percent RPS low and high conditions. Construction and operation of solar photovoltaic panels, access roads, and associated facilities would introduce new elements that have the potential to substantially degrade the existing quality of sites, particularly those in undeveloped areas. While specific locations of distributed solar photovoltaic energy development are unknown, such development may occur in areas with national, state, or county designated scenic vistas, other scenic resources, and State scenic highways. Solar photovoltaic development has the potential to substantially damage scenic resources.

Tehachapi – Low and High Load Conditions

Under the 20 percent RPS solar photovoltaic energy and transmission development is expected to occur in the Tehachapi area under both low and high load conditions. High load conditions under the RPS would require approximately three times the solar photovoltaic generation from this area. Although there are no officially designated State scenic highways in the Tehachapi area, portions of State Routes 14 and 58, which intersect near the Tehachapi Mountains, are eligible for designation. Depending on the locations of solar photovoltaic development, they may extend into the viewsheds of State Routes 14 and 58. Construction of solar photovoltaic facilities would create temporary, adverse changes in the visual character of the Tehachapi area and permanent facilities have the potential to create substantial changes in the visual quality and character of the flat desert areas south of the Tehachapi Mountains. Facility elements may be visible from public vantages, particularly State Routes 14, 58, and 138, which pass directly through the area where solar photovoltaic development would occur. Residents in the community of Rosamond may be affected by construction and operation activities near State Route 14. Some recreationists in the Sierra Pelona Mountains to the south of the Tehachapi area may be affected by the change in visual character, but this would largely depend on where the recreationist is located. Because specific locations of solar photovoltaic projects are unknown, it is possible that facilities could be constructed in pristine areas, resulting in significant scenic impacts.

Out of State – Low and High Load Conditions

Under the 20 percent low and high load conditions, implementation of the same degree of solar photovoltaic energy projects in Arizona/Southern Nevada—though modest—may result in significant adverse effects on scenic resources in these areas. Projects may occur on federal lands, in which case they would be subject to environmental review of aesthetic impacts under NEPA, and projects may also be subject to state environmental policies, rules, and regulations. In any case, however, implementation of solar photovoltaic projects in out-of-state locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land. Scenic impacts of solar photovoltaic development under the 20 percent RPS low and high load conditions would be significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed solar photovoltaic energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Tehachapi – Low and High Load Conditions

The amount of solar photovoltaic and transmission development in the Tehachapi area under 33 percent RES low and high load conditions is expected to be the same as under the 20 percent RPS high load scenario, discussed above.

Mountain Pass – Low and High Load Conditions

As with solar thermal, the level of solar photovoltaic energy and transmission development in the Mountain Pass area is anticipated to remain the same under both the 33 percent low and high scenarios. Construction activities and introduction of new solar photovoltaic energy facilities into the desert landscape may impair scenic vistas, resources, and aesthetic character. These visual elements would be visible primarily to motorists traveling on Interstate 15, which passes through the Mountain Pass project area and is a popular route for travelers to Las Vegas, and recreationists at the Primm Valley Golf Course. While not a State-designated scenic highway, San Bernardino County has designated portions of Interstate 15 that pass through the area as having scenic character of visual importance. Motorists are considered to have a low sensitivity to change of existing visual character because of their distance, angle, and duration of views in this area. Construction and operation activities may also be visible to residents in the nearby community of Primm, Nevada, although views may be minimal because of the community's distance from the area.

Although some transmission lines already pass through the Ivanpah Valley, the solar thermal energy facilities would introduce new artificial elements that would contrast photovoltaic with the existing natural environment as well as strong spatial and scale dominance. The proposed project would result in a significant visual change in the site and its surroundings.

Riverside East – Low and High Load Conditions

As with solar thermal, a similar amount of solar photovoltaic energy and transmission development is expected to occur in the Riverside East area under the 33 percent RES low and high load conditions. Construction activities would create a temporary, adverse change in the visual character of the area due to the introduction of heavy equipment in addition to site clearing and grading activities. Operation would introduce new solar photovoltaic energy facilities into the largely undeveloped desert landscape. These visual elements would be visible primarily to motorists traveling on Interstate 10, which passes through the project area, but which is not listed as a State scenic highway. The proposed project would introduce prominent solar photovoltaic structures into the foreground of motorists and into the background of residents in the nearby City of Blythe. Some recreationists at Joshua Tree National Forest to the west of the Riverside East area may also be affected by the substantial visual change in the desert landscape. Construction and operation of solar photovoltaic development would substantially degrade the Riverside East area and its existing natural surroundings by changing the environment to an industrial landscape. This would be a significant impact.

Fairmont –Low and High Load Conditions

Under the 33 percent RES low and high load conditions, development of solar photovoltaic energy and transmission is expected to occur in the Fairmont area. Construction activities would create a temporary, adverse change in the visual character of the Fairmont area due to the introduction of heavy equipment, access roads in addition to site clearing and grading. Construction activities may also alter naturally vegetated areas. Operation of the proposed project would introduce new solar photovoltaic facilities into areas that are largely undeveloped or used for agricultural purposes. These visual elements may be visible to motorists traveling on State Route 138, and to a much lesser extent, on State Route 14 although views from State Route 14 may be indiscernible. The proposed project would introduce prominent structures with an industrial character into the foreground of motorists and into the background of some residents in the nearby cities of Palmdale and Lancaster and the community of Little Rock, As a result, construction and operation of solar photovoltaic facilities would substantially degrade the Fairmont area and its existing natural surroundings.

Out of State – Low and High Load Conditions

Out-of-state scenic impacts under the 33 percent RES, high and low load, for solar photovoltaic would be identical to the 20 percent RPS, high and low load, described above.

Scenic impacts of solar photovoltaic and transmission line development under the 33 percent RES low and high load conditions would be significant***.***

Geothermal

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Throughout the State, some amount of distributed geothermal energy development would occur. Geothermal facilities, including power plants, substation, power lines, access roads, and associated facilities, would introduce industrial facilities into some viewsheds. While there is uncertainty as to the exact locations of any distributed geothermal development and such development may occur in areas with national, state, or county designated scenic vistas, scenic highways, or other aesthetic resources. Geothermal energy development would introduce or increase the presence of artificial elements into some viewsheds, including turbine generators, associated buildings, pipes and pumps, and necessary access roads, which may be highly visible to some viewer groups, and has the potential to substantially impair the visual environment. This would be a potentially significant impact.

Imperial North – High Load Conditions

Under the 20 percent RPS high load condition, some limited geothermal development would occur in the Imperial North area. Construction and operation of geothermal development would introduce artificial elements associated with such development into the existing landscape, which largely consists of agricultural development, open space, and the Salton Sea. Because the landscape largely consists of relatively flat open space and agricultural lands, introduction of these visual elements would substantially degrade the existing character of the Imperial North area. Although geothermal development would not occur in the vicinity of any State scenic highways, Imperial County considers the Salton Sea a scenic resource. Changes in the landscape may substantially damage views of the Salton Sea, which would be significant.

Out of State – Low and High Load Conditions

Under the 20 percent low and high load conditions, implementation of geothermal resource projects in Reno/Dixie Valley, and Utah/Southern Idaho may result in significant adverse effects on scenic resources in these areas. Some of these projects may occur on federal lands, which would subject such projects to environmental review of aesthetic impacts under NEPA. In some cases, renewable energy resource projects may occur in states where such projects would be subject to the state’s environmental review process. In any case, however, implementation of geothermal projects in out of state locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land. Scenic impacts of geothermal development under the 20 percent RPS low and high load conditions would be significant**.** This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions
No additional distributed geothermal energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Imperial North –High Load Conditions
Under the 33 percent RES high load condition, substantial geothermal and transmission line development would occur in the Imperial North area. Geothermal development would introduce more adverse artificial elements associated with such development into the existing landscape. Viewer groups, including residents, motorists, and recreationists, would experience enhanced visual impacts because of the proposed increase in development. Viewer groups may also be affected over a longer period as more geothermal facilities are constructed. Changes in the landscape may substantially damage views of the Salton Sea, which would be a significant impact.

Out of State – Low and High Load Conditions
Out-of-state scenic impacts under the 33 percent RES, high and low load, for geothermal projects would be identical to the 20 percent RPS, high and low load, described above.

Scenic impacts of geothermal and transmission line development under the 33 percent RES low and high load conditions would be significant.

Solid-fuel Biomass

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions
Throughout the State, some amount of distributed solid fuel biomass development would occur. There is uncertainty as to the exact locations of any distributed solid fuel biomass development and such development could occur in areas with national, state, or county designated scenic vistas. Solid fuel biomass development would introduce or increase the presence of artificial elements into some viewsheds, including combustion power plants, associated buildings, pipes and pumps, and necessary access roads, which may be highly visible to some viewer groups. I

Out of State – Low and High Load Conditions
Out-of-state biomass resources are not anticipated for the 20 percent RPS, low load condition. A modest amount from British Columbia is anticipated for the 20 percent RPS, high load condition. Because site-specific details are unknown, implementation of biomass resource projects in out-of-state/country locations may have significant scenic effects primarily because such projects are typically located in areas of undeveloped, uninhabited land and would result in substantial alteration of the visual landscape. Biomass projects in British Columbia or other areas in Canada would require compliance with applicable environmental laws.

Scenic impacts of biomass development under the 20 percent RPS low and high load conditions would be significant**.** This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

Because no additional distributed solid-fuel biomass is anticipated under the 33 percent RES over and above the 20 percent RPS, no additional scenic impact would occur.

Out of State – Low and High Load Conditions

Under the 33 percent RES, high and low load scenarios, a modest increase in biomass from New Mexico would be anticipated. As described above, renewable energy projects in out-of-state areas would require compliance with applicable environmental laws. Such projects have the potential to result in scenic impacts.

While modeling indicates that implementation of the RES would have only a minor effect on biomass project development under the 33 percent RES low and high load conditions, such development could result in scenic imapacts that are potentially significant..

Biogas

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Throughout the State, some amount of distributed biogas development would occur. There is uncertainty as to the exact locations of any distributed biogas development and such development may occur in areas with national, state, or county designated scenic vistas. Biogas development would introduce or increase the presence of artificial elements into some viewsheds, including combustion turbines or boilers and steam turbines, associated buildings, and necessary access roads, which may be highly visible to some viewer groups.

Out of State – Low and High Load Conditions

Out-of-state biogas resources are not anticipated for the 20 percent RPS, low load condition. A modest amount from Wyoming is anticipated for the 20 percent RPS, high load condition. Out-of-state biogas projects may occur on federal lands, which would subject such projects to environmental review of aesthetic impacts under NEPA. In some cases, biogas projects may occur in states where such projects would be subject to the state's environmental review process. Because site-specific details are unknown, implementation of biogas resource projects in out of state locations, including Wyoming, may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land and would result in substantial alteration of the visual landscape.

Scenic impacts of biogas development under the 20 percent RPS low and high load conditions would be significant***.*** This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed biogas energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so *no additional impact* would occur from approval of the 33 percent RES.

Out of State – Low and High Load Conditions

Out of State scenic impacts under the 33 percent RES, high and low load, for biogas projects would be identical to the 20 percent RPS, high load scenario, described above, so no additional impact would occur from approval of the 33 percent RES.

While scenic impacts of biogas development would be potentially significant, there would be no additional impact from approval of the 33 percent RES.

Small Hydroelectric Power Generation

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Throughout the State, development of small hydroelectric power generation would occur. There is uncertainty as to the exact locations of any small hydroelectric power development and such development may occur in areas with national, state, or county designated scenic vistas, scenic highways, or other scenic resources. Small hydroelectric power development would introduce or increase the presence of artificial elements into some viewsheds, including powerhouses, dams, transmission lines, and associated buildings, which could be highly visible to some viewer groups.

Out of State – Low and High Load Conditions

Under the 20 percent low load conditions, implementation of the same degree of small hydroelectric energy resource projects in British Columbia and the Pacific Northwest may result in significant adverse effects on scenic vistas, scenic resources, and visual character in these areas. The 20 percent high load condition may result in additional small hydroelectric energy resources, and commensurate impacts, in Wyoming. Projects in the U.S. may occur on federal lands, which would subject such projects to environmental review of aesthetic impacts under NEPA. Renewable energy resource projects may also occur in states where such projects would be subject to the state's environmental review process. Small hydroelectric projects in British Columbia or other areas in Canada would require compliance with applicable environmental laws. In any case, however, implementation of renewable energy resource projects in out of state/country locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land and would result in substantial alteration of the visual landscape.

Scenic impacts of small hydroelectric development under the 20 percent RPS low and high load conditions have the potential to be significant*.* This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed small hydroelectric energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Out of State – Low and High Load Conditions

Out-of-state/country scenic impacts under the 33 percent RES, high and low load, for small hydroelectric projects would be identical to the 20 percent RPS, high and low load, described above, so no additional impact would occur from approval of the 33 percent RES.

While scenic impacts of small hydroelectric development would be potentially significant, there would be no additional impact from approval of the 33 percent RES.

IMPACT A-2	**Adverse Effects of Light and Glare. Depending upon their location, size, and character, and proximity to sensitive receptors, development of renewable energy projects necessary for compliance with the RES regulation may generate new sources of substantial light or glare that would adversely affect day or nighttime views in areas of renewable energy development. This would be a potentially *significant* impact*.***

Wind Power

20 Percent Renewable Portfolio Standard

Distributed Statewide – High and Low Load Conditions

Throughout the State, some distributed wind energy development would occur under the 20 percent RPS high and low load conditions. Nighttime lighting for safety and security purposes would be required, which would cause some amount of light and potentially glare. On turbines 200 feet or taller, safety lighting would be required in accordance with FACC Advisory Circular AC 70/7460-1K to reduce potential hazards to aircraft traveling to nearby airports, including the Edwards Air Force Test Center. These regulations require either a single incandescent or rapid discharge flashing red light located on each of the end turbines in a line and on interior turbines so that no lighted turbine is 0.5 mile or more from the nearest lighted turbine. However, safety lighting pursuant to FAA regulations would be limited to only that necessary for safety and security, thus such lighting would not be a source of substantial light.

Tehachapi – Low and High Load Conditions

Under the 20 percent RPS low and high load conditions, wind energy development is expected to occur in the Tehachapi area. Daily and seasonal sunlight conditions striking ridgelines and wind facilities would tend to make them more visible and more likely to be sources of glare by virtue of the reflectivity of their surfaces. Nighttime lighting for safety and security purposes would be required, which would cause some amount of light and potentially glare. On turbines 200 feet or taller, safety lighting would be required in accordance with FAA Advisory Circular AC 70/7460-1K to reduce potential hazards to aircraft traveling to nearby airports, including the Edwards Air Force Test Center. These regulations require either a single incandescent or rapid discharge flashing red light located on each of the end turbines in a line and on interior turbines so that no lighted turbine is 0.5 mile or more from the nearest lighted turbine. Wind energy facilities would introduce lighting sources in some areas of the Tehachapi Mountains and surrounding desert plains where no lighting currently exists, although some areas of the Tehachapi Mountains currently are developed by wind farms. Given the overall visual environment, safety lights, including those required by the FAA, would not be a source of substantial light.

Out of State – Low and High Load Conditions

Under the 20 percent low and high load conditions, implementation of the same degree of wind energy resource projects in Montana, the Pacific Northwest, Utah, Southern Idaho, and Wyoming may result in significant light and glare impacts, as described above.

Light and glare impacts of wind energy development under the 20 percent RPS low and high load conditions would be less than significant.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed wind energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Tehachapi – Low and High Load Conditions

Under the 33 percent RES low and high load conditions, the same amount of wind energy development is expected to occur and no change in the amount of development is expected from the 20 percent RPS high load conditions. Therefore, visual impacts due to substantial light or glare would be the same as discussed under the 20 percent RPS high load conditions, so no additional impact would occur.

Mountain Pass – Low and High Load Conditions

With implementation of wind energy facilities, light or glare may be created under the 33 percent RES low and high load conditions in the Mountain Pass area. Introduction of light or glare in this area would be along ridgelines in open, desert areas that have a minimal amount of existing sources of day or night time lighting. As noted above, the FAA requires lighting that would be visible at night to reduce potential hazards to aircraft. Safety lighting pursuant to FAA regulations would be limited to only that necessary for safety and security, thus such lighting would not be a source of substantial light. Other safety and security lighting at night may introduce new sources of light but would not be substantial.

Fairmont –Low and High Load Conditions

With implementation of wind energy facilities, light or glare may be created under the 33 percent RES, low and high load conditions in the Fairmont area. Introduction of light or glare in this area would be along ridgelines in open, desert areas that have some amount of existing sources of day or night time lighting due to the nearby Tehachapi Wind Resource Area and the nearby communities. As noted above, the FAA requires lighting that would be visible at night to reduce potential hazards to aircraft. Safety lighting pursuant to FAA regulations would be limited to only that necessary for safety and security, thus such lighting would not be a source of substantial light. However, other safety and security lighting at night may introduce new sources of light but would not be substantial.

Solano – Low and High Load Conditions

With implementation of wind energy facilities, light or glare may be created under the 33 percent RES, low and high load conditions in the Solano area. Introduction of light and glare in this area would be along the flat, open areas north of the Sacramento River and Suisun Bay. As noted above, the FAA requires lighting that would be visible at night to reduce potential hazards to aircraft. Safety lighting pursuant to FAA regulations would be limited to only that necessary for safety and security, thus such lighting would not be a source of substantial light. Other safety and security lighting at night may introduce new sources of light but would not be substantial.

Out of State – Low and High Load Conditions

Under the 33 percent low and high load conditions, implementation of the same degree of wind energy resource projects in Montana, the Pacific Northwest, Utah, Southern Idaho, Wyoming, and Alberta may result in significant adverse effects relative to light and glare in these areas. (See Out of State – Low and High Load Conditions for wind energy, above.) In addition, wind projects in Alberta or other areas in Canada would require compliance with applicable environmental laws.

Light and glare impacts of wind energy development under the 33 percent RES low and high load conditions would be less than significant.

Solar Thermal

20 Percent Renewable Portfolio Standard

Distributed Statewide –Low and High Load Conditions

Development of solar thermal energy would occur in various locations throughout the State under the 20 percent RPS low and high conditions. Operation of solar thermal facilities may create substantial sources of light or glare due to certain project components, including power towers, and parabolic dishes and troughs. The levels of light and glare may dominate the landscape, which in some cases, may include minimal or no existing lighting. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare.

Tehachapi – Low and High Load Conditions
Under the 20 percent RPS solar thermal energy development is expected to occur in the Tehachapi area under both low and high load conditions. High load conditions under the RPS would require approximately three times the solar thermal generation from this area. Solar thermal facilities may create substantial sources of light or glare due to certain project components, including power towers, and parabolic dishes and troughs. The levels of light and glare may dominate the landscape, which in some cases, may include minimal or no existing lighting. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare.

Out of State – Low and High Load Conditions
Under the 20 percent low and high load conditions, implementation of the same degree of solar thermal energy projects in Arizona/Southern Nevada may result in significant adverse effects relative to light and glare in these areas. Projects may occur on federal lands, in which case they would be subject to environmental review of aesthetic impacts under NEPA, and projects may also be subject to state environmental policies, rules, and regulations. In any case, however, implementation of solar thermal projects in out-of-state locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land. This would be a potentially significant impact. Implementation of Mitigation A-1 and A-2 would reduce light and glare impacts, but it is uncertain whether mitigation would be sufficient to reduce the impact to a less than significant level.

Light and glare impacts of solar thermal development under the 20 percent RPS low and high load conditions would be potentially significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide –Low and High Load Conditions
No additional distributed solar thermal energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Tehachapi – Low and High Load Conditions
Under the 33 percent RES low and high load conditions, the same amount of solar thermal energy development is expected to occur and no change in the amount of development is expected from the 20 percent RPS high load conditions. Therefore, visual impacts due to substantial light or glare would be the same as discussed under the 20 percent RPS high load conditions, so no additional impact would occur from approval of the 33 percent RES.

Mountain Pass – Low and High Load Conditions
Under the 33 percent plausible low and high load conditions, the same amount of solar thermal energy development would occur in the Mountain Pass area. Operation of solar

thermal facilities may create substantial sources of light or glare due to certain project components, including power towers, and parabolic dishes and troughs, in this area that is largely dominated by the open landscape of the desert. The levels of light and glare may dominate the landscape and would affect mostly motorists traveling on State Route 15, recreationists at the Primm Valley Golf Club, and to a lesser extent, the residents of the City of Primm. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare.

Riverside East– Low and High Load Conditions

Under the 33 percent plausible low and high load conditions, the same amount of solar thermal energy development is expected to occur in the Riverside East area. Solar thermal energy facilities would create a new source of substantial light, including security lighting that would adversely affect nighttime views in this largely undeveloped desert area. Daytime glare is also a major issue of concern, not only for aesthetic reasons, but also for safety reasons due to the proximity of the Blythe Airport. Potentially affected receptors would be travelers and recreationists in the surrounding mountains and Joshua Tree National Forest, motorists, nearby residents of the City of Blythe, and visitors and aviators accessing Blythe Airport. Any visible glare or reflected light would draw viewer’s attention to the facilities, even from distant locations.

Fairmont –Low and High Load Conditions

With implementation of solar thermal energy facilities, new sources of substantial light or glare may be created under the 33 percent RES low and high load conditions in the Fairmont area. Although the Fairmont area includes nearby cities, including Palmdale and Lancaster, solar thermal energy development would be in largely undeveloped areas with minimal existing lighting. Sparse housing would also be near project facilities. Project operation may affect the views of motorists traveling along State Routes 14 and 138, in addition to some area residents. Levels of light or glare may dominate the project landscape. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare.

Pisgah –Low and High Load Conditions

With implementation of solar thermal energy facilities, new sources of substantial light or glare may be created under the 33 percent RES low and high load conditions in the Pisgah area. Solar thermal energy development would be in largely undeveloped areas with minimal existing lighting. Project operation may affect the views of motorists traveling along State Routes 40, and levels of light or glare may dominate the project landscape. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare.

Out of State – Low and High Load Conditions

Out-of-state light and glare impacts under the 33 percent RES, high and low load, for solar thermal would be identical to the 20 percent RPS, high and low load, described above, so no additional impact would occur from approval of the 33 percent RES.

Light and glare impacts of solar thermal development under the 33 percent RES low and high load conditions would be potentially significant.

Solar Photovoltaic

20 Percent Renewable Portfolio Standard

Distributed Statewide –Low and High Load Conditions

Development of solar photovoltaic energy would occur in various locations throughout the State under the 20 percent plausible low and high conditions. Solar photovoltaic installations may create new sources of substantial light or glare, thereby affecting day and nighttime views. Levels of light or glare may dominate the project landscape. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare. Depending on specific locations of development, the views of motorists, residents, and recreationists may be affected.

Tehachapi – Low and High Load Conditions

Under the 20 percent RPS solar photovoltaic energy development is expected to occur in the Tehachapi area under both low and high load conditions. High load conditions under the RPS would require approximately three times the solar photovoltaic generation from this area. Solar photovoltaic installations may create new sources of substantial light or glare, thereby affecting day and nighttime views of the desert landscape and Tehachapi Mountains. Although renewable energy development already exists in the Tehachapi area, the installation of photovoltaic arrays would introduce new visual elements that would be the source of light and glare. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare.

Out of State – Low and High Load Conditions

Under the 20 percent low and high load conditions, implementation of the same degree of solar photovoltaic energy projects in Arizona/Southern Nevada—though modest—may result in significant adverse light and glare in these areas. Projects may occur on federal lands, in which case they would be subject to environmental review of aesthetic impacts under NEPA, and projects may also be subject to state environmental policies, rules, and regulations. In any case, however, implementation of solar photovoltaic projects in out-of-state locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land.

Light and glare impacts of solar photovoltaic development under the 20 percent RPS low and high load conditions would be potentially significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide –Low and High Load Conditions

No additional distributed solar photovoltaic energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Tehachapi – Low and High Load Conditions

Under the 33 percent plausible low and high load conditions, the same amount of solar photovoltaic energy development in the Tehachapi area is expected to occur and no change in the amount of development is expected from the 20 percent RPS high load conditions. Therefore, visual impacts due to substantial light or glare would be the same as discussed under the 20 percent RPS high load conditions, so no additional impact would occur from approval of the 33 percent RES.

Mountain Pass – Low and High Load Conditions

Under the 33 percent plausible low and high load conditions, the same amount of solar photovoltaic development is expected to occur in the Mountain Pass area. With implementation of solar photovoltaic energy facilities, new sources of substantial light or glare may be introduced in this open desert environment that is largely undeveloped. Project facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare. Views by motorists traveling along Interstate 15 and recreationists at the Primm Valley Golf Club would mostly be adversely affected by the new sources of light and glare.

Riverside East – Low and High Load Conditions

Under the 33 percent plausible low and high load conditions, the same amount of solar photovoltaic energy development is expected to occur in the Riverside East area. Solar photovoltaic components, including solar arrays, would introduce new sources of substantial daytime light and glare to the desert landscape. Security lighting at night would also be a source of nighttime lighting that may affect visual receptors. Project components other than solar arrays may also be sources of light or glare. Views of recreationists at Joshua Tree National Forest, motorists traveling on Interstate 10, and to a lesser extent, residents in the City of Blythe would be affected. Other potentially affected receptors are visitors and aviators at the Edwards Air Force Test Flight Center south of the Kramer project area.

Fairmont –Low and High Load Conditions

With implementation of solar photovoltaic energy facilities, new sources of substantial light or glare may be created under the 33 percent RES, low and high load conditions in the Fairmont area. Although the Fairmont area includes nearby cities, including Palmdale and Lancaster, solar thermal energy development would be in largely undeveloped areas with minimal existing lighting. Sparse housing would also be near project facilities. Project operation may affect the views of motorists traveling along State Routes 14 and 138, in addition to some area residents. Levels of light or glare may dominate the project landscape. These facilities would also require the use of nighttime lighting for safety and security reasons, which may also result in glare.

Out of State – Low and High Load Conditions

Out-of-state light and glare impacts under the 33 percent RES, high and low load, for solar photovoltaic would be identical to the 20 percent RPS, high and low load, described above, so no additional impact would occur from approval of the 33 percent RES.

Light and glare impacts of solar photovoltaic development under the 33 percent RES low and high load conditions would be significant.

Geothermal

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Development of distributed solar photovoltaic energy is expected to occur in various locations throughout the State under the 20 percent plausible low and high conditions. Geothermal development may be located in a variety of visual environments, some of which may have minimal existing nighttime lighting. Geothermal facilities would require nighttime lighting for operational safety and security and glare from night lighting may also occur. Glare from the surfaces of geothermal project facilities during the day may also occur.

Imperial North – High Load Condition

Under the 20 percent RPS high load condition, geothermal development would occur in the Imperial North area. Geothermal development would be located in an area dominated by open space, agricultural land, and recreational areas associated with the Salton Sea. These land uses have relatively minimal existing night lighting. Geothermal facilities would require nighttime lighting for operational safety and security. Glare from night lighting may also occur. Glare from the surfaces of geothermal project facilities during the day may also occur.

Out of State – Low and High Load Conditions

Under the 20 percent low and high load conditions, implementation of geothermal resource projects in Reno/Dixie Valley, and Utah/Southern Idaho may result in significant adverse light and glare effects in these areas. Some of these projects may occur on federal lands, which would subject such projects to environmental review of aesthetic impacts under NEPA. In some cases, renewable energy resource projects may occur in states where such projects would be subject to the state's environmental review process. In any case, however, implementation of geothermal projects in out of state locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land.

Light and glare impacts of geothermal development under the 20 percent RPS low and high load conditions would be significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed geothermal energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Imperial North –High Load Conditions
Under the 33 percent RES high load condition, geothermal development would occur in the Imperial North area. The amount of development would be greater and more substantial than amount of development under the 20 percent plausible high load scenario. A greater amount of nighttime lighting for safety and security purposes would be required with the increased geothermal energy development and would also increase potential sources of glare. Glare from the surfaces of geothermal project facilities during the day may also occur.

Out of State – Low and High Load Conditions
Out-of-state light and glare impacts under the 33 percent RES, high and low load, for geothermal projects would be identical to the 20 percent RPS, high and low load, described above, so no additional impact would occur from approval of the 33 percent RES.

Light and glare impacts of geothermal development under the 33 percent RES low and high load conditions would be potentially significant***.***

Solid-fuel Biomass

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions
Development of distributed solid-fuel biomass energy would occur in various locations throughout the State under the 20 percent plausible low and high load conditions. Geothermal development may be located in a variety of visual environments, some of which may have minimal to no existing night lighting. Solid-fuel biomass facilities may introduce substantial sources of nighttime lighting for operational safety and security and glare from night lighting may also occur. Additionally, there may be some amount of daytime light and glare created from the operation of solid-fuel biomass facilities. .

Out of State – Low and High Load Conditions
Out-of-state biomass resources are not anticipated for the 20 percent RPS, low load condition. A modest amount from British Columbia is anticipated for the 20 percent RPS, high load condition. Because site-specific details are unknown, implementation of biomass resource projects in out-of-state/country locations may have significant light and glare effects primarily because such projects are typically located in areas of undeveloped, uninhabited land. Biomass projects in British Columbia or other areas in Canada would require compliance with applicable environmental laws.

Light and glare impacts of biomass development under the 20 percent RPS low and high load conditions would be potentially significant***.*** This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed biomass energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Out of State – Low and High Load Conditions

Under the 33 percent RES, high and low load scenarios, a modest increase in biomass from New Mexico would be anticipated. As described above, renewable energy projects in out-of-state areas would require compliance with applicable environmental laws. Such projects have the potential to result in scenic impacts.

While modeling indicates that implementation of the RES would have only a minor effect on biomass project development under the 33 percent RES low and high load conditions, such development could result in light and glare impacts that are potentially significant.

Biogas

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Development of distributed biogas energy would occur in various locations throughout the State under the 20 percent RPS low and high load conditions. Biogas facilities may be sources of daytime light and glare. Additionally, facilities would require nighttime lighting for operational safety and security, which may be substantial sources of light, and glare from night lighting may also occur.

Out of State – Low and High Load Conditions

Out-of-state biogas resources are not anticipated for the 20 percent RPS, low load condition. A modest amount from Wyoming is anticipated for the 20 percent RPS, high load condition. Out-of-state biogas projects may occur on federal lands, which would subject such projects to environmental review of aesthetic impacts under NEPA. In some cases, biogas projects may occur in states where such projects would be subject to the state’s environmental review process. Because site-specific details are unknown, implementation of biogas resource projects in out-of-state locations, including Wyoming, may have significant light and glare effects primarily because such projects are typically located in areas of undeveloped, uninhabited land.

Light and glare impacts of biogas development under the 20 percent RPS low and high load conditions would be potentially significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

No additional distributed biogas energy is anticipated under the 33 percent RES over and above the 20 percent RPS, so no additional impact would occur from approval of the 33 percent RES.

Out of State – Low and High Load Conditions

Out-of-state light and glare impacts under the 33 percent RES, high and low load, for biogas projects would be identical to the 20 percent RPS, high load scenario, described above, so no additional impact would occur from approval of the 33 percent RES.

Small Hydroelectric Power Generation

20 Percent Renewable Portfolio Standard

Distributed Statewide – Low and High Load Conditions

Development of distributed small hydroelectric power generation would occur in various locations throughout the State under the 20 percent plausible low and high load conditions. Project operation may introduce substantial daytime sources of light and glare associated with lighting for powerhouses, dams, and associated facilities in undeveloped areas that have minimal to no existing lighting. Nighttime lighting would also be required for safety and security purposes, which may introduce substantial sources of light and glare.

Out of State – Low and High Load Conditions

Under the 20 percent low load conditions, implementation of the same degree of small hydroelectric energy resource projects in British Columbia and the Pacific Northwest may result in significant adverse light and glare effects in these areas. The 20 percent high load condition may result in additional small hydroelectric energy resources, and commensurate impacts, in Wyoming. Projects in the U.S. may occur on federal lands, which would subject such projects to environmental review of aesthetic impacts under NEPA. Renewable energy resource projects may also occur in states where such projects would be subject to the state's environmental review process. Small hydroelectric projects in British Columbia or other areas in Canada would require compliance with applicable environmental laws. In any case, however, implementation of renewable energy resource projects in out-of-state/country locations may have significant effects primarily because such projects are typically located in areas of undeveloped, uninhabited land and would result in substantial alteration of the visual landscape.

Scenic impacts of small hydroelectric development under the 20 percent RPS low and high load conditions have the potential to be significant. This impact would be expected to occur even without adoption of the RES.

33 Percent Renewable Electricity Standard

Distributed Statewide – Low and High Load Conditions

Under the 33 percent plausible low and high load conditions, the same amount of small hydroelectric energy development statewide is expected to occur and no change in the amount of development is expected from the 20 percent RPS high load condition, so no additional impact would occur from approval of the 33 percent RES.

Out of State – Low and High Load Conditions

Out-of-state/country light and glare impacts under the 33 percent RES, high and low load, for small hydroelectric projects would be identical to the 20 percent RPS, high and low load, described above, so no additional impact would occur from approval of the 33 percent RES.

While scenic impacts of small hydroelectric development would be potentially significant*,* there would be no additional impact from approval of the 33 percent RES.

4. MITIGATION

Mitigation is required for the following significant or potentially significant impacts.

Mitigation Measure A-1

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**

- **Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.**

- **The project proponent shall color and finish the surfaces of all project structures and buildings visible to the public to ensure that they: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. Project components shall be non-specular and non-reflective. The project proponent shall submit a surface treatment plan to the lead agency for review and approval. The surface treatment plan shall include:**

  A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;

  B. A list of each major project structure and building, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;

C. One set of color brochures or color chips showing each proposed color and finish;

D. A specific schedule for completing the treatment; and

E. A procedure to ensure proper treatment maintenance for the life of the project.

- **To the extent feasible, the sites selected for use as construction staging and laydown areas shall be areas that are already disturbed and/or are in locations of low visual sensitivity. Where possible, construction staging and laydown areas for equipment, personal vehicles, and material storage shall be sited to take advantage of natural screening opportunities provided by existing topography and vegetation. All construction-related areas shall be kept clean and tidy by storing construction materials and equipment within the proposed construction staging and laydown areas and/or generally away from public view.**

- **Where screening topography and vegetation are absent, natural-looking earthwork berms and vegetative or architectural screening shall be used where possible to minimize visual impacts.**

- **All operation and maintenance areas shall be kept clean and tidy by storing all renewable energy equipment, parts, and supplies in areas that are screened from view and/or are generally not visible to the general public.**

- **To protect landscape character and promote visual quality, the project proponent shall construct project facilities using the existing and already maintained network of access roads to the greatest practical extent. The project proponent shall submit plans for any new access roads and any maintenance plans for un-maintained access roads to the CPUC for review and approval at least 60 days prior to the start of construction.**

- **The project proponent shall revegetate and regrade disturbed soil areas that must be cleared during the construction process to restore the area to an appearance that will blend back into the overall landscape context. The project proponent shall submit plans for revegetation and revegetation to the CPUC for review and approval at least 60 days prior to the start of construction.**

- **Among the FAA-approved lighting devices available, the project proponent shall use those that are designed to be least visible from ground level of the surrounding landscape.**

- **Because the eye is naturally drawn to prominent landscape features, siting projects and their associated elements next to such features shall be avoided to the greatest extent practical.**

- **Because the landscape setting observed from national historic sites, national trails, and cultural resources may be a part of the historic context contributing to the historic significance of a proposed site for development, project siting shall avoid locating facilities to the greatest**

extent practical that would alter the visual setting such that they would reduce the historic significance or function.

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant visual impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

Mitigation Measure A-2

- **Prior to start of commercial operation, the project proponent shall design and install all temporary lighting for project construction and permanent lighting for project operation such that light bulbs and reflectors are not visible from public viewing areas and illumination of the vicinity and the nighttime sky is minimized during both project construction and operation. The project proponent shall develop and submit a lighting plan for the project to the CPM for review and approval. The lighting plan shall include:**

  A. Lighting shall be designed so that during both construction and operation, highly directional, exterior light fixtures are hooded, with lights directed downward or toward the area to be illuminated and so that backscatter to the nighttime sky is minimized. The design of this outdoor lighting shall be such that the luminescence or light source is shielded to prevent light trespass outside the project boundary, consistent with operational safety and security;

  B. High illumination areas not occupied on a continuous basis such as maintenance platforms shall be provided with switches or motion detectors to light the area only when occupied; and

  C. A lighting complaint resolution form shall be used by facility operators, to record all lighting complaints received and to document the resolution of those complaints. All records of lighting complaints shall be kept in the onsite compliance file.

- **At least 90 days prior to ordering any permanent exterior lighting, the project proponent shall contact the lead agency to discuss the documentation required in the lighting mitigation plan.**

- **At least 60 days prior to ordering any permanent exterior lighting, the project proponent shall submit to the lead agency for review and approval a plan that describes the measures to be used and that demonstrates that the requirements of this condition will be satisfied. The submittal to the CPM shall include the county's comments. The project proponent shall not order any exterior lighting until receipt of lead agency approval of the lighting mitigation plan.**

- **At least thirty (30) days prior to start of commercial operation, the project proponent shall notify the lead agency that the lighting has been completed and is ready for inspection.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant visual impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

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III.B. AIR QUALITY

This section includes a general description of existing conditions (e.g., types of sensitive land uses and sources located out-of-state), a summary of applicable regulations, and evaluation of potential short-term and long-term air quality impacts associated with the out-of-state implementation of the proposed renewable energy development scenarios. Mitigation is recommended, as necessary, to reduce significant impacts.

As described in the Project Description, the RES Calculator was used to identify out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects would actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and would depend upon myriad economic, political, and environmental factors. The plausible compliance scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

1. ENVIRONMENTAL SETTING

Note to Reader: The evaluation of the in-State air quality impacts resulting from the renewable energy projects necessary for compliance with the RES is provided in Chapter IX of the RES Staff Report. Based on that analysis, implementation of new in-State renewable energy projects would not generate levels of emissions that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, result in a cumulatively considerable net increase in non-attainment areas, or expose sensitive receptors to substantial pollutant concentrations or odors with mitigation (e.g., compliance with applicable regulations). Thus, in-State air quality impacts from operation of renewable energy facilities is expected to result in beneficial effects. Generally, it is important to note that renewable electricity generation produces fewer pollutants per unit of electricity output than the fossil-fuel generation it would displace and less total electricity would be generated in-State in comparison to existing conditions.

Construction of any new facilities would be subject to site-specific mitigation imposed by local and potentially federal lead agencies and local air districts. Mitigation for construction related air quality impacts is expected to be the same or similar to those detailed below in Mitigation B-1. Please refer to the RES Staff report for additional information.

The following presents an evaluation of the potential out-of-state air quality impacts that could occur with implementation of the 33 percent RES.

(a). EXISTING OUT-OF-STATE SOURCES AND SENSITIVE LAND USES

Out-of-state renewable energy resources are projected by the RES Calculator to be developed in the following general areas: Alberta, Arizona/Southern Nevada, British Columbia, Montana, New Mexico, Northwest, Reno/Dixie Valley, Utah/Southern Idaho, and Wyoming.

The existing air quality environment in the proposed out-of-state areas is influenced by stationary, area, and mobile sources. According to EPA, there are areas within those mentioned above where out-of-state renewable energy resources are projected by the RES Calculator to be developed that are currently designated as nonattainment areas for ozone (8-hour), PM_{10}, $PM_{2.5}$, CO, SO_2, and lead) (EPA 2010). Sensitive land uses in such areas may include residences (e.g., single- and multi-family), schools, hospitals, nursing homes, and other uses that may include segments of the population that are sensitive to poor air quality.

2. REGULATORY SETTING

The following provides a brief description of the Federal and State regulations that could be applicable to an out-of-state renewable energy project. Local regulations may also apply; however, because the specific siting of the renewable energy facilities is not known at this time it would be speculative to present a discussion of applicable local regulations.

Table III.B-1. Applicable Laws and Regulations for Air Quality

Regulation	Description
Federal	
40 Code of Federal Regulations (CFR) (National Environmental Policy Act [NEPA])	NEPA requires all federal agencies to consider environmental factors through a systematic interdisciplinary approach before committing to a course of action. The NEPA process is an overall framework for the environmental evaluation of federal actions.

Table III.B-1. Applicable Laws and Regulations for Air Quality	
Regulation	Description
Clean Air Act and 40 CFR, Part 50	The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) (40 CFR, Part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of NAAQS. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six principal pollutants, which are called "criteria" pollutants.
Other Applicable Federal-Level Regulations	This includes all other applicable regulations at the federal level for portions of the project area that are outside of the U.S. (e.g., Canada).
State	
Other Applicable State-Level Regulations	This includes all other applicable regulations at the state level for portions of the project area that are outside of California (e.g., Arizona, Nevada).

3. PROJECT IMPACTS

This section describes the project's out-of-state effects on air quality for the 20 percent RPS and 33 percent RES. The discussion includes the criteria for determining the level of significance of the effects and a description of the methods and assumptions used to conduct the analysis.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

(a). METHODOLOGY

Potential out-of-state impacts to air quality were assessed based on the potential for the 33 percent RES to exceed the thresholds of significance identified below. The analysis that is presented below evaluates the change from existing conditions to the 33 percent RES in 2020. However, an incremental portion of these impacts would occur regardless of whether the 33 percent RES is implemented. The CPUC approved the 20 percent RPS and this regulation would be implemented by 2020. The 33 percent RES would further the renewable energy objective and would be added to the 20 percent RPS. Therefore, the analysis below describes the impacts that would occur under the 20 percent RPS, the total impacts that would occur under the 33 percent RES (i.e., existing conditions to 33 percent RES), and the incremental impacts from 20 percent RPS to 33 percent RES. For each of these alternatives, a high and low load scenario is also evaluated (see Section II, Project Description, for additional details).

For some impacts below, the same type and magnitude would occur under each scenario and each alternative. Where this occurs, a combined analysis is presented to streamline the presentation of environmental impacts to avoid unnecessary repetition.

(b). THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance were used to determine whether implementing the 33 percent RES would result in a significant air quality impacts. The project would result in a significant impact if it would:

- conflict with or obstruct implementation of the applicable air quality plan;
- violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria air pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

IMPACT B-1	**Short-Term Construction Impacts to Air Quality from Out-of-State Project-Generated Emissions of Criteria Air Pollutants and Precursors. Because the specific air quality impacts of the 33 percent RES cannot be identified with any certainty, and construction activities associated with these projects could generate levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, or result in a cumulatively considerable net increase in non-attainment areas, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).**

All Renewable Energy Project Types

All renewable energy projects no matter their size, out-of-state location, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with Federal environmental review requirements (e.g., NEPA) or other applicable state requirements. The environmental review process for all renewable project types under either the 20 percent RPS or 33 percent RES would assess whether project implementation would result in short-term construction air quality impacts.

At this time, the specific location, type, and number of renewable energy projects constructed out-of-state is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, energy demands, environmental constraints, and other market constraints. Nonetheless, the analysis provided herein provides a reasonable accounting of the types of environmental impacts that would occur with implementation of the 33 percent RES plausible compliance scenarios (high or low load conditions) as discussed below for short-term construction emissions. Further, subsequent environmental review would be conducted at such time that a renewable energy project is proposed and land use entitlements are sought.

During construction of renewable energy projects out-of-state, criteria air pollutant and precursor emissions could be generated from a variety of construction activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would generate fugitive PM dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (including PM_{10} and $PM_{2.5}$) vary as a function of parameters such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. Exhaust emissions from construction-related mobile sources also include ROG and NO_x emissions. These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment. Criteria air pollutants that are also associated with localized concerns (e.g., CO) are discussed under Impact B-3 below.

The site preparation phase typically generates the most substantial emission levels because of the on-site equipment and ground-disturbing activities associated with grading, compacting, and excavation. Site preparation equipment and activities typically include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Although detailed construction specific information is not available at this time, based on the types of renewable energy projects listed in the Section II, Project Description it would be expected that the primary sources of construction-related emissions include soil disturbance- and equipment-related activities (e.g., use of backhoes, bulldozers, excavators, and other related equipment). Based on typical emission rates and default parameters for above mentioned equipment and activities, construction of a out-of-state renewable energy project could result in hundreds of pounds of daily NO_x and PM_{10}, which may exceed general mass emissions limits depending on the exact location of generation. Thus, because the specific air quality impacts of renewable energy projects necessary to comply with the 33 percent RES cannot be identified with any certainty, and construction activities associated with these projects could generate levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, or result in a cumulatively considerable net increase in non-attainment areas, this impact is considered potentially significant for all renewable energy types under the 33 percent RES (high and low load). It is important to note that there is no difference in the impacts that would occur under the 20 percent RPS versus the 33 percent RES, as, based on the modeling, the magnitude of electricity generated from new out of-state renewable projects is relatively similar (e.g., approximately 9,500 GWh versus 10,900 GWh under both low and high load scenarios). Additionally, the magnitude of this impact is influenced more by the how (e.g., size of project footprint and types of construction activities required) and the where (e.g., whether located in a nonattainment area) of the new renewable projects, more so than the total amount of electricity generated.

IMPACT B-2

Long-Term Operational Impacts to Air Quality from Out-of-State Project-Generated Emissions of Criteria Air Pollutants and Precursors. Because renewable generation produces lower levels criteria air pollutants per unit of electricity output than fossil-fuel generation it would displace and less total electricity would be generated out-of-state in comparison to existing conditions, these projects would not be anticipated to result in significant environmental impacts (e.g., generate levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, or result in a cumulatively considerable net increase in non-attainment areas). This impact is considered *less than significant* for all renewable energy types under the 33 percent RES (high and low load).

All Renewable Energy Project Types

All renewable energy projects no matter their size, location out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with Federal environmental review requirements (e.g., NEPA) or other applicable state requirements. The environmental review process for all renewable project types under either the 20 percent RPS or 33 percent RES would assess whether project implementation would result in long-term operational air quality impacts.

At this time, the specific location, type, and number of renewable energy projects constructed out-of-state is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, energy demands, environmental constraints, and other market constraints. Nonetheless, as discussed with regards to the in-state projects, renewable generation produces less criteria air pollutants per unit of electrical output than fossil-fuel generation it would displace with implementation of the 33 percent RES plausible compliance scenarios (high or low load conditions). Additionally, in comparison to existing conditions less total electricity would be generated out-of-state under the 33 percent RES (e.g., approximately 98,000 GWh versus 60,000 under the low load scenario and 86,000 under the high load scenario). Further, subsequent environmental review would be conducted at such time that a renewable energy project is proposed and land use entitlements are sought. Thus, project-generated long-term operational emissions of criteria air pollutants would not be anticipated to result in significant environmental impacts (e.g., generate levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, or result in a cumulatively considerable net increase in non-attainment areas). It is important to note that there is no difference in the impacts that would occur under the 20 percent RPS versus the 33 percent RES (e.g., in comparison to existing conditions less total electricity would be generated out-of-state under both the low and high load scenarios). This impact is considered less than significant for all renewable energy types under the 33 percent RES (high and low load).

IMPACT B-3	**Impacts to Sensitive Receptors in the Project Area from Exposure to Substantial Pollutant Emissions (e.g., localized criteria air pollutants, toxic air contaminates) and Odors. Because the specific out-of-state air quality impacts of the 33 percent RES cannot be identified with any certainty, and these projects could potentially expose sensitive receptors to substantial localized criteria air pollutants, toxic air contaminants , or odors, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).**

All Renewable Energy Project Types

As discussed above under Impact B-1, all renewable energy projects no matter their size, location out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with Federal environmental review requirements (e.g., NEPA) or other applicable state requirements. The environmental review process for all renewable project types under either the 20 percent RPS or 33 percent RES would assess whether project implementation would result in the exposure of sensitive receptors to air quality impacts.

At this time, the specific location, type, and number of renewable energy projects constructed out-of-state is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, energy demands, environmental constraints, and other market constraints. Nonetheless, the analysis provided herein provides a reasonable accounting of the types of environmental impacts that would occur with implementation of the 33 percent RES plausible compliance scenarios (high or low load conditions) as discussed below for the exposure of sensitive receptors to substantial emissions. Further, subsequent environmental review would be conducted at such time that a renewable energy project is proposed and land use entitlements are sought.

The primary criteria air pollutant of localized concern is CO. Local mobile-source CO emissions near roadway intersections are a direct function of motor vehicle activity, particularly during peak commute hours, including traffic volume, speed, and delay. Transport of CO is extremely limited because it disperses rapidly with distance from the source under normal meteorological conditions. Under specific meteorological conditions, CO concentrations near roadways and/or intersections may reach unhealthy levels with respect to local sensitive land uses, such as residential areas, schools, playgrounds, childcare facilities, and hospitals. Consequently, CO emissions are typically analyzed at a local rather than a regional level. Additionally, because increased CO concentrations are usually associated with roadways that are congested and with heavy traffic volume, the criteria to determine if project-generated emissions would result in the exposure of sensitive receptors to substantial pollutant concentrations is tied the project’s effect on the delay times and LOS of local intersections.

As discussed in Section M, Transportation and Traffic, although detailed information is not currently available, renewable energy projects would be anticipated to result in short-term construction and long-term operational traffic from worker commute-, maintenance/operation-, and material delivery-related trips. The amount of construction activity would fluctuate depending on the particular type, number, and duration of usage for the varying equipment; and the phase of construction (e.g., demolition, construction, erection). These variations would affect the amount of project-generated traffic for both worker commute trips and material deliveries. The amount of operational traffic would also vary depending on the size and type of renewable energy project. Thus, depending on the amount of trip generation and the location of the renewable energy project, implementation could conflict with applicable programs, plans, ordinances, or policies, specifically the degradation of delay times and LOS of local intersections, which are tied as discussed above to localized CO impacts. Long-term operation of stationary sources could also result in localized CO emissions at sensitive receptors if located at close distance to new renewable energy projects.

During construction of renewable energy projects out-of-state, toxic air contaminants (TACs) could be generated from a variety of construction activities, but primarily composed of exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips. Construction activities could be located in areas where naturally occurring substances are present in the soil, thatif These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment. The amount of TAC’s and associated unit risk factors from operational activities would also vary depending on the size and type of renewable energy project. Even though project implementation would be anticipated to produce less TACs overall due to the fact renewable energy production produces less TAC’s per unit of electricity output than the fossil-fuel generation it would displace under the plausible compliance scenarios, the exposure of sensitive receptors is highly dependent on the their distance from the source.

With regards to both project-generated construction and operational TAC emissions, the dose to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance or substances in the environment, which is positively correlated with distance from the source, and the duration of exposure to the substance. Thus, a new renewable energy project could be located in an area where sensitive receptors are currently located and no current sources exist, resulting in a net increase in exposure from project implementation.

Lastly, though the types of renewable energy projects listed in the Project Description would not be anticipated to result in any construction-related odor emissions, long-term operational activities could depending on the exact type of stationary sources on-site. Even diesel emissions at a close distance could be considered an objectionable odor source.

In summary, the specific location, type, and number of renewable energy projects constructed out-of-state is not known at this time. However, construction and operational activities could result in the generation of localized CO emissions, TACs, and odors. Thus, because the specific air quality impacts of new renewable projects needed to comply with the 33 percent RES cannot be identified with any certainty, and activities associated with these projects, depending on the exact location of the renewable energy projects in relation to existing sensitive receptors, could result in the exposure thereof to substantial pollutant concentrations or odors, this impact is considered potentially significant for all renewable energy types under the 33 percent RES (high and low load). It is important to note that there is no difference in the out-of-state impacts that would occur under the 20 percent RPS versus the 33 percent RES.

4. Mitigation

Mitigation is required for the following significant or potentially significant impacts.

Mitigation Measure B-1

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**
- **Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.**
- **Comply with local plans, policies, ordinances, rule, and regulations regarding air quality-related emissions and associated exposure.**
- **Apply for, secure, and comply with all appropriate air quality permits for project construction and operations from the local agencies with air**

quality jurisdiction and from other applicable agencies (e.g., EPA), if appropriate, prior to construction mobilization.

- **Prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. Implementation of the above mitigation would reduce this impact to a less-than-significant level

for all renewable energy types under the 33 percent RES plausible compliance scenarios (high and low load conditions).

Mitigation Measure B-2

- **Implement Mitigation M-1 above.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented.

Implementation of the above mitigation would reduce this impact to a less-than-significant level for all renewable energy types under the 33 percent RES (high and low load conditions).

III.C. BIOLOGICAL AND FOREST RESOURCES

This section addresses biological and forest resources that could be affected by implementation of renewable energy project necessary for compliance with the proposed Renewable Electricity Standard. The information presented is based on previous evaluations of potential impacts to biological resources from renewable energy projects including, but not limited to, the following documents:

- Bureau of Land Management (BLM), Final Programmatic EIS on Wind Energy Development on BLM-administered Land in the Western United States, June 2005. http://windeis.anl.gov/documents/fpeis/index.cfm
- BLM, Draft Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States, May 2008 http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide/Documents/draft_programmatic.html
- DOE-BLM, Final Programmatic EIS, Designation of Energy Corridors on Federal Lands in the 11 Western States, November 2008. http://corridoreis.anl.gov/documents/fpeis/vol1/WWEC_FPEIS_FrontI.pdf
- CEC, Draft EIS and Draft Desert Area Conservation Plan Amendment for the SES Solar Two Project, February, 2010. http://www.energy.ca.gov/sitingcases/solartwo/documents/index.html

1. ENVIRONMENTAL SETTING

(a). CALIFORNIA

California is one of the most biologically diverse areas in the world. Its varied topography and climate have given rise to a remarkable diversity of habitats and a correspondingly diverse array of both plant and animal species. California has more species than any other state in the United States and also has the greatest number of endemic species, those that occur nowhere else in the world (DFG 2007).

California contains examples of most of the major biological provinces, or biomes, in North America, including grassland, shrubland, deciduous forest, coniferous forest, tundra (alpine), mountains, deserts, rainforest (temperate), marine, estuarine, and freshwater habitats. Each of these biomes contains many different types of plant communities, such as redwood forests, vernal pool wetlands, or blue oak woodlands. Altogether, the state supports 81 types of forests, 107 types of shrublands, and 52 types dominated by herbaceous plants, in addition to 27 other types of vegetation (Sawyer and Keeler-Wolf 1995). Some of California's plant species and communities, such as mixed conifer forests, chamise chaparral, and creosote scrub, are widespread. Others are highly restricted in their distributions, such as unique stands of Crucifixion-thorn, Gowen cypress, Hinds walnut, and Torrey pine (DFG 2007).

Some parts of the state are particularly rich in plant species diversity. Areas with the greatest number of plant species are the Klamath and inner North Coast ranges, the high Sierra Nevada, the San Diego region, and the San Bernardino Mountains. Other regions with considerable plant diversity are the outer North and Central Coast Ranges, the Cascade Range, the Sierra Nevada foothills, and the western transverse Range (DFG 2007). The plant species richness by region is shown at the following website http://www.dfg.ca.gov/biogeodata/atlas/pdf/Plant_24b.pdf.

California has a great number of animal species, representing large portions of wildlife species nationwide. The state's diverse natural communities provide a wide variety of habitat conditions for wildlife. The state's wildlife species include 84 species of reptiles (30 percent of the total number found in the United States); 51 species of amphibians (22 percent of U.S. species); 67 species of freshwater fish (8 percent of U.S. species); 433 species of birds (47 percent of U.S. species); and 197 mammal species (47 percent of U.S. species). Seventeen species of mammals, 17 species of amphibians, and 20 species of freshwater fish live here and nowhere else (DFG 2007).

Animal species are not equally distributed across the state. Some of California's natural communities are particularly rich in wildlife species, supporting hundreds of species each. Twenty-four habitats—including valley foothill riparian, mixed conifer, freshwater wetlands, mixed chaparral, and grasslands in the state—support more than 150 terrestrial animal species each. Oak woodlands also are among the most biological diverse communities in the state, supporting 5,000 species of insects, more than 330 species of amphibians, reptiles, birds and mammals, and several thousand plant species (DFG 2007).

California Bioregions

California has been classified into nine bioregions by California Department of Fish and Game (DFG) for purposes of developing a comprehensive wildlife conservation strategy for the state. These regional divisions were based on the state's physiographic characteristics (i.e., watersheds and vegetation communities) coupled with consideration of wildlife- and natural resources management areas of responsibility. The regional approach facilitated the discussion of habitats, ecosystems, and conservation issues at a scale appropriate for conservation planning and compatible with resource management jurisdictions and decision-making authorities. A brief summary is provided below of each bioregion, except for the marine region which is not expected to be affected by the proposed regulation. The information below is excerpted from the California Wildlife Action Plan (DFG 2007).

Mojave Desert Region

The vast Mojave Desert's more than 32 million acres extend into four states: California, Nevada, Arizona, and Utah. Within California, the Mojave Region's 20 million acres cover one-fifth of the state, spanning an area larger than the counties of San Diego, Orange, Los Angeles, Imperial, Riverside, Ventura, Santa Barbara, and San Luis Obispo combined.

About 80 percent of the Mojave Desert in California is managed by federal agencies, each of which has differing sets of missions that often extend beyond wildlife conservation. BLM is the largest land manager of the region and oversees 8 million acres, or 41 percent, of the federally owned sector. The National Park Service manages the Mojave National Preserve and Death Valley and Joshua Tree national parks, which account for another 26 percent of the region. The Department of Defense manages five military bases that cover about 13 percent of the region. California Department of Parks and Recreation (State Parks) and DFG wildlife areas account for just 0.32 percent of the region. About 18 percent of the region belongs to private landowners or municipalities.

Lying in the rain shadow of the southern Sierra Nevada and Southern California's Transverse and Peninsular Ranges, the dry Mojave landscape is highlighted by dramatic geologic features, encompassing peaks, cliffs, canyons, dry washes, sand dunes, and large playas. Variations in elevation and soil composition and different orientations to the wind and sun, along with desert springs, moist seeps, and two major riparian corridors, provide isolated microclimates and ecosystems throughout the region.

The harsh yet diverse environment of the Mojave has facilitated the evolution of numerous endemic and specially adapted species of plants and wildlife on islands of unique habitat in a sea of creosote bushes, the most widespread plant community of the state. From 282 feet below sea level in Death Valley to altitudes of 11,000 feet in the Panamint Mountains, the range of habitats supports 130 different plant alliances. However, the landscape is mostly a moderately high plateau at elevations between 2,000 and 3,000 feet. The common habitats of the region are creosote bush scrub, desert saltbush, Joshua tree scrub, desert wash, alkali scrub, and juniper-pinyon woodlands. Although limited in area, springs, seeps, perennial streams of the Panamint Range's Surprise Canyon and Cottonwood Creek, along with the Amargosa and Mojave rivers, are vital wet habitats supporting wildlife diversity in the region.

The Mojave Desert is home to extraordinary plants and wildlife. The Joshua tree, barrel, and prickly pear cacti, and pinyon pine highlight the desert landscape, home to prairie falcons, burrowing owls, desert tortoises, rosy boas, desert horned lizards, collared and leopard lizards, Mohave ground squirrels, kangaroo rats, Mojave River and Amargosa voles, bobcats, kit foxes, mountain lions, and bighorn sheep.

Colorado Desert Region

California's Colorado Desert is part of the larger Sonoran Desert, which extends across southwest North America. The Colorado Desert region encompasses approximately 7 million acres, reaching from the Mexican border in the south to the higher-elevation Mojave Desert in the north and from the Colorado River in the east to the Peninsular mountain range in the west.

Public lands in the desert are managed by several different federal and state agencies, all of which have differing sets of missions that often expand beyond wildlife conservation. BLM is the Colorado Desert region's largest land manager, with about 2.9 million acres, or 43.1 percent of the region. Department of Defense lands account for about 500,000 acres, or 7 percent, of the region. A number of other public landholdings occur around the Salton Sea, with State Parks, DFG, and U.S. Fish and Wildlife Service (USFWS) managing lands along and under the sea. Joshua Tree National Park spans the transition from the Mojave to the Colorado Desert, with slightly less than half the park, about 340,000 acres, in the Colorado Desert. Anza Borrego Desert State Park encompasses over 600,000 acres, or nearly 9 percent, of the region, and the Santa Rosa Wildlife Area, which includes DFG, State Lands Commission, and BLM lands, encompasses about 100,000 acres. Together, Joshua Tree National Park, Anza Borrego Desert State Park, and the Santa Rosa Wildlife Area, along with other protected lands in the Mojave Desert, are part of the Mojave and Colorado Deserts Biosphere Reserve, designated by the United Nations as an important global site for preservation of the biological and cultural resources of these two desert regions.

Most of the Colorado Desert lies at a relatively low elevation, below 1,000 feet, with the lowest point of the desert floor at 275 feet below sea level in the Salton Trough. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet, most of the region’s mountains do not exceed 3,000 feet. These ranges block moist coastal air and rains, producing the region’s arid climate.

The Colorado Desert’s climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never receives frost. In addition, the Colorado Desert, especially toward the southern portion of the region, has two rainy seasons per year, in the winter and late summer, while the more northerly Mojave Desert receives only winter rains.

The region’s terrestrial habitats include creosote bush scrub; mixed scrub, including yucca and cholla cactus; desert saltbush; sandy soil grasslands; and desert dunes. Higher elevations are dominated by pinyon pine and California juniper, with areas of manzanita and Coulter pine. In addition to hardy perennials, more than half of the desert’s plant species are herbaceous annuals, and appropriately timed winter rains produce abundant early spring wildflowers. In the southern portion of the region, the additional moisture supplied by summer rainfall fosters the germination of summer annual plants and supports smoketree, ironwood, and palo verde trees. Common desert wildlife include mule deer, bobcat, desert kangaroo rat, cactus mouse, black-tailed jackrabbit, Gambel’s quail, and red-diamond rattlesnake. Among sensitive species are flat-tailed horned lizard, Coachella Valley fringe-toed lizard, desert tortoise, prairie falcon, Andrews’ dune scarab beetle, Peninsular bighorn sheep, and California leaf-nosed bat.

In the Colorado Desert’s arid environment, aquatic and wetland habitats are limited in extent but are critically important to wildlife. Groundwater springs and runoff from seasonal rains form canyon-mouth-associated alluvial fans, desert arroyos, desert fan palm oases, freshwater marshes, brine lakes, desert washes, ephemeral and perennial streams, and riparian vegetation communities dominated by cottonwood, willow, and non-native tamarisk. Two of the region’s most significant aquatic systems are the Salton Sea and the Colorado River. While most desert wildlife depend on aquatic habitats as water sources, a number of species, such as arroyo toad, desert pupfish, Yuma clapper rail, and southwestern willow flycatcher, are restricted to these habitats. In some places, summer rains produce short-lived seasonal pools that host uncommon species, such as Couch's spadefoot toad.

Desert fan palm oases are rare ecological communities found only in the Colorado Desert. They occur only where permanent water sources are available, such as at springs or along fault lines, where groundwater is forced to the surface by the presence of hard, impermeable rock, and can be found in the San Jacinto, Santa Rosa, and Little San Bernardino mountains, Indio and Mecca-Orocopia hills, and in the canyons of Anza Borrego Desert State Park. With an overstory of desert fan palm trees, these communities provide unique islands of shade, moisture, and vegetation in an otherwise arid and sparse landscape. Fan palm oases host species found nowhere else in the desert, like the two-inch, blue-black, giant palm-boring beetle, which is endemic to this community, and the Western yellow bat, which is strongly associated with this habitat. The oases also allow a number of other species, normally found in more mesic coastal and forest environments, to live in the desert, including California mountain king snake, gopher snake, Western screech-owl, bobcat, and hooded oriole.

South Coast Region

California's South Coast encompasses more than 8 million acres, extending along the coast from the middle of Ventura County in the north to the Mexican border in the south. Inland, the region is bounded by the Peninsular mountain ranges and the transition to the Mojave and Colorado deserts on the east and by the Transverse mountain ranges on the north. It is an area of strikingly varied landscapes, ranging from wetlands and beaches to hillsides, rugged mountains, arid deserts, and densely populated metropolitan areas.

The region's coastal habitats include coastal strand, lagoons, and river-mouth estuaries that transition from riparian wetlands to fresh and saltwater marshes. California least tern, Western snowy plover, light-footed clapper rail, California brown pelican, and other waterfowl and shorebirds depend on these habitats. Moving inland, the predominant hillside and bluff communities are coastal sage scrub and chaparral.

Southern California's coastal sage scrub is composed of a mix of drought-resistant shrubs and forbs found no place else in the country, commonly including California sagebrush, bush monkeyflower, buckwheat species, and black, purple, or white sage. Chaparral plant communities, also drought tolerant, are characterized by a greater component of woody species, including chamise, manzanita, California lilac, and scrub oak. Inhabitants of sage scrub and chaparral communities include the coast horned lizard, rosy boa, California gnatcatcher, San Diego cactus wren, and Quino checkerspot butterfly. Isolated grasslands and vernal pool habitats are interspersed in the coastal landscape and support unique and endemic species such as Stephens' kangaroo rat and fairy shrimp species. Low- to mid-elevation uplands often feature oak woodlands, including Engelmann oak. Higher-elevation mountainous areas are dominated by coniferous forests, including Jeffrey pine, ponderosa pine, big-cone Douglas fir, and white fir, and support sensitive species such as the San Bernardino flying squirrel and long-eared and long-legged myotis bats. Along the Peninsular mountain range, coniferous forests transition to the western edge of the Colorado and Mojave desert ecosystems.

The region's largest river drainages include the Tijuana, San Diego, San Luis Rey, Santa Margarita, Santa Ana, San Gabriel, Los Angeles, Santa Clara, and Ventura rivers. Pine forests occur along high-elevation stream reaches, and mountain drainages host mountain yellow-legged frog, California red-legged frog, Santa Ana sucker, and Santa Ana speckled dace. Lower-elevation river reaches support riparian vegetation species, including cottonwood, willow, sycamore, and coast live oak, which provide habitat for such riparian bird species as the least Bell's vireo, southwestern willow flycatcher, Swainson's thrush, and yellow warbler, as well as the arroyo toad. In urbanized coastal areas, many sections of the region's river corridors are channelized with concrete.

The region is recognized as one of the world's hotspots of biological diversity and is home to a total of 476 vertebrate animal species, approximately 38 percent of all the vertebrate species found in California. It is also distinguished by the tremendous population growth and urbanization that have transformed the landscape since the 1940s.

Central Coast Region

California's Central Coast encompasses approximately 8 million acres and extends from the southern boundary of the Los Padres National Forest north to the San Francisco Bay lowlands. Inland, the region is bounded east of the Diablo and Temblor mountain ranges. The Central Coast landscape is characterized by a rugged coastline, small mountain ranges that roughly parallel the coast, river valleys with rich alluvial soils, and arid interior valleys and hills. Across the region, differences in climate, geography, and soils result in widely varying ecological conditions, supporting diverse coastal, montane, and desert-like natural communities.

Sand dunes and wetlands occur along the coast. Rivermouth estuaries, lagoons, sloughs, tidal mudflats, and marshes make up coastal wetland communities, a unique environment where marine, freshwater, and terrestrial systems meet. Coastal habitats support numerous shorebirds. Coastal estuaries provide important nursery habitats for anadromous and oceanic fish, especially in watersheds where small or seasonally dry upper tributaries provide limited rearing. Elkhorn Slough and Morro Bay are the region's two largest estuaries, with other significant wetlands found at the Pajaro, Salinas, and Santa Maria river mouths, Devereux Slough, and Goleta Slough.

Other coastal habitats include coastal scrub and maritime chaparral. Coastal scrub and grasslands also extend inland along river valleys, like the lower Salinas Valley, where the moist maritime climate reaches through gaps in the coastal ranges. Maritime chaparral, characterized by manzanita and California lilac species adapted to the foggy coastal climate, once dominated sandy hills along Monterey Bay, Nipomo Mesa, Burton Mesa, and Morro Bay. Maritime chaparral is now one of the region's most threatened community types, with its extent severely reduced by development. These scrub and chaparral communities provide important habitat for Morro Bay-, Santa Cruz-, and

Pacific kangaroo rat species and the San Diego desert woodrat, as well as shrubland bird species, including California quail, sage sparrow, rufous-crowned sparrow, and the sensitive California thrasher and Costa's hummingbird. The outer coast ranges, including the Santa Cruz and Santa Lucia mountains, run parallel to the coastline. Well-watered by the moist ocean air, these slopes are drained by streams that run all year. The Santa Lucia Mountains provide most of the water supply to the Salinas River. These ranges support mixed coniferous forests and oak woodlands. The dominant coniferous species include ponderosa pine, Douglas fir, red alder, and, in the north, redwoods. The oak woodlands are dominated by coast live oak and valley oak. Rarer, endemic tree species include Monterey pine and Santa Lucia fir. Wildlife inhabitants of the outer coastal mountains include wide-ranging species such as mountain lion and bobcat and sensitive species that include the California spotted owl, American badger, peregrine falcon, California condor, and golden eagle.

Moving inland across the Gabilan, Diablo, Temblor, and Sierra Madre ranges, the climate becomes progressively drier, and the vegetation shifts to oak woodlands, grasslands, interior chaparral, and desert-like interior scrub. Interior streams are mostly intermittent, drying in the summer and fall, except at the higher elevations of the Sierra Madre ranges, where streams run year round. Biologically diverse oak woodland communities support more than 200 species of plants, 300 vertebrates, and 5,000 invertebrates. Inhabitants of oak woodlands include Western gray squirrel, dusky footed woodrat, Monterey dusky-footed woodrat, pallid bat, and Townsend's big-eared bat. Large expanses of annual grasslands, now dominated by non-native grasses, are inhabited by California ground squirrel and black-tailed jackrabbit, along with sensitive species that include the giant kangaroo rat, burrowing owl, San Joaquin kit fox, American badger, and, in the southern portion of the region, reintroduced tule elk and pronghorn. Interior chaparral habitats support drought-resistant woody shrubs, including manzanita, California lilac, and chamise.

The Central Coast's largest drainages include the Salinas, Santa Maria, Pajaro, and Santa Ynez watersheds. Riverine and riparian habitats are important to amphibian and reptile species, including the California red-legged frog, foothill yellow-legged frog, and western pond turtle, and birds such as the bank swallow, Lawrence's goldfinch, and least Bell's vireo. Steelhead and coho salmon are still present, in small numbers, in most of the streams where they historically occurred. Mammals that use riparian habitats include gray fox, striped skunk, mole and shrew species, and ringtail.

Higher-elevation riparian vegetation in moist coastal climates includes willow, alder, bay, maple, Douglas fir, and sometimes redwood, while valley-bottom riparian communities are dominated by sycamore, willow, alder, and cottonwood. Steep coastal streams in the forested Santa Cruz and northern Santa Lucia mountains are some of the region's most intact systems and host relatively healthy anadromous fish populations. In contrast, the majority of the region's large river-valley floodplain and riparian forests have been replaced by agriculture, and lowland fish assemblages have been severely compromised.

Seasonal vernal-pool wetland complexes are found in many parts of the region, including the Salinas River drainage and coastal dune terraces and mesas of Santa Barbara County, and seasonal sag ponds are found along the San Andreas fault zone, particularly in the eastern portion of San Luis Obispo County. California tiger salamanders, western spadefoot toads, fairy shrimp species, and many endemic plant species depend on these unique seasonal pool habitats.

The San Andreas Fault runs the length of the region and shapes much of the region's geography. Most of the north-south running mountain ranges and valley depressions have been formed as a result of pressure between the two continental plates meeting at this fault zone. Compression, chemical interaction, and surfacing of ancient seabed sediments have produced serpentine soils that are rich in such metals as chromium, nickel, and cobalt, but poor in nutrients. A number of plants have adapted to these harsh, near-toxic conditions, resulting in unique, island-like ecological communities largely restricted to serpentine areas. Several sensitive invertebrates, such as Opler's longhorn moth, also are dependent on or strongly associated with serpentine plant species.

North Coast–Klamath Region

Encompassing approximately 14 million acres, the North Coast–Klamath Region extends along the Pacific coast from the California-Oregon border in the north to the San Francisco Bay watershed in the south. The region's eastern, inland boundary is formed by the Cascade ranges along the northern portion of the region and by the transition to the Sacramento Valley along the southern portion.

The region is characterized by large expanses of rugged, forested mountains that range in elevation from 3,000 feet to 8,000 feet, and includes the Klamath, Siskiyou, Marble, Trinity, and North Coast ranges. The climate varies considerably across the region, with high precipitation levels in many coastal areas and dry conditions and rain shadow effects in some inland valleys. Overall, the region has a fairly wet climate and receives more rainfall than any other part of the state, feeding more than 10 sizeable river systems.

Along the coast, sandy beaches host snowy plover, willet, and sanderling, while rocky shoreline habitats support black oystercatcher, ruddy turnstone, and surfbird. Coastal wetland communities, including estuaries, lagoons, marshes, and open-water bays, are also important for shorebirds and provide nursery habitats for anadromous, oceanic, and near-shore fish. Among the region's notable coastal wetlands are: the estuary at the mouth of the Smith River, Lake Talawa and Lake Earl, Humboldt Bay, the mouth of the Eel River, and Bodega and Tomales bays.

Terrestrial communities along the coast include grasslands, coastal shrub, pine forests, mixed evergreen forests, and redwood forests. Unique, geographically limited habitats include sphagnum bogs and pygmy scrub forests. The region's coastal redwoods are among the largest, tallest, and oldest trees in the world, often exceeding 200 feet in height, 15 feet in diameter, and 2,000 years in age. Redwood groves are patchily distributed across the coastal fog belt that extends up to 40 miles inland and where winter rains and summer fog provide a persistent moist environment. Some inhabitants of coastal redwood forests include black bear, Roosevelt elk, MacGillivray's warbler, olive-sided flycatcher, marbled murrelet, Pacific giant salamander, rough-skinned newt, and banana slug.

The region's inland Klamath-Siskiyou mountain ranges are recognized for their biological diversity; they have been designated as an area of global botanical significance by the World Conservation Union (IUCN), as one of 200 global conservation priority sites by the World Wildlife Fund, and as a proposed United Nations' biosphere reserve. These mountains harbor some of the most floristically diverse temperate coniferous forests in the world, attributable in part to the region's variable climate, geography, and soil types that create a variety of ecological communities. Unique, localized conditions have given rise to endemic species that have evolved to specialize in these areas, including nearly 100 plant species that are restricted to serpentine soils. Additionally, portions of the region remained unglaciated during the last ice ages and have served as centers of distribution for numerous species that sought refuge there. Finally, these mountains represent the intersection of coastal ecosystems with the inland Klamath Basin region. As a result, the inland mountains and river systems support a rich flora and fauna that include species from both regions. The Klamath River system, for instance, harbors both coastal fish, like salmonids and Coast Range sculpin, and fish whose ranges extend from the inland Klamath Basin, such as the tui chub.

Ecological communities of the inland mountain ranges include moist inland forests dominated by Douglas fir, ponderosa pine, and sugar pine mixed with a variety of other conifers and hardwoods; drier oak forests and savannas; serpentine soil–associated plant communities; shrublands, including such species as mountain heather-bilberry, mountain whitethorn, and manzanita; high-elevation subalpine forests dominated by white- and red fir, western white pine, and mountain hemlock; and less-widespread cranberry and pitcher plant fens and alpine grasslands on high peaks. More than 3,000 plant species are known from these mountains, and the area supports some 30 temperate conifer tree species, more than any other ecosystem in the world. Wildlife inhabitants include such sensitive species as the northern spotted owl, northern goshawk, Humboldt marten, and Pacific fisher, as well as common species like mule deer, black bear, and red-tailed hawk.

The region's major inland waterways are part of the Klamath River system, which includes the Klamath, Scott, Shasta, Salmon, and Trinity rivers. In the upper portions of their watersheds, these rivers are centered in alluvial valleys that historically supported freshwater marshes and grasslands but have now been converted to agriculture. Below these alluvial valleys, the Klamath-system rivers are generally confined between steep mountain slopes over most of their length and support fairly narrow riparian habitats. River systems draining the region's Coast Ranges include the Eel, Russian, Mattole, Navarro, Smith, Mad, and Gualala rivers. Because the Coast Range is composed of soft, easily eroded soils, these rivers have carved more extensive riparian habitats and also carry high sediment loads. Most of the North Coast–Klamath Region's large rivers widen as they approach their ocean outlets, forming alluvial floodplains and deltas.

These floodplains once supported extensive black cottonwood, willow, and red alder forests but have now been largely converted to agricultural uses.

The region is known for these extensive river systems and the anadromous fish populations they support. The majority of California's river segments with state or federal Wild and Scenic river designations are in the North Coast–Klamath Region, including portions of the Klamath, Trinity, Smith, Scott, Salmon, Van Duzen, and Eel. Anadromous fish species include coho and chinook salmon, steelhead, coast cutthroat trout, green sturgeon, and Pacific lamprey. Although the region has seen sharp declines in its fish populations due to alterations of the region's freshwater river systems, the remaining fish populations still represent the most important anadromous fish runs in the state. The region's rivers support one-third of the state's chinook, most of the state's coho salmon and steelhead, and all of the coast cutthroat trout.

Modoc Plateau Region

The Modoc Plateau Region is located in the northeastern corner of the state, framed by and including the Warner Mountains and Surprise Valley along the Nevada border to the east and west to the edge of the southern Cascades Range. The region extends north to the Oregon border and south to include the Skedaddle Mountains and the Honey Lake Basin.

Sixty percent of the region is federally managed; the U.S. Forest Service (USFS) manages 30 percent, BLM manages 26 percent, and USFWS and the Department of Defense each manage about 2 percent of the lands. DFG manages 1 percent of the region as wildlife areas. About 37 percent of the lands are privately owned or belong to municipalities.

A million years ago, layered lava flows formed the 4,000–5,000-foot elevation Modoc Plateau, separating the watersheds of the region from the Klamath drainage to the northwest. The waters of the western slope of the Warner Mountains and the Modoc Plateau carved a new course, the Pit River, flowing to the southwest through the Cascades and joining the Sacramento River.

Situated on the western edge of the Great Basin, the Modoc Plateau historically has supported high desert plant communities and ecosystems similar to that region—shrub-steppe, perennial grasslands, sagebrush, antelope bitterbrush, mountain mahogany, and juniper woodlands. Sagebrush plant communities are characteristic of the region, providing important habitat for sagebrush-dependent wildlife. Conifer forests dominate the higher elevations of the Warner Mountains and the smaller volcanic mountain ranges and hills that shape the region. Wetland, spring, meadow, vernal pool, riparian, and aspen communities scattered across the rugged and otherwise dry desert landscape support diverse wildlife. The region has varied aquatic habitats, from high mountain streams to the alkaline waters of Goose Lake and Eagle Lake to clear spring waters of Fall River and Ash Creek.

Northeastern California is an outstanding region for wildlife, providing habitat for mountain lion, mule deer, pronghorn, Rocky Mountain elk, greater sage-grouse, and the colorful waterfowl of the Pacific Flyway that funnel through the area during their annual migrations. Golden eagles, peregrine and prairie falcons, northern goshawks, sandhill cranes, and American white pelicans nest and hunt or forage in the region. The varied aquatic habitats and natural barriers along the Pit River and its tributaries have allowed the evolution of several unique aquatic communities that include endemic fish and invertebrates.

Sierra Nevada and Cascade Region

Extending approximately 525 miles from north to south, the Sierra Nevada and Cascade ranges form the spine of the California landscape. The mostly volcanic southern Cascades stretch from north of the Oregon border southeastward, merging just south of Mt. Lassen with the northern reaches of the predominantly granitic Sierra Nevada. To the south, the Sierra Nevada range embraces the Mojave Desert to the east and curves south to link with the Tehachapi Mountains. The region includes the oak woodland foothills on the western slopes of the Sierra and Cascade ranges and, on the east, the Owens Valley and edges of the Great Basin.

On the west side, the slope of the Sierra Nevada and Cascades rises gradually from near sea level at the floor of the Central Valley to ridges ranging from 6,000 feet in the north to 14,000 feet in the south, then drops off sharply to the east. In contrast, the east side of the Cascades slopes gradually. As the Sierra elevation increases from west to east, life zones transition from chaparral and oak woodlands to lower-level montane forests of ponderosa and sugar pine to upper montane forests of firs, Jeffrey and lodgepole pine and, above timberline, to alpine plant communities.

Federal agencies manage about 61 percent of the Sierra Nevada and Cascades: 46 percent by USFS, 8 percent by the National Park Service, and 7 percent by the Bureau of Land Management. About 2 million acres are wilderness areas, mostly in the eastern and southern Sierra, managed by USFS. Lands managed by the National Park Service include Lassen Volcanic, Sequoia, Kings Canyon, and Yosemite national parks and Devils Postpile National Monument. State parks and wildlife areas account for 1 percent of the region, and the remaining, approximately 36 percent of the Sierra and Cascades, is privately owned. Most of the higher elevations and the eastern Sierra are public lands, whereas most of the oak woodlands and lower mixed conifer forests and rangelands below 3,000 feet on the western slope are in private ownership. There is a checkerboard ownership pattern of private and public lands in areas of the northern half of the Sierra that lie near historical railway routes.

About 40 percent of the state’s surface-water runoff flows to the Central Valley from the Sierra and Cascades. These flows are critical to meet California’s hydropower demands and agricultural and drinking water needs. Much of the water is stored in reservoirs and is conveyed by aqueducts to irrigate agriculture from Redding to Bakersfield and to provide drinking water for most of urbanized California, including the San Francisco Bay Area and Southern California.

The hundreds of creeks and streams of the western slope of the Sierra and Cascades drain via a dozen major river basins to merge with the Sacramento River in the north and the San Joaquin River in the south, eventually joining at the San Francisco Bay Delta. The southern forks of the Kings River and streams farther south drain into the Tulare basin. The streams east of the Sierra crest flow into the Great Basin via the Lahontan, Mono, and Owens drainages. Many of the springs and creeks of northeastern California drain via the Pit River, which winds through the Cascades and joins the Sacramento River at Lake Shasta.

Bold topography, the large elevation gradient, and varied climatic conditions of the Sierra and Cascades support diverse plant communities. Fifty percent of California's 7,000 vascular plants are found in the region, and more than 400 plant species are endemic. The varied conditions and floristically and structurally diverse plant communities provide a large array of habitats important for maintaining California's wildlife diversity and abundance.

There are 572 vertebrate species that inhabit the Sierra Nevada and Cascades region at some point in their life cycle, including 293 birds, 135 mammals, 46 reptiles, 37 amphibians, and 61 fish. Notable species include black bear, mountain lion, mule deer, northern goshawks, California spotted owl, western tanager, Cassin's finch, mountain kingsnake, mountain yellow-legged frog, and golden and cutthroat trout.

Central Valley and Bay-Delta Region

The Central Valley and Bay-Delta Region comprises most of the low-lying lands of central California. Much of the region is part of a vast hydrological system that drains 40 percent of the state's water. This water, falling as either rain or snow over much of the northern and central parts of the state, drains along the Sacramento and San Joaquin rivers into the Delta. In the Delta, freshwater from these rivers mixes with saltwater from San Francisco Bay, creating a rich and diverse aquatic ecosystem. Encompassing 1,600 square miles of waterways, the San Francisco Bay and Delta together form the West Coast's largest estuary and the second-largest estuary in the nation. This region is primarily in private ownership.

The region has four distinct subregions: the San Francisco Bay Area, the Delta, the Sacramento Valley, and the San Joaquin Valley. Each has unique combinations of climate, topography, ecology, and land-use patterns.

The San Francisco Bay Area subregion, the most densely populated area of the state outside of the Southern California metropolitan region, consists of the low-lying baylands, aquatic environments, and watersheds that drain into San Francisco Bay. Low coastal mountains surround San Francisco Bay, with several peaks rising above 3,000 feet. The region receives 90 percent of its surface water from the major Central Valley rivers via the Delta. Other major rivers draining into the Bay include the Napa and Petaluma rivers and Sonoma, Petaluma, and Coyote creeks. The Bay Area has relatively cool, often foggy summers and cool winters, strongly influenced by marine air masses. Rainwater runs off rapidly, and most of the smaller streams are dry by the end of the summer.

The topography allows for a variety of different habitats. The Bay itself has both deep and shallow estuarine (mixed freshwater and saltwater) environments. In addition to estuarine species, the Bay also supports many marine species, including invertebrates, sharks, and marine mammals. Along the shoreline are coastal salt marsh, coastal scrub, tidal mudflats, and salt ponds. Freshwater creeks and marshes, especially those that still have patches of riparian vegetation, are home to aquatic invertebrates and freshwater fish. Upland areas support a mixture of grasslands, chamise chaparral, and live oak and blue oak woodlands. Small stands of redwood, Douglas fir, and tanoak grow in moister areas.

The Great Central Valley of California contains the other three subregions: the Sacramento Valley, the San Joaquin Valley, and the Sacramento–San Joaquin Delta. Together, they form a vast, flat valley, approximately 450 miles long and averaging 50 miles wide, with elevations almost entirely below 300 feet.

The Central Valley is surrounded by the Sierra Nevada on the east, the coastal ranges on the west, the Tehachapi Mountains on the south, and the Klamath and Cascade mountains on the north. Less influenced by marine air than San Francisco Bay, the valley’s climate has hot, dry summers and foggy, rainy winters.

Agriculture dominates land uses in the Central Valley, with very few remnants of natural land remaining. The major natural upland habitats are annual grassland, valley oaks on floodplains, and vernal pools on raised terraces. The more arid lands of the southern San Joaquin Valley also contain alkali sink and saltbush shrublands. Slow-moving rivers along the valley floor provide habitat for fish and invertebrates and help maintain adjacent riparian, wetland, and floodplain habitats.

Hydrology is the main difference between the three Central Valley subregions. The Delta is a low-lying area that contains the tidally influenced portions of the Sacramento, San Joaquin, Mokelumne, and Cosumnes rivers. The Delta was once a huge marsh formed by the confluence of the Sacramento and San Joaquin rivers but has been extensively drained and diked for flood protection and agriculture. Exposure of the rich, organic soils behind these levees has increased oxidation rates to such an extent that the land is breaking down and much of the surface has now subsided below sea level. Due to its natural patterns of flooding, the Delta is relatively less populated than the other subregions.

The second subregion, the Sacramento Valley, contains the Sacramento River, the largest river in the state. This river historically overflowed into several low-lying areas, particularly in its lower reaches. The lower 180 miles of the river, below Chico Landing, are now constrained by levees, and excess floodwaters are diverted into large bypasses to reduce risks to human populations. Oak woodlands, riparian forests, vernal pools, freshwater marshes, and grasslands provide the major natural vegetation of the Sacramento Valley subregion.

The Sacramento Valley is the most prominent wintering site for waterfowl, attracting more than 1.5 million ducks and 750,000 geese to its seasonal marshes along the

Pacific Flyway. Species include northern pintails, snow geese, tundra swans, sandhill cranes, mallards, grebes, peregrine falcons, heron, egrets, and hawks. Black-tailed deer, coyotes, river otters, muskrats, beavers, ospreys, bald eagles, salmon, steelhead, and swallowtail butterflies are just some of the wildlife that abounds in this bioregion. Species on the endangered species list include the winter-run Chinook salmon, delta smelt, giant garter snake, and the western yellow-billed cuckoo.

The third subregion of the Central Valley, the San Joaquin Valley, has two distinct, or separate, drainages. In the northern portion, the San Joaquin River flows north toward the Delta. It captures water via several major rivers that drain the central Sierra Nevada. The southern portion of the valley is isolated from the ocean and drains into the closed Tulare Basin, which includes the beds of the former Tulare, Buena Vista, and Kern lakes. These lakes and vast wetlands historically were fed by the rivers that drain the southern Sierra Nevada (the Kings, Kaweah, Tule, and Kern). These lakes are now dry most of the time because water has been diverted to upland agriculture. Runoff during the wettest years will occasionally flood out of river channels and temporarily refill some of these lakebeds. The California Aqueduct extends along the entire western edge of the valley, delivering water from the Delta to farmers in the Tulare basin and over the Tehachapi Mountains to Southern California.

Habitat includes vernal pools, valley sink scrub and saltbush, freshwater marsh, grasslands, arid plains, orchards, and oak savannah. The growth of agriculture in the Central Valley has converted much of the historic native grassland, woodland, and wetland to farmland.

Historically, millions of acres of wetlands flourished in the bioregion, but stream diversions for irrigation dried all but about 5 percent. Precious remnants of this vanishing habitat are protected in the San Joaquin Valley subregion in publicly owned parks, reserves, and wildlife areas. Rare species include San Joaquin kit fox, blunt-nosed leopard lizard, San Joaquin antelope squirrel, and Tipton kangaroo rat, Hoover's woolystar, Mason's lilaeopsis, and San Joaquin woollythreads.

Sensitive Biological Resources

Special-status species include plants and animals in the following categories:

- species officially listed by the State of California or the federal government as endangered, threatened, or rare;
- candidates for state or federal listing as endangered, threatened, or rare or proposed for listing;
- taxa (i.e., taxonomic categories or groups) that meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the State CEQA Guidelines;
- species identified by DFG as species of special concern;

- species listed as Fully Protected under the California Fish and Game Code;
- species considered by California Department of Forestry and Fire Prevention (CAL FIRE), BLM, or USFS as sensitive;
- species included on USFWS list of bird of conservation concern (USFWS 2008a);
- plants considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California" (List 1B and 2).

California contains 281 federally and/or state listed plant species (DFG 2010a). This list is available at http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf. In addition, there are 1,569 special-status plant species (Lists 1B and 2) in California (CNPS 2010). Information about these species, including status, range, distribution, and habitat associations can be viewed on CNPS's online inventory at http://www.cnps.org/cnps/rareplants/inventory.

There are 156 federally and/or state listed animal species in California (DFG 2010b) http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf. The primary source of information used to identify other special-status wildlife in California was the Wildlife Species Matrix, which consists of all wildlife taxa (species and subspecies) on the DFG's Special Animals List at the time of publishing the California Wildlife Action Plan (DFG 2007). The list of California bird species of special concern was significantly updated in February 2008 and therefore the output from the matrix was revised to reflect the status change for these species. The special status animal list includes 371 species, including 87 mammals, 86 birds, 38 reptiles, 34 amphibians, 84 fishes, and 42 invertebrates. Of these, 154 are endemic to the state. Table III.C-1 summarizes the number of special-status wildlife species by region in California. Appendix III.C-1 provides the status, habitat types, and bioregions for each of these species.

Sensitive habitats are those identified as sensitive natural communities "rare and worthy of consideration" in the List of California Terrestrial Natural Communities Recognized by the CNDDB, as well as those subject to U.S. Army Corps of Engineers (USACE) jurisdiction under Section 404 of the Clean Water Act (CWA), Section 1602 of the California Fish and Game Code, and the state's Porter-Cologne Water Quality Control Act, which protects waters of the state. Sensitive habitats are of special concern because they have high potential to support special-status plant and animal species. Sensitive habitats can also provide other important ecological functions, such as enhancing flood and erosion control and maintaining water quality. California contains 619 types of sensitive natural communities (CNDDB 2010).

Table III.C-1. Number of Special-Status Wildlife Species by Region in California								
Taxon	Mojave Desert	Colorado Desert	South Coast	Central Coast	North Coast	Modoc Plateau	Sierra Nevada/ Cascade	Central Valley
Invertebrates	2	1	8	14	12	2	13	15
Fish	9	3	8	12	32	18	26	20
Amphibians	4	5	8	8	12	1	20	6
Reptiles	14	19	17	14	2	3	11	11
Birds	43	52	55	52	46	35	52	52
Mammals	27	29	33	27	23	17	31	30
Total	99	109	129	127	127	76	153	134

Source: Ascent 2010, DFG 2010b, Shuford and Gardali 2008, DFG 2007

(b). OUT-OF-STATE AREAS

Because the proposed adoption of regulations is a statewide regulatory change, the primary project area is the State of California. However, changes in California could affect other portions of the Western Electricity Coordinating Council (WECC) service territory, which includes all of Arizona, California, Colorado, Idaho, Nevada, Oregon, Utah, Washington and the Canadian provinces of British Columbia and Alberta and parts of Montana, Nebraska, New Mexico, South Dakota, Texas, Wyoming, and Baja California, Mexico.

Vegetative communities occurring within this western region span a great variety of ecosystems, from arid deserts to coastal coniferous forests. Each vegetative community is unique in species composition, richness, diversity, and structure. A wide range of environmental factors, including climate, elevation, aspect, precipitation, and soil type, influence the presence and development of various types of vegetation and wildlife throughout the region comprising the WECC service territory.

The Department of Energy and BLM summarized the biological resources in an area that largely coincides with the WECC service territory in the Programmatic Environmental Impact Statement for the Designation of Energy Corridors on Federal Land in 11 Western States (DOE-BLM 2008). In the 11-state area, which roughly corresponds to the WECC service area, 34 ecoregions were identified. A description of these habitats is provided in Appendix III.C-2.

The various ecoregions encompassed in the western region include a diversity of plant communities and species that provide a wide range of habitats that support diverse assemblages of terrestrial wildlife. Table III.C-2 lists the number of wildlife species that occur within western North America, excluding California which is described in more detail above. Potential renewable energy development could occur in many of the ecosystems occurring in these regions. Therefore, many of the wildlife species that occur within these states may be expected to occur within or near a proposed energy development project.

Table III.C-2. Number of Wildlife Species in Western North America[1]

State	Amphibians	Reptiles	Mammals[2]	Birds
Alberta[3]	No data	No data	19	189
Arizona	29	112	169	533
Baja, Mexico[4]	4	43	50+	~200
British Columbia[5]	20	16	136	488
Colorado	18	56	131	478
Idaho	15	24	111	402
Montana	18	17	110	417
Nevada	15	54	125	472
New Mexico	25	96	156	510
Oregon	31	29	137	492
Utah	17	57	136	428
Washington	27	22	116	468
Wyoming	12	27	121	420

[1] excludes marine species, native species that have been extirpated and not subsequently reintroduced into the wild and feral domestic species
[2] Includes wild horses and burros
[3] Source: Alberta Biodiversity Monitoring Institute http://www.abmi.ca/abmi/biodiversitybrowser/species.jsp. Accessed May 7, 2010
[4] Source: World Wildlife Fund http://www.worldwildlife.org/wildworld/profiles/terrestrial/na/na1301_full.html. Access May 10, 2010
[5] Source: Government of British Columbia, Ministry of the Environment http://www.env.gov.bc.ca/wld/bio.htm Accessed May 7, 2010

Source: DOE-BLM 2008, p.2-154, except where noted

Federally Listed Species in Western United States

The WECC Service Area is primarily made up of 10 states in addition to California (which is described in more detail above). The number of plant and wildlife species protected by the federal endangered species act varies by state, with Oregon, Arizona, New Mexico, Washington and Utah containing the highest number of listed species. Table III.C-3 provides the number of listed species by taxon and state. Lists of federally protected species by state is available at http://www.fws.gov/ecos/ajax/tess_public/StateListing.do?state=all.

Table III.C-3. Number of Federally Listed Species in Western United States[1]

State	Plants	Invertebrates	Fish	Amphibians	Reptiles	Birds	Mammals	Total
Arizona	17	1	17	2	2	7	10	56
Colorado	13	1	6	0	0	6	5	31
Idaho	5	5	6	0	0	1	6	23
Montana	3	0	3	0	0	4	4	14
Nevada	9	1	24	0	1	1	2	38
New Mexico	13	7	13	1	1	5	5	45
Oregon	15	3	20	0	3	6	10	57
Utah	25	1	8	0	1	3	5	43
Washington	9	1	15	0	2	5	11	43
Wyoming	5	0	6	0	1	3	5	20

[1] marine species, such as marine mammals, anadromous fish, and sea turtles. Also includes species that historically occurred but are currently presumed to be extirpated in some locations such as grizzly bear and Eskimo curlew

Source: USFWS 2010

2. REGULATORY SETTING

Biological resources in California are protected and/or regulated by a variety of federal and state laws and policies. Key regulatory and conservation planning issues applicable to the proposed project are summarized in Table III.C-4.

Table III.C-4. Applicable Laws and Regulations for Biological Resources	
Applicable Law	Description
Federal	
Federal Endangered Species Act	Designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat.
Migratory Bird Treaty Act	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.
Clean Water Act	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request state certification that the proposed activity would not violate state and federal water quality standards.
Rivers and Harbors Act of 1899	Requires permit or letter of permission from USACE prior to any work being completed within navigable waters.
U.S. Environmental Protection Agency (USEPA) Section 404 (b)(1) Guidelines	Requires the USACE to analyze alternatives in a sequential approach such that the USACE must first consider avoidance and minimization of impacts to the extent practicable to determine whether a proposed discharge can be authorized.
National Environmental Policy Act (NEPA)	NEPA requires an evaluation of environmental impacts of projects proposed on federal lands or receiving federal funding.

Table III.C-4. Applicable Laws and Regulations for Biological Resources	
Applicable Law	Description
California Desert Conservation Area Plan (CDCA)	Comprises one of two national conservation areas established by Congress at the time of the passage of the Federal Land and Policy Management Act (FLPMA). The FLPMA outlines how the BLM would manage public lands. Congress specifically provided guidance for the management of the CDCA and directed the development of the 1980 CDCA Plan.
Federal Noxious Weed Act of 1974 (P.L. 93-629) (7 U.S.C. 2801 et seq.; 88 Stat. 2148)	Establishes a federal program to control the spread of noxious weeds. Authority is given to the Secretary of Agriculture to designate plants as noxious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit.
Executive Order 13112, "Invasive Species," February 3, 1999	Federal agencies are mandated to take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.
Executive Order 11988, "Floodplain Management," May 24, 1977	Requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.
Executive Order 11990, "Protection of Wetlands," May 24, 1977	Requires all federal agencies to consider wetland protection as an important part of their policies and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," January 10, 2001	Requires that each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations develop and implement a Memorandum of Understanding (MOU) with the USFWS that shall promote the conservation of migratory bird populations.
Wild Free-Roaming Horses and Burros Act	Provides for the protection of wild free-roaming horses and burros. Directs BLM and USFS to manage wild horses and burros on lands under their jurisdiction.

Table III.C-4. Applicable Laws and Regulations for Biological Resources	
Applicable Law	Description
Bald and Golden Eagle Protection Act	Declares it is illegal to take, possess, sell, purchase, barter, offer to sell or purchase or barter, transport, export or import a bald or golden eagle, alive or dead, or any part, nest or egg of these eagles unless authorized. Active nest sites are also protected from disturbance during the breeding season.
BLM Manual 6840 — Special Status Species Management (BLM 2001),	Establishes special status species policy on BLM land for plant and animal species and the habitats on which they depend. The policy refers species designated by the BLM State Director as sensitive.
National Forest Management Act (NFMA)	Requires USFS to provide for a diversity of plant and animal communities as part of its multiple use mandate. NFMA regulations require that each forest prepare a plan that provides the strategic direction for managing the land and its resources over the next 10 to 15 years. USFS must maintain viable populations of existing native and desired non-native species in the planning area. The Regional Forester designates sensitive and management indicator species as part of a proactive approach to ensuring biodiversity is maintained.
Listed Species Recovery Plans and Ecosystem Management Strategies	Provides guidance for the conservation and management of sufficient habitat to maintain viable populations of listed species and ecosystems. Relevant examples to the RES Regulation include: Desert Tortoise Recovery Plan, Flat-tailed Horned Lizard Rangewide Management Strategy; Amargosa Vole Recovery Plan, Recovery Plan for Upland Species of the San Joaquin Valley, California
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California’s rare, threatened, and endangered species.
Porter-Cologne Water Quality Control Act	Requires that each of the nine RWQCBs prepare and periodically update basin plans for water quality control. Each basin plan sets forth water quality standards for surface water and groundwater and actions to control nonpoint and point sources of pollution to achieve and maintain these standards.

Table III.C-4. Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
Z'berg-Nejedly Forest Practice Act	Ensures that logging on timberland is done in a manner that will preserve and protect fish, wildlife, forests and streams, enforced by CAL FIRE
California Forest Practice Rules 2010	State Board of Forestry has authority delegated by legislature to adopt forest practice and fire protection regulations on non federal lands. These regulations carry out California legislature's mandates to protect and enhance the State's unique forest and wildland resources.
Wetlands Preservation (Keene-Nejedly California Wetlands Preservation Act) (Public Resources Code, Section 5810 et seq.)	California has established a successful program of regional, cooperative efforts to protect, acquire, restore, preserve, and manage wetlands. These programs include, but are not limited to, the Central Valley Habitat Joint Venture, the San Francisco Bay Joint Venture, the Southern California Wetlands Recovery Project, and the Inter-Mountain West Joint Venture.
California Wilderness Preservation System (Public Resources Code, Section 5093.30 et seq.)	Establishes a California wilderness preservation system to be composed of state-owned areas to be administered for the use and enjoyment of the people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, provide for the protection of such areas, preserve their wilderness character, and provide for the gathering and dissemination of information regarding their use and enjoyment as wilderness.
Significant Natural Areas (Fish and Game Code section 1930 et seq.)	Designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.
Protection of Birds and Nests (Fish and Game Code section 3503 and 3503.5)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Raptors (e.g., hawks and owls) are specifically protected.
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds.
Fur-bearing Mammals (Fish and Game Code sections 4000 and 4002)	Lists fur-bearing mammals which require a permit for take.

Table III.C-4. Applicable Laws and Regulations for Biological Resources	
Applicable Law	Description
Fully Protected Species (Fish and Game Code Sections 3511,4700, 5050, and 5515)	The Fish and Game code identifies several amphibian, reptile, fish, bird and mammal species which are Fully Protected. DFG cannot issue a take permit), except for take related to scientific research.
California Environmental Quality Act (CEQA Guidelines section 15380)	CEQA defines rare species more broadly than the definitions for species listed under the state and federal Endangered Species Acts. Under section 15830, species not protected through state or federal listing but nonetheless demonstrable as “endangered” or “rare” under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society (CNPS) and some animals on the CDFG’s Special Animals List.
Oak Woodlands (California Public Resources Code Section 21083.4)	Requires counties to determine if a project within their jurisdiction may result in conversion of oak woodlands that would have a significant adverse effect on the environment. If the lead agency determines that a project would result in a significant adverse effect on oak woodlands, mitigation measures to reduce the significant adverse effect of converting oak woodlands to other land uses are required.
Lake and Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFG in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 et seq. and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.

Table III.C-4. Applicable Laws and Regulations for Biological Resources	
Applicable Law	Description
California Food and Agriculture Code, section 403	The California Department of Food and Agriculture is designated to prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.
Noxious Weeds (Title 3, California Code of Regulations, section 4500)	List of plant species that are considered noxious weeds.
Regional and Local	
Regional Habitat Conservation Plans and Natural Communities Conservation Plan (HCP/NCCP)	Establish a coordinated process for permitting and mitigating the incidental take of endangered species and conserving natural resources. Approved plans likely relevant to the development of renewal energy projects: Western Riverside County HCP; Lower Colorado River Multi-Species Conservation Plan; Coachella Valley Multi-Species HCP; Orange County Central/Coastal NCCP/HCP; Kern Water Bank HCP; Southeastern Lincoln County, NV HCP. Other plans under development include the Desert Renewable Energy Conservation Plan for renewable energy projects in the Mojave and Colorado Desert regions and Solano Multispecies Habitat Conservation Plan.
Various County General Plans	General plans typically designate areas for land usages, guiding where new growth and development should occur while providing a plan for the comprehensive and long-range management, preservation, and conservation of and natural resources and open-space lands.
Various Local Ordinances	Local ordinances provide regulations for proposed projects for activities such as grading plans, erosion control, tree removal, protection of sensitive biological resources and open space.

3. PROJECT IMPACTS

This section describes the analysis of impacts to biological and forest resources associated with the proposed regulation change. It describes the methods used to determine the potential impacts of renewable energy and transmission projects necessary for compliance with the RES and the thresholds of significance of those impacts. Mitigation to reduce the level of impact is provided in the following section.

(a). METHODS

Potential impacts on biological and forest resources from the proposed regulation change were evaluated primarily on the basis of the information and analyses presented in large-scale renewable energy projects, review of pertinent literature, and information provided in the Renewable Energy Transmission Initiative (RETI), which identifies competitive renewable energy zones (CREZs) in California and in neighboring states that can provide significant electricity to California consumers by the year 2020.

As described in the Project Description, the RES Calculator was used to model anticipated in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data with which to characterize the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

(b). THRESHOLDS OF SIGNIFICANCE

Criteria for determining the significance of impacts related to biological and forest resources were based on the environmental checklist form in Appendix G of the State CEQA Guidelines and mandatory findings of significance.

An impact related to biological resources was considered significant if it would result in any of the conditions listed below.

- Have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the DFG or USFWS.
- Have a substantial effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by CDFG or USFWS.
- Have a substantial adverse effect on federally protected wetlands, as defined by CWA Section 404 (including, but not limited to, marshes, vernal pools, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.
- Substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

An impact to forest resources was considered significant if it would result in any of the conditions listed below.

- Conflict with existing zoning for, or cause rezoning of forest land (as defined in Public Resource Code section 12220(g)), timberland (as defined by in Public Resource Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))
- Result in the loss of forest land or conversion of forest land to non-forest use
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use

(c). GENERAL BIOLOGICAL RESOURCES IMPACTS OF RENEWABLE ELECTRICITY FACILITIES

Wind Power

Development of wind energy projects would involve building wind farms, including grading and paving for site preparation, excavation for turbine foundations, trenching to install underground electric cabling, and other construction activities. Roads would need to be constructed between turbines. Transmission lines would also need to be constructed to deliver the generated energy. Construction and other ground-disturbing activities could result in the direct removal, degradation, and fragmentation of habitat. Construction of wind generating facilities and transmission lines may also affect biological resources by reducing cover, nesting, and foraging habitat, compacting soils, and spreading invasive weeds, which could reduce the quality of the habitat.

Wind farms are typically constructed in areas with adequate wind conditions, and can require a relative large amount of land (e.g., approximately 50 acres to generate 1 MW of electricity). Turbines are often installed along ridgelines, but slopes of greater than 20 percent are usually avoided due to construction difficulties. Wind farms are also usually restricted from locations in designated roadless areas in national forests or areas near major airports which have restrictions of the air space on flight paths for airplanes (RETI 2008).

Operation of wind farms is likely to result in the direct mortality of birds and bats through collision with rotating turbines or transmission lines or trauma from turbulence or pressure changes surrounding the moving turbines. Direct mortality of many avian and bat species from turbines and transmission lines has been well documented. In some cases, high levels of avian mortality have resulted from operation of wind farms. Diurnal raptors are considered to be particularly susceptible to mortality from collision with wind turbines and transmission lines because of their large size and flight characteristics (Erickson et al. 2002). Better siting and turbine design has reduced wildlife mortality (CEC and DFG 2007); however, operation of wind generating projects could result in the direct mortality of bird and bat species.

Wind farms could increase the risk of fire and result in impacts to biological resources. Major fire hazards include hardware and conductor failure, dropping of collection lines, turbine malfunction or mechanical failure, construction related accidents, access vehicle or electrocuted wildlife contact with dry vegetation.

The biological resources that could be affected by wind energy development depend on the specific location of the proposed project and its environmental setting. Most wind power generation to achieve the RES has been modeled to come from projects located in the Tehachapi, Fairmont, Mountain Pass, and Solano regions of California. The other major source of wind power would likely be located out of state/country from the Pacific Northwest, Montana, and Alberta, with smaller amounts from Wyoming and Utah/Southern Idaho. A small percentage of wind power could come from distributed locations within the state, which may include the Modoc Plateau in northeastern California, other areas in and southern California.

Solar Thermal and Solar Photovoltaic

Solar thermal and solar photovoltaic energy development projects would most likely occur in desert areas of California, Arizona, and Nevada. Large expanses of flat terrain, not shaded by hills or tall vegetation are optimal for constructing lenses and reflectors or photovoltaic cells to collect heat from the sun. Construction would involve grading and paving for site preparation and installation of parabolic collectors or photovoltaic cells, and generators to create electricity. In addition, solar thermal projects require a system of pipes through which a fluid, typically oil, is circulated. Roads would need to be constructed between solar collectors and photovoltaic cells for cleaning and maintenance. Transmission lines would also need to be constructed to deliver the generated energy.

The central environmental issue surrounding solar energy development is direct effects and habitat loss for desert tortoise and other sensitive desert wildlife. In addition, human activities in previously undeveloped areas potentially provide food or other attractants in the form of trash, litter, or water, which draw unnaturally high numbers of predators such as the common raven, kit fox, and coyote. Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). In addition to ravens, feral dogs have emerged as significant predators of desert tortoise. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 2008b). Dogs brought to the project site with visitors may harass, injure, or kill desert tortoises, particularly if allowed off leash to roam freely in occupied desert tortoise habitat. Additional traffic along roadways may result in high numbers of wildlife mortality, which would provide an additional attractant and subsidy for opportunistic predators/scavengers such as ravens.

Geothermal

Geothermal energy development projects would most likely occur in California where existing geothermal resources are located, such as Imperial, Kern, and Napa counties.

Out of state locations, especially in Nevada, Utah, and southern Idaho, are also anticipated to be developed with geothermal resources. Construction would involve drilling wells, installation of pipes to transmit steam or water, building power generating engines or turbines, and various other ground disturbing activities. Access roads would need to be constructed for operation and maintenance. Transmission lines would also need to be constructed to deliver the generated energy.

Solid-fuel Biomass

Biomass is waste and by-products that can be utilized as fuel for producing energy, instead of being put in landfills or burned. Three principal sources of biomass fuels are (1) agricultural residues, such as removed or pruned orchard trees, pits, or nut shells, (2) forestry residuals, including limbs, tree tops, small trees, and other slash removed during timber harvesting, forest fire fuel reduction, or forest thinning projects, and (3) urban and industrial wastes, such as construction/demolition wood, pallets, or landscaping tree trimming. Construction of new facilities to generate electricity using solid-fuel biomass in areas of natural vegetation could affect biological and forest resources, as discussed below under each impact statement. Using fuel from agricultural or urban and industrial sources is not expected to affect biological and forest resources and is not discussed further. The use of forestry waste for biomass energy development could affect biological and forestry resource by creating a demand for forest residuals and making forest thinning projects more economically feasible.

The increased demand for forest-generated biomass fuel supply may increase the number of forest thinning or fuel reduction projects in the area surrounding biomass energy plants and thus could indirectly affect biological resources. The impacts of the specific forest projects that would generate waste that could be used as biomass fuel would undergo separate environmental review for those projects under existing laws and regulations. However, the generalized types of impacts the forest projects could have on biological resources are included in the discussion below.

In general, forest projects that could create a biomass fuel source (e.g., timber harvest, fuel reduction or thinning project) can affect biological resources in the following ways. Habitat for special-status plants and animals may be altered by removal of understory vegetation and the forest community composition may change over time due to forest treatments. During vegetation removal, special-status plants or animals may be crushed or entombed during operation of mechanized equipment. Roads created to access the project site may result in habitat loss or degradation from erosion, soil compaction and increased human disturbance. Sensitive habitats, including jurisdictional waters of the United States, may also be adversely affected during vegetation removal or creation of roads. Erosion and run-off may result in degradation of sensitive habitats. Important movement corridors or use of native nursery sites (such as maternal bat colony) may be impeded during implementation of forest projects. These impacts on biological resources could be significant and would be evaluated and mitigated if necessary during specific project review and permitted under existing regulations pertaining to forest practices.

Biogas

Biogas energy development is likely to occur in proximity to fuel sources such as large dairies, where biological or forestry resources are not likely to be present. However, because these resources could be adjacent to the existing facilities, and development of biogas as an energy source could require minor facility expansion or modification, biological and forest resources in adjacent areas could be affected during construction or other ground-disturbing activities.

Small Hydroelectric

Small hydroelectric projects would most likely occur in distributed areas California. Most hydroelectric power generation in California is located in the eastern mountain ranges, using rivers flowing from the Sierra Nevada. Hydroelectric facilities typically use dams to capture river flows to create an elevational difference and use water pressure to create electricity; or water is diverted and run through a turbine to create electricity before the water is returned to the river. Pumped storage methods can also generate electricity by using a closed water system that is artificially created instead of using natural waterways. Out of state locations, especially in the northwest, are also anticipated to be developed.

Construction would involve construction of dams, reservoirs, stream diversion structures, pumps, turbine, and power houses. Access roads would need to be constructed for operation and maintenance. Transmission lines would also need to be constructed to deliver the generated energy. Construction and other ground-disturbing activities could result in the direct removal, degradation, and fragmentation of habitat, especially species associated with aquatic or riparian habitats. Construction of hydroelectric facilities and transmission lines may also affect biological or forest resources by altering natural hydrographs of streams, changing water temperature or water quality, inundating uplands by creating reservoirs or other water storage facilities, increasing nonnative species populations (e.g., bass or other warm water fishes and bullfrogs), and altering the predator-prey relationships.

IMPACT C-1 **Loss of special-status species. The future development of renewable energy projects and transmission lines under the proposed regulation change could result in the loss of special-status plants and animals due to construction, operation, and maintenance of energy generating structures and transmission lines. Special-status species may be afforded protection under the federal or California endangered species acts, California Fish and Game Code, CEQA or other regulations. Therefore, loss of special-status species is *potentially significant*.**

Wind Power

20 Percent RPS Compliance Scenarios

Low Load Conditions

Under low load conditions, most in-State wind energy would be generated in the Tehachapi area based on modeling projections of where renewable energy projects would be environmentally and economically feasible. The Tehachapi CREZ is located along the southern border of the Sierra Nevada/Cascade and Mojave Desert bioregions. These are biologically diverse areas supporting varied plant and animal communities, with a high percentage of endemic species. The Mojave Desert bioregion contains 99 special-status species and the Sierra Nevada/Cascade Region contains 153 special-status species (Table III.C-2).

Substantial wind energy would be generated at out of state locations, mainly in the Pacific Northwest, but also Montana, Utah/Southern Idaho, and Wyoming

Distributed wind energy would come from projects located throughout California. As described previously, California contains 1,569 special-status plant and 371 special-status animal species. The geographic location and habitat types present at a specific project site would determine which of these species could be affected.

Loss of special-status plant and animal species due to project construction and operation is considered ***potentially significant***.

High Load Conditions

Under high load conditions, the 20 percent renewable energy standard would result in additional wind projects in the Tehachapi area, which would result in increased impacts to biological resources in that area. The impact to special-status species under the high load condition of the 20 percent RPS compliance scenario is considered ***significant*** and is potentially greater than the low load condition because more energy would be generated in additional locations.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The high and low load conditions of the 33 percent RES compliance scenarios are identical. Additional wind projects are anticipated to be located out of state (mostly in Alberta), Central Valley bioregion (Solano CREZ), and Mojave Desert bioregion (Fairmont and Mountain Pass CREZ).

The additional locations of wind projects and transmission lines would be located in the Mojave Desert bioregion of California and could affect similar special-status species as the other scenarios which would also locate wind projects in this bioregion, but the magnitude of the impact could be larger due to a greater number of project sites or larger facilities. Additional special-status species could be affected by the development in Alberta and Solano CREZs.

Solar Thermal and Solar Photovoltaic

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Under the low and high load conditions under the 20 percent RPS scenarios, solar thermal and solar photovoltaic energy projects would occur at in the Tehachapi CREZ and distributed locations throughout California, but specific CREZs are not identified. Out of state projects could occur in the Arizona/Southern Nevada CREZ. Given the requirements for solar energy collection, these projects are mostly likely to occur in the Mojave Desert. For both solar thermal and solar photovoltaic, more development would occur in the Tehachapi CREZ under the high load condition.

As identified above under impacts from wind energy, the Mojave Desert and specifically the Tehachapi area contains a great variety of special-status species. The Mojave Desert bioregion contains 99 special-status wildlife species. Construction and other ground-disturbing activities associated with solar thermal, solar photovoltaic, and transmission projects could result in the direct removal, degradation, and fragmentation of habitat for special-status species. Construction and operation also could result in special-status species being crushed, entombed in dens or burrows, or killed or injured during collision with vehicles and power line conductors or towers. Construction of solar thermal and solar photovoltaic facilities and transmission lines may also affect special-status species by reducing cover, nesting, and foraging habitat, compacting soils, and spreading invasive weeds, which could reduce the quality of the habitat. In addition, wildlife could experience increased predation levels from ravens and other predators attracted to the project site and could be disturbed by increased levels of noise and activity. Potential impacts to special-status plants and animals from solar thermal development under the 20 percent RPS compliance scenario are ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The 33 percent RES scenario would likely result in solar thermal and solar photovoltaic projects in addition to the 20 percent RPS scenario in the Colorado Desert bioregion (Riverside East CREZ) and desert southwest regions of Arizona and southern Nevada, as well as additional locations in the Mojave bioregion (Fairmont , Pisgah, and Mountain Pass CREZs). Potential impacts to special-status species in the Mojave bioregion under the 33 percent scenarios would be greater than the 20 percent scenarios. Other special-status species, including the 109 special-status wildlife species in the Colorado Desert bioregions, could be affected by development and operation of solar thermal and solar photovoltaic projects. In addition, under the high load condition, solar thermal projects could affect 56 listed species in Arizona and 38 listed species in Nevada. This is ***potentially significant***.

Geothermal

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

The geothermal energy projects would occur at distributed locations throughout California, but specific CREZs are not identified, and out of state locations in the Reno Area-Dixie Valley CREZ and Utah/Southern Idaho CREZ. Given the distribution of geothermal resources in California, these projects are mostly likely to occur in the Imperial Valley in the Colorado Desert biogregion, Bakersfield area in the central valley bioregion, and near the Geysers in the North Coast/Klamath bioregion. The high load condition under the 20 percent RPS scenarios for geothermal development differ from the low load condition in the additional development in the Colorado Desert bioregion (Imperial North CREZ).

As identified above under impacts from solar energy, Colorado Desert bioregion contains 109 special-status wildlife species. The Central Valley and north coast bioregions contain 134 and 127 special-status wildlife species, respectively.

Construction and other ground-disturbing activities associated with geothermal projects could result in the direct removal, degradation, and fragmentation of habitat for special-status species. Construction and operation also could result in special-status species being crushed, entombed in dens or burrows, or killed or injured during collision with vehicles and power line conductors or towers. Construction of geothermal facilities and transmission lines may also affect special-status species by reducing cover, nesting, and foraging habitat, compacting soils, and spreading invasive weeds, which could reduce the quality of the habitat. Effects from lighting and noise may negatively affect special-status species and degrade the quality of their habitat. Potential impact to special-status plants and animals from geothermal development under the 20 percent RPS compliance scenario is ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The low load 33 percent RES scenario would not be different than the low load 20 percent RES scenario. The high load 33 percent RES scenario would likely result in additional geothermal projects in the Colorado Desert bioregion (Imperial north CREZ))

Although similar species would be affected under the 20 and 33 percent RES scenarios, because of the higher energy production, the impacts under the high load 33 percent RES scenario has the potential to have a greater effect on special-status species.

Solid-fuel Biomass

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Construction of new biomass facilities could result in loss of special-status plant and animal species. New facilities could be located in distributed locations throughout California. They would likely be located near sources of biomass, where urban, agricultural, or forest waste products would be available. The high load condition would also likely result in development of biomass development in the British Columbia CREZ. Construction of new facilities could involve grading, paving, and other ground disturbing activities which could result in the direct removal, degradation, and fragmentation of habitat for special-status species. This is considered a ***potentially significant*** impact.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The high and low conditions under the 33 percent RES scenario are identical. They differ from the 20 percent RES scenario in that additional development could occur in New Mexico.

Biogas

Biogas energy development is likely to occur at existing landfills or large dairies. Because these areas are already developed, natural habitats and special-status species are not expected to be present. However, development of energy production at the existing facilities may require minor expansion of the development footprint or affect adjacent areas where biological resources are present. While these impacts are expected to be minor, there remains a possibility that special-status species could be present. Therefore, impacts to special-status species are ***potentially significant***.

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Biogas development would occur at distributed locations throughout California. Under the high load condition, additional development could occur in Wyoming. Because some expansion, modification, or alteration of existing facilities may occur, the development of these projects could result in ***significant*** impacts to special-status species, but the impacts are expected to be very small in comparison to the other types of renewable energy development.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

Low and high load conditions under the 33 percent scenarios are identical to the high load condition under the 20 percent scenario. .

Small Hydroelectric

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

The low and high load conditions are nearly identical, but additional development would be expected to come from Wyoming under the high load condition. Projects could be located throughout California, or out of state in British Columbia and the Pacific Northwest. Hydroelectric projects in California could affect from 3 to 32 special-status fish, plus other special-status plants and animals, depending on location. Oregon and Washington contain 20 and 15 listed fish species respectively. Construction and other ground-disturbing activities associated with hydroelectric projects could result in the direct removal, degradation, and fragmentation of habitat for special-status species, especially species associated with aquatic or riparian habitats. Construction and operation also could result in degradation of aquatic habitat for special-status species by creation of reservoirs or diverting stream flows, which would change the natural stream flow. The seasonal timing, duration, and magnitude of stream flows could be altered from the natural hydrograph, which could change habitat conditions and aquatic species composition. Construction of hydroelectric facilities and transmission lines may also affect special-status species by altering natural hydrographs of streams, changing water temperature or water quality, inundating uplands by creating reservoirs or other water storage facilities, increasing nonnative species populations (e.g., bass or other warm water fishes and bullfrogs), and altering the predator-prey relationships. Potentially impact to special-status plants and animals (including fishes) from hydroelectric development under the 20 percent RPS compliance scenario is ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The low and high load conditions under the 33 percent scenario are identical to the high load conditions of the 20 percent scenario.

IMPACT C-2

Removal, Degradation, and Fragmentation of Sensitive Habitats. The future development of renewable energy projects under the proposed regulation change could result in the placement of fill material into waters of the United States, including wetlands, or removal of riparian or other habitats considered sensitive by resource agencies. The removal, degradation and fragmentation of sensitive habitats, including waters of the United States, are *potentially significant*.

Wind Power

Although wind energy development typically occurs on ridges and other elevated land where wetlands and surface water bodies are less likely to occur, access roads and transmission lines may cross lands where these features may be more common. Construction of wind generating projects could result in fill of permanent placement of fill material into waters of the United States, including wetlands, which are regulated under Clean Water Act. Waters of the United States could be incidentally filled or disturbed during installation of turbines, construction or improvement of access roads, culvert replacement, and establishment of staging areas. Additionally, construction of the proposed project could adversely affect such resources through disturbance, placement of fill material, transport of sediment, and runoff of contaminants (e.g., fuel, lubricants). Other habitats considered sensitive by the DFG, such as riparian habitat, desert dunes, Joshua tree woodlands, or alkali grassland, could be removed, degraded, or fragmented as a result of construction. In addition, these habitats could be affected during operation of the projects due to the increased risk of fire from the electrical equipment. The removal, degradation and fragmentation of sensitive habitats, including waters of the United States, are ***potentially significant***.

20 Percent RPS Compliance Scenarios

Low Load Condition

Under low load conditions, most wind energy would be generated in the Tehachapi area based on modeling projections. Examples of sensitive habitats in this area include riparian and desert wash communities, ephemeral or intermittent streams, and perennial creeks or rivers.

Substantial wind energy would be generated at out of state locations, mainly in the Pacific Northwest, but also Montana, Utah/Southern Idaho, and Wyoming. This region contains many streams and rivers as well as other wetland types that are likely considered jurisdictional waters of the United States.

Distributed wind energy would come from projects located throughout California, but has not been identified within any particular CREZ. California contains 619 types of sensitive habitats (CNDDB 2010). The geographic location and habitat types present at a specific project site would determine what sensitive habitats could be affected. Construction and other ground-disturbing activities associated with wind power projects could result in the fill, loss or degradation of sensitive habitats. Impacts to sensitive habitats, including jurisdictional waters, are considered ***significant***.

High Load Condition

Under high load conditions, the 20 percent renewable energy standard would result in additional wind projects in the Tehachapi area, which would result in increased impacts to special-status species in that area. Impacts to sensitive habitats under the high load condition would be similar in type and mechanism to the low load condition, but the magnitude would likely be larger due to a greater number of projects and potential larger size of projects.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The high and low load conditions of the 33 percent RES compliance scenarios are identical. Additional wind projects to the 20 percent RPS are anticipated to be located out of state (mostly in Alberta), Central Valley bioregion (Solano CREZ), and Mojave Desert bioregion (Fairmont and Mountain Pass CREZs).

The additional locations of wind projects would be located in the Mojave Desert bioregion of California and could affect sensitive habitats as the other scenarios that would also locate wind projects in this bioregion, but the magnitude of the impact could be larger due to a greater number of project sites or larger facilities. This is a ***potentially significant*** impact.

Solar Thermal and Solar Photovoltaic

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Under the low and high load conditions under the 20 percent RPS scenarios, solar thermal and solar photovoltaic energy projects would occur at in the Tehachapi CREZ and distributed locations throughout California, but specific CREZs are not identified. Out of state projects could occur in the Arizona/Southern Nevada CREZ. Given the requirements for solar energy collection, these projects are mostly likely to occur in the Mojave Desert. For both solar thermal and solar photovoltaic, more development would occur in the Tehachapi CREZ under the high load condition.

The Mojave Desert and Colorado Desert contain many types of sensitive habitats and waters of the United States, such as desert arroyos, desert fan palm oases, freshwater marshes, brine lakes, desert washes, ephemeral and perennial streams, and riparian vegetation communities dominated by cottonwood, willow, and other species. The geographic location and habitat types present at a specific project site would determine what sensitive habitats could be affected. Construction and other ground-disturbing activities associated with solar projects could result in the fill, loss or degradation of sensitive habitats. Impacts to sensitive habitats, including jurisdictional waters, are considered ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The 33 percent RES scenario would likely result in solar thermal and solar photovoltaic projects in addition to the 20 percent RPS scenario in the Colorado Desert bioregion (Riverside East CREZ) and desert southwest regions of Arizona and New Mexico (out of state CREZ), as well as additional locations in the Mojave bioregion (Fairmont , Pisgah, and Mountain Pass CREZs).

These bioregions in California and out of state locations contain similar types of sensitive habitats as discussed under the 20 percent scenario. The geographic location and habitat types present at a specific project site would determine what sensitive habitats could be affected. However, because additional projects would likely be required to achieve the 33 percent compliance, the potential impacts to sensitive habitats including waters of the United States could be greater in magnitude and affect different types of habitats than the 20 percent scenario. This is considered a ***significant*** impact.

Geothermal

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

The geothermal energy projects would occur at distributed locations throughout California, but specific CREZs are not identified, and out of state locations in the Reno Area-Dixie Valley CREZ and Utah/Southern Idaho CREZ. Given the distribution of geothermal resources in California, these projects are mostly likely to occur in the Imperial Valley in the Colorado Desert biogregion, Bakersfield area in the central valley bioregion, and near the Geysers in the North Coast/Klamath bioregion. The high load condition under the 20 percent RPS scenarios for geothermal development differ from the low load condition in the additional development in the Colorado Desert bioregion (Imperial North CREZ).

As identified above under impacts from solar energy, Colorado Desert bioregion contains many types of sensitive habitats, such as desert arroyos, desert fan palm oases, freshwater marshes, brine lakes, desert washes, ephemeral and perennial streams, and riparian communities. The Central Valley and north coast bioregions also contain many sensitive and jurisdictional habitats.

Construction and other ground-disturbing activities associated with geothermal projects could result in the fill, loss or degradation of sensitive habitats. Therefore, the geothermal development associated with achieving the 20 percent compliance scenario would result in ***potentially significant*** impacts to sensitive habitats including waters of the United States.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The low load 33 percent RES scenario would not be different than the low load 20 percent RES scenario. The high load 33 percent RES scenario would likely result in additional geothermal projects in the Colorado Desert bioregion (Imperial north CREZ).

Solid-Fuel Biomass

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

New facilities could be located in distributed locations throughout California. They would likely be located near sources of biomass, where urban, agricultural, or forest waste products would be available. The high load condition would also likely result in development of biomass development in the British Columbia CREZ. Construction of new facilities could involve grading, paving, and other ground disturbing activities which could result in loss of jurisdictional waters of the United States and sensitive habitats. This is considered a ***potentially significant*** impact.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The high and low conditions under the 33 percent RES scenario are identical. They differ from the 20 percent RES scenario in that additional development could occur in New Mexico.

Biogas

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Biogas development would occur at distributed locations throughout California. Under the high load condition, additional development could occur in Wyoming. Because some expansion, modification, or alteration of existing facilities may occur, the development of these projects could result in ***significant*** impacts to jurisdictional waters of the United States and sensitive habitats, but the impacts are expected to be very small in comparison to the other types of renewable energy development.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

Low and high load conditions under the 33 percent scenarios are identical to the high load condition under the 20 percent scenario.

Small Hydroelectric

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

The low and high load conditions are nearly identical, but additional development would be expected to come from Wyoming under the high load condition. Projects could be located throughout California, or out of state in British Columbia and the Pacific Northwest.. Hydroelectric projects in California and out of state locations could affect jurisdictional waters of the United States, navigable waters, and sensitive habitats, such as riparian or other wetland communities. Construction and other ground-disturbing activities associated with hydroelectric projects could result in the direct removal of riparian or wetland communities, fill or discharge into jurisdictional waters, and obstruction of navigable waters. Potential impacts to waters of the United States and other sensitive habitats from hydroelectric development under the 20 percent RPS compliance scenario are ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The low and high load conditions under the 33 percent scenario are identical to the high load conditions of the 20 percent scenario.

IMPACT C-3	**Loss and Fragmentation of Wildlife Habitat or Plant Community. The future development of renewable energy projects under the proposed regulation change could result in loss, degradation, or fragmentation of common habitats. The WECC service area supports a number of native habitats that are important to wildlife. Large areas of native habitat could be substantially reduced or fragmented on a regional scale due to renewable energy development. The removal, degradation and fragmentation of native habitats is *potentially significant*.**

Wind Power

Construction activities and soil disturbance could result in loss of large areas of natural vegetation, resulting in fragmentation of wildlife habitat and plant communities. Wind farms typically require large tracts of land to install enough turbines to make a project economically viable. In addition, invasive weeds could be introduced and spread by construction and operation of projects. The spread of invasive plants is a major threat to biological resources because they can displace native plants, increase the threat of wildfire, supplant wildlife foods that are important to herbivorous species, and alter the composition of ecosystems.

20 Percent RPS Compliance Scenarios

Low Load Condition

Under low load conditions, most wind energy would be generated in the Tehachapi area based on modeling projections. Substantial wind energy would be generated at out of state locations, mainly in the Pacific Northwest, but also Montana, Utah/Southern Idaho, and Wyoming. These regions contain many coniferous forest types, such as fir, Douglas fir, hemlock, spruce and cedar, as wells as deciduous forests dominated by bigleaf maple, dogwood, and red alder, shrub and grassland communities.

Distributed wind energy would come from projects located throughout California, but has not been identified within any particular CREZ. California contains about 1,300 vegetation types (DFG 2003, pg. 22). The geographic location and habitat types present at a specific project site would determine what native habitats could be affected. Impacts to wildlife habitat from renewable energy development resulting in substantial loss on a local or regional scale are considered ***significant***.

High Load Condition

Under high load conditions, the 20 percent renewable energy standard would result in additional wind projects in the Tehachapi area, which would result in increased impacts to important wildlife habitat and plant communities in that area.

33 Percent RES Compliance Scenarios

Low Load Conditions

The high and low load conditions of the 33 percent RES compliance scenarios are identical. Additional wind projects to the 20 percent RPS are anticipated to be located out of state (mostly in Alberta), Central Valley bioregion (Solano CREZ), and Mojave Desert bioregion (Fairmont and Mountain Pass CREZs).

The additional locations of wind projects would be located in the Mojave Desert bioregion of California and could affect similar native habitats as the other scenarios, but the magnitude of the impact could be larger due to a greater number of project sites or larger facilities. This is a ***potentially significant*** impact.

Solar Thermal and Solar Photovoltaic

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Under the low and high load conditions under the 20 percent RPS scenarios, solar thermal and solar photovoltaic energy projects would occur at in the Tehachapi CREZ and distributed locations throughout California, but specific CREZs are not identified. Out of state projects could occur in the Arizona/Southern Nevada CREZ. Given the requirements for solar energy collection, these projects are mostly likely to occur in the Mojave Desert. For both solar thermal and solar photovoltaic, more development would occur in the Tehachapi CREZ under the high load condition.

The Mojave Desert contains many important wildlife habitats and plant communities, such Mojave creosote brush scrub, California annual grassland, Mojave juniper woodland and scrub, desert bunchgrass mix, and desert saltbush scrub. Important habitats in the Colorado Desert include creosote bush scrub, grasslands, sand dunes, and riparian woodlands. The geographic location and habitat types present at a specific project site would determine what native habitats could be affected. Renewable energy development on a local or regional scale resulting in substantial loss of wildlife habitat is considered ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The 33 percent RES scenario would likely result in solar thermal and solar photovoltaic projects in addition to the 20 percent RPS scenario in the Colorado Desert bioregion (Riverside East CREZ) and desert southwest regions of Arizona and New Mexico (out of state CREZ), as well as additional locations in the Mojave bioregion (Fairmont , Pisgah, and Mountain Pass CREZs).

These bioregions in California and out of state locations contain important habitat types, such as iodine bush, salt bush scrub, yucca and cholla cactus scrub, sandy soil grasslands, and desert dunes. Higher elevations are dominated by pinyon pine and California juniper, with areas of manzanita and Coulter pine. The geographic location and habitat types present at a specific project site would determine what sensitive habitats could be affected. However, because additional projects would likely be required to achieve the 33 percent compliance, the potential impacts to native habitats could be greater in magnitude and affect different types of habitats than the 20 percent scenario. Because development of solar thermal projects could result in a substantial loss of native habitat important to wildlife at a local or regional level, this is considered a ***significant*** impact.

Geothermal

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

The geothermal energy projects would occur at distributed locations throughout California, but specific CREZs are not identified, and out of state locations in the Reno Area-Dixie Valley CREZ and Utah/Southern Idaho CREZ. Given the distribution of geothermal resources in California, these projects are mostly likely to occur in the Imperial Valley in the Colorado Desert biogregion, Bakersfield area in the central valley bioregion, and near the Geysers in the North Coast/Klamath bioregion. The high load condition under the 20 percent RPS scenarios for geothermal development differ from the low load condition in the additional development in the Colorado Desert bioregion (Imperial North CREZ).

As identified above under impacts from solar energy, Colorado Desert bioregion contains many types of native habitats including creosote bush scrub, grasslands, sand dunes, and riparian woodlands. The Bakersfield area contains important grasslands, vernal pools, and riparian communities. The Geysers area contains oak and other woodlands and grasslands. The geographic location and habitat types present at a specific project site would determine what native habitats could be affected. The magnitude of impacts to common native habitats from geothermal development is expected to be much less than solar or wind development because less land is expected to be affected. However, impact to wildlife habitat from geothermal development resulting in substantial loss on a local or regional scale is considered ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The low load 33 percent RES scenario would not be different than the low load 20 percent RES scenario. The high load 33 percent RES scenario would likely result in additional geothermal projects in the Colorado Desert bioregion (Imperial north CREZ).

Solid-Fuel Biomass

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Construction of new biomass facilities could result in loss and fragmentation of native habitats that are important at a local or regional scale for wildlife populations and plant communities. New facilities could be located in distributed locations throughout California. They would likely be located near sources of biomass, where urban, agricultural, or forest waste products would be available. The high load condition would also likely result in development of biomass development in the British Columbia CREZ. Construction of new facilities could involve grading, paving, and other ground disturbing activities which could result in the substantial loss of native habitats. However, the magnitude of impacts to common native habitats from biomass energy development is expected to be much less than solar or wind development because less land is expected to be affected. This is considered a ***potentially significant*** impact.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The high and low conditions under the 33 percent RES scenario are identical. They differ from the 20 percent RES scenario in that additional development could occur in New Mexico. Potential impacts to native habitats under the 33 percent scenarios would be greater than the 20 percent scenarios. Because of the higher energy production, a greater number of projects in more locations would be expected to occur than under the 20 percent compliance scenario. Therefore, impacts to native habitats that are important at a local or regional scale for wildlife populations and plant communities are ***potentially significant***.

Biogas

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Biogas development would occur at distributed locations throughout California. Under the high load condition, additional development could occur in Wyoming. Because some expansion, modification, or alteration of existing facilities may occur, the development of these projects could result in significant impacts to common habitats, but the impacts are expected to be very small in comparison to the other types of renewable energy development. The loss or disturbance to native habitats is not expected to result in substantial effects on native wildlife or plant communities. Therefore this impact is ***less than significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

Low and high load conditions under the 33 percent scenarios are identical to the high load condition under the 20 percent scenario The loss or disturbance to native habitats is not expected to result in substantial effects on native wildlife or plant communities. Therefore this impact is ***less than significant***.

Small Hydroelectric

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

The low and high load conditions are nearly identical, but additional development would be expected to come from Wyoming under the high load condition. Projects could be located throughout California, or out of state in British Columbia and the Pacific Northwest. Hydroelectric projects in California and out of state locations could affect native wildlife habitats and plant communities. Construction and other ground-disturbing activities, as well as stream diversion or impoundment to create reservoirs, associated with hydroelectric projects could result in loss of large areas of natural vegetation, resulting in fragmentation of wildlife habitat and plant communities. Potentially impacts to common wildlife habitats and plant communities from hydroelectric development under the 20 percent RPS compliance scenario are ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The low and high load conditions under the 33 percent scenario are identical to the high load conditions of the 20 percent scenario.

IMPACT C-4 **Interference with Wildlife Movement. The future development of renewable energy projects under the proposed regulation change could interfere with wildlife movement or impede the migration of fish populations. These projects could reduce the ability of terrestrial wildlife populations to move unimpeded through an area. In addition, impacts to aquatic habitat, such as diversion of stream flows, could impede movement of native fishes and aquatic wildlife. This impact is *potentially significant*.**

Linkages and corridors facilitate regional animal movement and are generally centered around waterways, riparian corridors, flood control channels, contiguous habitat, and upland habitat. Drainages generally serve as movement corridors because wildlife can move easily through these areas, and fresh water is available. Corridors also offer wildlife unobstructed terrain for foraging and for dispersal of young individuals. Ridgelines may also serve as movement corridors. Riparian corridors remain a common pathway utilized by many species because they typically provide cover, foraging opportunities, and water. For many species, this is the only habitat type that they utilize.

The California Essential Habitat Connectivity Project commissioned by the California Department of Transportation (Caltrans) and DFG has identified essential habitat and corridors to maintain linkages between wildlands in order to maintain California's diverse natural communities in the face of human development and climate change (http://www.dfg.ca.gov/habcon/connectivity/). In addition, movement corridors have been identified and mapped for specifically for several species in southern California, including Nelson's Bighorn Sheep and Mojave ground squirrels.

Paved roadways, major aqueducts, expansive agricultural fields, and urban develop are common types of features that can impede wildlife movement. Dams and diversions may be barriers to aquatic species movement. Habitat linkages and wildlife movement corridors are essential to maintaining healthy wildlife and fish populations by allowing colonization, migration, and genetic diversity.

Wind, Solar Thermal, and Solar Photovoltaic

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Wind projects, solar thermal and solar photovoltaic development could interfere with behavioral activities of wildlife if they avoid construction and operational activities associated with the projects. These projects typically require large expanses of land and are likely to be sited in desert locations or ridge tops where few human-caused barriers to wildlife movement currently exist, with the exception of major roadways. Traditionally used migratory or movement routes may be avoided due to visual and noise disturbance caused by the projects, which could affect condition and survival of the species. This is considered a potentially significant impact and is likely greater in magnitude than the other types of renewable energy development. However, many guidance documents have been prepared or are being prepared to help mitigate this affect. Plans include the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) and Desert Renewable Energy Conservation Plan. It is assumed that projects would comply with these plans to avoid or minimize this impact. Therefore, this impact is considered ***less than significant***.

33 Percent RES Compliance Scenarios

The effect of the low and high load 33 percent RES compliance scenarios on movement corridors is also potentially significant because wind, solar thermal, and solar photovoltaic development could impede the migration or seasonal movement of native species. It is likely that the effect on movement corridors could be greater under these scenarios than the 20 percent scenarios because of a great number of projects being developed in more areas to meet the additional energy requirements. However, analysis of the actual siting of the wind or solar facilities in relation to existing movement corridors would need to be conducted at the project level to determine the magnitude of the effect. Because plans are being developed to avoid or minimize this impact and it is assumed projects would comply with these plans, this impact is considered ***less than significant***.

Geothermal and Solid-Fuel Biomass

20 Percent RPS Compliance Scenarios

Proposed development of geothermal and solid-fuel biomass energy projects could interfere with behavioral activities of wildlife if they avoid construction and operational activities associated with the projects. Traditionally used migratory or movement routes may be avoided due to visual and noise disturbance caused by the projects, which could affect condition and survival of the species. However, analysis of the actual siting of the geothermal and biomass facilities in relation to existing movement corridors would need to be conducted at the project level to determine the magnitude of the effect. This is considered a ***potentially significant*** impact.

33 Percent RES Compliance Scenarios

The effect of the low and high load 33 percent RES compliance scenarios on movement corridors is also ***potentially significant*** because geothermal and biomass energy development could impede the migration or seasonal movement of native species. It is likely that the effect on movement corridors could be greater under these scenarios than the 20 percent scenarios because of a great number of projects being developed in more areas to meet the additional energy requirements. However, analysis of the actual siting of the geothermal and biomass facilities in relation to existing movement corridors would need to be conducted at the project level to determine the magnitude of the effect.

Biogas

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

Biogas development would occur at distributed locations throughout California. Under the high load condition, additional development could occur in Wyoming. . As described under Impact C-1, some expansion, modification, or alteration of existing facilities may occur; however, the area of disturbance is expected to be relatively small and the potential impact to native wildlife and fish movement would be minor. No substantial impediment to wildlife or fish movement is likely to occur, nor is the loss of any important wildlife nursery areas. Therefore this impact is ***less than significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

Low and high load conditions under the 33 percent scenarios are identical to the high load condition under the 20 percent scenario. No substantial impediment to wildlife or fish movement is likely to occur, nor is the loss of any important wildlife nursery areas. Therefore this impact is ***less than significant***.

Small Hydroelectric

20 Percent RPS Compliance Scenarios

Low and High Load Conditions

The low and high load conditions are nearly identical, but additional development would be expected to come from Wyoming under the high load condition. Projects could be located throughout California, or out of state in British Columbia and the Pacific Northwest. Hydroelectric projects in California and out of state locations could substantially interfere with the movement of native fish and wildlife. Creation of dams or stream diversions could alter seasonal movements of native fish and other aquatic organisms, creating barriers to spawning, rearing, or outmigration habitats. Creation of reservoirs could also impede the movement of terrestrial species. Therefore, impacts on fish and wildlife movement resulting from hydroelectric development would be ***significant***.

33 Percent RES Compliance Scenarios

Low and High Load Conditions

The low and high load conditions under the 33 percent scenario are identical to the high load conditions of the 20 percent scenario. .

IMPACT C-5	**Conflict with adopted HCPs, NCCPs, other conservation plans or other policies to protect natural resources. The future development of renewable energy projects under the proposed regulation change could conflict with adopted HCPs, NCCPs, other conservation plans or other policies to protect natural resources. However, because a project would not be likely to be approved if it was not consistent with these plans, it is assumed that any renewable energy project would be consistent. This impact is *less than significant*.**

Regional conservation plans provide a framework to protect natural resources, while improving and streamlining the environmental permitting process for impacts on endangered species. These plans often contain planning and conservation areas, as well as establish conditions for permitted activities.

The Natural Community Conservation Planning (NCCP) is the effort by the State of California to plan for the protection and perpetuation of biological diversity with a broad-based ecosystem approach. Currently there are currently 24 active NCCPs covering more than 9 million acres (Table III.C-5). Many of these NCCPs also are Habitat Conservation Plans, which authorize the take of federally listed species under certain conditions.

Of particular relevance to the RES is the development of the Desert Renewable Energy Conservation Plan (DRECP). To achieve California's RPS (20 percent scenario) energy goals and greenhouse gas emission reduction standards in a manner that is both timely and in compliance with federal and state environmental laws, CEC, DFG, USFWS, and BLM are cooperatively developing a conservation strategy to provide for effective protection and conservation of the natural resources within the Mojave and Colorado Desert Regions while allowing solar and other qualified RPS energy development in a manner that avoids or minimizes environmental impacts. The DRECP will guide solar and other qualified RPS energy project siting in the Mojave and Colorado Desert regions and will ensure the conservation of California's natural resources. A Memorandum of Understanding between these agencies was signed in November 2008. A planning agreement was developed in May 2010 and establishes that the DREP will serve as a HCP and NCCP. The stated goal is to have l a sound conservation strategy developed by December 2013.

In addition, most California counties have general plans which guide where development may occur and may provide for conservation of open space and natural resources. Large land managers, such as California State Parks, USFS, BLM, also have policies which are designed to protect and conserve natural resources while fulfilling the agencies mandate. Other municipalities (i.e., cities or other incorporated area) may also have ordinances relating to natural resource management.

Table III.C-5. Natural Community Conservation Plans Approved or in Development					
NCCP Summary Table (July, 2009)					
NCCP	Status	County	Cities	Plan Area (acres)	Conservation (acres)**
Altamont Pass Wind Resource Area	Planning	Alameda	6 Companies	58,777	
Bay Delta Conservation Plan	Planning	Overlaps 5 Counties	0	947,075	
Butte County	Planning	Butte	4	564,270	
CalFed	Implementing				
Central Coastal/Orange County	Implementing	Orange	Multiple	208,000	37,380
Coachella Valley MSHCP	Implementing	Riverside	8	1,100,000	745,900
Desert Renewable Energy Conservation Plan	Planning	Overlaps 6 Counties			
East Contra Costa County	Implementing	Contra Costa	5	174,000	30,300
Imperial Irrigation District	Planning	Irrigation District		500,000	
Mendocino Redwood Company	Planning	Private Lands	1 Company	230,000	
Orange County Transportation Authority	Planning				
Placer County Conservation Plan	Planning	Placer	3	959,833	
Rancho Palos Verdes	Planning		1	8,661	1,428
San Diego County MHCP	Implementing	San Diego	7	111,908	19,000
San Diego MSCP *	Implementing	San Diego	8	582,000	172,000
San Diego East County MSCP	Planning	San Diego	9	1,600,000	
San Diego Gas & Electric Subregional	Implementing				
San Diego North County MSCP	Planning	San Diego	13	311,800	
San Diego Joint Water Agencies	Planning				
San Diego Water Authority	Planning				
Santa Clara Valley	Planning	Santa Clara	3	440,318	
Western Riverside County MSHCP	Implementing	Riverside	Multiple	1,200,000	500,000
Yolo County Heritage Program	Planning	Yolo	4	653,663	
Yuba Sutter	Planning	Yuba/Sutter	4	200,100	
Total = 24		11	69	9,850,405	1,506,008
(Implementing Planning = 16; = 8)		(as signatories)			

Development of renewable energy projects in the State of California may conflict with local ordinances, county or land-management policies, or conditions of adopted HCPs or NCCPs, depending on where the projects are located. Therefore this is a ***potentially significant*** impact.

All Renewable Energy Types

20 Percent RPS Compliance Scenarios

Development of wind, solar thermal, solar photovoltaic, geothermal, biomass, biogas, and small hydroelectric projects under the low and high load 20 percent RPS compliance scenarios could conflict with local or regional policies or with provisions of an adopted NCCP or HCP, which would be a significant impact. However, project approval would not be granted by the regulatory agencies if there was a conflict. Because the regulatory approval would require the projects to consistent with the conditions or policies in adopted HCPs, NCCPs, or other conservation plans, this impact is considered ***less than significant***.

33 Percent RES Compliance Scenarios

Although renewable energy development would be greater under the 33 RES compliance scenarios, as described above, it is not likely that projects would conflict with conditions or policies in adopted HCPs, NCCPs, or other conservation plans. Therefore, this impact is considered ***less than significant***.

IMPACT C-6	**Loss or conversion of forest land. The future development of renewable energy projects under the proposed regulation change could result in the loss or conversion of forest lands. This impact is *potentially significant*.**

Forest land is defined as land that can support at least 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits (California Public Resources Code section 12220(g)). "Timberland" means land, other than land owned by the federal government and land designated by the board as experimental forest land, which is available for, and capable of, growing a crop of trees of any commercial species used to produce lumber and other forest products, including Christmas trees (California Public Resources Code section 4526). Timberland production zone means an area which has been zoned accordingly and is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses (Government Code section 51104(g)).

Wind Power, Solar Thermal, Solar Photovoltaic, Biomass, and Biogas

20 Percent RPS Compliance Scenarios

Several types of renewable energy development projects have potential to convert forest land to non-forest land depending on the actual project footprint. However, none of these types of projects are expected to covert large expanses of forest land due to the anticipated siting conditions and requirements. Wind farms are typically located in very windy areas, which tend to be relatively tree-less ridge tops. Solar thermal and solar photovoltaic projects are typically located in flat, desert regions, which also tend not to be forested or contain important areas for timber production. Biogas projects would be located at existing landfills or dairies, where forest land is not expected to occur. However, relatively small areas of forest land could be affected by development of these projects if the project footprint expanded into forested areas. Transmission lines or access roads associated with these projects could require removal of forest land.

Construction of biomass facilities may require removal of a few acres of forest land. Biomass facilities are likely to be located near sources of biomass fuels, such as near forests. However, biomass facilities are expected to be relatively small in size (10s of acres or less), compared to the large expanses of land required for wind or solar projects (1,000s of acres or more). Therefore the potential loss of forest or timber land due to construction of biomass facilities is expected to be relatively small.

Although the effect on forest land is expected to be minor from wind, solar thermal, solar photovoltaic, biomass, and biogas development, conversion of forest land to non-forest use could occur in association with these projects and therefore, this is a ***potentially significant*** impact.

33 Percent RES Compliance Scenarios

Development of wind, solar thermal, solar photovoltaic, biomass, and biogas projects under the 33 percent RES compliance scenarios could result in conversion of forest land to non-forest use. Because the number of projects would be greater under these scenarios than the 20 percent scenarios, the magnitude of the impact could be greater to forest resources.

Geothermal and Small Hydroelectric

20 Percent RPS Compliance Scenarios

Geothermal and small hydroelectric projects have a greater likelihood of converting forest land to non-forest uses than the other types of renewable energy projects. Because the location of geothermal projects is not specified by modeling projections, it is uncertain where the projects would occur. Some of these projects may occur in the Imperial North CREZ, located in the Colorado Desert bioregion, which does not have many areas of important forest or timber production lands. However, one of the largest geothermal resources areas is located at The Geysers, Central Coast bioregion, which contains large areas of oak woodlands and other forest types. Development of geothermal projects in the Geysers area, or other areas with forest lands, could result in conversion of forests to non-forest uses.

Hydroelectric projects also may be located in forest locations. Many streams with suitable gradients for hydroelectric power generation are located in mountainous regions, where forest is the dominant land cover. Construction of hydroelectric facilities may require removal of trees and operation of dams may create reservoirs, resulting in loss of forest and timber production. Therefore this impact is ***significant***.

33 Percent RES Compliance Scenarios

Similar to the 20 percent scenarios, development of geothermal and hydroelectric projects under the 33 percent RES compliance scenarios could result in conversion of forest land to non-forest use. Because the number of projects would be greater under the 33 percent scenarios than the 20 percent scenarios, the magnitude of the impact could be greater to forest resources.

4. MITIGATION

This section describes the mitigation required for the proposed change in renewable energy regulation. ARB would not be the lead agency on the project-specific implementation of the proposed renewable energy development, nor does it have regulatory authority over those projects. Therefore, ARB would not be the responsible agency for implementing the mitigation.

The mitigation applies to both the 20 percent and 33 percent RES compliance scenarios. Impacts to threatened and endangered species protected by state and Federal law, wetlands protected by the Clean Water Act, streambeds protected by the Fish and Game Code, and species and habitats covered in the DRECP would be expected to be reduced to less-than-significant levels through the regulatory permitting process of individual renewable energy projects or the broader resources management requirements of conservation planning. Other important species and habitats that do not benefit from these more stringent laws and regulations may not be feasibly mitigated. Because ARB has no regulatory oversight on the implementation of the mitigation, the responsibility to mitigate for significant biological impacts rests with other agencies. As a result of these circumstances, impacts to some biological and forest resources would be reduced and others may not be fully mitigated; therefore, some significant biological impacts would remain potentially significant. In addition, some impacts to biological and forest resources may not be feasible to mitigate fully due to the nature of the impact; therefore, impacts to biological and forest resources that are not protected by state and Federal law or covered in the DRECP may be significant and unavoidable.

Mitigation Measure C-1

All Types of Renewable Energy Development

1. **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**

2. **Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.**

3. **As part of the environmental analysis, mitigation to avoid, minimize, and compensate for impacts to special-status species shall be developed, as appropriate, by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to special-status species. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. It provides recommendations to renewable energy developers, and federal, state, local and Tribal governments for improving the efficiency of the regulatory process in California and protecting environmental and cultural resources, and human health and safety. Recommendations include 1) guidance for preparing applications for renewable energy projects located in the California desert region and 2) best management practices for the permitting/pre-construction, construction, operation, repowering or retrofitting, and decommissioning phases of desert renewable energy facilities. The manual also provides recommendations for project design features to be considered when developing such renewable energy projects.**

This may include the following types of activities:

During Project Siting and Design

- **To the extent feasible, site facility construction and other ground disturbing activities to avoid areas federally designated as critical habitat for listed species, identified as core areas in recovery plans for listed species, or otherwise identified as essential habitat for the conservation of state or federally listed species.**

- **Follow the California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC and DFG 2007).**

- **Follow *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006) or the standard at the time of project design for reducing avian mortality from power lines and transmission poles.**

Prior to construction

- **Conduct pre-construction surveys for special-status species that could be affected by the project.**

- **Consult with USFWS, DFG, or other regulatory agency as appropriate in compliance with federal and state regulations to develop appropriate avoidance and minimization measures.**
- **If take of listed species cannot be avoided, secure appropriate incidental take permits from USFWS and/or DFG and implement terms and conditions of the permits.**
- **Compensate for impacts to special-status species that cannot be avoided or minimized. This may include developing a compensatory mitigation plan that will result in no net loss of acreage, function, and value of affected habitat. Unavoidable effects could be mitigated through a combination of creation, preservation, and restoration of habitat or purchase of credits at a mitigation bank approved by the regulatory agencies.**

During construction and operation

- **Minimize disturbance to natural vegetation to the extent feasible. If potential habitat for special-status species is present and can be avoided on the project site, establish appropriate sized buffers prior to ground disturbing activities and maintain them until ground disturbing activities in that area are completed.**
- **If special-status species or their habitat are present and can be avoided, implement additional measures such as worker awareness training, dust and erosion control plans, and periodic biological monitoring to ensure minimization measures are being maintained.**
- **Consider other minimization measures as needed, such as speed limits for vehicles during construction, prevention of invasive species, lighting and noise minimization measures, fire hazard reduction, and safe handling, transport and storage of toxic materials.**
- **The projects would comply with other laws and regulations protecting special-status species. If federally listed would be affected, a biological opinion (BO), which may include an incidental take permit , from USFWS may be required. The project applicant(s) would abide by conditions in the BO (including conservation and minimization measures). If take of California state listed species would occur, a 2081(b) incidental take permit from DFG would be required. DFG requires impacts to listed species to be minimized and fully mitigated. No Section 2081(b) permit may authorize the take of "fully protected" species and "specified birds" (Fish and Game Code Sections 3505, 3511, 4700, 5050, 5515, and 5517). If a project is planned in an area where a fully protected species or a specified bird occurs, an applicant must design the project to avoid all take; DFG cannot provide take authorization for the species under CESA.**
- **California Energy Commission, DFG, USFWS and BLM are developing a Desert Renewable Energy Conservation Plan (DRECP). The geographic area in the DRECP focuses on the Mojave and Colorado Desert bioregions. The goal of DRECP will coordinate and consider desert land uses and activities during the planning process and will identify areas**

for conservation and declining species management. As the DRECP is developed, renewable energy projects in the Mojave and Colorado Desert bioregions should coordinate with this planning effort, which may help streamline agency approvals and endangered species permitting.

With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.

Mitigation Measure C-2

All Types of Renewable Energy Development

1. **In order to reduce potential impacts to waters of the United States and other sensitive habitats, the lead agency for renewable energy development projects shall conduct a project-specific analysis and evaluate the potential impacts to waters of the United States and sensitive habitats in accordance with CEQA.**

2. **As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for impacts to sensitive habitats would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to sensitive habitats. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of activities:**

    - **Redesign or modify the project to avoid direct and indirect impacts on sensitive habitats, if feasible.**

    - **If waters of the United States and other sensitive habitats can be avoided on site, installing barrier fencing between the construction site and the sensitive areas to avoid indirect or accidental impacts.**

    - **Avoid construction activities in saturated or ponded wetlands and streams during the wet season to the maximum extent possible. Where such activities are unavoidable, protective practices, such as use of padding or vehicles with balloon tires, will be employed.**

    - **Develop other minimization measures such as stormwater pollution prevention plan (SWPPP) and erosion control plans and others to protect sensitive habitats and waters of the United States.**

3. **Before the approval of grading and improvement plans and before any groundbreaking activity associated with each distinct project phase, the project applicant(s) for each project requiring fill of wetlands or other waters of the United States or waters of the state would obtain all necessary permits under Sections 401 and 404 of the CWA or the State's Porter-Cologne Act for the respective phase. The project applicant(s) would commit to replace, restore, or enhance on a "no net loss" basis (in accordance with USACE and the appropriate RWQCB) the acreage of all wetlands and other waters of the United States that would be removed, lost, and/or degraded with implementation of project plans for that phase. Wetland habitat would be restored, enhanced, and/or replaced at an acreage and location and by**

methods agreeable to USACE, the RWQCB, and other regulatory agencies, as appropriate, depending on agency jurisdiction, and as determined during the Section 401 and Section 404 permitting processes.

4. **As part of the Section 404 permitting process, a draft wetland mitigation and monitoring plan (MMP) would be developed for the project on behalf of the project applicant(s). Before any ground-disturbing activities that would adversely affect wetlands and before engaging in mitigation activities associated with each phase of development, the project applicant(s) would submit the draft wetland MMP to USACE, the appropriate RWQCB, and other appropriate regulatory agencies for review and approval of those portions of the plan over which they have jurisdiction. Once the MMP is approved and implemented, mitigation monitoring would continue for a minimum of 5 years from completion of mitigation, or human intervention (including recontouring and grading), or until the performance standards identified in the approved MMP have been met, whichever is longer.**

   As part of the MMP, the project applicant(s) would prepare and submit plans for the creation of aquatic habitat at an adequate mitigation ratio to offset the aquatic functions and services that would be lost at the project site, account for the temporal loss of habitat, and contain an adequate margin of safety to reflect anticipated success. Restoration of previously altered and degraded wetlands would be a priority of the MMP for offsetting losses of aquatic functions and values on the project site because it is typically easier to achieve functional success in restored wetlands than in those created from uplands. The MMP must demonstrate how the aquatic functions and values that would be lost through project implementation will be replaced.

   The habitat MMP for jurisdictional wetland features would be consistent with USACE's and EPA's April 10, 2008 Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332 and 40 CFR Part 230). In keeping with these guidelines, mitigation banks would be used to the maximum extent possible for compensatory mitigation for project impacts on aquatic habitats. According to the Final Rule, mitigation banks should be given preference over other types of mitigation because a lot of the risk and uncertainty regarding mitigation success is alleviated by the fact that mitigation bank wetlands must be established and demonstrating functionality before credits can be sold. This also alleviates temporal losses of wetland function while compensatory wetlands are being established. Mitigation banks also tend to be on larger, more ecologically valuable parcels and are subjected to more rigorous scientific study and planning and implementation procedures than typical permittee-responsible mitigation sites (USACE and EPA, 2008).

5. **The project would comply with other laws and regulations protecting waters of the United States and sensitive habitats. If these resources would be affected, permits may be required. Examples of these include a Section 408 permit under the Clean Water Act for work in navigable waters or Section 1600 permit under the California Fish and Game Code for stream or lakebed alteration. All terms and conditions of these permits would be implemented.**

With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.

Mitigation Measure C-3

All Types of Renewable Energy Development

1. **In order to reduce potential impacts to common native habitats, the lead agency for renewable energy development projects would conduct a project-specific analysis and evaluate the potential impacts to important wildlife habitats and plant communities in accordance with CEQA.**

2. **As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for impacts to common native habitats would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to common habitats. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of activities:**

   - **Avoiding siting new renewable facilities in areas of important native habitats or fragmenting large areas of contiguous habitat**

   - **Minimizing loss of native habitats by designing compact facilities to the extent feasible**

   - **Using existing roads for access rather than creating new roadways**

With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.

Mitigation C-4

All Types of Renewable Energy Development

1. **In order to reduce potential impacts to wildlife and fisheries movement corridors, the lead agency for renewable energy development projects would conduct a project-specific analysis and evaluate the potential impacts to movement corridors in accordance with CEQA.**

2. **As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for impacts to movement corridors would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to movement corridors. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of activities:**

   - **Avoiding siting new renewable facilities in areas of important movement corridors for native fish or wildlife**

   - **Avoid developing areas identified as essential habitat and corridor linkages between wildlands as identified in The California Essential Habitat Connectivity Project (http://www.dfg.ca.gov/habcon/connectivity/) or other scientifically defensible source such as recovery**

plans for listed species, federally designated critical habitat maps, or agency management plans.

- **Provide for passage of native species by designing fish ladders on dams, undercrossing on roadways, or other proven methods to allow for fish and wildlife movement.**

With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.

Mitigation C-5

All Types of Renewable Energy Development

1. **In order to reduce potential conflicts with adopted HCPs, NCCPs or other local policies designed to protect biological resources, the lead agency for renewable energy development projects would conduct a project-specific analysis and evaluate the potential conflicts with these plans and policies in accordance with CEQA.**

2. **As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for conflicts with adopted plans and policies would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of conflicts. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of activities:**

   - **Site facilities in a manner that is consistent with the goals and strategies of adopted HCPs, NCCPs, General Plan, or other approved local plan, to the extent feasible.**

   - **If plans or policies are applicable to the project and conflicts cannot be avoided, the lead agency will compensate the effects consistent with the conservation plan and policy and implement all applicable measures required by the conservation plan or policy.**

3. **California Energy Commission, DFG, USFWS and BLM are developing a Desert Renewable Energy Conservation Plan (DRECP). The geographic area in the DRECP focuses on the Mojave and Colorado Desert bioregions. The goal of DRECP will coordinate and consider desert land uses and activities during the planning process and will identify areas for conservation and declining species management. As the DRECP is developed, renewable energy projects in the Mojave and Colorado Desert bioregions should be coordinate with this planning effort, which may help streamline the approval and permitting process.**

With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.

Mitigation C-6

All Types of Renewable Energy Development

1. **In order to reduce potential impacts to forestry resources, the lead agency for renewable energy development projects would conduct a project-specific analysis and evaluate the potential impacts to forest and timber land in accordance with CEQA.**

2. **As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for loss of forest or timberland would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of the impact. This may include the following types of activities:**

   - **Develop compensation for loss of forest consist with lead agency, local government, agencies with regulatory or management authority, or other applicable standards. For example, oak woodland in California is often subject to county policies which require specific compensation and replacement. Compensation may be in the form of replacement plantings at specific ratios or contribution of funds to the Oak Woodlands Conservation Fund, as established under subdivision (a) of Section 1363 of the Fish and Game Code, for the purpose of purchasing oak woodlands conservation easements.**

   - **Compile with other laws and regulations pertaining to forests. For removal of trees for commercial timber land (or Timber Production Zone), a Timber Harvest Plan (THP) may need to be prepared. The THP would provide details on planned logging operations and the steps that will be taken to minimize environmental impacts of these operations. CAL FIRE enforces the laws that regulate logging on privately-owned lands in California, including the Forest Practice Act and rules enacted by the State Board of Forestry and Fire Protection. For federal lands, USFS, BLM, and other federal land managers maintain rules and regulations protecting forest lands.**

With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.

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III.D. CULTURAL RESOURCES

This section describes the existing cultural resources setting of regions where renewable energy development is expected to occur, presents the regulatory framework under which cultural resources are protected, and evaluates the potential impacts to cultural resources as a result of implementation of renewable energy projects necessary to comply with the 33 Percent RES.

Cultural and paleontological resources are non-renewable. Activities resulting in ground disturbance have the highest potential for destroying significant cultural or paleontological resources. Some activities associated with site development also have the potential to result in indirect impacts such as increasing pedestrian and vehicular traffic, providing access to previously unaccessible areas, and/or increasing localized soil erosion. Visual intrusions from new facilities have the potential to significantly alter landscapes, viewsheds, traditional cultural properties (such as plant collection areas), sacred sites, scenic by-ways, and historic trails listed in the National Trails system.

In general the types of historical resources likely to be affected by new development includes prehistoric and historical archaeological sites such as prehistoric habitation sites, lithic tool and debris scatters, bedrock milling stations, quarries, rock art, historical refuse scatters, mining pits, ranching and agricultural artifact scatters or structural ruins, native plant gathering areas, traditional cultural properties, and sacred sites.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

As described in the Project Description, the RES Calculator was used to identify in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

Development of renewable energy resources is expected to occur in various locations throughout California, and based on output from the RES Calculator (see Chapter II, Project Description), are likely to include the following general areas identified as Competitive Renewable Energy Zones (CREZs): Tehachapi, Pisgah, Solano, Mountain Pass, Fairmont, Riverside East, and Imperial North. In addition, some out-of-state renewable energy projects would be developed. Renewable energy projects could be developed in most Western U.S. states, although this would more likely occur in states closest to California with substantial renewable energy resources and transmission routes, e.g., Arizona, Nevada, and Utah. The following provides a brief description of the cultural resources settings for each of these areas:

(a). TEHACHAPI

The Tehachapi Mountains and the western Mojave Desert contain a record of substantial depth and variety for human occupation. The earliest archaeological evidence occurs during the terminal Pleistocene, a period marked by rising temperature, precipitation and unstable climate. Although evidence of Paleoindian occupation (prior to 10,000 years B.P) in the region is sparse, the valley was no doubt ideal for the exploitation of Pleistocene megafauna. Archaeologists hypothesize that the earliest occupants of the region led a foraging lifestyle focused around lakeshore or wetland environments (Davis 1978; Moratto 1984). As the Holocene era progressed and the climate moderated, humans occupied increasingly higher elevation zones in the Coast Ranges, Tehachapi Mountains, and Sierra Nevada. Research has established a cultural sequence for the prehistoric setting of the region including the Lake Mojave Period (10,000–7000 B.P.; the Pinto Period (7000–4000 B.P.) during mid-Holocene times; the subsequent Gypsum Period (4000–1500 B.P.); and Rose Spring Period (1500–800 B.P.) which experienced periods of moderate climate interrupted by severe drought; followed by the Late Prehistoric Period (800–300 B.P.) during which climatic conditions ameliorated and saw an increase in precipitation around ca. 600 B.P. Settlement strategies shifted from that of the terminal Pleistocene when population was sparse and subsistence depended on hunting and gathering to one of intensive exploitation of a wide variety of flora and fauna niches. Sites ranged from hunting camps, to seasonal camp sites, to sedentary villages.

During the Ethnographic Period (300 B.P. to present) in the Tehachapi CREZ at least two groups of Shoshonean speakers occupied the area. These include the Kawaiisu, Numic who lived in Tehachapi Valley and throughout the southern Sierra Nevada in the vicinity of Lake Isabella and Walker Pass and the Kitanemuk (Takic), who resided south of the Kawaiisu and north of the Tataviam on the northwestern end of Antelope Valley. Native occupants lived in large permanent winter villages and dispersed into smaller mobile gathering groups during the late spring, summer, and fall months to harvest a variety of seasonal resources. The Kawaiisu lived amicably with their southern neighbors, the Kitanemuk, and are known to have cooperated in antelope drives with the Yokuts of the San Joaquin Valley (Antelope Valley Indian Museum n.d.).

During historic times (A.D. 1500 to present), the Spanish were the first non-native people to enter the region. In 1772, Pedro Fagés led a military expedition through Tejon Pass into the San Joaquin Valley (Wallace 1978:459). Spanish missionaries soon followed when Friar Francisco Garcés traveled through the Antelope Valley in 1776 along the Mojave Indian trail (Beck and Haase 1974:15). Trappers such as Jedediah Smith and Kit Carson journeyed to the area during the 1820s and were followed by John Fremont, who explored the region in 1844, signaling the earliest American presence (Palmdale City Library 2004).

California’s accession to the Union in 1850 led to several infrastructural developments in the region of the Tehachapi CREZ. From 1853 to 1863, the San Joaquin Valley, Tehachapi Mountains, and western Antelope Valley became centers of gold and silver mining and small mining towns such as Randsburg and Calico sprang up. Mojave, Barstow, and Rosamond became major suppliers for the mining operations. Willow Springs was established as a stage stop in 1860 (Tipton 1988) and a telegraph line connecting San Francisco and Los Angeles was constructed through the Mojave Desert the same year (County of Los Angeles Public Library 2000). Despite these transregional developments, the Tehachapis and Antelope Valley remained largely undeveloped until the 1870s, when the Southern Pacific Railroad completed its line through the valley and established stations and permanent towns. In 1828, the military arrived in the western Mojave Desert when the dry lakebed near Muroc became an area for general aviation training. In 1942, the facility was named Army Air Base, Muroc Lake, which later became Muroc Air Force Base (1948), and subsequently Edwards Air Force Base in 1949.

(b). PISGAH

The earliest evidence for human occupation in this portion of the Mojave Desert begins at about 12,000 B.P. The prehistoric cultural chronological sequence for this area has been divided into five temporal periods during which environmental changes may have influenced cultural adaptations, including increasing population, trade, and social complexity (Sutton 1996: 232).

The proposed periods include the Paleoindian Complex (12,000 - 10,000 B. P.) during which occupation was generally located along the shorelines of ancient pluvial lakes (Davis 1969). In addition to fluted points, inhabitants of this period used scrapers, burins, awls, and choppers for processing foodstuffs. The Lake Mojave Period (ca. 10,000 to 8500 B.P.), one of warming climate, witnessed a cultural pattern of small nomadic social units centered on foraging within undefined hunting territories and lacustrine resource collection sites. The Pinto Period (ca. 8500 – 6000 cal B.C.) marked the beginning of cultural adaptation to the desert. The majority of Pinto Complex archaeological sites have been found near pluvial lakes, adjacent to fossil stream channels, near springs, and in upland regions where larger groups remained for longer periods of time. From the period 6000 B.P. to 4000 B.P., there was increased occupation of the desert regions during the Medithermal Climatic period, an interval of moister and cooler temperatures allowing for the intensive re-occupation of the desert region. The Gypsum Complex (ca. 4000 B.P. –A.D. 200) saw occupation of rockshelters, along with evidence of ritualistic behavior including the emergence of rock art, use of quartz crystals, and production of paint. Base camps with extensive midden development are a prominent site type in well-watered valleys and near concentrated subsistence resources (Warren and Crabtree 1986). The subsequent Rose Spring Complex (ca. A.D. 200 – A.D. 1100) evidenced permanent living structures and wickiups, pit houses, and other types of structures. In the eastern Mojave Desert, agricultural people appear to have been present, as Anasazi populations from Arizona controlled or influenced a large portion of the northeastern Mojave Desert by ca. A.D. 700.

Ethnographically, there was a large movement of people across the Mojave Desert and several groups utilized the surrounding Mojave Desert region. The Kawaiisu, Kitanemuk, Southern Paiute, Serrano, Chemhuevi, Tubatulabal, and Panamint occupied the desert at times to hunt and gather resources. Eerkens (1999:301-302) acknowledges that all groups in the area maintained flexible settlement patterns based on availability of resources. The surrounding valleys were not conducive for large scale inhabitation due to fluctuating environmental conditions and the overall arid nature of the region; therefore groups occupying and utilizing the area would have been small and nomadic (Zigmond 1986:398).

Preceded by the Spanish and American exploratory expeditions across the Mojave Desert during the late 1700s and early 1800s, Euroamerican colonization of the desert region took hold by the mid-nineteenth century. Much of this activity was initiated by long-distance commerce, mining, railroad, farming, and ranching interests. This period of initial exploration was followed by a period of expansion with physical and economic ties to distant population centers via highways and rail, and the movement of agricultural products and precious minerals along these transportation routes. Today, the economic pursuits in the Mojave Desert centers around recreational land use, military training, and transportation facilities.

(c). SOLANO

The Solano CREZ is situated in the Delta region north of Suisun and San Pablo Bays in Solano County. This area comprises the northwestern edge of the vast Central Valley. Anthropologists and archaeologists have divided the Central Valley region into three geographical areas that have yielded a variety of archaeological materials ranging in antiquity: the Sacramento Valley, the Delta, and the San Joaquin Valley. Periods of marked changes in the archaeological record reflect differences in the way Native peoples adapted to their environment, as well as influences from groups located in adjacent regions. A chronological framework for the Central Valley Region has been developed based on a common suite of characteristics (Moratto 1984:180–214). The Early Period/Windmiller Pattern (5000 B.P. – 3700 B.P) is characterized by extended burials with westerly orientation typically accompanied by funerary goods, and a high frequency of large projectile points. Few grinding implements, however, are present. The Transitional Period/Middle Horizon/Berkeley Pattern (3700 B.P. – 2000 B.P.) contains flexed burials with variable orientation, a greater reliance on collection of acorns, as suggested by the higher frequency of mortars and pestles in comparison with the previous period, and the presence of bone tools and fish spears. Sites dating to the Late Period/Late Horizon/Augustine Pattern (2000 B.P. – A.D. 1780) contain flexed burials and some occurrence of cremations, smaller serrated projectile points, and shell beads and other ornaments of trade. It has been suggested that finds of earlier periods dating prior to 5000 years ago may be deeply buried under as much as 10 meters of alluvial sediments accumulated in some parts of the valley. Generally, site types correspond to the resources being exploited and the environments in which they are found. Early period sites are fortuitous hunting and gathering camps, which transition to seasonal exploitation camps, and evolve into large village sites.

The majority of Solano County encompasses the traditional homeland of the *Patwin*, a native word used by several contiguous, linguistically and culturally similar bands in this region, in reference to themselves as “people” (Johnson 1978: 350). General territorial boundaries would include the Sacramento River on the east, the Napa River and Clear Lake on the west, San Pablo and Suisun Bays on the south, and the town of Princeton on the north. The earliest historical records of the Patwin are those of baptisms, marriages, and deaths of Indian neophytes at Mission San Francisco de Asis (1776), Mission San Jose (1797), and Mission Sonoma (1823). Like many other tribal groups, very little historical information is known about this group due to their almost total disappearance as a result of European introduced diseases, missionization, and the domination of their territory by miners and settlers in the mid and late nineteenth century. What information is available suggests the Patwin"s main food staples were fish, shellfish, waterfowl, wild seeds, berries, roots, tubers, and acorns, which were secured and processed with baskets and various tools made of stone, wood, or bone. Four types of permanent habitation were constructed within the Patwin's subsistence strategy; a family dwelling, a ceremonial dance house, a sweat house, and a menstrual hut; all of which were earth-covered semi-subterranean structures built in an elliptical form.

In 1835, the Mexican government commissioned Commandante Mariano Guadalupe Vallejo to colonize the lands of the Sonoma Mission, encompassing the area north of San Francisco Bay, as a buffer against the Russians at Fort Ross and to protect settlers from hostile Indian attacks. Grain and cattle were the primary products of the Sonoma province at that time. Following the fall of the Mexican regime during the Bear Flag Revolt (1846), the Sonoma province was annexed by the U.S. and became part of the larger California Territory that attained statehood in 1850. Growth and prosperity in Solano County since the gold rush was spurred by the establishment of ports along the Suisun and San Pablo Bays as early as 1850, and by the California Pacific Railroad that constructed a route into the region by 1868, providing a more efficient means of transporting goods in and out of the region.

(d). MOUNTAIN PASS

Probably the most widely cited chronology of the eastern California desert is Warren's 1980 overview for the Amargosa-Mojave Basin Planning Units under contract with the Bureau of Land Management (Warren 1980). In this chronology, Warren offers five temporal periods of habitation based on distinctive projectile points types and radiometric assay dates (Warren 1980, 1984). With a postulated beginning date of 12,000 B.P., Warren's initial Lake Mojave Period is believed to have persisted until approximately 7000 B.P., when it was followed by the Pinto Period (ca. 7000-4000 B.P.), the Gypsum period (ca. 4000-1500 B.P.), the Saratoga Springs Period (ca. A.D. 450-1350 [1500 B.P.]), and the Shoshonean Period (ca. A.D. 1350-1850)[600-100 B.P.]). Details of this cultural sequence and associated artifact types are available from several sources, including Warren (1980, 1984) and Hall (1993).

To summarize briefly, geomorphic reconnaissance suggests that portions of the Mountain Pass area including Ivanpah Playa may have supported a lake during late Holocene times (<4000 B.P.) which could have attracted human occupation. There also is evidence of limited use of Ivanpah Playa during the earlier Lake Mojave and Pinto periods. Surface finds of projectile points suggest human habitation of the playa with increasing intensity during the Gypsum, Saratoga Springs, and Shoshonean periods. Turquoise mines located at Halloran Springs, California were exploited during these times and mineral was being traded to the southwest. Warren observes that during the Saratoga Spring Period these mines were controlled by the Anasazi of southern

Nevada. Trade routes from the mines led to the Anasazi center in Lost City, Nevada. These routes may have crossed through the Mountain pass area. Warren sees trade as part of the Hakataya sphere of influence beginning in the Shoshonean Period around A.D. 1300. Ceramics were introduced in the regions around A.D. 1000, apparently from the southwest. Further sources of influence came from the Colorado River cultures around A.D. 1000 to A.D. 1500. Ethnographically, the Mountain Pass area was used by the Las Vegas group of the Southern Paiute (Kelly and Fowler 1986) and/or the Desert Chemehuevi subgroup about the same time (King and Casebier 1976). Site types ranged much like they did elsewhere in the desert including special function collection sites, trails and traces, camp sites, and mining sites such as seen at the turquoise mines of Halloran Springs.

The Mountain Pass CREZ is situated along the Interstate 15 corridor in the Mojave Desert region of San Bernardino County, approximately 15 miles from the Nevada border. Situated at approximately 4,728 feet above mean sea level, mining has been the primary factor in the local economic development of this high desert region since gold was first discovered at Salt Spring in 1849. Additional gold discoveries were made across the region during later decades, and from 1870 to the 1910s, gold and silver prospecting continued with fairly even intensity. Low metal prices and the economy put a damper on mining during the 1920s, but an increase in gold prices spurred a resurgence of activity during the Great Depression. Iron extraction became prevalent during WWII, with precious metals falling to the wayside. The technology boom created since WWII has spurred the need for rare earth metals in numerous applications, including medicine, metallurgy, aerospace, nuclear, radars, superconductors, and other high-tech industry. Since the 1950s, rare earth metals have been extracted from the Mountain Pass Mine, forming the principal economy for the area.

(e). FAIRMONT

The Fairmont CREZ is situated in the middle of the Antelope Valley in the western portion of the Mojave Desert of southern California. The prehistoric cultural chronology for this area has been divided into seven periods including the Fluted Point Period (12,000-10,000 B.P.) represented by sporadic finds of early artifact types, the subsequent Lake Mojave Period (10,000-7000 B.P.) found along early Holocene lakeshore sites, the Pinto Period (7000-4000 B.P.) extending into the middle Holocene in Antelope Valley, the Gypsum Period (4000-1500 B.P.), continuing adaptation introduced in the Pinto period, the Saratoga Springs Period (1500-800 B.P.) beginning in 1500, the Post-Saratoga Springs of the Late Prehistoric times (800-300 B.P.) and the Ethnographic Period (A.D. 1700 to present [300 B.P.).

Fluted Point Period is represented by fortuitous hunting and use of Clovis projectile points, crescents, gravers, scrapers, choppers, and perforators (Davis 1978). These assemblages are often observed near lakeshores, in mountain passes, and in grassland areas, but unlike other areas of California, it is thought that early inhabitants of the Mojave Desert were foragers rather than big game hunters (Davis 1978, Moratto 1984). During the subsequent Lake Mojave Period, sites are associated with early Holocene lakeshores and are representative of generalized hunting and foraging and exploitation of lacustrine resources. Recent studies suggest that Pinto Period of the middle Holocene in Antelope Valley was hot and dry punctuated by wet episodes (Mehringer 1986; Grayson 1993). It is believed local populations in the region diminished and dispersed due to the decrease in permanent wetland habitats and reduction in resources. Gypsum Period sites settlement patterns are similar to those of the Pinto Period, however, there is an increased milling component. Large village complexes appear during this time period, reflecting a transition from seasonal migration to year-round sedentary occupation of the Antelope Valley (Sutton 1988). Beginning in 1500, the bow and arrow replace other tool types and Anasazi ceramics were introduced from the southern Mojave Desert. The Anasazi influences were later replaced by a diffusion of Colorado River cultural traits (Hakataya) into the eastern fringes of the Mojave Desert, while the rest of the southern Mojave Desert was more influenced by groups from the California coast (Warren 1984, Warren and Crabtree 1986). During this time, populations were forced into a more intensive dependence on subsistence resources due to severe changes in the climate and an increase in the populations. The Late Prehistoric Period reflects trade along the Mojave River and the people of the eastern Antelope Valley appear to have participated in the exchange of a variety of exotic goods.

During the Ethnographic Period the Kawaiisu, the Kitanemuk, the Tataviam, and the Vanyume cultural groups seasonally used the Fairmont CREZ area of the Mojave Desert. It is possible that members of the Mohave, Serrano, and Chemehuevi groups may have visited the area to hunt and gather resources (Earle 1990, Kroeber 1925, Warren 1984). Among the known ethnographic village, Apavuchiveat, is believed to be situated at Buckhorn Springs. It is likely of Desert (Vanyume) Serrano affiliation. It is also thought that a site existed to the west of Lake Mohave, at Willow Springs.

Until the mid-nineteenth century, European land use of the Antelope Valley was limited to sporadic exploration by Euro-American expeditions. By the late nineteenth and early twentieth centuries, railroads, ranches, homesteads, and mines developed in the area, although settlement was disperse and focused along major transportation routes. The earliest military activity of the area occurred in 1928. In 1935, 128 square miles of the Muroc Dry Lake property (now Rogers Dry Lake) was annexed for military use, which led to the establishment of the Muroc Army Air Field in 1943, and later Edwards Air Force Base.

(f). RIVERSIDE EAST

The prehistoric cultural setting of Native American occupation for the inland valleys of Southern California can be divided into seven cultural periods: Paleoindian (ca. 12,000–9500 B.P.; Early Archaic (ca. 9500–7,000 B.P.); Middle Archaic (ca. 7000–4000 B.P.); Late Archaic (ca. 4000–1500 B.P.); Saratoga Springs (ca. 1500–750 B.P.); Late Prehistoric (ca. 750–410 B.P.); and Protohistoric (ca. 410–180 B.P.), which ended in the ethnographic period. The following discussion has been adapted from Horne and McDougall and others based on data synthesized from the Eastside Reservoir Project (Goldberg et al. 2001).

Little is known about the PaleoIndian and Early Archaic periods of development for this region of California, as few sites have been found. Subsistence patterns were thought to be based in hunting of Pleistocene mega-fauna much as described for elsewhere in California. By about 6000 B.P., during the Middle Archaic Period (ca. 7000–4000 B.P.), local environmental conditions changed and climate in the deserts reached maximum aridity of the postglacial period. The areas saw an increase in prehistoric occupation after about 6000 B.P. The more intensively used residential locations occur along alluvial fan margins, while less intensively used areas tend to be in the arroyo bottoms or upland benches (Goldberg et al. 2001). The Late Archaic Period experienced increased settlement coincidental to the Little Pluvial, a period of increased moisture in the region. By approximately 2100 B.P. drying and warming resumed, perhaps providing the catalyst for resource intensification. Archaeological site types diversified to include residential base sites, temporary camps, and task-specific activity areas suggesting the subsistence base broadened during the Late Archaic. Because paleo-environmental conditions were little changed from the preceding period, cultural trends in the early portion of the Saratoga Springs Period (ca. 1500–750 B.P.) continued to develop along the same trends. A period of even more persistent drought began around 1060 B.P. These climatic changes were experienced throughout the western United States. Owing to inhospitable climate and a decline in water and food sources, land-use and procurement strategies changed profoundly. Subsistence strategies were further refined and intensified accordingly (Goldberg et al. 2001).The focal shift of prehistoric activity from alluvial fan margins to mountain-front benches adjacent to permanent water sources continued during the Saratoga Springs period (Goldberg et al. 2001). During the Late Prehistoric Period (ca. 750–410 B.P.), southern California experienced a period of cooler temperatures and greater precipitation, during which ecosystem productivity improved with the occurrence of reliable water sources (Spaulding 2001). This trend continued into the Protohistoric Period (ca. 410–180 B.P.). Generally, increased sedentism lead to the formation of small, but permanent villages. Hunting became more efficient and widespread exploitation of locally available resources provided reliable and storable food sources.

Archival and published reports suggest the Riverside East CREZ is situated where the traditional use territories of the Serrano, Cahuilla, and Gabrielino overlap, just south of the present City of San Bernardino. All of these cultural groups belonged to cultural nationalities speaking languages belonging to the Takic branch of the Shoshonean family, a part of the larger Uto-Aztecan language stock (Bean and Smith 1978:576; Geiger and Meighan 1976:19). Specific aspects of Serrano, Cahuilla, and Gabrielino ethnography and ethnohistory can be found in Bean and Vane (2001).

Exploration of the California coast in the sixteenth and seventeenth centuries was the basis for most historic land use in the Riverside East CREZ. In the eighteenth century, Spain recognized the need to strengthen its claim, and therefore founded a series of presidios, military camps, and missions along the California coast, beginning in San Diego. In 1821, with the transition to Mexico dominance, the port of San Diego was opened to foreign trade. Americans soon settled in California, some of whom became citizens and owners of large tracts of land.

Subsequently, Southern California was promoted as a prime agricultural area, with fertile soil and a mild climate. Between the 1870s and 1880s, there were three land booms tied to railroad expansion and American settlers took advantage of the low fares to come to California (Lech 2004:222). The Riverside East CREZ lies in proximity to the City of Riverside. Riverside was founded as a town in San Bernardino County in the 1870s and incorporated in 1883. Advertised as a “Colony for California” the area was settled by immigrants coming to partake of the wonders expressed in promotional literature. Riverside became a center of the citrus industry, and famous for its Washington navel orange. Competition with the neighboring city of San Bernardino resulted in the formation of the County of Riverside in 1893 with Riverside as the county seat.

(g). IMPERIAL NORTH

As indicated for the Mountain Pass CREZ, probably the most widely cited chronology for the Mojave Desert was prepared by Warren (1980). Warren’s initial Lake Mojave Period is believed to have persisted until approximately 7000 B.P., when it was succeeded by the Pinto (ca. 7000–4000 B.P.), Gypsum (ca. 4000–1500 B.P.), Saratoga Springs (ca. 1500–800 B.P.), and Shoshonean (ca. 800–100 B.P.) periods. For the Colorado Desert region of southeastern California, Crabtree presented a similar chronology in his *Cultural Resources Overview of the Colorado Desert Planning Units*. Crabtree’s chronology is also divided into five temporal periods: Period I: Pre-Projectile Point (ca. pre-12,000 B.P.); Period II: San Dieguito (ca. 12,000–7000 B.P.); Period III: Pinto Basin (ca. 7000–3500 B.P.); Period IV: Amargosa (ca. 3500–1000 B.P.); and Period V: Late Prehistoric (ca. 1000 B.P.–historic period). Elements of settlement strategy for the cultural chronologies for the Mojave and Colorado deserts are summarized below.

Paleoclimatic and paleoecological data suggest that until about 7500 B.P. the prevailing westerly air flow pattern weakened, while the desert interior received moist monsoonal flow from the southeast (Davis and Sellers 1987; Spaulding and Graumlich 1986). Hence, the desert interior was less arid than cismontane southern California, and possessed an abundance of water and relatively productive ecosystems. As climate became warmer and more arid, Pleistocene megafauna perished (between 13,000 and 10,000 B.P). Human populations responded to these changes by focusing on a wider variety of fauna and flora resources. Sites dating from this interval have generally been found around early Holocene marshes, lakes, and streams and stream terraces which dominated much of the landscape. The Pinto Period is marked by the gradual transition from pluvial to arid conditions during the terminal Pleistocene-Early Holocene. Sites attributed to the Pinto Period are few in number in southern California, but are best documented in the Mojave Desert. These sites are associated with ephemeral lakes, and now-dry streams and springs, suggesting wetter conditions than now prevailed in the deserts. Warren postulates that the “Pinto Basin Complex evolved from the earlier hunting complexes of the Lake Mojave Period and that it represents a small population dependent on hunting and gathering, but lacking a well-developed milling technology” (in Moratto 1984:414). According to Warren (Moratto 1984:414), moister conditions returned at approximately 6500 B.P. and the Pinto Basin peoples appear to reoccupy much of the lower Mojave Desert. As more arid conditions prevailed about 4500 B.P., populations again withdrew to the desert margins and oases, leaving much of the desert region uninhabited.

The Gypsum Period in the Mojave Desert is also marked by change (Warren 1984:416). Manos and milling stones became common suggesting a wide range of perishable items were collected. The beginning of the Gypsum period coincides with the beginning of the Little Pluvial (ca. 4000 B.P.), which apparently allowed for more intensive occupation of the California deserts. Increased contact with neighboring groups likely provided the desert occupants important storable foodstuffs during less productive seasons or years, in exchange for valuable lithic materials. The Saratoga Springs Period in the Mojave Desert saw essentially a continuation of the Gypsum Period subsistence adaptation throughout much of the California desert. Unlike the preceding period, however, the Saratoga Springs Period is marked by strong regional cultural developments, especially in the southern California desert regions, which were heavily influenced by the Hakataya culture of the lower Colorado River area. The Saratoga Springs Period is characterized by cultural diversification with strong regional developments.

During the protohistoric Shoshonean Period in the Mojave Desert, the regional cultural developments established during the preceding Saratoga Springs Period continued. In the southern desert region, pottery, which first appeared on the lower Colorado River at about 1200 years ago, started to spread across the California deserts by 1100 years ago (Warren 1984:425). Trade along the Mojave River expanded, resulting in middlemen between coastal and Colorado River populations. Large, complex village sites were established along the headwaters of the Mojave River (Smith 1963). This gradual spread of desert-based populations marks the “Shoshonean expansion (Warren 1984:426–427). The Late Prehistoric Period in the Colorado Desert is marked by technological innovations (Cleland 1998; CSRI 1986;). This period is characterized by the intrusion of new ceramic types, flood plain horticulture, as well as shifts from burial practices to that of cremation. Typical of the Hohokam culture from southern Arizona, these traits were introduced to the Colorado River inhabitants and gradually spread west to the Peninsular Range and Coastal Plains of southern California.

Ethnographically, the greater Salton Sea Basin was traditionally occupied by the Desert Cahuilla Indians; to a lesser extent, the Kumeyaay Indians resided slightly further to the south in Imperial County. However, a few locations along the Colorado River in Imperial County traditionally have been occupied by the Halchidhoma. Further to the south along the Colorado River are the Quechan, while the northwestern portion of the region in the Morongo and Yucca valleys was traditionally occupied by the Vanyume sub-group of Serrano Indians.

Key historical events that shaped the Mojave Desert included exploration and survey for railroad routes. On March 3, 1853, Congress passed an appropriations bill for the survey of all possible routes for a railroad to the Pacific. This spurred a series of studies including Mojave Desert surveys undertaken by Lt. Robert Stockton Williamson and Lt. Amiel Weeks Whipple. Lt. Williamson set out on July 10, 1853, to survey the land west of the Colorado River. Lt. Whipple generally described the land in the vicinity of the "Old Spanish Trail." Several additional studies were made, with the eventual route for the railroad being established by General William J. Palmer in 1868. During the same time period (1850s to 1860s), traffic and travel across the desert region increased dramatically. One of the pioneer trail blazers was Edward F. Beale, who opened a wagon road from Needles to Barstow, which was completed in 1857. Known as the Old Government Road, the route was utilized by the military, emigrants, miners, and trade caravans. This, in turn, resulted in a gradual growth of regional settlement. Settlements were isolated and slow to develop in the 1860s and 1870s, prior to completion of the railroad in 1883.

The construction of the Southern Pacific was completed on July 12, 1883. This was a landmark event in the history of the western Mojave, as it quickly and permanently impacted all desert development. Many small towns and sidings were established. Agricultural development soon followed with increased settlement throughout the western Mojave. Sheep and cattle ranching predominated during the nineteenth century, with agricultural crops becoming of increasing importance in the first half of the twentieth century.

2. REGULATORY SETTING

Applicable laws and regulations associated with cultural resources are discussed in Table III.D-1.

Table III.D-1. Applicable Laws and Regulations for Cultural Resources

Applicable Regulation	Description
Federal	
National Historic Preservation Act (NHPA) of 1966	Requires federal agencies to consider the preservation of historic and prehistoric resources. The Act authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places (NRHP), and it establishes an Advisory Council on Historic Preservation (ACHP) as an independent federal entity. Section 106 of the Act requires federal agencies to take into account the effects of their undertakings on historic properties and afford the ACHP a reasonable opportunity to comment on the undertaking prior to licensing or approving the expenditure of funds on any undertaking that may affect properties listed, or eligible for listing, in the NRHP.

Table III.D-1. Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	Description
National Environmental Policy Act of 1969	Requires federal agencies to foster environmental quality and preservation. Section 101(b)(4) declares that one objective of the national environmental policy is to "preserve important historic, cultural, and natural aspects of our national heritage... ." For any major federal actions significantly affecting environmental quality, federal agencies must prepare, and make available for public comment, an environmental impact statement (EIS).
Archaeological Resources Protection Act of 1979 (NRPA) (16 USC 470aa-470II)	Requires a permit for any excavation or removal of archaeological resources from public lands or Indian lands. The statute provides both civil and criminal penalties for violation of permit requirements and for excavation or removal of protected resources without a permit.
Advisory Council Regulation, Protection of Historic Properties (36 CFR 800)	Establishes procedures for compliance with Section 106 of the National Historic Preservation Act of 1966. These regulations define the Criteria of Adverse Effect, define the role of State Historic Preservation Officer (SHPO) in the Section 106 review process, set forth documentation requirements, and describe procedures to be followed if significant historic properties are discovered during implementation of an undertaking. Prehistoric and historic resources deemed significant (i.e., eligible for listing in the NRHP, per 36 CFR 60.4) must be considered in project planning and construction. The responsible federal agency must submit any proposed undertaking that may affect NRHP-eligible properties to the SHPO for review and comment prior to project approval.
National Park Service Regulations, National Register of Historic Places (NRHP) (36 CFR 60)	Sets forth procedures for nominating properties to the NRHP, and present the criteria to be applied in evaluating the eligibility of historic and prehistoric resources for listing in the NRHP.
Archaeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (FR 190:44716–44742)	Non-regulatory technical advice about the identification, evaluation, documentation, study, and other treatment of cultural resources. Notable in these Guidelines are the "Standards for Archaeological Documentation" (p. 44734) and "Professional Qualifications Standards for Archaeology" (pp. 44740–44741).

Table III.D-1. Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	Description
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (PL 101–601)	Vests ownership or control of certain human remains and cultural items, excavated or discovered on federal or tribal lands, in designated Native American tribes, organizations, or groups. The Act further: requires notification of the appropriate Secretary or other head of any federal agency upon the discovery of Native American cultural items on federal or tribal lands; proscribes trafficking in Native American human remains and cultural items; requires federal agencies and museums to compile an inventory of Native American human remains and associated funerary objects, and to notify affected Indian tribes of this inventory; and provides for the repatriation of Native American human remains and specified objects possessed or controlled by federal agencies or museums.
Department of Transportation Act of 1966, Section 4(f)	Section 4(f) of the Act requires a comprehensive evaluation of all environmental impacts resulting from federal-aid transportation projects administered by the Federal Highway Administration (FHA), Federal Transit Administration (FTA), and Federal Aviation Administration (FAA) that involve the use—or interference with use—of several types of land: public park lands, recreation areas, and publicly or privately owned historic properties of federal, state, or local significance. The Section 4(f) evaluation must be sufficiently detailed to permit the U.S. Secretary of Transportation to determine that there is no feasible and prudent alternative to the use of such land, in which case the project must include all possible planning to minimize harm to any park, recreation, wildlife and waterfowl refuge, or historic site that would result from the use of such lands. If there is a feasible and prudent alternative, a proposed project using Section 4(f) lands cannot be approved by the Secretary. Detailed inventories of the locations and likely impacts on resources that fall into the Section 4(f) category are required in project-level environmental assessments.
State	
CEQA	See Thresholds Discussion Below

Table III.D-1. Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	Description
Local	
City/County General Plans	Policies, goals, and implementation measures in county or city general plans may contain measures applicable to cultural and paleontological resources. In addition to the enactment of local and regional preservation ordinances, CEQA requires that resources included in local registers be considered (pursuant to section 5020.1(k) of the Public Resources Code). Therefore, local county and municipal policies, procedures, and zoning ordinances must be considered in the context of project-specific undertakings.
Cooperative Agreements Among Agencies	Cooperative agreements among land managing agencies (BLM, National Park Service, U.S. Forest Services, California State Parks, Bureau of Indian Affairs, Department of Defense, to name a few) the SHPO and ACHP may exist and will need to be complied with on specific projects. In addition, certain agencies have existing Programmatic Agreements (PA) requiring permits (CPUC, BLM) to complete archaeological investigations and employ the Secretary of Interior's Professional Qualification Standards and Guidelines (36 CFR 61).

3. Project Impacts

(h). Thresholds of Significance

Under the California Environmental Quality Act (CEQA) (Public Resources Code, Section 21000 et seq.), a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. A historical resource is a resource that is either listed or eligible for listing in the California Register of Historical Resources (CRHR), listed in a local registry, or determined to be significant by the lead agency. (See Section 5024.1 and Section 21084 of the Public Resources Code.)

A resource eligible for listing on the CRHR (PRC 5024.1, Title 14 CCR, Section 4852) is a resource that:

- Is associated with events or patterns of events that have made a significant contribution to the broad patterns of the history and cultural heritage of California and the United States.
- Is associated with the lives of persons important to the nation or to California's past.

- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

- Has yielded, or may be likely to yield, information important to the prehistory or history of the State and the Nation.

The fact that a resource is not listed in, or determined to be eligible for listing in the CRHR, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in a historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be a historical resource as defined in Public Resources Code sections 5020.1(j) or 5024.1.

The CEQA *Statutes and Guidelines* directs public agencies to avoid damaging effects on historical resources whenever feasible. If avoidance is not feasible, the importance of the resource must be evaluated using the criteria outlined in the Guidelines. Resources deemed not important by CEQA criteria do not require further consideration in the CEQA process.

If the project may damage an important historical resource, it may have a significant effect on the environment. Direct impacts may occur by:

- Physically damaging, destroying, or altering all or part of the resource;

- Altering characteristics of the surrounding environment that contribute to the resource's significance;

- Neglecting the resource to the extent that it deteriorates or is destroyed. Indirect impacts primarily result from the effects of project-induced population growth. Such growth can result in increased construction as well as increased recreational activities that can disturb or destroy cultural resources; or

- The incidental discovery of cultural resources without proper notification.

CEQA provides guidelines for mitigating impacts to archaeological and historical resources in Section 15126.4. Achieving CEQA compliance with regard to treatment of impacts to significant cultural resources requires that a mitigation plan be developed for the resource(s). Preservation in place is the preferred manner of mitigating impacts to significant historical resources, when feasible.

If human remains are discovered in any location other than a dedicated cemetery, Section 7050.5(b) of the California Health and Safety Code also must be followed.

For paleontological resources, CEQA guidelines, Appendix G, states, in part, that a project will "normally" have a significant effect on the environment if it, among other things, will disrupt or adversely affect….a paleontological site except as part of a scientific study. Furthermore, the California Public Resources Code Section 5097.5

states, in part, that no person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any vertebrate paleontological site, including fossilized footprints, or any other paleontological feature, situated on public lands (lands owned by or under the jurisdiction of the state, city, county, district or public corporation), except with the express permission of the public agency having jurisdiction over such lands.

IMPACT D-1	**Adverse Impacts to Cultural Resources from Ground Disturbance. All new renewable energy projects and transmission lines that may be proposed for construction and needed to comply with the 33 percent RES no matter their location in-State or out-of-state would have the potential to result in significant impacts to cultural and paleontological resources depending on their location in proximity to cultural resources and their potential to result in ground disturbance. This would be a *potentially significant* impact.**

For all of the renewable energy types described below and transmission lines needed to support delivery, cultural resources impacts would be the same under the 20 percent RPS and 33 percent RES under either high or low load conditions because each of these scenarios would result in the construction of new facilities that could potentially disturb cultural resources. Specific details on the magnitude and type of impacts cannot be determined and would be dependent upon the total number of facilities built and whether these facilities would be built in culturally sensitive areas. All things being equal, it could be assumed that because the high-load condition would result in a greater number of facilities being constructed (compared to the low load condition), this scenario under the 33 percent RES would have a greater magnitude of impacts (e.g., number of resources affected). However, for purposes of this analysis and because the specific siting details are not known, it is reasonable to assume that cultural resources impacts under the high- and low-load conditions would be comparable.

The following provides a brief description of the cultural sensitivity of the areas where proposed renewable energy projects would be located by resource type.

Wind Power

Modeling output for the 33 percent RES indicates that wind power would primarily be generated in the following CREZs: distributed throughout the State, Tehachapi, Fairmont, Mountain Pass, Solano, and out-of-state areas including Colorado, Wyoming, the Northwest, and Idaho.

Solar Thermal

Modeling output for the 33 percent RES indicates that solar thermal power would primarily be generated in the following CREZs: distributed throughout the State, Fairmont, Mountain Pass, Pisgah, Riverside East, Tehachapi, and out-of-state areas including Arizona and southern Nevada.

Solar Photovoltaic

Modeling output for the 33 percent RES indicates that solar photovoltaic power would primarily be generated in the following CREZs: distributed throughout the State, Fairmont, Mountain Pass, Riverside East, Tehachapi, and out-of-state areas including Arizona and southern Nevada.

Geothermal

Modeling output for the 33 percent RES indicates that geothermal power would primarily be generated in the following CREZs: distributed throughout the State and out-of-state areas including Utah/Southern Idaho and Reno area/Dixie Valley.

Solid-fuel Biomass

Modeling output for the 33 percent RES indicates that solid-fuel biomass power would primarily be generated in distributed areas throughout the State.

Biogas

Modeling output for the 33 percent RES indicates that biogas power would primarily be generated in distributed areas throughout the State.

Small Hydroelectric

Modeling output for the 33 percent RES indicates that small hydroelectric power would primarily be generated in the following CREZs: distributed throughout the State and out-of-state areas including British Columbia and the Northwest.

Conclusion

For all of the renewable energy sources discussed above, the types of cultural resources that could potentially be affected with facility construction could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological site associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist. Such resources may occur individually, in groupings of modest size, or in districts. Because significant cultural resources could be affected with implementation of the 33 percent RES, this would be a ***potentially significant*** impact. Impacts under the 33 percent RES would be the same as the 20 percent RPS.

4. Mitigation

Mitigation Measure D-1

Proponents of new renewable energy projects and transmission lines shall:

- **Coordinate with local land use agencies to seek entitlements for development of the projects including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA).The local land use agency or governing body shall certify that the environmental documents are prepared in compliance with applicable regulations and shall approve the projects for development.**

- **Implement all mitigation identified in the environmental documents to reduce or substantially lessen the environmental impacts of the projects.**

- **Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).**

- **Seek guidance from the state and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.**

- **Consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies will provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.**

- **Define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE should include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access.**

- **Retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm.**

- **Conduct initial scoping assessments to determine whether proposed construction activities would disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface**

disturbance. The scoping assessment should be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements.

- **The project proponent's qualified paleontological resources specialist should determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:**

  a) a preliminary survey (if not conducted earlier) and surface salvage prior to construction;

  b) physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries;

  c) monitoring and salvage during excavation;

  d) specimen preparation;

  e) identification, cataloging, curation and storage; and

  f) a final report of the findings and their significance.

- **Choose sites that avoid areas of special scientific value.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33% RES (high and low load conditions).

III.E. GEOLOGY, SOILS, AND MINERAL RESOURCES

This section contains a description of the environmental setting, regulatory setting, and potential impacts associated with the construction and operation of renewable energy projects necessary to comply with the 33 percent RES with respect to geology, soils, and mineral resources.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

As described in the Project Description, the RES Calculator was used to identify in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

1. ENVIRONMENTAL SETTING

The following presents a discussion of the geology, soils, and mineral resources associated with the proposed project. Data collection for this analysis consisted of: identifying and collecting readily available geology and soils, and mineral resource information from local, state, and federal agency sources.

(a). TOPOGRAPHY

The topography of the CREZs identified by the RES Calculator that would support renewable energy projects under the 33 percent RES in California ranges from approximately 100 feet below mean sea level (bmsl) in the Imperial Valley region (Imperial North CREZ) to over 6,000 feet above mean sea level (amsl) in the Tehachapi area (Tehachapi CREZ). The Solano CREZ is characterized with relatively flat to gently-sloping terrain ranging in approximate elevations from 10 to over 200 feet amsl. The topography in the Mountain Pass CREZ is mountainous with moderately steep slopes and alluvial aprons with approximate elevations ranging from 2,600 feet to over 5,400 feet amsl. The topography associated with the Tehachapi CREZs varies with location from mountainous with moderately steep slopes to relatively flat and gently-sloping terrain ranging in elevation from greater than 2,100 to over 6,300 feet.. To the south, the Fairmont CREZ lies both in relatively flat terrain and in more mountainous, steeply-sloping terrain with elevations ranging from approximately 2,300 to over 3,700 feet amsl. To the east, elevations in the Pisgah CREZ range from approximately 1,100 to more than 2,200 feet, mostly along alluvial valley bottoms. Further to the southeast, the Riverside East CREZ is located in mixed terrain consisting of moderately steep hills and isolated mountains surrounded by alluvial slopes and valleys with elevations ranging approximately between 380 to slightly less than 1,300 feet asml. The Imperial North CREZ, the most southerly of the zones, is located along the alluvial slopes and valley bottom of the Salton Sea trough with elevations ranging approximately from 100 feet bmsl to over 300 feet amsl along the valley margins near the surrounding hills.

(b). REGIONAL GEOLOGY

California's geologic history is very complex being associated with major episodes of tectonic activity including intrusive and extrusive volcanic activity, folding and faulting, and mountain building (Norris and Webb, 1990). The most recent period of mountain building is still going on, and practically all of the current landforms and geographic features are very young in geologic terms, only a few million years old. Rocks older than 600 million years, those of the Precambrian Era, are rare in California.

The oldest rocks, which are more than 1,000 million years old, are located in the eastern deserts and the eastern Transverse Ranges (San Bernardino and San Gabriel Mountains). The distribution of rocks of these ages suggests that the west coast of the North American Continent was well to the east of all but the southern end of what is now California. All of these very old formations have been extensively metamorphosed, and therefore it is difficult to determine the conditions that existed when they were originally formed. Some of the oldest rocks (around 1,800 million years old) are located in the mountains around Death Valley and are much like the rocks exposed in the inner gorge of the Grand Canyon. Metamorphic rocks around 1,000 million years old are located in the San Gabriel Mountains and the Orocopia Mountains east of the Salton Sea. During the Paleozoic Era, beginning around 400 million years ago (mya), tectonic forces began the process of mountain building and appears to mark the first time the coast moved west into most of what is now California, and the ancestral Sierra Nevada mountains were emplaced. During the Mesozoic Era between 245 to 65 mya, mountain building continued and the beginnings of the Coast Ranges were formed.

The Cenozoic Era, between 65 mya and the present, was marked with continued uplift, erosion and deposition. The Pacific plate became completely overridden by the North American plate forming the San Andreas Fault system, and in turn other faults. Volcanic activity became widespread in the Sierra Nevada and Mojave Desert regions, and a number of deep marine basins formed along the central and southern California coast. About 5 mya, mountain building accelerated resulting in the uplifting of most of the modern mountain ranges, including the Sierra Nevada and the large fault-block ranges to the east, the Coast Ranges, the Transverse Ranges, and the Peninsular Ranges. This was followed by Pleistocene glaciations in the Sierra Nevada and, to a minor extent, in the San Bernardino Mountains; recent volcanic eruptions in the Mojave Desert and Great Basin regions; and the widespread volcanic activity that created the southern Cascade volcanoes (Mt. Shasta and Mt. Lassen) and the lava flows of the Modoc Plateau region.

The varied geologic history of California is expressed by a series of recognizable and unique physiographic regions, also known as geomorphic provinces. The CREZs of the 33 percent RES lie within several of these geomorphic provinces as delineated on the California Geomorphic Province map (CGS, 2002). The Solano CREZ lies within the Great Valley province very near the boundary with the Coast Ranges province to the east. The Great Valley is an alluvial plain about 50 miles wide and 400 miles long in the central part of California. Its northern part is the Sacramento Valley, drained by the Sacramento River and its southern part is the San Joaquin Valley drained by the San Joaquin River; the proposed Solano CREZ project area lies at the juncture of these. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic (about 160 million years ago).

The Tehachapi CREZ lies within both the southern-most part of the Sierra Nevada province and the northwestern-most part of the Mojave Desert province. The Sierra Nevada province is a tilted fault block nearly 400 miles long. Its east face is a high, rugged multiple scarp, contrasting with the gentle western slope (about 2°) that disappears under sediments of the Great Valley. The surface topography has been shaped and modified by both glacial and stream erosion; the highest elevation is Mt. Whitney at 14,495 feet amsl near the eastern scarp. The metamorphic bedrock contains gold-bearing veins in the northwest trending Mother Lode.

The Fairmont, Pisgah, Mountain Pass, and Riverside East CREZs all lay within the Mojave Desert province. The Mojave Desert province is a broad interior region of isolated mountain ranges separated by expanses of desert plains. It has an interior enclosed drainage and many playas. There are two important fault trends that control topography a prominent NW-SE trend and a secondary east-west trend with the apparent alignment with Transverse Ranges. At its western-most extent, the Mojave Desert province is wedged-shaped between the Garlock Fault (southern boundary Sierra Nevada province) and the San Andreas Fault, where it bends east from its northwest trend. The northern boundary of the Mojave is separated from the prominent Basin and Range province by the eastern extension of the Garlock Fault.

The Imperial North CREZ lies within the central portion of the Colorado Desert province, adjacent to the Peninsular Ranges province to the west and eastern-most extent of the Transverse Ranges province to the north. The Colorado Desert province is a low-lying barren desert basin, about 245 feet bmsl in part, and is dominated by the Salton Sea. The province is a depressed block between active branches of alluvium-covered San Andreas Fault with the southern extension of the Mojave Desert on the east. It is characterized by the ancient beach lines and silt deposits of extinct Lake Cahuilla.

Several geologic units (CDMG, 1977) are exposed throughout the proposed project area at the various CREZs. These units include deposits of Quaternary age alluvium, lake and playa deposits and other marine and non-marine sediments; Quaternary age volcanic rocks; Miocene age sedimentary rocks; Tertiary age sedimentary and volcanic rocks; Upper Cretaceous age sedimentary rocks; Mesozoic age plutonic, sedimentary, and metamorphic rocks; Paleozoic to Mesozoic age schists; Paleozoic to Permo-Triassic age granitic rocks; Paleozoic age sedimentary and metasedimentary rocks; and Precambrian age sedimentary, plutonic and metamorphic rocks. A general summary of the exposed geologic units associated with the proposed CREZ areas is provided below in Table III.E-1.

Table III.E-1. General Summary of Geologic Units

Geologic Unit	Unit Symbol	Associated CREZ	Description of Geologic Unit
Quaternary Age Sand and Playa Deposits	Qs	Tehachapi Riverside East	Extensive marine and non-marine sand deposits, generally near the coast or desert playas.
Quaternary (Holocene) Age Volcanic Rock	Qrv	Pisgah	Recent volcanic flows and minor pyroclastic deposits.
Quaternary Age Alluvium	Q	Solano Mountain Pass Tehachapi Fairmont Pisgah Riverside East Imperial North	Mostly non-marine alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Some marine deposits near the coast.

Table III.E-1. General Summary of Geologic Units			
Geologic Unit	Unit Symbol	Associated CREZ	Description of Geologic Unit
Quaternary Age Volcanic Rock	Qv	Tehachapi	Volcanic flows and minor pyroclastic deposits.
Pliocene and/or Pleistocene Age Sedimentary Deposits	QPc	Solano Tehachapi Riverside East Imperial North	Mostly loosely consolidated non-marine sandstone, shale, and gravel.
Tertiary Age Volcanic Rock	Tv	Pisgah	Volcanic flow rocks, with minor pyroclastic deposits.
Tertiary Age Sedimentary Deposits	Tc	Tehachapi	Undivided non-marine sandstone, shale, conglomerate, breccia, and ancient lake deposits.
Mesozoic Age Plutonic Rock	gr^{MZ}	Tehachapi Fairmont Pisgah	Granite, quartz monzonite, granodiorite, and quartz diorite.
Paleozoic to Mesozoic Age Metamorphic Rock	sch	Tehachapi Fairmont	Marine metasedimentary (schists) of various types.
Carboniferous Sedimentary and Metamorphic Rock	C	Mountain Pass	Marine shale, sandstone, conglomerate, limestone, dolomite, chert; hornfels, marble, and quartzite.
Paleozoic and Permo-Triassic Plutonic Rock	gr^{PZ}	Fairmont	Granitic rocks.
Paleozoic Sedimentary and Metamorphic Rock	Pz	Tehachapi Riverside East	Undivided marine rocks; slate, sandstone, shale, chert, conglomerate, limestone, dolomite, marble, schist, hornfels, and quartzite.
Precambrian Plutonic Rock	gr^{PC}	Fairmont	Various plutonic rocks including granite, syenite, anorthosite, and gabbroic rocks.
Precambrian Sedimentary and Metamorphic Rock	pC	Mountain Pass Riverside East	Marine conglomerate, shale, sandstone, limestone, dolomite, marble, gneiss,

Source: CDMG (1977)

(c). FAULTING AND SEISMICITY

Active (fault rupture within the past 11,700 years) and potentially active (fault rupture within the past 1.6 million years) faults relate mostly to regional strike-slip (horizontal side-to-side motion) faulting, as well as to extensional tectonics (a pulling apart of the earth's crust) in the eastern Mojave Desert, are present in the proposed 33 percent RES CREZs. The fault locations can be found on the Fault Activity Map of California (CDMG 1994), and recently released 150th Anniversary Fault Activity Map of California (CGS 2010). While there are numerous faults that have been classified as active and potentially active near or in the vicinity of the proposed project CREZs, only those that have exhibited historic movement (displacement within the last 200 years) are considered and presented below in Table III.E-2.

Table III.E-2. Summary of Faults with Historic Displacement

CREZ	Fault Name	Direction to Fault from CREZ
Solano	San Andreas Fault Hayward Fault Green Valley Fault Concord Fault Calaveras Fault Marsh Creek Fault	West Southwest West Southwest South South
Mountain Pass	None Indicated (Stateline Fault [1])	 East
Tehachapi	San Andreas Fault Garlock Fault Zone White Wolf Fault	Southwest North-Northwest / crosses through central part North-Northwest
Fairmont	San Andreas Fault San Fernando Fault	Southwest / crosses Southwest
Pisgah	Lavic Lake Fault Galway Lake Fault Camp Rock Fault Emerson Fault Homestead Valley Fault Calico Fault Manix Fault	South South Southwest South-Southwest South West-Northwest North-Northwest

Table III.E-2. Summary of Faults with Historic Displacement		
CREZ	Fault Name	Direction to Fault from CREZ
Riverside East	San Andreas Fault	West-Southwest
Imperial North	Coyote Creek Fault (San Jacinto Fault Zone) Elmore Ranch Fault Superstition Hills Fault Brawley Fault Zone Imperial Fault Zone San Andreas Fault	Adjacent to West Part of Facility South South South South North

1 – Stateline Fault, part of the larger Stateline Fault System is considered by Guest, et al. (2007) to be active.
Source: CDMG (1994) and CGS (2010)

(d). SOILS

The soils within the proposed project area are generally reflective of the underlying geologic unit(s). Soil formation depends on the extent of weathering of the unit(s) which is governed by the ground surface slope, the long-term climate, vegetation cover, the degree of human modification, and time. The following Table III.E-3 provides a summary of the soil types located at the proposed CREZ project areas.

Table III.E-3. Summary of General Soil Types at Proposed CREZ Project Areas		
CREZ	Soil Type Name	Soil Type Number
Solano	Millsholm-Los Osos-Dibble-Balcom Sehorn-Diablo-Balcom-Alo Hillgate-Corning San Ysidro-Antioch Tamba-Reyes Suisun-Joice	s888 s887 s885 s884 s883 s880
Mountain Pass	Ubehebe-Rodad-Penelas-Entero Skyhaven-Rillito-Mead-McCullough-Ireteba-Bluepoint Rock outcrop-Petspring-Lomoine-Armoine Tecopa-Rock outcrop-Lithic Torriorthents St. Thomas-Rock outcrop Nickel-Blackmount-Arizo	s5673 s1144 s1139 s1126 s1125 s1124

Table III.E-3. Summary of General Soil Types at Proposed CREZ Project Areas

CREZ	Soil Type Name	Soil Type Number
Tehachapi	Rock outcrop-Hi Vista-Calvista-Cajon Wasco-Rosamond-Cajon Ramona-Hanford-Greenfield Neutralia-Garlock-Cajon-Alko Rosamond variant-Rosamond-Playa-Gila-Cajon variant-Cajon Tunis-Trigger-Torriorthents-Rock outcrop Tehachapi-Steuber-Havala Walong-Rock outcrop-Edmundston-Anaverde	s1031 s1024 s1009 s769 s768 s766 s765 s762
Fairmont	Sobrante-Lodo Gaviota-Cieneba-Capistrano-Caperton Wilshire-Soboba-Oak Glen-Avawatz Wasco-Rosamond-Cajon Ramona-Hanford-Greenfield	s1057 s1055 s1047 s1024 s1009
Pisgah	Nickel-Bitter-Arizo Playas Rositas-Carrizo Rock outcrop Upspring-Sparkhule-Rock outcrop	s1142 s1138 s1137 s1131 s1127
Riverside East	Vaiva-Quilotosa-Hyder-Cipriano-Cherioni Rillito-Gunsight Playas Rositas-Carrizo Rositas-Duneland-Carsitas Tecopa-Rock outcrop-Lithic Torriorthents Rositas-Orita-Carrizo-Aco	s1141 s1140 s1138 s1137 s1136 s1126 s1041
Imperial North	Vint-Meloland-Indio Rock outcrop-Rillito-Beeline-Badland Rositas-Orita-Carrizo-Aco Vint-Imperial-Glenbar-Gilman Indio-Gilman-Coachella Myoma-Carsitas-Carrizo	s996 s995 s994 s993 s992 s991

Source: General Soil Map of the United States (2010) and NRCS (2010).

(e). GEOLOGIC HAZARDS

Fault Rupture

Fault rupture occurs when movement on a fault deep within the earth breaks through to the surface. However, not all earthquakes result in surface rupture. Fault rupture almost always follows preexisting active faults, which are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden displacements are more damaging to structures because they are accompanied by shaking. A factor considered in the seismic (earthquake) design of project structures is the location of active faults that may, for example, cross renewable energy facility structures, transmission line routes and/or affect a substation and/or other related structures.

A number of the proposed 33 percent RES CREZs appear to be located within or near a currently established State of California Alquist-Priolo Earthquake Fault Zone (APEFZ) for surface rupture hazards. The CREZs that may be affected by the APEFZ are listed below in Table III.E-4.

Table III.E-4. Proposed CREZ Project Areas Affected by APEFZ

CREZ	Fault Name (Associated APEFZ)	Comment
Tehachapi	Garlock Fault	Crosses CREZ through central part
Fairmont	San Andreas Fault	Crosses along western extent of CREZ
Pisgah	Lavic Lake Fault	Crosses CREZ at western end
Imperial North	Coyote Creek Fault (San Jacinto Fault Zone)	Crosses CREZ at western end; Elmore Ranch Fault crosses CREZ at central part

Source: (CGS 2007)

Ground Shaking

The intensity of the seismic shaking, or strong ground motion, during an earthquake is dependent on the distance between the proposed project area and the epicenter (point at the earth's surface directly above the initial movement of the fault at depth) of the earthquake, the magnitude (seismic energy released) of the earthquake, and the geologic conditions underlying and surrounding the proposed project area. Earthquakes occurring on faults closest to the proposed 33 percent RES CREZs would most likely generate the largest ground motion.

Strong seismic shaking can cause ground cracking in natural geologic formations, soils, and artificial fill deposits particularly at the contacts between units where different material properties are juxtaposed. Other forms of seismically induced ground failures which may affect the proposed project include ground cracking and seismically induced landslides. Ground cracking may result from several causes including lateral spreading due to local or widespread liquefaction or similar ground failure, from areas between fault strands experiencing localized extension or dilation, and along ridgelines or other similar topographic features.

The USGS (2002) provides a uniform estimate of the intensity (strength; not to be confused with magnitude) of earthquake-induced ground motion based on an up-to-date assessment of potential earthquake faults or other sources. A commonly used benchmark is peak horizontal ground acceleration that is provided for probability of occurrence and represented as a fraction of the acceleration of gravity (g). For example, the expected acceleration of 20 percent of gravity would be indicated as 0.20g. The approximate estimated range of peak horizontal ground acceleration for a 10-percent (0.10) and 2-percent (0.02) probability of exceedance in 50 years in the proposed CREZ project areas is presented below in Table III.E-5.

Table III.E-5. Peak Horizontal Acceleration at the Proposed CREZ Project Areas

CREZ	10% Probability of Exceedance in 50 Years in (g)	2% Probability of Exceedance in 50 Years in (g)
Solano	0.40	0.80
Mountain Pass	0.09 – 0.10	0.18 – 0.20
Tehachapi	0.25 – 0.40	0.50 – 0.80
Fairmont	0.20 – 0.40	0.40 – 0.60
Pisgah	0.10 – 0.20	0.20 – 0.40
Riverside East	0.09 – 0.15	0.14 – 0.30
Imperial North	0.25 – 0.60	0.40 – 1.20

Source: USGS (2002, 2008)

Overall, this information suggests that ground shaking would be experienced at the proposed CREZ project areas due to earthquakes on currently active faults, many of which are located very near or cross the proposed CREZ project area. The seismic shaking potential at each proposed CREZ project area as indicated in Table III.E-6 below, ranges from low to extremely high and is dependent upon the nearness of the subject fault and the maximum earthquake that can credibly be expected based on the available information about the fault.

Table III.E-6. Seismic Shaking Potential at the Proposed CREZ Project Areas

CREZ	Comment / Rating	Source
Solano	CREZ located east of area indicated as highest potential [Extremely High]	Solano County General Plan (2008); Figure HS-3 [USGS 2002, 2008]
Mountain Pass	Low to Moderate	[USGS 2002, 2008]
Tehachapi	High to Very High	[USGS 2002, 2008]
Fairmont	High [High to Very High]	Los Angeles General Plan (2008) [USGS 2002, 2008]
Pisgah	Moderate	[USGS 2002, 2008]
Riverside East	Moderate [Low to Moderate]	Riverside County General Plan (2003); Figure S-12 (Safety Element) [USGS 2002, 2008]
Imperial North	High to Extremely High	Imperial County General Plan (1993) [USGS 2002, 2008]

Liquefaction

Liquefaction occurs primarily in saturated, loose, fine to medium grained soils in areas where the groundwater table is within approximately 50 feet of the ground surface. Shaking causes the soils to lose strength (that is, lose their ability to stick together) and behave as a liquid. Liquefaction, which can include loss of bearing strength (the ability to support a load such as a building foundation), lateral spreading, subsidence, and buoyancy effects, is caused when these sediments temporarily lose their shear strength during strong ground shaking. Susceptibility to liquefaction is a function of the sediment density, water content, depth, and the peak ground acceleration. Over most of the proposed 33 percent RES CREZs, liquefaction would be unlikely or localized due to groundwater depth (generally much greater than 50 feet) and/or the geologic materials present. The expected liquefaction potential identified in Table III.E-7 below ranges from none to low (and moderate) for those areas where regional data are available.

Table III.E-7. Liquefaction Potential at the Proposed CREZ Project Areas		
CREZ	Comment / Rating	Source
Solano	Very Low to Low	Solano County General Plan (2008); Figure HS-6
Mountain Pass	Regional Data Not Available	
Tehachapi	Regional Data Not Available	
Fairmont	CREZ is located (in part) within an area identified as a liquefaction zone	Los Angeles General Plan (2008); Figure 8.1 (Safety Element)
Pisgah	None to Low	San Bernardino County General Plan (2007)
Riverside East	Moderate	Riverside County General Plan (2003); Figure S-3 (Safety Element)
Imperial North	CREZ is located (in part) within an area identified as liquefiable	Imperial County General Plan EIR (1993)

Geologic materials susceptible to liquefaction can include substantial clay- and silt-rich units (playas and playa fringe areas) and areas with a high percentage of coarse sedimentary particles such as gravel, cobbles, and boulders (intermediate and older alluvial fans), and some units with calcium carbonate cementation (some intermediate and older alluvial fans). Areas of non-sedimentary rock are not susceptible to liquefaction.

Landslides

Landslides, rockfalls, and debris flows occur periodically on many slopes; some processes act very slowly, while others occur very suddenly, with potentially disastrous results. Landslides can result from certain geologic materials, slope steepness, excessive rainfall, earthmoving disturbance, and seismic activity. Excavation and development activities often increase the incidence of landslides. Rockfalls and debris flows are examples of earth movements that occur rapidly, often without warning. Landslides do occur rapidly without warning but can also provide signs of movement before the slide moves completely moves. Such warning signs can include cracks and other ground-deforming surface features. The proposed 33 percent RES CREZs traverse hills and slopes that may be susceptible to landslides, both seismically and non-seismically induced. The landslide potential for the proposed 33 percent RES CREZs for which regional data are available is summarized below in Table III.E-8.

Table III.E-8. Landslide Potential at the Proposed CREZ Project Areas		
CREZ	Comment / Rating	Source
Solano	CREZ is not located in an area of landslide potential	Solano County General Plan (2008); Figure HS-5
Mountain Pass	Regional Data Not Available	
Tehachapi	Regional Data Not Available	
Fairmont	CREZ is located (in part) within an area identified as a landslide zone	Los Angeles General Plan (2008); Figure 8.1 (Safety Element)
Pisgah	None	San Bernardino County General Plan (2007)
Riverside East	Low to High (depending on location)	Riverside County General Plan (2003); Figure S-4 (Safety Element)
Imperial North	Moderate in areas of steep terrain west of the western-most part of the CREZ	Imperial County General Plan EIR (1993)

Subsidence

Subsidence is the settling of the ground surface due to compaction (consolidation) of underlying unconsolidated (loosely-packed) sediments. Subsidence is most common in uncompacted soil, thick unconsolidated alluvial material, and improperly constructed artificial fill. Subsidence can result from earthquakes or fluid withdrawal (extraction of groundwater or oil) from compressible sediments resulting in the settling or sinking of the ground surface over a regional area. Table III.E-9 below provides a summary of the areas where subsidence has been documented within the proposed 33 percent RES CREZs.

Table III.E-9. Subsidence at or near the Proposed CREZ Project Areas		
CREZ	Comment / Rating	Source
Solano	Not Well Documented	
Mountain Pass	Not Well Documented	
Tehachapi	Not Well Documented	
Fairmont	Not Well Documented	
Pisgah	Not Well Documented	
Riverside East	Susceptible but not documented	Riverside County General Plan (2003); Figure S-7 (Safety Element)
Imperial North	Low (to Moderate)	Imperial County General Plan EIR (1993)

Expansive Soil

Expansive soils shrink or swell with changes in moisture content. This characteristic is typically associated with high clay mineral content soils. Changes in soil moisture could result from a number of factors, including rainfall, landscape irrigation, utility leakage, and/or perched groundwater. Expansive soils are typically very fine-grained with high to very high percentages of clay. The potential for expansive soils in the proposed 33 percent RES CREZs is not well documented on a regional scale; one proposed project area, Solano CREZ is designated as high (playa). Generally, for planning purposes, the shrink-swell potential may be expected to be generally low (to moderate) for many of the proposed CREZ areas based on their geologic settings.

Collapsible Soils

Collapsible soils are those which experience a decrease in volume and associated settlement caused by a change in soil structure due to wetting of partially saturated subsoil. Typically, collapsible soils occur predominantly at the base of mountains, where Holocene-age alluvial fan and wash sediments have been deposited during rapid runoff events. Moreover, seismically-induced ground settlement can occur during strong ground shaking in alluvium if deposits have a low relative density and are dynamically compacted thereby reducing volume. Differential settlement can damage structures placed across such susceptible areas. Regional information concerning collapsible soils within the proposed CREZ project areas is not available. Based on their geologic settings, the presence of collapsible soils within the proposed 33 percent CREZs would be expected to be limited and locally developed.

(f). Mineral Resources

Mineral resources consist of oil and gas and deposits of rock, sand, and gravel. Publically available literature, maps, and online sources were utilized to evaluate potential impact to the presence of mineral resources at the proposed 33 percent CREZs. Historical information (CDNR, 1953) indicates mining has been very extensive in throughout the identified CREZs. Typical metallic ores and deposits include but are not limited to gold, silver, tungsten, platinum, copper, iron, manganese, mercury, titanium, arsenic, lead, nickel, chromium and uranium. Typical non-metallic deposits include silica, quartz, boron-borates, feldspar, gypsum-anhydrite, volcanic materials, talc, soapstone, calcium, sulfur, limestone, marble, graphite, strontium, barium-barite, sand and gravel, clay, dimension stone, and flagstone.

The California Geological Survey (CGS), formerly the California Division of Mines and Geology, classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act (SMARA) of 1975 and assists the CGS in the designation of lands containing significant aggregate resources. Mineral Resource Zones (MRZ) have been designated to indicate the significance of mineral deposits. The MRZ categories follow:

- **MRZ-1:** Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.
- **MRZ-2:** Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.
- **MRZ-3:** Areas containing mineral deposits the significance of which cannot be evaluated from available data.
- **MRZ-4:** Areas where available information is inadequate for assignment to any other MRZ.

In most areas, aggregate production for construction purposes represents the majority of the mining activity. A generalized summary of the mineral resources expected within the proposed CREZ project areas is provided below in Table III.E-10.

Table III.E-10. Mines (Active or Closed) and Prospects at the Proposed CREZ Project Areas

CREZ	Number of Mines or Prospects[1]	Classification	Estimated Aggregate Production[2] (million tons/year)	Other Source[3]
Solano	5	MRZ-2 & MRZ-3	NA	Solano County General Plan (2008); Figure RS-4.
Mountain Pass	>100	NA	None	
Tehachapi	>100	NA	<0.5	
Fairmont	>50	NA	5-10	Los Angeles County General Plan (2008); Figure 6.5
Pisgah	>50	NA	None	
Riverside East	>50	MRZ-4	<0.5	Riverside General Plan EIR, 2003; Figure 4.12.1
Imperial North	<50	NA	<0.5	

1 – Includes proposed CREZ project area footprint and surrounding area within approximately 2-miles
2 – CGS (2006)
3 – USGS Mineral Resource Data System (MRDS); active or closed mines and/or prospects listed. County General Plans as cited.

2. Regulatory Setting

Table III.E-11. Applicable Laws and Regulations for Geology, Soils, and Mineral Resources

Federal	
Mining and Mineral Policy Act	The Mining and Mineral Act of 1970 declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.
Clean Water Act	This law was enacted to restore and maintain the chemical, physical, and biological integrity of the nation's waters by regulating point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. This includes the creation of a system that requires states to establish discharge standards specific to water bodies (National Pollution Discharge Elimination System (NPDES)), which regulates storm water discharge from construction sites through the implementation of a Storm Water Pollution Prevention Plan (SWPPP). In California, the state's NPDES permit program is implemented and administered by the local Regional Water Quality Control Boards.
State	
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), Section 2621–2630.	The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (formerly the Special Studies Zoning Act) regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. This act mitigates against surface fault rupture of known active faults beneath occupied structures, and requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings. While this act does not specifically regulate overhead transmission lines, it does help define areas where fault rupture is most likely to occur. This act groups faults into categories of active, potentially active, and inactive.

Table III.E-11. Applicable Laws and Regulations for Geology, Soils, and Mineral Resources	
Surface Mining and Reclamation Act (SMARA)	The intent of SMARA of 1975 is to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using Mineral Resource Zones (MRZ) to designate lands that contain mineral deposits are designed to protect mineral deposits from encroaching urbanization and land uses that are incompatible with mining. The MRZ classifications reflect varying degrees of mineral significance, determined by available knowledge of the presence or absence of mineral deposits as well as the economic potential of the deposits.
Seismic Hazards Mapping Act, PRC Section 2690–2699.	The Seismic Hazards Mapping Act (the Act) of 1990 (Public Resources Code, Chapter 7.8, Division 2) directs the California Department of Conservation, Division of Mines and Geology (now called California Geological Survey) to delineate Seismic Hazard Zones. The purpose of the Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. These include areas identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Cities, counties, and state agencies are directed to use seismic hazard zone maps developed by CGS in their land-use planning and permitting processes. The Act requires that site-specific geotechnical investigations be performed prior to permitting most urban development projects within seismic hazard zones.

Table III.E-11. Applicable Laws and Regulations for Geology, Soils, and Mineral Resources	
California Division of Oil, Gas, and Geothermal Resources, PRC Section 3106.	Public Resources Code Section 3106 mandates the supervision of drilling, operation, maintenance, and abandonment of oil wells for the purpose of preventing: damage to life, health, property, and natural resources; damage to underground and surface waters suitable for irrigation or domestic use; loss of oil, gas, or reservoir energy; and damage to oil and gas deposits by infiltrating water and other causes. In addition, the California Division of Oil, Gas, and Geothermal Resources (DOGGR) regulates drilling, production, injection, and gas storage operations in accordance with California Code of Regulations (CCR) Title 14, Chapter 4, Subchapter 1.
Landslide Hazard Identification Program, PRC Section 2687(a)	The Landslide Hazard Identification Program requires the State Geologist to prepare maps of landslide hazards within urbanizing areas. According to Public Resources Code Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.
Uniform Building Code (UBC-1997) and the California Building Code (CBC-2001).	These codes define minimum building requirements based on different regions of the United States and their seismic hazard potential. There are four types of Seismic Zones with Zone 1 having the least seismic potential and Zone 4 having the highest seismic potential. The CBC-2001 is a modified version of the UBC-1997 published in the United States by the International Conference of Building Officials. Standards and text were amended to reflect California earthquake conditions. Oversight of the CBC is assigned to the California Building Standards Commission, which is responsible by law for coordinating building standards.
Local	
County General Plans (and EIR)	Includes Solano, San Luis Obispo, Los Angeles, Kern, San Bernardino, Riverside, and Imperial counties. These county General Plans provide a regulatory framework to address potential environmental impacts that may result from a proposed project.

3. PROJECT IMPACTS

Evaluation of the 20 percent RPS and 33 percent RES considers the relationship between the location and size of the proposed CREZs to associated potential geologic hazards and resources. For the purpose of this analysis, the various project types (wind, solar thermal, solar photovoltaic, geothermal, solid-fuel biomass, biogas, small hydroelectric, and transmission lines) are considered as a group; impacts being evaluated with respect to the 20 percent RPS (high and low load conditions) and 33 percent RES (high land low load conditions). This method of evaluation is appropriate as the impacts resulting from a renewable energy project from a geology, soils, and mineral resources perspective is directly related to the amount of land that is required to support facilities capable of meeting the energy generation of these scenarios and transporting the energy to points of delivery.

In evaluating the potential impacts, the amount of land required varies with the technology selected. For example, development of geothermal, biogas, biogas, and solid-fuel biomass resources are expected to have a significantly smaller footprint than the other technologies. The development of a geothermal field involves the drilling of wells to access the resource along with the installation of associated facilities. It is assumed that the development and/or expansion of a geothermal field requires significantly less land when compared to the development of the other potential resources due to the generally localized nature of geothermal resources. Development of biogas resources is associated with the volume, type, and availability of fuel. Lastly, the development of solid fuel biomass and biogas resources is similarly limited in the amount of land required to convert organic (mainly plant) materials into a combustible gas, liquid or solid; the final produced fuel is then used at an existing facility.

In contrast, the other potential resources of wind, solar thermal, solar photovoltaic, and small hydroelectric require significantly larger areas of land for development, and transmission may require stretches of land up to 200 miles long with easements of up to 300 feet, depending on number of lines and area needed for construction staging. While the following impact analysis considers all renewable resources, emphasis is placed on the latter group due to the increased environmental sensitivity resulting from the larger land use needs these technologies require.

All renewable energy projects no matter their size, location within the State or out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the State CEQA Guidelines. For those projects that would be located out-of-state, it is assumed that these projects would be located in areas that would be subject to comparable Federal environmental review requirements (e.g., NEPA). At this time, the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, energy demands, environmental constraints, and other market constraints. Nonetheless, the analysis provided herein provides a reasonable accounting of the types of environmental impacts that would occur with implementation of the 33 percent RES plausible compliance scenarios (high or low load conditions). Further, subsequent environmental review would be conducted at such time that a renewable energy project is proposed and land use entitlements are sought.

IMPACT E-1	**Seismic Hazard Impacts Related Fault Rupture, Ground Shaking, Ground Failure/Liquefaction or Landslides. Strong seismic ground shaking could cause damage to structures and access roads, blocking access and posing safety hazards to people. The CREZs with the greatest risk of seismic hazards are Solano, Tehachapi, Fairmont, and Pisgah because of their close proximity to major active faults and/or crossing of Alquist-Priolo Earthquake Fault Zones. The specific design details, siting locations, and seismic hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the risk of impact to the proposed project due to strong seismic ground shaking would be considered *potentially significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).**

All Renewable Energy Project Types

In general, the renewable energy and transmission projects would be located in a variety of seismic conditions including areas that have high to extremely high seismic-related fault rupture and ground shaking potential (i.e., Solano, Tehachapi, and Fairmont CREZ), moderate to high seismic ground failure/liquefaction potential (i.e., Fairmont and Riverside East CREZ), and moderate to high landslide potential (i.e., Fairmont and Riverside East CREZ). Proposed renewable energy projects located within the identified CREZ's would be subject to substantial risk of loss and possible injury or death due to the probable strong seismic ground shaking associated with earthquake activity. This includes the risk of seismic-related ground failure, including liquefaction and in some locations landslides. Strong seismic ground shaking could cause damage to structures and access roads, blocking access and posing safety hazards to people. Strong ground shaking could also trigger landslides in areas where the natural slope is naturally unstable or is over-steepened by the construction of access roads and structures.

The CREZs with the greatest risk of seismic hazards are Solano, Tehachapi, Fairmont, Pisgah, and Imperial North because of their close proximity to major active faults and/or crossing of Alquist-Priolo Earthquake Fault Zones. However, seismic risks exist for all of the identified CREZs.

The specific design details, siting locations, and seismic hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the risk of impact to the proposed project due to strong seismic ground shaking is considered potentially significant for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT E-2	**Substantial soil erosion or the loss of topsoil. All identified CREZs are susceptible, although not all areas within any particular CREZ would exhibit similar vulnerability. The specific design details, siting locations, and soil erosion hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential soil erosion hazard impacts would be considered *potentially significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).**

In general, the renewable energy projects and transmission lines would be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to both soil erosion and loss of topsoil during construction. All identified CREZs are susceptible, although not all areas within any particular CREZ would exhibit similar vulnerability. The specific design details, siting locations, and soil erosion hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential soil erosion hazard impacts would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT E-3	**Unstable Geologic Unit or Soil Impacts. Proposed renewable energy projects located within the identified CREZ's and transmission footings for lines along delivery routes could be potentially located on a geologic unit or soil that is unstable, or would become unstable as a result of the project, and potentially could result in on- or off-site landslide, subsidence, liquefaction or collapse. The specific design details, siting locations, and soil stability hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential soil stability hazard impacts would be considered *potentially significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).**

Proposed renewable energy projects located within the identified CREZ's could be potentially located on a geologic unit or soil that is unstable, or would become unstable as a result of the project, and potentially could result in on- or off-site landslide, subsidence, liquefaction or collapse. Failure of a geologic unit or soil due to unstable conditions could result in structural damage to foundations and/or footings. Over-steepening of natural slopes on hill sides for access roads could result in slope failure (landslide) in areas of unstable geologic and/or soil conditions. Liquefaction and associated ground deformation, and subsidence could result in areas of shallow groundwater. The specific design details, siting locations, and soil stability hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential soil stability hazard impacts would be considered

potentially significant for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT E-4	**Adverse Impacts from Construction on Expansive Soil. All proposed CREZs are potentially susceptible to the presence of expansive soils particularly in areas of fine-grained sediment accumulation typically associated with playas, valley bottoms, and local low-lying areas. The specific design details, siting locations, and expansive soil hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential expansive soil impacts would be considered *potentially significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).**

In general, the renewable energy projects and transmission lines would be located in a variety of geologic settings that would expose facilities and structures to expansive soil conditions. Expansive soils, those with high-plasticity clay content, can cause structural failure of the foundations and footings. The presence of expansive soils as defined in Table 18-1-B of the Uniform Building Code (1994) could create substantial risks to life or property. The potential for expansive soils within the proposed CREZ project areas is not well documented. Therefore, all proposed CREZs are potentially susceptible to the presence of expansive soils particularly in areas of fine-grained sediment accumulation typically associated with playas, valley bottoms, and local low-lying areas. The specific design details, siting locations, and expansive soil hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential expansive soil impacts would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT E-5	**Adverse Soils Impacts from Septic Tanks or Alternative Waste Water Disposal Systems. The soils in the identified CREZs could support materials that would not be able to adequately support septic tanks or alternative wastewater disposal systems. The specific design details, siting locations, and hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the impacts related to adequately supporting septic tanks or alternative wastewater disposal systems would be considered *potentially significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).**

Renewable energy projects would be located in a variety of geologic settings whose suitability for use with septic tanks or alternative waste water disposal systems is uncertain. It is not known if any renewable facilities would be of such a size to require the use of septic tanks or alternative waste water disposal systems. However, it is likely that facilities constructed in the remote areas typical of those proposed would require the use of such systems. The soils present in all of the CREZs consist, at least in part, of alluvium, and often represent a majority of the exposed surface materials. However, the amount of fine-grained material in the alluvium is not known and could affect its suitability to support such a system. The specific design details, siting locations, and hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the impacts related to adequately supporting septic tanks or alternative wastewater disposal systems would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT E-6	**Loss of Mineral Resource of Value to Region and the Residents of the State and Loss of Locally Important Mineral Resources. All identified CREZs support mines or other regionally or locally important mineral resources. The specific design details, siting locations, and regionally or locally significant mineral resources for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, because mineral resources could be affected with implementation of renewable energy projects, this impact would be considered *potentially significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).**

In general, the renewable energy projects would be located in a variety of geologic settings and associated minerals. Both metallic and non-metallic mineral resources are located in each identified CREZ. Metallic mineral resources include both precious and industrial metals, and non-metallic deposits include sand and gravel, dimension stone and other mineral used for construction or construction materials. Numerous mines (both active and closed) and prospects are identified. The vast majority of the listed mines appear to be closed; many identified mining locations are listed as prospects. The CREZs with the highest number of mines/prospects include Mountain Pass and Tehachapi (see Table III.E-10).

All identified CREZs support mines or other regionally or locally important mineral resources. The specific design details, siting locations, and regionally or locally significant mineral resources for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, because mineral resources could be affected with implementation of renewable energy projects, this impact would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

4. MITIGATION

Mitigation E-1

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**

- **Prior to the issuance of any development permits, proponents for the proposed renewable energy projects shall prepare a geotechnical investigation/study, which shall include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, minerals resources and the presence of hazardous materials.**

- **Proponents shall provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents shall avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible.**

- **Proponents shall submit a draft Notice of Intent and a draft Storm Water Pollution Prevention Plan (SWPPP) to the State Water Resources Control Board (SWRCB) or RWQCB for advance review. Ensure the SWPPP is prepared by a qualified consultant. If the facility will be subject to the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Construction Permit), ensure the plan addresses the latest SWRCB requirements and is submitted to the SWRCB. Structures and/or facilities shall be designed to meet all applicable Federal, State and local regulations. If found to be situated in areas where seismic hazards cannot be mitigated to less-than-significant levels subsequent to the findings of the required geotechnical investigations and implementation of the applicable engineering standards, the affected structures and/or facilities shall be relocated.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant geology, soils, and mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

Mitigation E-2 through E-6

Implement Mitigation E-1, above.

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

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III.F. GREENHOUSE GAS EMISSIONS

The evaluation of greenhouse gas emission impacts resulting from adoption of the RES is provided in Chapter IX of the RES staff report.

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III.G. HAZARDS AND HAZARDOUS MATERIALS

This section contains a description of the environmental setting, regulatory setting, and potential impacts associated with the implementation of the proposed project with respect to hazards and hazardous materials. The purpose of this section is to determine if the proposed renewable energy projects could potentially cause significant impacts to the public from the use, handling, storage, or transportation of hazardous materials at the proposed CREZ locations. This analysis does not address the potential exposure of workers to hazardous materials used at the proposed CREZ project sites because employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential for health impacts from the handling of hazardous materials.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

As described in the Project Description, the RES Calculator was used to identify in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

(a). TYPES OF HAZARDOUS MATERIALS

Hazardous materials include corrosive, toxic, reactive, or flammable materials which can be found in our homes and businesses. These materials can be harmful to people, wildlife, and the environment. Throughout the State, they can be found in a number of products and locations, including hazardous waste sites and naturally occurring materials like asbestos, radon, and mercury. Hazardous materials come from a variety of sources.

Hazardous waste includes household and industrial products that cannot be safely disposed of in the trash or poured down sinks or storm drains. This includes items such as used motor oil, batteries, solvents, poisons, chemicals, oil- and latex-based paints, and automotive fluids. Hazardous waste is subject to storage time limits, disposal requirements, and labeling requirements on containers. Most hazardous waste may be stored for only 90 days with exceptions made for businesses that generate small quantities under certain circumstances. In many of the counties where the proposed CREZ project areas are located, hazardous wastes used by businesses are reported in an annual inventory of hazardous materials required by their General Plans. The State of California also requires the reporting of small and large quantity generators.

Naturally occurring hazardous materials in California includes asbestos, radon, and mercury. Asbestos is a naturally occurring mineral composed of long, thin, fibrous crystals. It is often found in a type of rock (Serpentine) located in the Coastal Ranges including the Solano CREZ. It has been used often in building materials because of its resistance to heat, chemical, or electricity damage. Inhaling asbestos fibers may cause various health issues, including lung cancer.

Mercury is a chemical element found in both natural processes and human activities. Natural sources of mercury include volcanoes, hot springs, and natural mercury deposits. Sources related to human activities include coal combustion and certain industrial and mining activities. Human exposure most often occurs through consumption of fish that has been exposed to methyl mercury.

Radon is a gas that forms during the decay of uranium that is naturally found in rock, water, and soil. It migrates to the surface through cracks or fractures in the earth's crust. Breathing air with elevated levels of radon gas may result in an increased risk of developing lung cancer.

Other sources of hazardous material can include agricultural spraying, such as herbicides and pesticides, leaking underground storage tanks, and airports.

(b). Superfund Sites

The most common contaminants released at statewide superfund sites includes chlorinated hydrocarbons trichloroethylene and tetrachloroethylene; and the heavy metals arsenic, chromium and lead. Based on National Priority List (NPL) data, there are no superfund sites located near or within the footprint of any of the proposed CREZ project areas (Scorecard, 2010). In addition, none of the recently added superfund sites are located in California (USEPA, 2010).

(c). Toxics Release Inventory

The Toxics Release Inventory (TRI) is a publicly available USEPA database that contains information on toxic chemical releases and waste management activities reported annually by certain industries as well as federal facilities. The most common contaminants released to land at TRI facilities are lead compounds, asbestos, zinc, aluminum (oxide), arsenic, barium and many other heavy metals (Scorecard, 2010). It is the most comprehensive inventory of information about chemicals released into the environment. These facilities are permitted under strict federal regulations and required to install and maintain pollution controls. TRI allows the public to see which facilities are increasing and decreasing their output of toxic chemicals and compounds, so that stakeholders are well informed about chemicals released into their communities, and industries can gauge their progress in reducing pollution. Thanks to improvements in EPA's system, the vast majority of facilities now report data electronically and detailed information about specific facilities is more readily accessible to the public. On March 19, 2009, USEPA released the 2007 Toxics Release Inventory (TRI, 2007) which is accessible via the internet and Google Earth.

Sites identified with associated releases are listed below in Table III.G-1. All of these sites are located outside the proposed CREZ project area footprints but are in the general regional vicinity of some portion of the proposed CREZ.

Table III.G-1. Summary of TRI Sites		
CREZ	Number of Sites	Location to Site
Solano	>10	Sites to the northwest in the Fairfield and south in the Antioch areas
Tehachapi	9	Near or co-located
Fairmont	5	Northwest and Southeast
Mountain Pass	1	West-southwest
Imperial North	1	Near or co-located

(d). LANDFILLS / HAZARDOUS WASTE LANDFILLS

Landfills, particularly those licensed to accept hazardous wastes, must address and manage leachate. Landfill leachate is liquid that moves through or drains from a landfill. This liquid may either exist already in the landfill, or it may be created after rainwater mixes with the chemical waste. Modern landfills are often designed to prevent liquid from leaching out and entering the environment; however, if not properly managed, the leachate is at risk for mixing with groundwater near the site, which can have dire effects.

The most common source of landfill leachate is rainwater filtering down through the landfill. Landfill leachate may be virtually harmless or dangerously toxic, depending upon the characteristics of the material in the landfill. Typically, landfill leachate has high concentrations of nitrogen, iron, organic carbon, manganese, chloride and phenols. Other chemicals including pesticides, solvents and heavy metals may also be present. In the past, this usually toxic soup was allowed to slowly leak away into the nearby environment, eventually mixing with the local groundwater system.

Modern landfill sites require that the landfill leachate be collected and treated. Since there is no method to ensure that rainwater cannot enter the landfill site, landfill sites must now have an impermeable layer at the bottom. The landfill leachate that collects at the bottom must be monitored and treated if required. This liquid can be treated in a similar manner to sewage, and the treated water can then be safely released into the environment.

With the exception of the Imperial North CREZ, there are no commercial hazardous waste landfills located near or within the footprint of any of the other proposed CREZ project areas (EHSO, 2010). The hazardous waste landfill, operated by Laidlaw Environmental Services at 5295 South Garvey Road in the City of Westmorland, is located southeast of the Imperial North CREZ.

(e). Other Hazardous Waste Sites

Several bombing target areas in the vicinity of the proposed Imperial North CREZ project area are identified (EnviroStor, 2010). The types of hazards identified include explosives (UXO; unexploded ordnance) and lead in the soil.

(f). Schools

Schools are not located within the proposed CREZ project areas. However, schools are located regionally to the Solano, Carrizo North, Tehachapi, Kramer, and Fairmont CREZs in nearby cities.

(g). Airports and Airstrips

Two airports/airstrips are located near the proposed CREZ projects areas. These include the Palmdale Air Force Plant 42 located to west of the Fairmont CREZ, and the Imperial County Airport located to the southeast of the Imperial North CREZ. Both locations are a minimum of 2 miles from the nearest proposed CREZ project area.

(h). Wildland Fires

Most of the proposed CREZ project areas, with the exception of the Solano and Carrizo CREZs are located in desert regions with sparse vegetation. Although wildfires occur in these areas, they are limited due to the general lack of fuel stock.

(i). Coal Ash Waste Sites

Coal ash sites contain harmful levels of arsenic, lead, mercury and other toxins, which can leach out slowly and contaminate drinking water sources. No coal ash sites are located in California; two are located in eastern Arizona (NRDC, 2009).

(j). Transportation of Hazardous and Toxic Materials

Land use hazards associated with the transport of hazardous cargo potentially exists at some of the proposed CREZ project locations that are near major highways. These may include the Tehachapi, Fairmont, Pisgah, Mountain Pass, and Riverside East CREZs. A number of major transportation routes (State Highway 14, Interstate-15, Interstate-40, and Interstate-10) pass through these CREZ areas and a wide range of hazardous cargo may regularly be transported along these routes. Types of hazardous cargo that may be transported by freeway include flammable liquids, corrosive materials, compressed and/or poisonous gases, explosives, and flammable solids. Some potential exists for a highway mishap that could cause hazardous cargo to spill, contaminating surrounding areas. If flammable liquids were to ignite, they could quickly spread fire and poisonous fumes that could cause human casualties and/or property damage.

Counties recognize that the possibility of an accident involving hazardous cargoes is present, and have established polices and implementation programs to minimize the likelihood and extent of such accidents. These provisions are included in the local land use planning documents.

2. REGULATORY SETTING

Table III.G-2. Applicable Laws and Regulations for Hazards and Hazardous Materials

Federal	
Clean Air Act (CAA) Act (42 USC Section 9601 et seq.)	The Clean Air Act is the law that defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The last major change in the law, the Clean Air Act Amendments of 1990, was enacted by Congress in 1990. Legislation passed since then has made several minor changes. The Clean Air Act, like other laws enacted by Congress, was incorporated into the United States Code as Title 42, Chapter 85. The House of Representatives maintains a current version of the U.S. Code, which includes Clean Air Act changes enacted since 1990.
Clean Water Act (CWA) (40CFR 112)	The 1972 amendments to the Federal Water Pollution Control Act (known as the Clean Water Act or CWA) provide the statutory basis for the NPDES permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the United States. Section 402 of the CWA specifically required EPA to develop and implement the NPDES program.
Safe Drinking Water Act (SDWA)	The Safe Drinking Water Act (SDWA) is the main federal law that ensures the quality of Americans' drinking water. Under SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. SDWA does not regulate private wells which serve fewer than 25 individuals.

Table III.G-2. Applicable Laws and Regulations for Hazards and Hazardous Materials

Toxic Substances Control Act (TSCA) 15 U.S.C. Section 2601 et seq.	The Toxic Substances Control Act (TSCA) of 1976 provides EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. TSCA addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls (PCBs), asbestos, radon and lead-based paint.
Resource Conservation and Recovery Act (RCRA) 42 U.S.C. Section6901 et seq.	The Resource Conservation and Recovery Act (RCRA) of 1976 gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. HSWA - the Federal Hazardous and Solid Waste Amendments - are the 1984 amendments to RCRA that focused on waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. Some of the other mandates of this law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the NPL. The Superfund Amendments and Reauthorization Act (SARA) of 1986 reauthorized CERCLA to continue cleanup activities around the country. Several site-specific amendments, definitions

Table III.G-2. Applicable Laws and Regulations for Hazards and Hazardous Materials	
	clarifications, and technical requirements were added to the legislation, including additional enforcement authorities. Also, Title III of SARA authorized the Emergency Planning and Community Right-to-Know Act (EPCRA).
Environmental Planning and Community Right-to-Know Act (EPCRA) (42 USC Section 9601 et seq.)	The Superfund Amendments and Reauthorization Act (SARA) of 1986 created EPCRA (40 CFR Parts 350-372), also known as SARA Title III, a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by state/tribe and local governments. EPCRA required the establishment of state/tribe emergency response commissions (SERCs/TERCs), responsible for coordinating certain emergency response activities and for appointing local emergency planning committees (LEPCs).
State	
Air Resources Board (ARB)	In 1967, California's Legislature passed the Mulford-Carrell Act, which combined two Department of Health bureaus--the Bureau of Air Sanitation and the Motor Vehicle Pollution Control Board--to establish the Air Resources Board (ARB). On February 8, 1968, the first meeting of the ARB was held in Sacramento. Since its formation, the ARB has worked with the public, the business sector and local governments to find solutions to California's air pollution problem.

Table III.G-2. Applicable Laws and Regulations for Hazards and Hazardous Materials	
Department of Toxic Substances Control (DTSC)	The California Department of Toxic Substances Control (or DTSC) is an agency whose mission is to provide the highest level of safety, and to protect public health and the environment from toxic harm. DTSC, part of the California Environmental Protection Agency (Cal/EPA), regulates the generation, handling, treatment and disposal of hazardous waste in California. DTSC also cleans up thousands of hazardous waste sites in California including disposal sites and industrial sites that resulted in contamination of soil and groundwater. In close cooperation with the United States Environmental Protection Agency, DTSC administers both state and federal hazardous waste programs including The Resource Conservation and Recovery Act (RCRA) the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 U.S.C. Section 9601–9675), the Toxic Substances Control Act (TSCA) and a number of other State and Federal bodies of law dealing with hazardous materials and the environment.
California Porter-Cologne Water Quality Act	This California state law provides a comprehensive water quality management system for the protection of California waters. Porter-Cologne designated the State Water Resources Control Board (SWRCB) as the ultimate authority over State water rights and water quality policy, and also established nine Regional Water Quality Control Boards (RWQCB) to oversee water nvironmental review, proponents shall implement all ioe RWQCBs have the responsibility of granting NPDES NPDES permits for storm water runoff from construction sites.
Safe Drinking Water and Toxic Enforcement Act of 1986	The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65), was enacted as a ballot initiative in November 1986. The proposition was intended by its authors to protect California citizens and the state's drinking water sources from chemicals known to cause cancer, birth defects, or other reproductive harm, and to inform citizens about exposures to such chemicals. The act requires the Governor to publish, at least annually, a list of chemicals known to the state to cause cancer or reproductive toxicity.

Table III.G-2. Applicable Laws and Regulations for Hazards and Hazardous Materials	
California Health and Safety Code Section 25501.	California law defines a hazardous material as any material that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may pose a present or potential hazard to human health and safety or to the environment if released in the workplace or the environment (California Health and Safety Code Section 25501). A hazardous waste is defined as a discarded material of any form (e.g., solid, liquid, gas) that may pose a present or potential hazard to human health and safety or to the environment when improperly treated, stored, transported, disposed of, or otherwise managed (California Health and Safety Code Section 25117).
Local	
Oil Spill Contingency Plan	The Oil Spill Contingency Plan (California Government Code Section 8574.1) requires that regional and local planning agencies incorporate within their planning the state's effort to respond to marine oil spills, and ensure the effective and efficient use of regional and local resources in the areas of traffic and crowd control, firefighting, boating traffic control, radio and communications control, and provision of medical emergency services.
Toxic Release Contingency Plan	The Toxic Release Contingency Plan (California Government Code Section 8574.16) requires that regional and local planning agencies incorporate within their planning the state's effort to respond to emergency toxic releases, and ensure the effective and efficient use of regional and local resources in the areas of traffic and crowd control, firefighting, hazardous materials response and cleanup, radio and communications control, and provision of medical emergency services.

Table III.G-2. Applicable Laws and Regulations for Hazards and Hazardous Materials	
Hazardous Materials Release Response and Inventory Program	The Hazardous Materials Release Response and Inventory Program (California Health and Safety Code Sections 25500–25520) establishes business and area plans for the handling and release of hazardous materials. Basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidentally released into the environment, is tracked by the local Certified Unified Program Agency (CUPA) within each region for the use and awareness of hazardous materials responders, firefighters, emergency care providers, regulatory agencies and other interested persons.
County General Plans (and EIR)	Includes Solano, San Luis Obispo, Los Angeles, Kern, San Bernardino, Riverside, and Imperial counties. These county General Plans provide a regulatory framework to address potential environmental impacts that may result from a proposed project.

3. PROJECT IMPACTS

For the purpose of this analysis, the various project types (wind, solar thermal, solar photovoltaic, geothermal, solid-fuel biomass, biogas, and small hydroelectric) are considered as a group; impacts being evaluated with respect to the 20 percent RPS (high load / low load conditions) and 33 percent RES (high load / low load conditions). This method of evaluation is appropriate as the impacts resulting from the proposed project from a hazards and hazardous materials perspective is not directly related to the amount of land that is required to support these scenarios.

IMPACT G-1	**Routine transport, use or disposal of hazardous materials. Because the proposed renewable energy facilities would generally be located substantial distances from highways, major developments, and other sensitive receptors, and the proposed renewable energy facilities would be required to comply with all appropriate Federal, State, and local laws regarding the transportation of hazardous materials, the risk of impact to the proposed project due to routine transport, use or disposal of hazardous materials would be *less than significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).**

Proposed renewable energy projects located within the identified CREZ's would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. While major interstate or state highways do cross near or through some of the proposed CREZ project areas, the propose locations of the facilities and equipment is set-back at considerable distances from these highways, and from other major developments; all but the Solano, Fairmont, and portions of the Tehachapi and Kramer CREZs are located in remote areas. Further, the proposed renewable energy facilities would be required to comply with all appropriate Federal, State, and local laws regarding the transportation of hazardous materials.

The risk of impact to the proposed project due to routine transport, use or disposal of hazardous materials would be ***less-than-significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT G-2	**Upset and accident conditions involving the release of hazardous materials into the environment. The project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. This would be a *potentially significant* impact under the 20 percent RPS and 33 percent RES (low and high load conditions).**

Construction equipment used in support of the project would require periodic refueling and lubricating. Large equipment such as backhoes, graders, etc. are typically fueled and maintained at the construction site as they are not designed for use on public roadways. Such maintenance utilizes a service vehicle that mobilizes to the location of the equipment. It is during the transfer of fuel that the potential for an accidental release is most likely. Although precautions can be taken to ensure that any spilled fuel is properly contained and disposed, and such spills are typically minor and localized to the immediate area of the fueling (or maintenance), the potential still remains for a significant release of hazardous materials into the environment. Consequently, the project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Therefore, this would be a ***potentially significant*** impact under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT G-3	**Hazardous emission release within one quarter mile of a school. No school facilities are located within ¼-mail of any of the proposed CREZs. Therefore, this would be a *less-than-significant* impact under the 20 percent RPS and 33 percent RES (low and high load conditions).**

Because the proposed renewable energy projects would be located in remote locations substantially distant from any school facilities, emissions of hazardous chemicals or handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school would not occur. This would be a ***less-than-significant*** impact under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT G-4	**Location within an area that is included on a hazardous materials list compiled pursuant to Government Code Section 65962.5. Proposed renewable energy projects located within the identified CREZ's are not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment. As a result, the proposed project would have *no impact* for all renewable energy project types under the 33 percent RES (low and high load conditions).**

Proposed renewable energy projects located within the identified CREZ's are not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment. As a result, the proposed project would have ***no impact*** for all renewable energy project types under the 33 percent RES (low and high load conditions).

IMPACT G-5	**Hazards associated with proximity to a public or private airport or location within an Airport Land Use Plan. No public or private airports are located within 2 miles of any of the proposed CREZs and not airport land use plans would apply to the CREZs. Therefore, implementation of renewable energy projects would result in *less-than-significant* hazard impacts under the 20 percent RPS and 33 percent RES (high and low load conditions).**

Proposed renewable energy projects located within the identified CREZ's are not located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public or private airport. Therefore, implementation of renewable energy projects would result in ***less-than-significant*** hazard impacts under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT G-6

Conflicts with an adopted emergency response plan. Proposed renewable energy projects would be subject to local land use approvals, which would ensure that the proposed facilities provide adequate emergency response and access to and from the site. Therefore, implementation of renewable energy projects would result in *less-than-significant* emergency response plan impacts under the 20 percent RPS and 33 percent RES (low and high load conditions).

Proposed renewable energy projects located within the identified CREZ's are not expected to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Proposed renewable energy projects would be subject to local land use planning approvals. Part of those approvals would require that adequate emergency response plans and access to and from the facility are provided such that it would not interfere with local or regional emergency response plans. Therefore, implementation of renewable energy projects would result in ***less-than-significant*** emergency response plan impacts under the 20 percent RPS and 33 percent RES (low and high load conditions).

IMPACT G-7

Wildland fire risk. Proposed renewable energy projects would be required to use construction/maintenance equipment with appropriate spark-suppression controls and would be required to provide adequate fire suppression facilities onsite. Therefore, wildland fire risks would be *less than significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

While there is a potential risk for wildland fires in any of the proposed CREZs, the project would not increase that risk to a level greater than would be expected under existing conditions because limited fuel stock would be available in most of the CREZs. Further, all off-highway construction equipment must have approved exhaust systems with spark-suppression controls facility pads and access/maintenance roads would serve as a barrier or potential fuel break to wildland fire. Finally, the proposed renewable energy projects would be required to provide adequate fire suppression facilities and water supply pressure consistent with local and State requirements. Therefore, wildland fire risks would be ***less-than-significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).

4. Mitigation

Mitigation is required for the following significant or potentially significant impacts.

Mitigation Measure G-2

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**

- **Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.**

- **Handling of potentially hazardous materials/wastes should be performed under the direction of a licensed professional with the necessary experience and knowledge to oversee the proper identification, characterization, handling and disposal or recycling of the materials generated as a result of the project. As wastes are generated, they shall be placed, at the direction of the licensed professional, in designated areas that offer secure, secondary containment and/or protection from stormwater runoff. Other forms of containment may include placing waste on plastic sheeting (and/or covering with same) or in steel bins or other suitable containers pending profiling and disposal or recycling.**

- **The temporary storage and handling of potentially hazardous materials/wastes should be in areas away from sensitive receptors such as schools or residential areas. These areas should be secured with chain-link fencing or similar barrier with controlled access to restrict casual contact from non-Project personnel. All project personnel that may come into contact with potentially hazardous materials/wastes will have the appropriate health and safety training commensurate with the anticipated level of exposure.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant hazards and hazardous material impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33% RES (high and low load conditions).

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III.H. HYDROLOGY, WATER QUALITY, AND WATER SUPPLY

This section describes the water resources that could be affected by implementation of the 33 percent RES including assessment of surface and groundwater hydrology, water quality, and water supply uses. Impacts are identified and mitigation recommended, where necessary.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

As described in the Project Description, the RES Calculator was used to identify in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

(a). CLIMATE AND HYDROLOGY

California experiences a Mediterranean climate with cool, wet winters and warm, dry summers. In California, most precipitation (i.e., rain and snow) and peak stream runoff events occur primarily during the months of October–April, and the most extreme events usually occur between November and March. Precipitation rates vary greatly across the state from northern to southern regions, and the state contains many desert regions where annual total precipitation is very low (i.e., less than about 6 inches). In mountainous areas, snowmelt can provide moderate to high runoff rates in the April to July period, and snowmelt generally contributes substantially to the seasonal and annual volume of water that is available for storage in reservoirs and sustained streamflows into the later summer months.

Many rivers are controlled by dams, reservoirs, and levees for a variety of purposes, including but not limited to, flood control, hydroelectric power generation, water storage and transport for municipal/domestic and agricultural water supply, recreation, and fish and wildlife uses. Most of the major rivers on the west side of the Sierra Nevada Mountains are controlled, to some degree, by large dams, reservoirs, and diversions and water conveyance canals. Smaller reservoirs are common at other locations throughout the state. Sierra Nevada Mountain runoff to the Sacramento River and San Joaquin River (i.e., approximately 25 million acre-feet [MAF] in above normal water year types) provides much of the surface water used in the state and managed and conveyed in State Water Project (SWP) and Central Valley Project (CVP) facilities operated by the Department of Water Resources and U.S. Bureau of Reclamation, respectively (Department of Water Resources 2009). Water from the Sacramento River and San Joaquin River flows into the Sacramento-San Joaquin Delta (Delta), where both the SWP and CVP operate pumps to export water to the southern portion of the state. California also conveys a substantial quantity of water from the Colorado River for agricultural uses in the Imperial Valley and Coachella Valley, and municipal uses in the Los Angeles region. Several large reservoirs are located in the Los Angeles and San Diego areas to store imported Delta and Colorado River water.

California contains vast quantities of groundwater in alluvial aquifers that cover approximately 40 percent of the land surface. Several large groundwater recharge and conjunctive use projects are part of the SWP/CVP operations to provide short-term and long-term sub-surface storage of surplus surface water for later withdrawal for municipal/agricultural uses . Groundwater pumping that exceeds the natural recharge can lead to “overdrafting,” which refers to long-term drawdown of groundwater table elevations.

Both groundwater and surface water are used extensively in California for agricultural, municipal, and industrial water supplies. Current annual municipal and industrial water use for the California population of approximately 35 million residents ranges from 10-12 MAF, with demands being lower in drought years when higher levels of conservation occur (Department of Water Resources 2009). Approximately 35 MAF is used for agricultural production. In years with average available surface water supply, groundwater meets about 30 percent of California’s urban and agricultural demand, increasing in drought years to about 40 percent or more (Department of Water Resources 2003). While water supplies typically have been sufficient to meet demands, significant water supply and water quality challenges exist at local levels, particularly during extreme drought year types when conservation and cutbacks for agriculture have occurred and the SWP/CVP operations are stressed to meet competing water demands and environmental requirements in the major rivers and Delta.

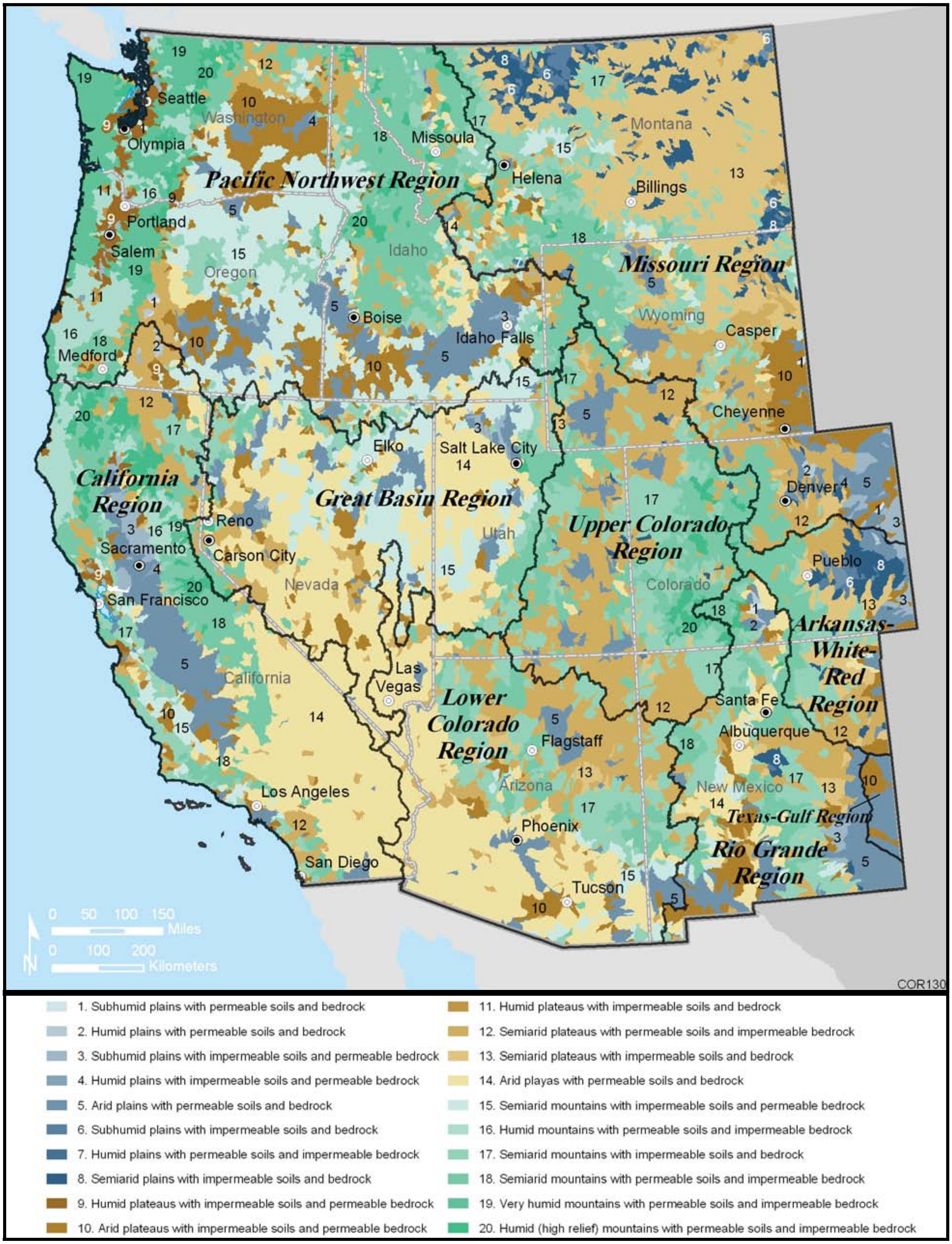
Western United States

There are nine hydrologic regions (i.e., Pacific Northwest, California, Upper Colorado, Lower Colorado, Rio Grande, Missouri, Great Basin, Arkansas-White-Red, and Texas-Gulf) identified in the 11 western states (excluding Alaska) which generally encompass the majority of, or overlap with, the boundaries of the Western Electricity Coordinating Council (WECC) service area in the 11 western states. Hydrologic landscape regions (HLRs), a classification scheme developed by the U.S. Geological Survey to group watersheds according to similar landscape and climatic characteristics, are shown in (Source: DOE and BLM 2008)

Figure III.H-1 for the nine hydrologic regions (DOE and BLM 2008). The HLRs demonstrate that there is a large variety of climate and hydrologic characteristics present in the western U.S. where renewable energy facilities may be located. In general, the range of climatic and hydrologic conditions that are present in California encompass the range of conditions that also may be present in the other western states. However, a difference in other western states from California is the presence of generally longer and colder winter seasonal conditions, which in many areas also translates into surface streamflow that lasts longer into the dry summer months or occurs year-round.

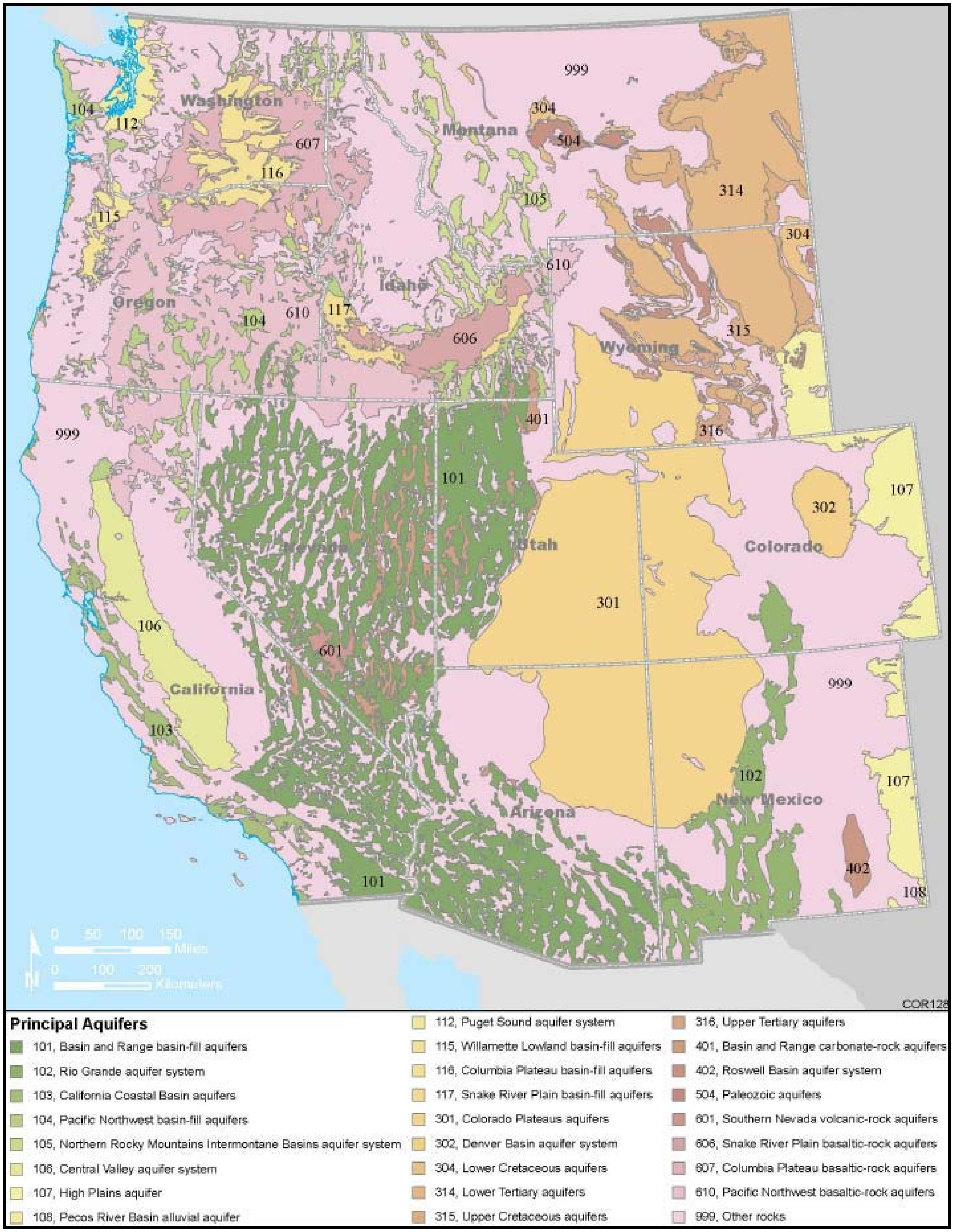
There are about 26 major groundwater aquifer systems in the western states (excluding Alaska), as shown in (Source: DOE and BLM 2008)

Figure III.H-2 (DOE and BLM 2008). In general, the aquifers occur in six types of permeable geologic materials: unconsolidated deposits of sand and gravel,



(Source: DOE and BLM 2008)

Figure III.H-1. Hydrologic Landscape Regions for the 11 Western States



(Source: DOE and BLM 2008)

Figure III.H-2. Principal Aquifer Systems in the 11 Western States

semiconsolidated sand, sandstone, carbonate rocks, interbedded sandstone and carbonate rocks, and basalt and other types of volcanic rocks. The source, volume, and quality of water flowing through it depends on: its hydrogeological conditions (e.g., hydraulic conductivity, effective porosity, and hydraulic gradient); external factors (e.g., rates of precipitation, recharge, evaporation, and transpiration); the location and hydrologic connection with streams, rivers, springs, reservoirs, and wetlands; and overlaying human activities (DOE and BLM 2008). Rocks and deposits with minimal permeability, which are not considered aquifers, consist of intrusive igneous rocks, metamorphic rocks, shale, siltstone, evaporite deposits, silt, and clay.

Within the 11 western states, there are 26 designated “sole-source aquifers” by the U.S. Environmental Protection Agency (EPA) (DOE and BLM 2008). A sole-source aquifer is defined as supplying at least 50 percent of the drinking water consumed in the area overlying the aquifer, where the surrounding area has no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water The designation protects an area's ground water resource by requiring EPA to review certain proposed projects within the designated area. All proposed projects receiving federal funds are subject to review to ensure that they do not endanger the aquifer.

(b). WATER QUALITY

The water quality of surface waters and groundwater varies throughout California. Potential surface sources of water quality impairments include point sources (direct discharges to water bodies) and dispersed non-point sources (e.g., stormwater runoff). Continuous point-source discharges such as domestic wastewater treatment plants can be a source of elevated levels of organic carbon, nutrients (i.e., nitrogen and phosphorus), salinity, or trace metals and organic compounds relative to natural background water concentrations. Potential domestic wastewater discharges of pharmaceutical and other personal care products have been identified as potentially contributing endocrine disrupting compounds (EDCs) and related adverse long-term toxic effects to aquatic organisms. Urban stormwater runoff from residential, commercial, and industrial land uses can mobilize and convey trash, oils, grease, trace metals (e.g., copper and zinc) to drainage systems and natural receiving water bodies. Stormwater runoff from residential and agricultural areas can also contain sediment, pesticides, herbicides, nutrients (e.g., fertilizers), and pathogens (e.g., bacteria and viruses from fecal wastes of pets and livestock). Contaminants of concern that remain in the environment for an extended period after deposition with little degradation include synthetic organic compounds such as chlorinated hydrocarbon pesticides (e.g., dichlorodiphenyltrichloroethane [DDT]), which largely have not been produced or used in California since the late 1970’s, polychlorinated biphenyl compounds (PCBs), and dioxin and furan compounds. Improperly managed construction activities-related erosion and stormwater runoff can contribute sediment.

Primary water quality issues vary around the state depending on the location and type of water resources present in an area, the size and extent of the watershed and regional water resources, the location of the water body with respect to potential pollutant sources, seasonal and climatic factors, and many other interacting physical, chemical, and biological processes. The State Water Resources Control Board (SWRCB) conducts monitoring of surface waters through the Surface Water Ambient Monitoring Program (SWAMP), in which the collected data is used in part to support water quality assessments by each Regional Water Quality Control Board for the Clean Water Act (CWA) Section 305(b) reporting process, which mandates the state to identify and prioritize funding efforts for protection, cleanup, and monitoring programs. The most recent Section 305(b) report released in 2002 identified that of the 32,536 miles of rivers/streams assessed, 27,449 were impaired for one or more beneficial uses, as was 361,128 of 576,013 acres of lakes/reservoirs assessed (SWRCB 2003). Table III.H-1 shows the number of water bodies on the 2006 statewide CWA Section 303(d) list of impaired water bodies by region and pollutant type.

Table III.H-1. Number of Water Bodies on the Clean Water Act Section 303(d) List for Each Pollutant Listed by Each Regional Water Quality Control Board

Pollutant Type	Regional Water Board									Total
	1	2	3	4	5	6	7	8	9	
Hydromodification				10						10
Mercury	10	100	2	8	51	3	1	2	1	178
Other Metals		55	15	115	77	75	6	18	46	407
Miscellaneous	201	13	1	28	16			2	22	283
Nuisance				14					11	25
Nutrients	110	27	114	104	21	254	10	20	81	741
Other Inorganics		4		19		5			10	38
Other Organics	2	69	12	89	10	2	17	10	12	223
Pathogens	10	48	141	122	33	45	7	30	55	491
Pesticides		99	69	177	145		18	16	18	542
Salinity	1	3	20	30	16	42	3	2	52	169
Sediment	410	20	150	23	5	85	3	15	17	728
Toxicity		3	4	32	30	1	1	7	18	96
Trash		1		37			1		3	42
Grand Total	**744**	**442**	**528**	**808**	**404**	**512**	**67**	**122**	**346**	**3,973**

Regional Water Board Numbers: North Coast (1), San Francisco Bay (2), Central Coast (3), Los Angeles (4), Sacramento River-San Joaquin River and Tulare Lake (5), Lahontan (6), Colorado River (7), Santa Ana (8), and San Diego (9).

Groundwater quality may be adversely affected by all of the sources contributing to surface water impairment discussed above, particularly in alluvial aquifers that are recharged directly through by infiltration and percolation of surface water. Direct inputs of wastes to groundwater include sub-surface sources such as inadequately contained solid waste landfills, failing residential and commercial septic system leachfields, and leaking underground storage tanks that contain fuels, oils, or other industrial chemicals. The level of the major dissolved minerals (e.g., calcium, magnesium, potassium, sodium, sulfate, chloride), or salinity, is an important groundwater quality parameter for drinking water acceptability, agricultural use (i.e., crop tolerance), and aquatic biota. Total dissolved solids (TDS) concentrations that exceed about 500 milligrams per liter (mg/L) reflect generally low salinity, whereas water with TDS levels above about 2,500 mg/L are undesirable for drinking and have severe limitations for agricultural irrigation. Salinity can be naturally high, such as coastal aquifers affected by seawater intrusion or in arid lands where eons of evaporative concentration and locations of prehistoric seas have raised salinity levels. In the desert regions of southern California where many RES energy resource opportunities are anticipated to occur, groundwater quality can be highly variable, with many areas affected by relatively high salinity (Department of Water Resources 2003).

Western United States

In general, the range of surface and groundwater quality conditions that are present in California encompass the range of conditions that also may be present in the other western states. The most recent Section 303(d) lists of water quality limited water bodies compiled nationally from each state's available reporting (as of 2008) identified that within the western U.S. (including California and excluding Alaska), approximately 137,000 of 320,000 miles of rivers/streams assessed were impaired for one or more beneficial uses, as was 3.1 million of the 4.2 million acres of lakes/reservoirs assessed (EPA 2010).

2. REGULATORY SETTING

Table III.H-2 below provides a general description of applicable laws and regulations that may pertain to the Project as it relates to hydrology, water quality, and water supply.

Table III.H-2. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply

Applicable Regulation	Description
Federal	
National Flood Insurance Program	Designated floodplain mapping program, flooding and flood hazard reduction implementation, and federal subsidized flood insurance for residential and commercial property. Administered by the Federal Emergency Management Agency (FEMA).
Executive Order 11988	Requires actions to be taken for federal activities to reduce the risks of flood losses, restore and preserve floodplains, and minimize flooding impacts to human health and safety.

Table III.H-2. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply	
Applicable Regulation	Description
Clean Water Act (CWA)	Administered primarily by the U.S. Environmental Protection Agency (U.S. EPA). Pertains to water quality standards, state responsibilities, and discharges of waste to waters of the United States. Sections 303, 401, 402, and 404.
CWA Section 303	Defines water quality standards consisting of: 1) designated beneficial uses of a water, 2) the water quality criteria (or “objectives” in California) necessary to support the uses, and 3) an antidegradation policy that protects existing uses and high water quality. Section 303(d) requires states to identify water quality impairments where conventional control methods will not achieve compliance with the standards, and establish Total Maximum Daily Load (TMDL) programs to achieve compliance.
CWA Section 401	State certification system for federal actions which may impose conditions on a project to ensure compliance with water quality standards.
CWA Section 404	Permit system for dredging or filling activity in waters of the U.S., including wetlands, and administered by the U.S. Army Corps of Engineers.
CWA Section 402	National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point sources and nonpoint source stormwater.
National Toxics Rule and California Toxics Rule	Applicable receiving water quality criteria promulgated by U.S. EPA for priority toxic pollutants consisting generally of trace metals, synthetic organic compounds, and pesticides.
State	
California Water Rights	The State Water Resources Control Board (SWRCB) administers review, assessment, and approval of appropriative (or priority) surface water rights permits/licenses for diversion and storage for beneficial use. Riparian water rights apply to the land and allow diversion of natural flows for beneficial uses without a permit, but users must share the resources equitably during drought. Groundwater management planning is a function of local government. Groundwater use by overlying property owners is not formally regulated, except in cases where the groundwater basin supplies are limited and uses have been adjudicated, or through appropriative procedures for groundwater transfers.

Table III.H-2. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply

Applicable Regulation	Description
Public Trust Doctrine	Body of common law that requires the state to consider additional terms and conditions when issuing or reconsidering appropriative water rights to balance the use of the water for many beneficial uses irrespective of the water rights that have been established. Public trust resources have traditionally included navigation, commerce, and fishing and have expanded over the years to include protection of fish and wildlife, and preservation goals for scientific study, scenic qualities, and open-space uses.
Porter-Cologne Water Quality Control Act and California Water Code (Title 23)	The SWRCB is responsible for statewide water quality policy development and exercises the powers delegated to the state by the federal government under the CWA. Nine Regional Water Quality Control Boards (Regional Water Boards) adopt and implement water quality control plans (Basin Plans) which designate beneficial uses of surface waters and groundwater aquifers, and establish numeric and narrative water quality objectives for beneficial use protection. Regional Water Boards issue waste discharge requirements (WDRs) for discharge activities to water and land, require monitoring and maintain reporting programs, and implement enforcement and compliance policies and procedures. Other state agencies with jurisdiction in water quality regulation in California include the Department of Public Health (drinking water regulations), Department of Pesticide Regulation, Department of Toxic Substances Control, Department of Fish and Game, and the Office of Environmental Health and Hazard Assessment.
Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California	Commonly referred to as the State Implementation Policy (or SIP), the SIP provides implementation procedures for discharges of toxic pollutants to receiving waters.

Table III.H-2. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply	
Applicable Regulation	Description
Thermal Plan	The Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California was adopted by the SWRCB in 1972 and amended in 1975. The Thermal Plan restricts discharges of thermal waste or elevated temperature waste to waters of the state. Generally, the Thermal Plan prohibits discharges from increasing ambient temperatures by more than 1ºF over more than 25% of a stream cross section, increasing ambient temperatures by more than 4ºF in any location, and prohibits discharge of waste that exceeds more than 20ºF above the ambient temperature.
Statewide NPDES General Permit for Stormwater Associated with Land Disturbance and Construction Activity (Order No. 2009-0009-DWQ, NPDES No. CAR000002) *Note: Permit becomes effective on July 1, 2010*.	NPDES permit for stormwater and non-storm discharges from construction activity that disturbs greater than one acre. The general construction permit requires the preparation of a storm water pollution prevention plan (SWPPP) that identifies best management practices (BMPs) to be implemented to control pollution of storm water runoff. The permit specifies minimum construction BMPs based on a risk-level determination of the potential of the project site to contribute to erosion and sediment transport and sensitivity of receiving waters to sediment.
Statewide NPDES General Permit for Discharges of Stormwater Associated with Industrial Facilities (Order No. 97-003-DWQ, NPDES No. CAS000001)	NPDES permit for stormwater and non-storm discharges from types of industrial sites based on the Standard Industrial Classification (SIC). The general industrial permit requires the preparation of a SWPPP that identifies potential onsite pollutants, BMPs to be implemented, and inspection/monitoring.
SWRCB Resolution 75-58	The *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling* (adopted June 19, 1976) addresses the specific siting of energy facilities. The policy states that use of fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.

Table III.H-2. Applicable Laws and Regulations for Hydrology, Water Quality, and Supply	
Applicable Regulation	Description
Local	
Floodplain Management	General Plans guide County land use decisions, and require the identification of water resource protection goals, objectives, and policies. Floodplain management is addressed through ordinances, land use planning, and development design review and approval. Local actions may be coordinated with FEMA for the National Flood Insurance Program. Typical provisions address floodplain use restrictions, flood protection requirement, allowable alteration of floodplains and stream channels, control of fill and grading activities in floodplains, and prevention of flood diversions where flows would increase flood hazards in other areas.
Drainage, Grading, and Erosion Control Ordinances	Counties regulate building activity under the federal Uniform Building Code, local ordinances, and related development design review, approval, and permitting. Local ordinances are common for water quality protection addressing drainage, stormwater management, land grading, and erosion and sedimentation control.
Environmental Health	The Regional Water Boards generally delegate permit authority to County health departments to regulate the construction and operation/maintenance of on-site sewage disposal systems (e.g., septic systems and leachfields, cesspools).

3. PROJECT IMPACTS

Criteria for determining the significance of impacts related to hydrology, water supply, and water quality were based on the environmental checklist form in Appendix G of the State CEQA Guidelines (14CCR 15000 et seq.). An impact was considered to be significant if the 33 percent RES would:

- substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);

- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on site or off site;

- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on site or off site;
- create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems;
- place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam;
- create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- cause exceedance of applicable state or federal numeric or narrative water quality objectives/criteria, or other relevant water quality thresholds identified for this assessment, by frequency, magnitude, and geographic extent that would result in adverse effects to beneficial uses; or
- cause long-term degradation of water quality, resulting in substantial risk of adverse effects to beneficial uses.

IMPACT H-1

Potential Operations-Related Effects to Groundwater Hydrology and Water Supply. Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the energy generation facilities constructed under the 33 percent RES that would likely rely on groundwater resources for steam generation, evaporative cooling, washing of solar panels, dust control, and domestic use by the workforce. In areas where groundwater resources are limited, reliance on groundwater has the potential to result in net lowering of groundwater levels and adversely affect resources on offsite properties. Therefore, the impact to groundwater resources is considered *potentially significant* under the 20 percent RPS and 33 percent RES (high and low load scenarios).

The potential hydrologic effects of renewable energy facility development and operations would likely be similar region-wide across the western states, thus this discussion does not differentiate potential effects in California and other states.

Wind Power

20 Percent RPS

Relative to the existing conditions, there is anticipated to be a substantial increase in the development of wind power facilities. Construction of wind power sites may involve an increase in the area of impermeable or less permeable surfaces associated with site development of small operation and maintenance (O&M) complexes (e.g., parking lots, buildings), access roads, or wind turbine foundations. Impervious surfaces may decrease the soil infiltration of precipitation and groundwater recharge. However, based on the generally dispersed spacing (i.e., low density) of wind power facilities within a watershed, the majority of land surface at a site would not be affected and thus groundwater recharge would not be expected to be appreciably reduced. Construction activities may use moderate quantities of water temporarily for items as dust control, concrete mixing, construction, equipment washing, and watering revegetation plantings. Wind power sites are likely to be relatively distant from urbanized areas, therefore, temporary water uses and the long-term domestic water supply for workers may rely on groundwater resources. There would be no operational use of water for the wind power, other than by workers. Long-term annual groundwater use would be relatively low given the small work force required for a wind power facility. This would be a less-than-significant impact.

33 Percent RES

Relative to existing conditions and the 20 percent RPS, additional wind power facilities would likely be constructed under the 33 percent RES, which would result in additional construction of impervious surfaces, temporary construction-related groundwater use, and potential long-term groundwater uses for domestic consumption by workers. However, the dispersed facility siting and low labor force required to operate wind power facilities is not expected to result in substantial groundwater use compared to existing supplies, and thus would be unlikely to result in substantial adverse effects to groundwater resources. This would be a less-than-significant impact.

Solar Thermal

20 Percent RPS

Construction of new solar thermal facilities would result in substantial areas of land covered with solar panels, primarily in the arid desert regions of southern California and other western states. Site grading for drainage control, access roads, and relatively close spacing of panels may result in reduced soil infiltration of rainfall and more concentrated and rapid overland runoff of drainage, which may reduce infiltration and groundwater recharge. Solar thermal facilities also may use substantial quantities of water for long-term operations including steam generation, evaporative cooling of the power generation units, periodic washing of the mirror panels to maintain their efficiency, dust control around the site, and domestic consumption by the work force. In areas such as arid desert regions of the southwest U.S. where available surface water is limited, the construction and operation of solar thermal facilities may result in the need to install groundwater wells. Groundwater pumping, if it exceeds the natural recharge rates, may result in decreased groundwater levels relative to existing conditions. Groundwater level reductions may adversely affect offsite groundwater users through reduced groundwater yield from a well, or the need to deepen a well, or the need to construct deeper replacement wells. Additionally, in arid regions and deserts, surface streams, springs, and wetlands may be hydrologically connected to the groundwater. Consequently, the potential seasonal or long-term reductions in groundwater levels may adversely affect flows in seasonal surface water bodies. However, absent site-specific project operations and groundwater information, it is not possible to characterize the probability of solar thermal facility operations to cause adverse offsite groundwater effects. Therefore, for purposes of this analysis, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

33 Percent RES

Relative to existing conditions and the 20 percent RES, there would be a substantial increase in the number of solar thermal facilities constructed under the 33 percent RES. Additional use of groundwater for steam generation, evaporative cooling, washing of mirror panels, dust control, and domestic consumption by workers has the potential to result in long-term reduced groundwater levels. Absent site-specific project operations and groundwater information, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

Solar Photovoltaic

20 Percent RPS

This assessment was based partially on information presented in recent environmental documents prepared for several large solar photovoltaic projects that are proposed to be constructed in southern California (BLM and CEC 2009, CEC 2009). Construction of solar photovoltaic energy facilities, like solar thermal installations, would result in substantial areas of land covered with solar panels, primarily in the arid desert regions of southern California and other western states. Site grading for drainage control, access roads, and relatively close spacing of panels may result in reduced soil infiltration of rainfall and more concentrated and rapid overland runoff of drainage, which may reduce infiltration and groundwater recharge. Long-term facility operations could likely include water use for periodic washing of solar panels, site dust control, and domestic water consumption by the work force. In areas where surface water resources are limited, development of groundwater wells to support groundwater pumping, if it exceeds the natural recharge rates, may result in decreased groundwater levels relative to existing conditions. Groundwater level reductions may adversely affect offsite groundwater users through reduced groundwater yield from a well, or the need to deepen a well, or the need to construct deeper replacement wells. Additionally, in arid regions and deserts, surface streams, springs, and wetlands may be hydrologically connected to the groundwater. Consequently, the potential seasonal or long-term reductions in groundwater levels may adversely affect flows in seasonal surface water bodies. However, absent site-specific project operations and groundwater information, it is not possible to characterize the probability of solar photovoltaic facility operations to cause adverse offsite groundwater effects. Therefore, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

33 Percent RES

Relative to existing conditions and the 20 percent RES, there would be a substantial increase in the number of solar photovoltaic facilities constructed under the 33 percent RES. Additional use of groundwater for washing of mirror panels, dust control, and domestic consumption by workers has the potential to result in long-term reduced groundwater levels. Absent project-specific operations and groundwater information, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

Geothermal

20 Percent RPS

This assessment was based partially on information presented in BLM's Final Programmatic Environmental Impact Statement on Geothermal Leasing in the Western United States (BLM 2008). Geothermal energy facilities may use geothermal fluids directly for turbine power generation, which may result in consumptive use through evaporation or discharge to brine ponds if the quality is unsuitable for reinjection back into the aquifer. Geothermal fluids also may be used indirectly as the heat source to generate steam power using supplemental water resources for steam generation, evaporative cooling, or both processes. In arid desert regions where available surface water is limited, the construction and operation of geothermal facilities may result in the need to use groundwater. Consequently, geothermal energy facility operations in areas of limited groundwater availability can potentially adversely affect offsite groundwater resources as described above for other energy sources. However, absent site-specific project operations and groundwater information, it is not possible to characterize the probability of geothermal facility operations to cause adverse offsite groundwater effects. Therefore, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

33 Percent RES

Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the number of geothermal facilities constructed under the 33 percent RES. Additional use of groundwater for geothermal facility operations has the potential to result in long-term reduced groundwater levels. Absent project-specific operations and groundwater information, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

Biogas and Solid-fuel Biomass

20 Percent RPS

Solid-fuel biomass energy facilities are likely to be operated to generate steam power using supplemental water resources for steam production and evaporative cooling. In the arid desert regions where available surface water is limited, the construction and operation of biogas may result in the need to use groundwater. Energy facility operations in areas of limited groundwater availability can potentially adversely affect offsite groundwater resources as described above for other energy sources. However, absent site-specific project operations and groundwater information, it is not possible to characterize the probability of solid-fuel biomass or biogas facility operations to cause adverse offsite groundwater effects. Therefore, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

33 Percent RES

Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the number of biogas facilities constructed under the 33 percent RES. Additional use of groundwater for solid-fuel biomass or biogas facility operations has the potential to result in long-term reduced groundwater levels. Absent project-specific operations and groundwater information, the potential for adverse reduction in groundwater levels in offsite wells of adjacent landowners and reduced flow contributions to surface water bodies is considered a potentially significant impact.

Small Hydroelectric

Small hydroelectric energy generation does not affect the use of groundwater, and thus would have no adverse effects on groundwater resources. Therefore, no impact would occur.

IMPACT H-2	**Potential Construction- and Operations-Related Effects to Stormwater Drainage and Flooding Hazards. Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the energy generation facilities constructed under the 33 percent RES that may create new compacted or paved impervious surfaces that would increase the amount of stormwater runoff. Additional stormwater runoff may contribute to localized drainage-related problems such as increased drainage channel flows and streamflows, potential increases or exceedances of channel capacities leading to flooding, increased erosion and sedimentation, or damage from inundation of property and structures from increased drainage volumes. Facilities that encroach on floodplains may contribute to increased floodwater elevations and exposure of people to flood hazards. Therefore, the impact to stormwater drainage and flooding hazards is considered *potentially significant* under the 20 percent RPS and 33 percent RES (high and low load scenarios).**

The potential effects of 33 percent RES facility development and operations to drainage and flooding would be similar across the western states, thus this discussion does not differentiate potential effects between California and other states.

Wind Power, Solar Thermal, Solar Photovoltaic, Geothermal, Solid-fuel Biomass, Biogas, and Small Hydroelectric

20 Percent RPS

Construction of all types of renewable energy facilities have the potential to result in the same types of potential adverse effects to drainage and flooding conditions. Construction activities typically involve substantial grading, excavation, and facility construction activities that have the potential to result in changes to overland drainage including soil compaction and creation of earthen roads, which reduces infiltration of rainfall, or creation of impervious surfaces such as paved areas/roads and buildings. Construction-related changes in drainage patterns may increase the rate or total volume of stormwater runoff from the site to adjacent properties and water bodies. Additionally, grading activities may change topographic features such as the routing of drainage channels across a site, size of flows conveyed in individual channels, and distribution of drainage to offsite receiving water bodies. Additional stormwater runoff can contribute to localized drainage-related problems such as erosion and sedimentation, or damage to stormwater drainage facilities that have inadequate capacity to convey the runoff.

The potential for construction and placement of energy facilities on the landscape to contribute to offsite flooding, or be exposed to flooding and flood hazards are related to drainage conditions. Increased stormwater drainage runoff rates and volumes may contribute to increased offsite channel flows that lead to additional inundation in existing areas of flooding, or increase the frequency with which channel capacities are exceeded. In the rural desert regions of the southwest, many areas that flood are not mapped and overland flooding can occur on the relatively level terrain, particularly in areas where the soil or bedrock is naturally impervious and generates high volumes of runoff during heavy rain events. Therefore, placement of energy facilities may expose property and workers at risk of exposure to flooding unless the site has been evaluated to determine the potential for flooding to occur. Moreover, encroachment of energy facilities within a floodplain could impede, restrict, or redirect flows, thereby exposing the facilities to flood damage or contribute to backwater upstream of the facility.

Absent site-specific project drainage and streamflow information, it is not possible to characterize the probability of facility operations to cause adverse offsite effects to stormwater drainage or flooding risks. Therefore, the specific effects of additional drainage that could occur in the project area, or risks to and from flooding hazards, are uncertain. Consequently, for purposes of this analysis, this impact is considered potentially significant.

33 Percent RES

Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the number of renewable energy facilities constructed to meet the 33 percent RES goal. Additional renewable energy facility construction may increase the potential for additional offsite stormwater drainage problems (e.g., erosion and sedimentation), contributions to offsite flooding, or exposure of renewable energy facilities to flooding and flood hazards. Absent site-specific project information, the specific effects of additional drainage that could occur in the project area, or risks to and from flooding hazards, are uncertain. Consequently, for purposes of this analysis the impact is considered potentially significant.

IMPACT H-3

Temporary Construction-Related Water Quality Effects. Project-related construction activities for renewable energy facilities implemented in response to the RES have the potential to result in temporary soil erosion, discharges of construction-related contaminants, and off-site transport of wastes in stormwater runoff. Therefore, the potential construction-related impact to water quality is considered *potentially significant* under the 20 percent RPS and 33 percent RES (high and low load conditions).

The potential temporary construction-related water quality effects of 33 percent RES facility development would be similar across the western states, thus this discussion does not differentiate potential effects between California and other states.

Wind Power, Solar Thermal, Solar Photovoltaic, Geothermal, Solid-fuel Biomass, Biogas, and Small Hydroelectric

20 Percent RPS

Construction of all types of renewable energy facilities has the potential to result in the same general types of temporary water quality effects. RES project activities would be expected to potentially involve a variety of disturbances, depending on the site, such as vegetation removal, land grading, excavation, general vehicular traffic on disturbed sites, trenching, and building construction that have the potential to result in temporary increases in soil erosion and discharge of construction-related contaminants to surface water or groundwater. Construction activities for larger facility installations may continue for many months, therefore, bare soils could be exposed to rainfall during the winter season when sites are most vulnerable to runoff and erosion.

Construction sites often require development of temporary staging areas for storage of construction materials, fuels, equipment, and vehicles, and involve the transport of materials to and from the site. Potential contaminants such as fuels, lubricants, concrete, and other toxic materials stored and handled at staging areas, or exposed to rainfall and runoff at other construction-site locations, could be transported off-site and potentially enter surface waters or infiltrate the soil to groundwater.

Based on the size and duration of anticipated construction activities, the potential exists for temporary discharges of construction-related contaminants to enter adjacent surface water or groundwater, thereby adversely affecting water quality. Consequently, the potential for construction to result in temporary adverse water quality effects is considered potentially significant.

33 Percent RES

Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the number of renewable energy facilities constructed to meet the 33 percent RES goal. Additional renewable energy facility construction may increase the potential for additional temporary construction-related water quality effects from exposure of disturbed soils to erosion and runoff, and discharges of toxic materials used in construction. stormwater drainage problems (e.g., erosion and sedimentation), Consequently, the potential for construction to result in temporary adverse water quality effects is considered a potentially significant impact.

IMPACT H-4

Long-term Operations-Related Effects to Surface and Groundwater Quality. Long-term operations-related discharges from renewable energy facilities implemented in response to the RES that use steam power for energy generation (solar thermal, geothermal, solid-fuel biomass, and biogas) have the potential to result in discharges of contaminants in stormwater runoff from industrial activity, and from cooling water discharges to surface water bodies. Therefore, the operations-related impact to water quality is considered to be *potentially significant* under the 20 percent RPS and 33 percent RES (high and low load conditions).

Relevant available environmental documents (BLM and CEC 2010, BLM and CEC 2009, CEC 2009, BLM 2008, BLM 2005, and CEC 2003) were reviewed to identify potential long-term operations that might result in waste discharges. The assessment was conducted based on available information regarding the potential chemical, physical, or biological contaminants that may be discharged to water and groundwater as a result of the 33 percent RES activity. The long-term water quality effects of 33 percent RES facility operations would be similar across the western states, thus this discussion does not differentiate potential effects between California and other states.

Wind Power, Solar Photovoltaic, and Small Hydroelectric

In general, renewable energy facilities consisting of wind power, solar photovoltaic, and small hydroelectric power generation are not anticipated to involve long-term sources of operational waste discharges. Solar photovoltaic plants would utilize water to periodically clean the solar panels and for dust control during dry windy periods, and may less frequently use chemical cleaning agents to remove accumulated dirt and grime. However, in the arid environments where solar installations would occur, the small amounts of water used are not expected to result in appreciable discharges to water, if at all.

Based on the anticipation that the majority of large renewable energy facilities would be located in rural areas substantially distant from towns and cities, domestic waste disposal service for the facility workforce would likely require construction of onsite wastewater treatment systems (OWTS) such as septic systems and leachfields. Installation and operation of OWTS may result in the percolation of treated wastewater to the soil and underlying groundwater that may contain elevated levels of some constituents relative to background groundwater such as nutrients (e.g., nitrate) and salts. However, the renewable energy facilities are anticipated to have small workforce requirements, thus resulting in relatively small wastewater loading rates relative to background conditions. Therefore, the potential long-term operations-related waste discharges associated with proposed renewable energy facilities would be expected to be small and not adversely affect beneficial uses in receiving waters. This would be a less-than-significant impact for these renewable energy types.

Solar Thermal, Geothermal, Solid-fuel Biomass, and Biogas

20 Percent RPS

Steam power generation facilities have the potential to result in long-term operational waste discharges associated with the steam condensation and cooling operations. In arid environments of southern California where many of the anticipated future renewable energy facilities might be located, and where available surface and groundwater resources are limited, cooling operations that use water generally result in the creation of highly saline blowdown water or brine. Brine wastes must be stored in lined containment ponds to prevent leakage and contamination of underlying groundwater. Typical operations would require multiple brine waste evaporation ponds, and dried brine wastes would be periodically collected and hauled to landfills for disposal. Therefore, managed brine waste storage in the arid desert regions is not anticipated to result in discharges of concern to water bodies. While unlikely to occur in the desert regions due to limited water availability, the potential exists for some renewable energy facilities to be constructed adjacent to streams and involve the use of river water for cooling operations, or as a receiving water for cooling water derived from a different source water. Conventional once-through cooling also may be more commonly used in less arid environments or coastal settings where a reliable and plentiful water source is available. Cooling water discharged to streams has the potential to cause temperature increases in the receiving water of sufficient magnitude that may exceed the thermal tolerance of aquatic life residing in the stream near the return flow, thus resulting in detrimental effects.

Steam power generation facilities generally are complex facilities that would have larger workforce requirements than other types of renewable energy facilities, may operate continuously depending on the fuel source, and may use and store a variety of operating chemicals, fuels, and other materials onsite. Industrial sites may be exposed to long-term rainfall and runoff that may have the potential to mobilize and transport contaminants that are present offsite to adjacent properties or receiving water bodies. Discharge of contaminants could result in adverse water quality effects to aquatic organisms, which are likely to be the most sensitive beneficial uses affected by stormwater runoff.

Absent site-specific project facility information, it is not possible to characterize the probability of steam power cooling operations and industrial activities to cause adverse offsite effects and contaminant discharges to receiving water bodies. Therefore, the specific effects of long-term facility operations that could occur are uncertain. Consequently, for purposes of this analysis, the impact is considered potentially significant.

33 Percent RES

Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the number of renewable energy facilities constructed to meet the 33 percent RES goal. Additional steam power energy generation facilities have the potential for additional long-term discharge water quality effects from cooling operations, and discharges of contaminants in stormwater runoff from the industrial activities. Consequently, the potential for adverse water quality effects is uncertain and considered a potentially significant impact.

4. MITIGATION

Mitigation is required for the following significant or potentially significant impacts.

Mitigation Measure H-1

- **As part of the subsequent project-level planning and environmental review for solar thermal, solar photovoltaic, geothermal, and biogas facilities, the project proponent shall coordinate with the local county groundwater management authority and prepare a detailed hydrogeologic analysis of the potential project-related effects on groundwater resources prior to issuance of any permits. The proponent shall mitigate for identified adverse changes to groundwater by incorporating technically achievable and feasible modifications into the project to avoid offsite groundwater level reductions, use alternative technologies or changes to water supply operations, or otherwise compensate or offset the groundwater reductions that occur to offsite properties. Consistent with state policies, the feasibility of using alternative water sources, such as treated municipal wastewater, shall be considered for use as source water for non-consumption purposes. The feasibility of alternative energy unit cooling methods should be considered that use less water, such as dry cooling methods. A program of monitoring and adaptive management during project implementation should be considered to evaluate the effects of the project and effectiveness of mitigation actions.**

- **For any planned use of water, identify the water sources, legal entitlements, water rights, adequacy of capacity to serve project demands while maintaining aquatic and riparian resources, quantity of water used for project construction and operational needs, and water discharges, including but not limited to construction, systems testing, and process and cooling needs.**

- **Where a groundwater well is proposed to be drilled or used, submit an application to the appropriate local jurisdiction for a permit. Where use of surface water is proposed for industrial purposes, provide a "will serve" and an approved water service agreement with applications to appropriate lead agencies.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Further, because the quantity and location of suitable groundwater resources in the arid western United States, particularly in desert regions, can be highly variable, the technical and economic feasibility of the mitigation to avoid and minimize potential offsite groundwater effects is uncertain. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33% RES (high and low load conditions).

Mitigation Measure H-2

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**

- **Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project shall prepare a stormwater drainage and flood control analysis and management plan. The plans shall be prepared by a qualified professional and shall summarize existing conditions and the effects of project improvements, shall include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to protection downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features shall be designed to ensure no change in existing downstream flow conditions that would result in new or increased severity of offsite flooding.**

- **Establish drainage performance criteria for off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious areas; (b) maximizing permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the system design.**

- **The project proponent shall design and construct new facilities to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs shall be approved by the local land use agency. The project proponent shall also consult with the appropriate flood control authority on the design of offsite stream crossings such that the minimum elevations are above the predicted surface-water elevation at the agency's designated design peak flows. Drainage and flood prevention features shall be inspected and maintained on a routine schedule specified in the facility plans, and as specified by the county authority.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33% RES (high and low load conditions).

Mitigation Measure H-3

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**

- **Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project shall comply with applicable construction grading and erosion control ordinances. Additionally, in compliance with the requirements of the SWRCB general NPDES stormwater permit for construction (Order No. 2009-0009-DWQ), the project proponent shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and identify and implement construction-related BMPs to avoid and minimize erosion and contaminant runoff. The SWPPP describes the site, erosion and sediment controls, means of waste disposal, control of post-construction sediment and erosion control measures and maintenance responsibilities, water quality monitoring and reporting during storm events, corrective actions for identified water quality problems and non-storm water management controls. These measures included in the SWPPP shall ensure compliance with applicable regional, state and federal water quality standards. The project proponent shall obtain authorization under the statewide NPDES stormwater permit for general construction activity (or via local agency if construction activity is managed locally) before beginning work.**

Construction BMPs shall include, but may not be limited to the following:

- **Limit construction access routes and stabilize access points;**
- **Stabilize denuded areas with seeding, mulching or other methods;**
- **Stake/mark construction limits;**
- **Designate specific areas of the site, away from storm drain inlets and drainage features for the storage, preparation and disposal of construction materials, chemical products and waste; for auto equipment parking; and for routine vehicle and equipment maintenance;**
- **Store stockpiled materials and wastes under a roof or plastic sheeting; berm around stockpile/storage areas to prevent contact with runoff;**
- **Perform major maintenance, repair and vehicle and equipment washing offsite or in designated and controlled areas on-site;**
- **Sweep up spilled dry construction materials (cement, fertilizer, etc.) immediately; water would not be used to wash them away; and**
- **Clean up liquid spills on paved or impermeable surfaces using "dry" clean-up methods (e.g. absorbent materials, cat litter, rags) and dispose of clean-up materials properly.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33% RES (high and low load conditions).

Mitigation Measure H-4

- **Project proponents of solar thermal, geothermal, solid-fuel biomas, biogas proposed renewable energy projects shall comply with the requirements of the SWRCB general NPDES stormwater permit for industrial activity (Order 97-003-DWQ) and shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and identify and implement BMPs to avoid and minimize contaminant runoff from the industrial sites. The SWPPP shall describe the site, and proposed BMPs for contaminant storage and handling controls, stormwater runoff management and treatment, non-storm water management controls, waste disposal measures, water quality monitoring and reporting during storm events, and corrective actions for identified water quality problems. BMPs in the SWPPP shall be implemented to avoid and minimize contaminant discharges offsite, and ensure compliance with applicable state and federal water quality standards.**

- **Project proponents of solar thermal, geothermal, solid-fuel biomas, biogas proposed renewable energy projects shall comply prepare a Report of Waste Discharge (ROWD) for authorization of an individual NPDES discharge permit. The effects of the discharge of cooling water to the receiving water shall be evaluated by a qualified professional to assess the potential effects to aquatic life. The allowable discharge operations shall be identified that are necessary to avoid adverse effects to the receiving water beneficial uses. Such measures may include, but not be limited to: (a) controlling the allowable temperature in the discharge; and (b) stipulating the configuration of the allowable size, location, and required dilution of the discharge at the point of discharge to the stream.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33% RES (high and low load conditions).

III.I. LAND USE AND AGRICULTURAL RESOURCES

This section addresses the compatibility of anticipated renewable energy projects required to comply with the 33 percent RES with existing and planned land use and consistency with laws, ordinances, regulations, and standards applicable to areas identified by the RES Calculator (see Chapter II, Project Description) as likely locations for future renewable energy projects. This section also addresses land use issues related to agricultural resources in those areas.

As modeled by the RES Calculator, development of renewable energy resources would occur in various locations (CREZs) throughout California, including the following general areas: Tehachapi, Solano, Mountain Pass, Fairmont, Riverside East, Pisgah, and Imperial North. Renewable resource development would also occur outside of California and at various distributed locations throughout the state.

As described in the Project Description, the RES Calculator was used to model anticipated in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data with which to characterize the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

The existing land uses and agricultural resources of these geographical areas identified by the RES Calculator are described in general terms below. Land use and agricultural policies and regulations pertinent to each area are discussed in Section 2, Regulatory Setting, below.

(a). TEHACHAPI

The Tehachapi area is located within the Tehachapi Wind Resource Area in Kern County. Kern County is the third largest county in California. Bakersfield is the county seat and urban center. Additional areas of urbanization include the Bear Valley Springs, and Lake Isabella, and Taft regions. Kern County has been ranked among California's leading counties in total urbanization and loss of farmland. From 1990 to 2006, the amount of "important" and "interim" farmland in Kern County decreased by 88,338 acres. Approximately one-third (29,000 acres) of this decrease was due to urban-related changes, while two-thirds (approximately 58,000 acres) was associated with the idling of farmland. Nevertheless, agriculture remains a significant land use in Kern County. According to the 2007 Agricultural Crop Report, prepared by the Kern County Agricultural Commissioner's Office, there are approximately 2.7 million acres of farmland in Kern County, of which 923,022 acres were harvested in 2007. Mineral and petroleum resources are also major economic activities within the county. Much of Kern County is in federal and state ownership, which is expected to increase over the next 20 years.

(b). MOUNTAIN PASS

The Mountain Pass area lies in the Mojave Desert near the Nevada border in San Bernardino County. San Bernardino County encompasses an area of over 20,000 square miles, of which approximately 78 percent is under federal and state ownership. Of this, approximately 7 million acres are owned and controlled by the Federal Bureau of Land Management; and 1.9 million acres are owned and controlled by the Department of Defense. The remaining federal jurisdictions are nearly equally divided by the National Park Service and the U.S. Forest Service. 24 cities lie within the county's boundaries. (San Bernardino, 2006 General Plan Program Final EIR, Chapter III.)

Agriculture has historically been an important part of the County of San Bernardino's economy. The County consistently ranks in the top 15 agricultural-producing counties in California (State of California Employment Development Department, 2002). The agricultural industry in San Bernardino County is dominated by the dairy industry and the related industries of calf production and forage crops. The County's agricultural diversity also includes numerous fruit orchards in the east San Bernardino Valley area and substantial nursery and vegetable production. (San Bernardino, 2006 General Plan Program Final EIR, Chapter IV).

(c). FAIRMONT

The Fairmont area is located in Los Angeles County. The northern part of the Los Angeles County is covered by large amounts of sparsely populated land, including the Angeles National Forest, a portion of the Los Padres National Forest, and the Mojave Desert. This area contains most of the remaining agricultural land in Los Angeles County. Edwards Air Force Base, which lies on the border of Los Angeles County and Kern County, consists of 79,000 acres of land. Northern Los Angeles County has experienced significant urbanization over the last 20 years, despite its rural nature. The western and coastal parts of Los Angeles County contains some of the most scenic parts of the County, including the Santa Monica Mountain National Recreation Area. The unincorporated areas include land that is preserved for open space and regional parks and small rural communities. The southern part of the County consists of numerous pockets of unconnected communities, often referred to as the County's unincorporated "urban islands." The eastern part of the county is urban and largely residential.

(d). RIVERSIDE EAST

The Riverside East region is in Riverside County. Riverside County is the fourth largest county in California, with a population of over two million. Most of the population is found in the western portion of the county. The eastern area comprises nearly 40 percent of the county's acreage but less than one percent of its population; it consists of most of the county's desert regions which include a mixture of public and privately owned lands. According to the county's 2008 Agricultural Production Report, leading agricultural production in Riverside County as of 2008 include, nursery stock, milk, eggs, table grapes and hey.

(e). IMPERIAL NORTH

The Imperial North project area is located in Imperial County. Roughly 50 percent of Imperial County undeveloped. The county's primary economic activity is agriculture, with nearly 3 million acres under irrigation. The majority of the county's existing agricultural land is located in the central portion of the county, and is a continuous land use from south of the Salton Sea to the California-Mexico border. The county's major urban areas, such as Brawley, Imperial, and El Centro are surrounded by these agricultural lands. Most urban land uses in this area are single-family homes and recreational vehicle parks. The Salton Sea, a 381-mile lake, is located in the northern portion of the county. The New and Alamo Rivers and the All American Canal are found in the southern part of the county.

(f). SOLANO

The Solano area is located in Solano County, just north of the Sacramento River where it flows into the Suisun Bay. Solano County contains an area of 910 square miles, 80 of which are under water. The county includes well-established urban, suburban, and rural communities. The county's incorporated cities – Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo – together encompass 128 square miles. The county also contains large expanses of federal and state lands and seven incorporated cities.

Agriculture accounts for more land than any other land use in Solano County (57%). As of 2007, existing agricultural land uses totaled 365,651 acres. Prime Farmland, Farmland of Statewide Importance, and Unique Farmland have all been identified in Solano County. Of the remaining land uses in unincorporated Solano County, watershed uses encompass 36,576 acres (6%), marshlands make up 64,731 acres (11%) and single-family residences comprise approximately 5,700 acres (1%). Very-low-density, rural, residential development on properties of 2.25-5 acres makes up the majority of the single-family residences. Although urban development in Solano County is generally concentrated within the incorporated boundaries of the cities, the cities of Vallejo, Fairfield, and to a lesser extent Vacaville have "islands" of county land surrounded by incorporated land where urban development has occurred without annexation. Commercial and industrial uses are primarily located within the county's incorporated city.

2. REGULATORY SETTING

This section describes federal, state, regional and local land use and agricultural policies and regulations reasonably anticipated to be applicable to implementation RES.

(a). FEDERAL

Federal Land Policy Management Act

The Federal Land Policy Management Act of 1976 (FLPMA) is the principal law governing how the Bureau of Land Management (BLM) manages public lands. FLPMA requires BLM to manage public land resources for multiple use and sustained yield for both present and future generations. Under FLPMA, BLM is authorized to grant right-of-ways (ROWs) for generation, transmission, and distribution of electrical energy. Although local agencies do not have jurisdiction over the federal lands managed by BLM, under FLPMA and BLM regulations at 43 CFR Part 1600, BLM must coordinate its planning efforts with state and local planning initiatives.

BLM Resource Management Plans

Established by FLPMA, Resource Management Plans (RMPs) are designed to protect present and future land uses and to identify management practices needed to achieve desired conditions within the management area covered by the RMP. Management direction is set forth in the RMPs in the form of goals, objectives, standards, and guidelines. These, in turn, direct management actions, activities, and uses that affect land management, and water, recreation, visual, natural, and cultural resources. RMPs anticipated to be potentially implicated with implementation of the RES include the following:

California Desert Conservation Area RMP

Section 601 of FLPMA established the California Desert Conservation Area (CDCA) in southeast California. Roughly 12 million acres of the 25 million-acre CDCA are public lands managed by BLM. Management practices in this area are defined in the CDCA Plan issued in 1980 and amended in 1999. The CDCA Plan is a comprehensive, long-range, plan with goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA, and it is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The plan's goals and actions for each resource are established in its twelve elements. Each of the plan elements provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.

Specific goals and objectives address alternative energy development in the *Energy Production and Utility Corridors* element of the CDCA Plan. Goal three of this element is to "[i]dentify potential sites for geothermal, wind energy parks and power plants." Plan amendment procedures are to provide for the coordination needed for ensuring rapid implementation of these fuel-replacement alternative energy programs in an environmentally superior manner.

BLM has made several amendments to the CDCA RMP since its adoption, including the following, which may be implicated by the proposed RES:

- **West Mojave RMP Amendment:** The West Mojave Plan is a habitat conservation plan in addition to an amendment to the CDCA RMP. The West Mojave Plan covers 9.3 million acres in the western portion of the Mojave Desert in southern California, covering parts of San Bernardino, Los Angeles, Kern, and Inyo Counties. The plan is designed to streamline the state and federal endangered species act permitting processes while providing multiple use opportunities and protect over 100 species of listed and sensitive species. The plan focuses on protecting large blocks of habitat, avoiding impacts to conservation areas and maintaining biodiversity. In addition to increasing the quantity of habitat conserved, the plan focuses on protecting the highest quality tortoise and ground squirrel habitat. Although the plan focuses on habitat preservation, the plan includes incidental take areas where permitting is streamlined to accommodate development of large areas of disturbed land for development, recreation, and resource extraction.

- **Northern and Eastern Mojave (NEMO) RMP Amendment:** The NEMO planning area covers 3.3 million acres in parts of San Bernardino and Inyo Counties. The plan amendment addresses threatened and endangered species conservation and recovery and adoption of public land health standards, evaluation of segments for eligibility in the National Wild and Scenic Rivers System, and changes resulting from the 1994 Desert Protection Act. It also designates routes of travel in Desert Wildlife Management Areas consistent with federal regulations.

- **Coachella Valley RMP Amendment:** The Coachella Valley planning area is located approximately 100 miles east of Los Angeles in central Riverside County and a small portion of San Bernardino County. The amendment was developed in tandem with the Coachella Valley Multi-Species Habitat Conservation Plan/Natural Communities Conservation Plan (CVMSHCP/NCCP) to provide a framework for those implementation actions which will support landscape-level conservation and provide for community needs.

- **Imperial Sand Dune RMP Amendment:** This Recreation Area Management Plan covers 160,000-acre Imperial County region and contains new adaptive management measures, vehicle designations, visitor facilities, and management prescriptions to accommodate the approximately 1.2 million visits annually, while protecting federally listed Pierson's milk-vetch and other sensitive plant and animal species.

- **Northern and Eastern Colorado Desert (NECO) RMP Amendment:** The NECO RMP Amendment is a landscape-scale, multi-agency planning effort that protects and conserves natural resources while simultaneously balancing human uses of the California portion of the Sonoran Desert ecosystem. The planning area encompasses over five million acres and hosts 60 sensitive plant and animal species. Lands within the planning area are also popular for hiking, hunting, rock-hounding, and driving for pleasure. Several commercial mining operations, livestock grazing, and utility transmission lines exist in the area as well.

- **Western Colorado (WECO) RMP Amendment:** The WECO planning area covers approximately 475,000 acres and approximately 2,320 miles of off-road vehicle routes in parts of Imperial and San Diego counties. The plan provides a balance between protecting resources and providing for off-highway vehicle use by updating previous designations for off-road vehicle limited areas in Imperial County.

California Coastal National Monument RMP

The mission of the California Coastal National Monument (CCNM) RMP is to protect and foster an appreciation for and stewardship of unique coastal resources associated with the California National Monument. The CCNM, covers more than 20,000 rocks and islands along the scenic 1,100-mile California coast. The plan does not include major islands such as the Channel Islands, the Farallon Islands, or the islands in San Francisco Bay. The plan contains broad direction for the protection of the geologic formations and habitats for seabirds, sea lions, seals, and plant life. The plan's strategy focuses on the coordination of the man actions already in place to protect California's coastal resources and emphasizes multi-agency cooperation.

Santa Rosa/San Jacinto Mountains National Monument RMP

The Santa Rosa and San Jacinto Mountains National Monument was designated by Congress in 2000. The monument comprises 150,000 acres of public lands in Riverside County. The BLM co-manages this desert setting with the U.S. Forest Service and partners with other state agencies, local governments, and Native American tribes, including the Agua Caliente Band of Cahuilla Indians.

South Coast RMP

The South Coast Resource Management Plan, completed in 1994, covers over 130,000 acres of public land and 167,000 acres of federal mineral ownership where the surface is privately owned (referred to as BLM split estate land). The BLM public lands in the South Coast planning area are scattered over a five-county area in over 300 separate parcels. Most of the BLM land base in the planning area is in western San Diego and western Riverside counties, with the remainder in southwestern San Bernardino, Los Angeles, and Orange counties.

BLM is currently developing a revision to the South Coast RMP.

Eastern San Diego County RMP

The Eastern San Diego County RMP covers nearly 100,000 acres of public lands in California sitting between the California Peninsular Ranges and the Colorado Desert ecosystem. Most of the higher land to the west is a part of the Cleveland National Forest, while the low desert country to the east is included in the Anza–Borrego Desert State Park. Cuyamaca Rancho State Park and a number of small Indian reservations are interspersed with national forest lands. Riverside County and the Mexican border mark the northern and southern boundaries of the Planning Area, while Imperial County borders it to the east and western San Diego County to the west.

Areas of Critical Environmental Concern

FLPMA defines an Area of Critical Environmental Concern (ACEC) as an area within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The BLM identifies, evaluates, and designates ACECs through its resource management planning process. Allowable management practices and uses, mitigation, and use limitations, if any, are described in the planning document and the concurrent or subsequent ACEC Management Plan. ACECs are considered land use authorization avoidance areas because they are known to contain resource values that could result in denial of applications for land uses that cannot be designed to be compatible with management objectives and prescriptions for the ACEC.

National Landscape Conservation System

Created in 2000, BLM's National Landscape Conservation System (NLCS) encompasses 27 million acres and is composed of 880 units that include national monuments, national conservation areas, wilderness and wilderness study areas, wild and scenic rivers, national scenic and historic trails, and conservation lands, including lands in the California Dessert. In March 2009, Congress passed the Omnibus Public Lands Management Act, providing a statutory basis for the NLCS. The mission of the NLCS is to conserve, protect, and restore nationally significant landscapes recognized for their outstanding cultural, ecological, and scientific values.

National Forest Management Act of 1976

The National Forest Management Act (NFMA) is the primary statute governing the administration of national forests. The act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. National Forest Plan's potentially implicated by the proposed RES include the San Bernardino, Angeles, Cleveland and the Los Padres National Forest Management Plans. Goal 4 of the U.S. Forest Service's National Strategic Plan for the National Forests states that the nation's forests and grasslands play a significant role in meeting America's need for producing and transmitting energy. Unless otherwise restricted, National Forest Service lands are available for energy exploration, development, and infrastructure (e.g., well sites, pipelines, and transmission lines). However, the emphasis on non-recreational special uses, such as utility corridors, is to authorize the special uses only when they cannot be reasonably accommodated on non-National Forest Service lands.

California Desert Protection Act of 1994

Congress enacted the California Desert Protection Act (CDPA) in 1994 (Public Law 103-433) to establish desert wilderness areas for protection including the Chuckwalla Mountains Wilderness, the Little Chuckwalla Mountains Wilderness, the Palen/McCoy Wilderness, and the Palo Verde Mountains Wilderness. In addition, this act established Death Valley National Park, Joshua Tree National Park and the Mojave National Preserve. The act established administration of wilderness lands and addresses land use compatibility issues such as buffers and utility ROWs.

Wild and Scenic Rivers Act

This act established a National Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. The act contains procedures and limitations for control of lands in federally administered components of the System and for disposition of lands and minerals under federal ownership.

Comprehensive Conservation Plans for National Wildlife Refuges

USFWS is directed to develop comprehensive conservation plans (CCP) to guide the management and resource use for each refuge of the National Wildlife Refuge System under requirements of the National Wildlife Refuge Improvement Act of 1997. Refuge planning policy also directs the process and development of CCPs. A CCP describes desired future conditions and long-range guidance necessary to meet refuge purposes. It also guides management decisions and sets forth strategies for achieving refuge goals and objectives within a 15-year time frame.

National Trails System Act

The National Trails System Act is intended to promote the preservation of, public access to, travel within, and the enjoyment and appreciation of the open air, outdoor areas, and historic resources through the establishment of a national trail system. The act created a series of trails that are administered by a federal agency (BLM, USFS, or NPS).

California Desert Protection Act of 2010 (S.2921)

In December 2009, Senator Dianne Feinstein introduced Senate Bill 2921, which would establish two national monuments on roughly 1 million acres of Mojave Desert. The bill also seeks to enhanced recreation opportunities, and development of renewable energy in the California Desert Conservation Area, to require the Secretary of the Interior to designate certain offices to serve as Renewable Energy Coordination Offices for coordination of Federal permits for renewable energy projects and transmission lines to integrate renewable energy development, and for other purposes. It is not known at the time of publication whether Congress will pass the California Desert Protection Act of 2010.

Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) directs Federal agencies to consider the effects of Federal programs or activities on farmland, and ensure that such programs, to the extent practicable, are compatible with state, local, and private farmland protection programs and policies. The rating process established under the FPPA was developed to help assess options for land use on an evaluation of productivity weighed against commitment to urban development.

Federal Aviation Administration Regulations

Federal Aviation Administration (FAA) regulations address potential aircraft obstruction for structures taller than 200 feet or within 20,000 feet of an airport. Specifically, Federal Regulation Title 14, Part 77, established standards and notification requirements for objects that have the potential to affect navigable airspace. The Part 77 standards are intended to: (1) evaluate the effect of the construction or alteration of structures on airport operating procedures; (2) determine if there is a potential hazard to air navigation; and (3) identify measures to enhance safety. Specifically, the FAA requires notification through the filing of FAA Form 7460, Notice of Proposed Construction or Alteration, if a structure is over 200 feet in height or closer than 20,000 feet to an existing airport or airport under construction.

(b). STATE

Natural Communities Conservation Planning Act

The California Fish and Game Code (sections 2800–2835) sets forth policies on the conservation, protection, restoration, and enhancement of the California's natural resources and ecosystems. The intent of the legislation is to provide for conservation planning as an officially recognized policy that can be used as a tool to eliminate conflicts between the protection of the State's natural resources and the need for growth and development. In addition, the legislation promotes conservation planning as a means of coordination and cooperation among private interests, agencies, and landowners, and as a mechanism for multispecies and multi-habitat management and conservation.

California Department of Fish and Game Wildlife Areas and Ecological Reserves

Uses of these Department of Fish and Game (DFG)-managed areas are restricted to those "compatible with wildlife values." Energy development is not allowed on these lands (geothermal drilled from outside the reserves might be an exception). Some reserves have existing easements for transmission which may allow upgrades with mitigation (additional lands purchased). DFG may also require undergrounding transmission lines in some circumstances.

State Park Units

The Department of Parks and Recreation (DPR) may acquire title or any interest in real property, "which the department deems necessary or proper for the extension, improvement, or development of the state park system" (Public Resources Code, § 5006). Prior to classifying a unit, the department must prepare an "inventory of the unit's scenic, natural, and cultural features, including, but not limited to, ecological, archaeological, historical, and geological features" (Public Resources Code, § 5002.1). This inventory is then considered by the DPR in classifying a unit. There are eight classification categories: State parks, State recreation units, Historical units, State seashores, State reserves, State wildernesses, Natural preserves, and Cultural preserves (§5019.53 – 5019.74). The last three units are subunits of the first five. Management and improvements on State parks must be made in a manner that protects the native environment to the "extent compatible with the primary purpose for which the park was established" (PRC §5019.53).

State Conservancies

The seven California Conservancies (Tahoe, Coastal, Santa Monica Mountains, San Gabriel, and Lower Los Angeles Rivers and Mountains, Coachella Valley and Mountains, San Joaquin River, and Baldwin Hills) were legislatively created to protect and preserve distinct regions of the state. They are empowered to acquire land to preserve and restore habitat and ecosystems, and provide recreational opportunities in these regions.

The state conservancies are given broad powers to conserve land and natural resources in defined geographical regions of statewide significance. Most conservancies have a direct mandate to provide recreation and education activities. Thus, they are engaged in conservation for human use, though they often also seek to conserve natural systems as well.

Wild and Scenic Rivers Act

This act establishes a Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. It was created in 1972 by the Legislature in an effort to balance the traditional water and power development on rivers with a preservation of some free-flowing segments for their recreation and wildlife values. In the state, 1,900 miles of river are under Wild and Scenic protection. Pursuant the California Wild and Scenic Rivers Act, no dam or reservoir shall be constructed on any river unless the Secretary determines that the facility is needed to supply domestic water and that it will not adversely affect the free-flowing condition of the river (Public Resources Code, § 5093.55).

State Planning and Zoning Law

California Government Code section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of the city or county. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city or county's vision for the area. The general plan is also a long-range document that typically addresses the physical character of an area over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals. General Plans anticipated as likely to be implicated by the RES are discussed under "Local" regulations, below.

The State Zoning Law (Government Code section 65800 et seq.) establishes that zoning ordinances, which are laws that define allowable land uses within a specific district, must be consistent with the general plan and any applicable specific plan.

Senate Bill 375

California SB 375, signed into law on October 1, 2008, is intended to enhance CARB's ability to reach AB 32 goals by directing CARB to develop regional GHG emissions reduction targets to be achieved within the automobile and light truck sectors for 2020 and 2035. CARB will work with California's 18 metropolitan planning organizations (MPOs) to align their regional transportation, housing, and land use plans and prepare a "Sustainable Communities Strategy" (SCS) to reduce the number of vehicle miles traveled in their respective regions and demonstrate the region's ability to attain its greenhouse gas reduction targets.

Additionally, SB 375 provides incentives for creating attractive, walkable, and sustainable communities and revitalizing existing communities. The bill exempts home builders from certain CEQA requirements if they build projects consistent with the new sustainable community strategies. It also encourages the development of more alternative transportation options, to promote healthy lifestyles and reduce traffic congestion.

Farmland Conservation

The Department of Conservation's Division of Land Resource Protection administers two important incentive programs for the preservation of agricultural land. The California Land Conservation Act, also known as the Williamson Act (Govt. Code, § 51200) was passed in 1965 to preserve, through tax incentives, farmland pressured by spiraling land valuation and tax increases associated with suburban growth. Farmland enrolled in the program is assessed at farmland value, as opposed to the Proposition 13 valuation; and, through the Open Space Subvention Act, counties are substantially reimbursed for lost property tax revenue. Approximately 16 million acres of farmland (about 50 percent of the State's total farmland) are enrolled in the program. Amendments to the Budget Act of 2009 reduced Williamson Act Subvention payments budget to $1,000, essentially suspending the subvention payments to the counties.

The Farmland Security Zone is additional agricultural land conservation legislation that allows local governments and landowners to rescind a Williamson Act contract and simultaneously place the farmland under a Farmland Security Zone contract for an initial term of at least 20 years. A Farmland Security Zone contact offers landowners greater property tax reduction than the Williamson Act by valuing enrolled real property at 65 percent of its Williamson Act valuation, or its Proposition 13 valuation, whichever is lower.

California Government Code Section 51238 states that unless otherwise decided by a local board or council, the erection, construction, alteration, or maintenance of electric and communication facilities, as well as other facilities, are determined to be compatible uses within any agricultural preserve. Also Section 51238 states the board of supervisors may impose conditions on lands or land uses to be placed within preserves to permit and encourage compatible uses in conformity with Section 51238.1.

Further, California Government Code Section 51238.1 allows a board or council to allow as compatible a use that without conditions or mitigations would otherwise be considered incompatible. However, this may occur only if the use meets the following conditions:

- The use will not significantly compromise the long-term productive agricultural capability of the subject contracted parcel or parcels or on other contracted lands in agricultural preserves.
- The use will not significantly displace or impair current or reasonably foreseeable agricultural operations on the subject contracted parcel or parcels or on other contracted lands in agricultural preserves. Uses that significantly displace agricultural operations on the subject contracted parcel or parcels may be deemed compatible if they relate directly to the production of commercial agricultural products on the subject contracted parcel or parcels or neighboring lands, including activities such as harvesting, processing, or shipping.
- The use will not result in the significant removal of adjacent contracted land from agricultural or open-space use.

The California Farmland Conservancy Program (CFCP) was created in 1996 (Public Resources Code, §10200) and provides grant funding for agricultural conservation easements. Although the easements are always written to reflect the benefits of multiple resource values, there is a provision in the CFCP statute that prevents easements funded under the program from restricting husbandry practices. This provision could prevent restricting those practices to benefit other natural resources.

The Department of Conservation also administers the Farmland Mapping and Monitoring Program (FMMP) (Gov. Code §65570, PRC §612). The FMMP was established in 1982 to assess the location, quality, and quantity of agricultural lands and conversion of these lands over time. Agricultural designations used by the DOC include the following :

- **Prime Farmland:** Farmland with the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- **Farmland of Statewide Importance:** Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- **Unique Farmland:** Farmland of lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in

California. Land must have been cropped at some time during the four years prior to the mapping date.

- **Farmland of Local Importance:** Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee.

- **Grazing Land:** Land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The minimum mapping unit for Grazing Land is 40 acres.

- **Urban and Built-Up Land:** Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. This land is used for residential, industrial, commercial, institutional, public administrative purposes, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.

- **Other Land:** Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines and borrow pits; and water bodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land.

California Coastal Act of 1976

The California Coastal Act contains provisions to protect agricultural productivity in the coastal zone. The act has specific guidance measures to avoid the conversion of prime agricultural land.

The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the area's agricultural economy, and conflicts shall be minimized between agricultural and urban land uses through all of the following:

> "…(e) By assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality (§30241 California Public Resources Code)."

Further, the Coastal Act calls for the protection of the long-term productivity of soils and timberlands (§30243 California Public Resources Code).

Airport Land Use Compatibility Planning

The State Aeronautics Act (Pub. Utilities Code section 21001 et seq.) establishes statewide requirements for the airport land use compatibility planning and requires nearly every county to create an Airport Land Use Commission (ALUC) or other alternative).

The California Department of Transportation (Caltrans) Airport Land Use Planning Handbook (CalTrans 2002) establishes guidance on land use planning in the vicinity of airports in California. The Handbook also outlines the legal authority (and limitations thereof) possessed by an ALUC when establishing noise and safety corridors around airports that potentially restrict land use development. The intent of the Handbook is to make recommendations for an ALUC for establishing land use development policies based upon FAA regulations, rather than specifying precise statutes or means of interpreting FAA regulations.

The purpose of an ALUC is to establish policies which intend to make land use development around airports compatible with airport-related noise and safety corridors. As applicable, these policies must follow established FAA regulations and other federal, state, and local statutes. However, the Caltrans Handbook provides guidance on the scope of authority that an ALUC has to restrict land use development. Generally speaking, Caltrans guidance suggests that land use restrictions are legitimate when they prevent harm to the surrounding area rather than confer a benefit to the airport. Chapter 9 of the Caltrans Handbook provides guidance on establishing safety corridors ("safety compatibility zones") around airports which dictate the type and density of development permitted. The Caltrans corridors are delineated based upon runway length and types of aircraft typically flown at an airport, and are intended as a guide, rather than specific criteria to be followed by an ALUC (Caltrans, 2002).

(c). LOCAL

While other California counties will support renewable electricity projects, general plans described below represent those locations identified by the RES Calculator.

Kern County General Plan

The Kern County General Plan identifies the goals, policies, and implementation measures that are applicable to the unincorporated areas within the county. The General Plan provides for a variety of land uses for future economic growth while also assuring the conservation of Kern County's agricultural, natural, and resource attributes Resource Policy 2 of the Land Use, Open Space, and Conservation Element provides that in areas with a resource designation on the General Plan only industrial activities which directly and obviously relate to the exploration, production, and transportation of the particular resource will be considered consistent with the General Plan.

San Bernardino County General Plan (2007)

The San Bernardino County General Plan consists of the seven mandatory elements and an option Economic Development element. The eight elements set forth a comprehensive set of planning policies. The Land Use (LU) Element designates the general distribution and intensity of land uses within the unincorporated area of the county. The Circulation and Infrastructure (CI) Element identifies the general location and extent of proposed transportation and infrastructure facilities and utilities. The Housing (H) Element is a comprehensive assessment of current and future housing needs for all segments of the county population, as well as a program for meeting those needs. The Open Space (OS) Element describes measures for the preservation of open space for the protection of natural resources, and for public health and safety. The Conservation (CO) Element addresses the conservation, Through its policies, the General Plan seeks to protect land for public services to serve the needs of the community for schools, parks, community facilities, open space, utilities, and infrastructure and encourage the joint use of public facilities wherever possible, as in shared school/park facilities, shared utility/trail easements, and shared school/library facilities.

County of Los Angles General Plan

The County of Los Angeles General Plan establishes goals and policies for the management of county resources. The policies of the General Plan's Land Use Element support the countywide General Plan policies of encouraging a more concentrated urban pattern through the revitalization of deteriorating urban areas, infilling of bypassed lands, and focusing new urban development in the most suitable locations. Policies that would potentially be applicable to the development of renewable energy projects in Los Angeles County include the following:

- **Policy 14:** Assure that new development is compatible with the natural and manmade environment by implementing appropriate locational controls and high quality design standards.
- **Policy 15:** Protect the character of residential neighborhoods by preventing the intrusion of incompatible uses that would cause environmental degradation such as excessive noise, noxious fumes, glare, shadowing and traffic.
- **Policy 17:** Establish and implement regulatory controls that ensure compatibility of development adjacent to or within major public open space and recreation areas including National Forests, the National Recreation Area, and State and regional parks.
- **Policy 20:** Protect identified Potential Agricultural Preserves by discouraging inappropriate land division and allowing only use types and intensities compatible with agriculture.

Riverside County General Plan

The Riverside County General Plan consists of seven elements: Land Use, Circulation, Multipurpose Open Space, Safety, Noise, Housing, and Air Quality. The most recent General Plan and Area Plans were adopted in 2003. The Riverside County General Plan Land Use Map consists of five broad Foundation Component land uses, which are subdivided into more detailed land use designations by regional area plans (Riverside County 2003).

The Riverside County General Plan consists of two levels of policies that direct land use and development in the County: policies that apply countywide and those that are unique to a specific region . Countywide policies that are applicable to the entire unincorporated area are contained in the General Plan and reflected on the Riverside County General Plan Land Use Map. More focused policies that address specific regional or local issues are found in the individual area plans.

The Land Use Element of the Riverside County General Plan designates the general distribution and extent of land uses, such as housing, business, industry, open space, agriculture, natural resources, recreation, and public/quasi-public uses, within the County. The Land Use Element and General Plan Land Use Map are intended to help guide Riverside County to achieve an integrated and coordinated land use, open space, and transportation system. Central to the vision for Riverside County is the desire to maintain and enhance the county’s character, including its extraordinary natural resources and unique communities, by clearly defining areas which are suitable for future growth and those which are suitable to be preserved and maintained. In essence, the plan directs that future growth should be directed to areas that are well served by public facilities and services and preserve significant environmental features, such as drainage ways, lands subject to extreme natural hazards, or lands that offer scenic beauty.

Imperial County General Plan

The Imperial County General Plan consists of nine elements: Land Use, Housing, Circulation and Scenic Highways, Noise, Seismic and Public Safety, Agricultural, Conservation and Open Space, Geothermal and Transmission, and Water. The most recent general plan was adopted in 2006. The general plan was developed to create a comprehensive guide for development within Imperial County and provides mechanisms to achieve desired community goals and objectives through a coordinated implementation program. The Land Use Element of the Imperial County General Plan designates the general distribution, location, and extent (including standards for population density and building intensity) of the uses of land for housing, business, industry, agriculture, open space, public facilities, and other types of public and private uses.

Solano County General Plan

The 2008 Solano County General Plan is the guide for Solano County's land development as well as conservation. The plan contains the policy framework viewed as necessary to fulfill the community's vision for Solano County in 2030: a sustainable place with a thriving environment an economy that maintains social equity. Protecting agricultural lands and the county's rural character is an overarching theme of the General Plan. The General Plan is organized into the following topical chapters: Land Use, Agriculture, Resources, Public Health and Safety, Economic Development, Transportation and Circulation, Public Facilities and Services, Housing, Park and Recreation, and Tri-City County Cooperative Plan.

3. PROJECT IMPACTS

This section describes the potential effects of renewable energy projects required to comply with the RES on land use and agricultural resources in areas identified by the RES Calculator as likely locations for future renewable energy projects. Due to the inability to predict with any certainty future renewable energy development scenarios, including types of development, timing, and location, the following impact analysis provides a general description of impacts on land use and agriculture from renewable energy development anticipated to potentially occur based on the RES Calculator output. However, the precise magnitude and extent of impacts would be addressed by environmental reviews at the project specific level.

As described in Chapter II, Project Description, general assumptions of land use per megawatt by resource type are as follows: solar thermal, 5 to 10 acres per MW; solar photovoltaic, 7 acres per MW; wind power, 50 acres per MW; and geothermal, 1 to 8 acres per MW) (RETI, Phase 1A Final Report, April 2008 and Final 1B Report, December 2008). Based on the RES Calculator output of electricity generation by resource type and assumptions of land use per megawatt by resource, the 33 percent RES high load scenario would require in-state land area of approximately 6,500 to 13,000 acres for solar thermal; approximately 1,800 acres for solar photovoltaic; approximately 54,000 acres for wind generation; and approximately 1,300 to 10,500 acres for geothermal.

Approximately 230 miles of additional transmission lines would be required within California under the 20 percent RPS, and an additional 360 would be required under the 33 percent RES by 2020. Most of the new transmission lines would be required for resources developed in the Mountain Pass, Pisgah, and Riverside East CREZs.

(a). THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, based on Appendix G of the CEQA Guidelines, implementing the proposed RES would result in a significant impact related to Land Use and Planning if implementation of the RES would:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

Implementation of the proposed RES would create a potentially significant impact to Agricultural Resources if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use or involve other changes in the existing environment, which, due to their location, could result in the conversion of farmland to non-agriculture use; or
- Conflict with existing zoning for agricultural use or a Williamson Act contract.

IMPACT I-1	**Physically divide an existing community. Depending upon the resource type, implementation of industrial scale renewable energy projects required to achieve compliance with the RES would be constructed on large tracts of land, which may be removed from existing urbanization. Smaller-scale projects would also need to be appropriately sited, with sufficient land available for equipment, transmission, and support facilities. As such it is unlikely that renewable electricity projects would physically divide an existing community. Therefore, this impact is *less than significant*.**

Transmission Infrastructure

Renewable energy transmission lines could traverse city and unincorporated jurisdictions that include the counties of Kern, Los Angeles, Riverside, Imperial, and Solano, and other areas within the state and beyond. Within the transmission line corridors would be land use regulations and land use types that would likely differ significantly from one jurisdiction to another. Transmission lines could traverse open space, agriculture, and residential areas. In general, transmission lines (both above ground and underground) would not physically divide existing communities because the transmission lines could co-exist with existing uses. Future proposed land uses would be required to follow set-back requirements to avoid potential conflicts with transmission lines. Although temporary and permanent disruptions to land uses could result to make way for transmission ROWs, routing of transmission lines often involves substantial public, agency, and other stakeholder involvement. As such, any disruptions are expected to be isolated and would not likely permanently divide an existing community.

Wind Power

Wind farms are generally located in large open space areas, including farmland, and involve dispersed placement of individual wind turbines away from existing communities. Therefore, the increase in wind power projects under both the 20 percent RPS and 33 percent RES is not expected to physically divide an existing community.

Solar Thermal

Solar thermal energy installations require large tracts of land, anywhere from 5 to 10 acres per MW. As a result of this large acreage need, solar thermal projects are not expected to occur within existing communities. Therefore, the increase in solar thermal projects under both the 20 percent RPS and 33 percent RES is not expected to physically divide an existing community.

Solar Photovoltaic

Like solar thermal energy installations, solar photovoltaic installations require large tracts of land when used to generate electricity at a commercial scale. A single MW of photovoltaic requires roughly 7 acres of land. As a result of this large acreage need, solar photovoltaic projects are not expected to occur within existing communities. Therefore, the increase in solar photovoltaic projects under both the 20 percent and 33 percent RES is not expected to physically divide an existing community.

Geothermal

Geothermal leasing and development requires a relatively small footprint and the land required is not usually completely occupied by the plant. Given the small footprint, geothermal development (direct and indirect) is generally compatible with many other land uses and is therefore not anticipated to physically divide an existing community under either the 20 percent RPS or 33 percent RES.

Solid-fuel Biomass

To be economically feasible, dedicated biomass plants are located either at the source of a fuel supply (such as at a sawmill) or within 50 miles of numerous suppliers (up to 200 miles for a very high quantity, lost cost supplier). Biomass plants have a relatively small footprint and would generally be compatible with nearby uses (i.e., near the fuel supply or suppliers) and therefore development of biomass plants are not expected to physically divide existing communities, either under the 20 percent RPS or 33 percent RES.

Similarly, although the production of biomass fuel supply requires large amounts of land, fuel production is anticipated to occur in areas already supplying or suitable for supplying particular fuel types. For instance, wood and wood waste are the primary biomass resources and are typically concentrated in areas of high forest-product industry activity. In rural areas, agricultural production can often yield significant fuel resources that can be collected and burned in biomass plants. Energy crops, such as switchgrass and short rotation woody crops, have also been identified as potential biomass sources. In urban areas, biomass is typically composed of wood wastes such as construction debris, pallets, yard and tree trimmings, and railroad ties. Because biomass fuel production would likely occur in locations consistent with its production, the production of biomass fuel is not anticipated to physically divide an existing community under either the 20 percent RPS or 33 percent RES.

Biogas

Distributed biogas projects could be constructed throughout the state, but are likely to be located in proximity to agricultural areas because of access to fuel and because of potential odor generation. Because landfill/digester gas projects would rely on existing waste for fuel, additional land would not be required to generate fuel. For these reasons, an increase in biogas projects is not expected to physically divide an existing community under either the 20 percent RPS or 33 percent RES.

Small Hydroelectric Power Generation

Because small hydroelectric power generation projects would be located at rivers and dams, increased small hydroelectric power generation is not anticipated to physically divide an existing community under either the 20 percent RPS or 33 RES.

Conclusion

Because implementation of the proposed 33 percent RES would be unlikely to physically divide an existing community, this impact is considered ***less-than-significant.*** No mitigation is required.

IMPACT I-2	**Conflict with Land Use Plans, Policies or Regulations. Implementation of the proposed 33 percent RES would likely result in conflicts with certain applicable land use plans, policies, or regulations of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect. Therefore, impacts related to conflict with land use plans, policies, and regulations are potentially *significant.***

Transmission Infrastructure

Construction of transmission lines could result in the conversion of existing land uses for the transmission system. Temporary conflicts with existing land uses could occur during construction; for example, transmission lines could traverse recreational areas which would be closed during transmission construction. Permanent impacts could include the need to relocate existing uses in proposed ROWs and the need for future development to comply with applicable setbacks. Indirect land use impacts could occur if the transmission infrastructure would substantially induce regional growth to the extent it would change off-site land uses. A review of existing land use plans, zoning designations, and policies would need to be conducted in order to provide appropriate, up-front guidance to developers on where and how to locate transmission infrastructure so that it would be as consistent as reasonably possible with existing land uses and the environment.

Wind Power

Wind power site monitoring and testing would generally result in temporary, localized impacts to existing land uses associated with the meteorological towers and minimum-specification access roads (if required). Meteorological data would be collected for a period of time (generally 1 to 3 years) and would require the installation of meteorological towers to characterize the wind regime at a potential wind power project. Because a meteorological tower would occupy only a few square feet, only a negligible impact to most existing land uses would be expected. However, the presence of the towers and possible access roads may impact more remote areas, including potential open space areas and recreational areas.

Construction activities would generally result in temporary impacts to existing land uses. For example, if the area were used for grazing, livestock might need to be removed from the areas where blasting or heavy equipment operations were taking place.

Permanent land use impacts are based on the amount of land that would be displaced by a proposed project and by the compatibility of the proposed use with existing, adjacent uses. A significant permanent land use impact would occur if they are proposed for the wind power project was removed from its current use. However, permanently converted acreage would usually compose only a small portion of that available within the project area. Given the overall footprints of wind turbine towers and ancillary structures, the amount of acreage required for most wind energy development projects should be a small fraction of the area in which they are located.

Generally, wind turbines need to be separated by a distance equivalent to at least several tower heights in order to allow wind strength to reform and for the turbulence created by one rotor not to harm another turbine downwind. Therefore, only a small percentage of land area is taken out of use by the turbines, access roads, and other associated infrastructure. Depending on the location, size, and design of a wind energy development project, wind development is compatible with a wide variety of land uses and generally would not preclude recreational, wildlife habitat conservation, military, livestock grazing, agriculture, oil and gas leasing, or other activities that currently occur within the proposed project area (Argone National Laboratory 2007). The opportunity may also exist for wind development on reclaimed mine lands. A review of existing land use plans, zoning designations, and policies would need to be conducted in order to provide appropriate, up-front guidance to developers on where and how to locate wind energy projects so that they would be as consistent as reasonably possible with existing land uses and the environment.

Overall, the establishment of a wind energy development project and its ancillary structures (e.g., transmission lines and access road) would modify the existing land cover), particularly if the wind energy development project was located within existing forests and shrublands.

Indirect land use impacts would not be expected, because it is anticipated that a wind energy development project would not substantially induce or reduce regional growth to the extent that it would change off-site land.

Upon decommissioning, land use impacts from facility construction and operation would be mostly reversible. No permanent land use impacts would likely occur from decommissioning.

Aviation Considerations

A general air navigation concern is associated with tall structures. Therefore, there could be wind power siting concerns relative to the locations of airports and flight patterns and air space associated with the airports because of the turbines and meteorological towers located at wind energy projects. The FAA must be contacted for any proposed construction or alteration of objects within navigable airspace under any of the following categories:

- Proposed objects more than 200 ft above ground level at the structure's proposed location;
- Within 20,000 ft of an airport or seaplane base that has at least one runway longer than 3,200 ft, and the proposed object would exceed a slope of 100:1 horizontally from the closest point of the nearest runway;
- Within 10,000 ft of an airport or seaplane base that does not have a runway more than 3,200 ft in length, and the proposed object would exceed a 50:1 horizontal slope from the closest point of the nearest runway; and/or
- Within 5,000 ft of a heliport and the proposed object would exceed a 25:1 horizontal slope from the nearest landing and takeoff area of that heliport (FAA (Federal Aviation Administration) 2007), Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace, Advisory Circular 70/7470-2K, U.S. Department of Transportation, effective March 1.).

The FAA could recommend marking and/or lighting a structure that does not exceed 200 ft above ground level, or that is not within the distances from airports or heliports mentioned above, because of its particular location (FAA 2007). Because a wind energy development project would have to meet appropriate FAA criteria, no adverse impacts to aviation would be expected.

Solar Thermal and Solar Photovoltaic

As discussed under Impact I-1 above, solar thermal and solar photovoltaic facilities require relatively large areas for soar radiation collection when used to generate electricity at a commercial scale. Construction activities could cause temporary conflicts with existing uses. Permanent land use impacts would occur where an existing use is displaced by a proposed solar project, which in turn, could potentially conflict with applicable land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. Because solar facilities usually cover many acres, other land uses are generally not compatible with the solar facilities. Further, to reduce the risk of fire, all vegetation must be removed, which could lead to the destruction and fragmentation of habitats protected under any applicable conservation plans. Construction could also conflict with existing uses.

Indirect land use impacts would not be expected, because it is anticipated that a solar energy development project would not substantially induce or reduce regional growth to the extent that it would change off-site land.

A review of existing land use plans, zoning designations, and policies would need to be conducted in order to provide appropriate, up-front guidance to developers on where and how to locate solar energy projects so that they would be as consistent as reasonably possible with existing land uses and the environment.

Geothermal

During exploration, surveying activities would impact land uses if additional roads or routes are developed to survey the potential geothermal sites. The magnitude and extent of the impact would depend on the current land uses in the area. Following surveying activities, all roads and routes could be reclaimed to any applicable standards, thereby minimizing any long-term impacts on land uses, including land use plans adopted for the purpose of avoiding or mitigating an environmental effect.

Drilling operations would require production wells, injection wells, fluid sump pits, and new access roads to accommodate larger equipment. This development would impact any land use activity that is displaced as a result of the new roads and would affect land uses activities that are sensitive to increases in motorized traffic, such as residential uses and agricultural uses. Drilling operations would also require drill site development, which on average requires a 5-50 acre well pad per plant. (Bureau of Land Management 2008). Land under the well pad would be consumed, eliminating all other potential uses of the 5-50 acre site while the well pad is in operation.

Operation of geothermal facilities may result in long-term impacts on land use. The utilization phase would require additional access roads for accessing the power plant and supporting well field equipment. Generally, pipelines are constructed with above-ground supports, which would minimize surface disturbance, but could affect any land use activity occurring above the ground. A power plant requires approximately 15 to 25 acres to accommodate all the needed equipment. (Bureau of Land Management 2008).

Similar to other construction required during this phase, this would result in a direct los of land use, displacing any current activities and uses from these lands. Installing electrical transmission lines from the power plant would disturb approximately one acre per mile of transmission line. (Ibid.) Short-term minor impacts on land uses would occur during the installation of powerlines; however, long-term impacts from wooden poles on land use would be minimal to negligible depending on existing land uses.

Impacts on land uses during operations within the utilization phase of geothermal resource development would be minor because the primary impact would occur during establishment of the plant; operations and maintenance activities would not be expected to consume additional land or impair or alter surrounding land uses. Short-term minor impacts would occur from standard operation and maintenance activities such as maneuvering construction and maintenance equipment and vehicles associated with these activities. No additional impacts would be recognized during this phase unless an additional drill site is required. Impacts from additional drill sites would be the same as those discussed under the exploration and drilling operations phases, above. After well production ceases the disturbed areas would be reclaimed in accordance with applicable reclamation standards, and land uses and activities could resume.

Indirect land use impacts would not be expected, because it is anticipated that a geothermal energy development project would not substantially induce or reduce regional growth to the extent that it would change off-site land uses.

A review of existing land use plans, zoning designations, and policies would need to be conducted in order to provide appropriate, up-front guidance to developers on where and how to locate geothermal projects so that they would be as consistent as reasonably possible with existing land uses and the environment.

Solid-fuel Biomass

Implementing a substantial biomass energy production program would require large amounts of water resources and land. Construction activities would generally result in temporary impacts to existing land uses. Permanent land use impacts would be based on the amount of land that would be displaced by a proposed project and by the compatibility of the proposed use with existing, adjacent uses. A significant permanent land use impact would occur if they are proposed for the bio-mass project was removed from its current use. However, permanently converted acreage would usually compose only a small portion of that available within the project area. The land used for increased biomass production for energy would compete with other uses, such as non-energy crops, forests, and urbanization generally.

Indirect land use impacts could be expected in that changes in crop types could substantially induce or reduce regional growth in such a manner that off-site changes of land uses, such as increased need for food crop production or agricultural workers housing.

A review of existing land use plans, zoning designations, and policies would need to be conducted in order to provide appropriate, up-front guidance to developers on where and how to locate biomass projects so that they would be as consistent as reasonably possible with existing land uses and the environment.

Biogas

The land area required for biogas can vary substantially depending upon the amount of gas required for a specific use, the volume of waste material available for processing, and other factors. Development of biogas projects would occur in coordination between a local agency and an applicant, and would involve assessment of appropriate locations for such facilities. Considerations would include land use compatibility, proximity to or transport of fuel, access, odors, and other issue areas. While the number, type, and location of biogas projects are unknown at this time, it is possible that such projects could result in conflict with applicable land use policies and regulations.

Small Hydroelectric Power Generation

Because small hydroelectric power generation projects would be located on rivers and damns (and not agricultural areas), increases in small hydroelectric power is not anticipated to conflict with existing land use polices or regulations.

Conclusion

Because ARB has no land use authority, mitigation is not available to mitigate potentially significant land use conflicts. Compliance with existing land use policies, ordinances, and regulations would serve to minimize or preclude this impact, but each project's ability to comply is unknown. For instance, renewable energy projects on public lands that are not identified in an applicable RMP (such as the CDCA) would be required to go through the plan amendment process, during which time BLM would address the individual project's environmental impacts and require mitigation to reduce those impacts. Land use impacts would be further addressed for individual projects through the project's CEQA and/or NEPA review. However, because ARB cannot guarantee proposed renewable energy projects would be consistent with any applicable land use policies, ordinances, or regulations, Impact I-2 is conservatively considered ***potentially significant.***

IMPACT I-3

Conflict with applicable Habitat Conservation Plan or Natural Communities Conservation Plan. Implementation of renewable electricity projects necessary for compliance with the proposed 33 percent RES could result in conflicts with an applicable habitat conservation plan or natural community conservation plan. Coordination with DFG, USFWS and other appropriate resource agencies, and implementation of mitigation I-3 and I-6 would reduce the severity of such impacts. Therefore, potential HCP/NCCP conflicts would be *less than significant.*

As discussed in section III.C, Biological Resources, the proposed 33 percent RES could conflict with applicable habitat conservation plans and/or natural community conservation plans. However, existing laws require project applicants and local jurisdictions to coordinate with appropriate natural resources and wildlife agencies (e.g. DFG, USFWS) and prepare mitigation plans to address significant impacts. Therefore, impacts related to potential conflicts with HCPs and NCCPs would be ***less than significant*** under both the 20 percent RPS and 33 percent RES.

IMPACT I-4

Conversion of Designated Farmland. Implementation of the proposed 33 percent RES could result in the conversion Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural uses or involve other changes in the existing environment, which, due to their location, could result in the conversion of farmland to non-agriculture uses. Therefore, impacts to designated farmlands would be potentially *significant.*

Transmission Infrastructure

Transmission infrastructure would not likely significantly affect existing agriculture, although temporary construction-related disturbances could occur. Above-ground lines would traverse above agricultural activity. Below-ground transmission lines, if any, could however, affect agriculture. For instance, irrigation ditches could not be built over lines, while cultivation directly over the lines might be restricted. Lines would most likely be buried deep enough to allow heavy equipment to pass over.

Wind Power

The precise location and nature of future wind power projects is unknown. Nevertheless, the areas in California identified by the RES Calculatory as most suitable for wind power generation (Tehacapi, Imperial North, Mountain Pass, Fairmont, Solano and distributed throughout California), contain prime farmlands, unique farmlands, or farmlands of statewide importance, as shown on the Farmland Mapping and Monitoring Program maps. Farmlands located in out-of-state areas could also be utilized for wind power projects. Although, in general, wind farms may be compatible with existing agricultural uses, large scale wind power projects might result in the conversion of farmland for the wind energy development, including infrastructure. Further, construction could interfere with existing agricultural operations. Therefore, this impact is considered significant under both the 20 percent RPS and 33 percent RES. Impacts would likely be greater under the 33 percent RES because wind projects would occupy a greater amount of land.

Solar Thermal

The precise location and nature of future solar thermal projects is unknown. However, the areas in California identified by the RES Calculator as most suitable for solar thermal development (distributed throughout California, Pisgah, Mountain Pass, Riverside East, and Fairmont) contain prime farmlands, unique farmlands, or farmlands of statewide importance, as shown on the Farmland Mapping and Monitoring Program maps. Farmlands located in out-of-state areas could also be located utilized for solar thermal projects. As discussed under impact III.I-1, solar thermal projects require significant land acreage. In general, solar thermal projects could not co-exist with existing agricultural operations. Therefore, implementation of the 33 percent RES under both the 20 percent RPS and 33 percent RES would likely result in the conversion of farmland for solar thermal development. Impacts would likely be greater under the 33 percent RES because wind projects would occupy a greater amount of land, which could potentially be farmland under existing conditions.

Solar Photovoltaic

The precise location and nature of future solar photovoltaic projects is unknown. Areas identified by the RES Calculator as most suitable for solar photovoltaic development in California (distributed throughout the state, Tehacahpi, Imperial North, Mountain Pass, Riverside and Fairmont), however, contain prime farmlands, unique farmlands, or farmlands of statewide importance, as shown on the Farmland Mapping and Monitoring Program maps. Farmlands located in out-of-state areas could also be utilized for solar photovoltaic projects. While smaller-scale distributed photovoltaic projects that occur on rooftops or in conjunction with specific developments would be unlikely to affect designated farmlands, commercial-scale solar photovoltaic projects would not be expected to co-exist with existing agricultural operations. Therefore, implementation of the 33 percent RES under both the 20 percent RPS and 33 percent RES would likely result in the conversion of farmland for solar photovoltaic development.

Geothermal

The precise location and nature of future geothermal projects is unknown. Areas identified by the RES Calculator as most suitable for geothermal development in California (distributed throughout the state, Imperial North), however, contain prime farmlands, unique farmlands, or farmlands of statewide importance, as shown on the Farmland Mapping and Monitoring Program maps. Farmlands could also be located in out-of-state areas utilized for geothermal projects. Although footprint impacts of a geothermal plant are relatively small, the plants cannot entirely co-exist with existing agricultural operations. Therefore, implementation of the 33 percent RES under both the 20 percent and 33 percent 33 percent RES could result in the conversion of farmland for geothermal development.

Solid-fuel Biomass

The precise location and nature of future solid-fuel biomass projects is unknown. Areas identified by the RES Calculator as most suitable for biomass development in California (distributed throughout the state, Imperial North), however, contain prime farmlands, unique farmlands, or farmlands of statewide importance, as shown on the Farmland Mapping and Monitoring Program maps. Farmlands could also be located in out-of-state areas utilized for geothermal projects. Although footprint impacts of biomass plants would be small relative to solar projects, for example, the plants would not be expected to co-exist with existing agricultural operations. Further, construction of the biomass plants on or near agricultural uses could conflict with agricultural operations. Therefore, implementation of the 33 percent RES under both the 20 percent RPS and 33 percent RES could result in the conversion of farmland for biomass development.

Increases in biomass fuel production, however, could help to sustain existing agricultural uses in that agricultural production yields significant fuel resources that can be collected and burned in biomass plants. Energy crops have also been identified as potential biomass sources. Nevertheless, because the development of biomass plants could result in the conversion of farmlands, this impact is considered significant.

Biogas

Because biogas projects could be largely compatible with agricultural operations in terms of types of fuel, proximity to the fuel source, and variable sizes of the projects, it is less likely that substantial impacts to prime farmland would occur. However, as specific projects are undefined, this cannot be concluded with certainty. Therefore, biogas projects have the potential to convert farmland to non-agricultural uses.

Small Hydroelectric Power Generation

Because small hydroelectric power generation projects would be located on rivers and damns (and not agricultural areas), increases in small hydroelectric power is not anticipated to convert farmland to non-agricultural uses.

Conclusion

Because ARB has no land use authority, mitigation is not available to reduce potentially significant impacts to less-than-significant levels. Compliance with existing land use policies, ordinances, and regulations would serve to minimize this impact. For instance, renewable energy projects on public lands that are not identified in an applicable conservation area management plan (such as the CDCA) would be required to go through the plan amendment process, during which time BLM would address the individual project’s environmental impacts and require mitigation to reduce those impacts. Land use impacts would be further addressed for individual projects through the project's CEQA and/or NEPA review. However, because ARB cannot guarantee proposed renewable energy projects would be consistent with any applicable land use policies, ordinances, or regulations, Impact I-4 is conservatively considered ***potentially significant.***

IMPACT I-5	**Conflict with Existing Agricultural Zoning or Williamson Act Contract. Implementation of projects necessary for compliance with the proposed 33 percent RES have the potential to conflict with existing zoning for agricultural use or a Williamson Act contract. Therefore, impacts to designated farmlands would be *potentially significant.***

Similar to the agricultural impacts discussed under Impact I-4, implementation of the proposed 33 percent RES could result in conflicts with existing zoning for agricultural uses or Williamson Act contracts. The areas identified by the RES Calculator as most suitable for wind power, solar thermal, solar photovoltaic, geothermal, solid-fuel biomass, biogas and small hydroelectric power development contain land zoned for agricultural uses and under Williamson Act contracts. Similar to the impacts discussed under Impact I-4, operation of these facilities would conflict with the existing agricultural zoning or Williamson Act contract. Construction could also interfere with existing operations. For example, although wind power can be compatible with agricultural uses, construction of wind turbines could require removal of grazing cattle or existing agricultural uses. Therefore, this impact would be ***potentially significant.***

4. MITIGATION

Mitigation is required for the following significant or potentially significant impacts.

Mitigation Measure I-1

- **Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with existing land uses, including but not limited to existing communities, municipal uses, commercial and industrial operations, and sensitive lands, including wildlife habitat.**

Implementation of this mitigation would reduce this impact to a less-than-significant level.

Mitigation Measure I-2

- **Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with land use plans, policies, and regulations of any agency with jurisdiction over the project, including general plans, specific plans, and zoning ordinances.**
- **Comply with ordinances, regulations and standards including the Subdivision Map Act, California Land Conservation Act, and local permitting requirements.**

- **Meet with local agencies and elected officials before filing permit or approval applications to ensure that the project is to be located on land zoned appropriately with no zoning, land use, or height restrictions. Include a statement from the local agency and the governing body that they have reviewed the proposed project and that it would be consistent with General Plan, zoning ordinances, and height restrictions. If a conditional use permit is required by the local agency, include a copy of the conditional use permit application with applications to lead agencies. Processing of applications for projects requiring land use designation changes will likely be delayed.**

- **Consult the Office of Planning and Research mapping tool to identify whether their proposed project is located in the vicinity of military bases and military airspace. This mapping tool will help developers comply with legislation that requires the military to be notified of certain development applications and general plan actions.**

- **DOD entities request early notification with the military on proposed energy development to provide an opportunity for DOD to address potential concerns with the proposed energy development project as it may relate to current and future military testing and training missions to include, but not limited to: Military Operating Areas; Military Training Routes; air space; Special Use Airspace; airfield surfaces; Terminal Operations; air and ground safety operations; Remote Support Sites (radars, microwaves and communications towers); and installation access.**

- **If the BLM Resource Management Plan must be amended, include a completed BLM application.**

- **Provide U.S. Census Bureau data to determine whether the facility would be located within a two-mile radius of a minority population or a population where fifty percent or more of the residents have an income below the poverty level.**

- **Ensure the proposed facility site contains adequate area for construction laydown and staging, parking for construction and operation worker vehicles and site traffic circulation aisles).**

Implementation of this mitigation would reduce this impact to a less-than-significant level.

Mitigation Measure I-3

- **Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with any habitat conservation plan (HCP) or natural communities conservation plan (NCCP). Appropriate consultation and coordination with agencies with jurisdiction by law over biological resources, including but not limited to the California Department of Fish and Game and U.S. Fish and Wildlife Service, shall be conducted.**

Implementation of this mitigation would reduce this impact to a less-than-significant level.

Mitigation Measure I-4

- **Renewable electricity projects shall be designed and sited so as to avoid or minimize impacts to, and conversion to non-agricultural uses of prime farmland, unique farmland, and farmland of Statewide importance, as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency.**
- **On privately-owned lands, assess the impacts of the proposed project on agriculture, farmland, and grazing operations through use of the California Agricultural Land Evaluation and Site Assessment model. Develop feasible measures to reduce the significance of impacts. Project developers should avoid when possible, the conversion of Prime Farmland, Unique Farmland or farmland of Statewide Importance, or lands under a current Williamson Act contract.**

Implementation of this mitigation would reduce this impact to a less-than-significant level.

Mitigation Measure I-5

- **Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with lands zoned for agriculture and lands under Williamson Act Contracts.**

Implementation of this mitigation would reduce this impact to a less-than-significant level.

III.J. NOISE

This section includes a general description of acoustic fundamentals, existing conditions (e.g., types of sensitive land uses and sources in the project area), a summary of applicable regulations, and evaluation of potential short-term and long-term noise (and vibration) impacts associated with implementation of the proposed renewable energy development scenarios. Mitigation is recommended, as necessary, to reduce significant impacts.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

(a). ACOUSTIC FUNDAMENTALS

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature, and can vary substantially from person to person.

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system, the decibel (dB) scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100 fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation noise sources) such as automobiles, trucks, and airplanes and stationary sources (nontransportation noise sources) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (walls, building façades, berms). Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dB per doubling of distance.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or "shielding" provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods, and human-made features such as buildings and walls may be used as noise barriers.

(b). Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below.

- **Equivalent Noise Level (L_{eq}):** The energy mean (average) noise level.
- **Maximum Noise Level (L_{max}):** The highest A/B/C weighted integrated noise level occurring during a specific period of time.
- **Minimum Noise Level (L_{min}):** The lowest A/B/C weighted integrated noise level during a specific period of time.
- **Day-Night Noise Level (L_{dn}):** The 24-hour L_{eq} with a 10-dB "penalty" applied during nighttime noise-sensitive hours, 10 p.m. through 7 a.m.
- **Community Noise Equivalent Level (CNEL):** Similar to the L_{dn} described above, but with an additional 5-dB "penalty" for the noise-sensitive hours between 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and watching television.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the L_{eq} descriptor listed above, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

(c). EFFECTS OF NOISE ON HUMANS

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustom to, the less tolerable the new noise source will be perceived.

With respect to how humans perceive and react to changes in noise levels, a 1 dB increase is imperceptible, a 3 dB increase is barely perceptible, a 6 dB increase is clearly noticeable, and a 10 dB increase is subjectively perceived as approximately twice as loud (Egan 1988). These subjective reactions to changes in noise levels was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 3 dB or more is typically considered substantial in terms of the degradation of the existing noise environment.

(d). VIBRATION

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature, explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration [FTA] 2006, California Department of Transportation [Caltrans] 2004). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration that is relevant to this analysis occurs from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings (FTA 2006).

(e). EXISTING SOURCES AND SENSITIVE LAND USES

The development of renewable energy resources would occur in various locations throughout California, including the following general areas: Tehachapi, Pisgah, Solano, Mountain Pass, Fairmont, Riverside East, and Imperial North. In addition, some out-of-state renewable energy projects would be developed. Renewable energy projects could be developed in most Western U.S. states, although this would more likely occur in states closest to California with substantial renewable energy resources and transmission routes, e.g., Arizona, Nevada, and Utah.

The existing noise environment in the project area is primarily influenced by transportation noise from vehicle traffic on the roadway systems (e.g., highways, freeways, primary arterials, and major local streets) and non-transportation noise from commercial and industrial operations. Other noise sources that contribute to the existing noise environment include passenger and freight on-line railroad operations and ground rapid transit systems; commercial, general aviation, heliport, and military airport operations (e.g., jet engine test stands, ground facilities and maintenance) and overflights; and to a much lesser extent construction sites, schools (e.g., play fields), residential and recreational areas (e.g., landscape maintenance activities, dogs barking, people talking), agricultural activities, and others. Those noted above are also considered sources of vibration in the project area.

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also generally considered sensitive to increases in exterior noise levels. Places of worship and transit lodging, and other places where low interior noise levels are essential are also considered noise-sensitive.

Those noted above are also considered vibration-sensitive land uses in addition to commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance. Equipment such as electron microscopes and high-resolution lithographic equipment can be very sensitive to vibration, and even normal optical microscopes will sometimes be difficult to use when vibration is well below the human annoyance level. Manufacturing of computer chips is an example of a vibration-sensitive process. This category does not include most computer installations or telephone switching equipment because most such equipment is designed to operate in typical building environments where the equipment may experience occasional shock from bumping and continuous background vibration caused by other equipment (FTA 2006).

2. Regulatory Setting

The following provides a brief description of the Federal and State regulations that could be applicable to a renewable energy project. Local regulations may also apply; however, because the specific siting of the renewable energy facilities is not known at this time it would be speculative to present a discussion of applicable local regulations.

Table III.J-1. Applicable Laws and Regulations for Noise Resources	
Regulation	Description
Federal	
40 Code of Federal Regulations (CFR) (National Environmental Policy Act [NEPA])	NEPA requires all federal agencies to consider environmental factors through a systematic interdisciplinary approach before committing to a course of action. The NEPA process is an overall framework for the environmental evaluation of federal actions.
Federal Noise Control Act (1972) (U.S. Environmental Protection Agency [EPA]), 40 CFR 201-211	This act established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. EPA was given the responsibility for providing information to the public regarding identifiable effects of noise on public health or welfare, publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety, coordinating federal research and activities related to noise control, and establishing federal noise emission standards for selected products distributed in interstate commerce. This act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations.
Quiet Communities Act (1978)	This act promotes the development of effective state and local noise control programs, to provide funds for noise research, and to produce and disseminate educational materials to the public on the harmful effects of noise and ways to effectively control it.
24 CFR, Part 51B (U.S. Department of Housing and Urban Development [HUD])	This regulation established standards for HUD-assisted projects and actions, requirements, and guidelines on noise abatement and control.
Federal Aviation Administration (FAA) Order 1050.1D	This order contains policies and procedures for considering environmental impacts.
14 CFR, Part 150 (FAA)	These address airport noise compatibility planning and include a system for measuring airport noise impacts and present guidelines for identifying incompatible land uses. All land uses are considered compatible with noise levels of less than 65 dBA L_{dn}. At higher noise levels, selected land uses are also deemed acceptable, depending on the nature of the use and the degree of structural noise attenuation provided.

Table III.J-1. Applicable Laws and Regulations for Noise Resources	
Regulation	Description
International Standards and Recommended Practices (International Civil Aviation Organization)	This contains policies and procedures for considering environmental impacts (e.g., aircraft noise emission standards and atmospheric sound attenuation factors).
32 CFR, Part 256 (Department of Defense Air Installations Compatible Use Zones [AICUZ] Program)	AICUZ plans prepared for individual airfields are primarily intended as recommendations to local communities regarding the importance of maintaining land uses which are compatible with the noise and safety impacts of military aircraft operations.
23 CFR, Part 772, Federal Highway Administration (FHWA) standards, policies, and procedures	These provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways.
29 CFR, Part 1910, Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration [OSHA])	This regulation established a standard for noise exposure in the workplace.

Table III.J-1. Applicable Laws and Regulations for Noise Resources	
Regulation	Description
Federal Transit Administration (FTA) Guidance (2006)	This guidance presents procedures for predicting and assessing noise and vibration impacts of proposed mass transit projects. All types of bus and rail projects are covered. Procedures for assessing noise and vibration impacts are provided for different stages of project development, from early planning before mode and alignment have been selected through preliminary engineering and final design. Both for noise and vibration, there are three levels of analysis described. The framework acts as a screening process, reserving detailed analysis for projects with the greatest potential for impacts while allowing a simpler process for projects with little or no effects. This guidance contains noise and vibration impact criteria that are used to assess the magnitude of predicted impacts. A range of mitigation is described for dealing with adverse noise and vibration impacts.
49 CFR 210 (Federal Rail Administration [FRA] Railroad Noise Emission Compliance Standards) and FRA Guidance (2005)	This section and guidance provides contains criteria and procedures for use in analyzing the potential noise and vibration impacts of various types of high-speed fixed guideway transportation systems.
State	
California Public Utilities Code (CPUC) Section 21670	The State Aeronautics Act of the CPUC establishes statewide requirements for airport land use compatibility planning and requires nearly every county to create an Airport Land Use Commission (ALUC) or other alternative.
Section 5000 et seq. of the California Code of Regulations (Title 21, Division 2.5, Chapter 6), California Airport Noise Regulations promulgated in accordance with the State Aeronautics Act	In Section 5006, the regulations state that: “The level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dBA for purposes of these regulations. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep and community reaction.

Table III.J-1. Applicable Laws and Regulations for Noise Resources	
Regulation	Description
California Streets and Highways Code Section 216 (Freeway Noise in Classrooms)	This section, known as the Control of Freeway Noise in School Classrooms, requires that, in general, Caltrans abate noise from freeways to specified levels when the noise exceeds specified levels in school classrooms
California Government Code Section 65302 (Provision of Noise Contour Maps)	This section requires Caltrans to provide cities and counties with noise contour maps along state highways.
Title 24, Part 2, California Code of Regulations	These establish standards governing interior noise levels that apply to all new single-family and multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation that will limit maximum L_{dn} levels to 45 dBA in any habitable room.

3. PROJECT IMPACTS

This section describes the project's effects on noise (and vibration) by scenario. The discussion includes the criteria for determining the level of significance of the effects and a description of the methods and assumptions used to conduct the analysis.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project proposed, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

(a). METHODOLOGY

Potential impacts to noise (and vibration) were assessed based on the potential for the construction and operation of renewable energy projects necessary to comply with the 33 percent RES to exceed the thresholds of significance identified below. The analysis that is presented below evaluates the change from existing conditions to the conditions anticipated under the 33 percent RES in 2020. However, an incremental portion of these impacts would occur regardless of whether the 33 percent RES is implemented. As described in Chapter II, Project Description, the 20 percent RPS is in effect and many renewables projects are in various stages of approval. The 33 percent RES would further the renewable energy objective and would be added to the 20 percent RPS. Therefore, the analysis below describes the impacts that would occur under the 20 percent RPS, the total impacts that would occur under the 33 percent RES (i.e., existing conditions to 33 percent RES), and the incremental impacts from 20 percent RPS to 33 percent RES. For each of these alternatives, a high and low load scenario is also evaluated (see Section II, Project Description, for additional details).

For some impacts below, the same type and magnitude would occur under each scenario and each alternative. Where this occurs, a combined analysis is presented to streamline the presentation of environmental impacts to avoid unnecessary repetition.

(b). THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance were used to determine whether implementing the 33 percent RES would result in a significant noise (and vibration) impacts. The project would result in a significant impact if it would:

- generate short-term construction or long-term operational noise (including vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors; or
- expose people residing or working in the project area to excessive noise levels, for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, or within the vicinity of a private airstrip.

IMPACT J-1

Impacts to Sensitive Receptors from Project-Generated Short-Term Construction and Long-Term Operational Noise (and Vibration) Levels. Construction and operation of new renewable energy and transmission projects could result in substantial increases in ambient noise levels and expose persons to or generate noise levels in excess of applicable standards. Because the specific noise (and vibration) impacts of the 33 percent RES cannot be identified with any certainty, and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, this impact is considered *potentially significant* under the 20 percent RPS and 33 percent RES.

All Renewable Energy Project Types

All renewable energy and transmission projects no matter their size, location within the State or out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the State CEQA Guidelines. For those projects that would be located out-of-state, it is assumed that these projects would be located in areas that would subject to comparable Federal environmental review requirements (e.g., NEPA). The environmental review process for all renewable project types under either the 20 percent RPS or 33 percent RES would assess whether project implementation would generate short-term construction or long-term operational noise (including vibration) levels in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors.

Short-Term Construction

Construction noise levels in the vicinity of renewable energy projects would fluctuate depending on the particular type, number, and duration of usage for the varying equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Construction generally occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. These variations in the operational characteristics of the equipment change the effect they have on the noise environment of the project site and in the surrounding community for the duration of the construction process.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes, mobile and stationary. Mobile equipment sources move around a construction site performing tasks in a recurring manner (e.g., loaders, graders, dozers). Stationary equipment operates in a given location for an extended period of time to perform continuous or periodic operations. Operational characteristics of heavy construction equipment are additionally typified by short periods of full-power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

Additionally when construction-related noise levels are being evaluated, activities that occur during the more noise-sensitive evening and nighttime hours are of increased concern. Because exterior ambient noise levels typically decrease during the late evening and nighttime hours as traffic volumes and commercial activities decrease, construction activities performed during these more noise-sensitive periods of the day can result in increased annoyance and potential sleep disruption for occupants of nearby residential uses.

The site preparation phase typically generates the most substantial noise levels because of the on-site equipment associated with grading, compacting, and excavation, which uses the noisiest types of construction equipment. Site preparation equipment and activities include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers); and possibly blasting. Erection of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which may also generate noise levels. Although a detailed construction equipment list is not currently available, based on the types of renewable energy projects listed in the Project Description it is expected that the primary sources of noise would include backhoes, bulldozers, excavators, blasting, and other related equipment. Noise emission levels from these types of construction equipment are shown in Table III.J-2 below.

Table III.J-2. Noise Emission Levels from Construction Equipment

Equipment Type	Typical Noise Level (dBA) @ 50 feet
Air Compressor	78
Asphalt Paver	77
Backhoe	78
Blasting	94
Compactor	83
Concrete Breaker	82
Concrete Pump	81
Concrete Saw	90
Crane, Mobile	81
Dozer	82
Front-end Loader	79
Generator	81
Grade	85
Hoe Ram Extension	90
Jack Hammer	89
Pneumatic Tools	85
Rock Drill	81
Scraper	84
Trucks	74–81
Water Pump	81

Notes:
Assumes all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacture-specified noise levels for each piece of heavy construction equipment.

Source: FTA 2006

Based on the information provided in Table III.J-2 and accounting for typical usage factors of individual pieces of equipment and activity types, on-site construction could result in hourly average noise levels of 87 dBA L_{eq} at 50 feet and maximum noise levels of 90 dBA L_{max} at 50 feet from the simultaneous operation of heavy-duty equipment and blasting activities. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within thousands of feet from project sites could exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours).

Additionally, construction activities may result in varying degrees of temporary groundborne noise and vibration, depending on the specific construction equipment used and activities involved. Groundborne noise and vibration levels caused by various types of construction equipment and activities (e.g., bulldozers, blasting) are summarized in Table III.J-3. Similar to the above discussion, although a detailed construction equipment list is not currently available, based on the types of renewable energy projects listed in the Project Description it is expected that the primary sources of groundborne vibration and noise would include bulldozers and blasting. According to FTA, levels associated with the use of a large bulldozer and blasting are 0.089 and 1.13 in/sec PPV (87 and 109 VdB) at 25 feet, respectively, as shown in Table III.J-3. With respect to the prevention of structural damage, blasting could exceed recommended levels (e.g., 0.2 in/sec PPV) within 80 feet of said activities based on FTA's recommended procedure for applying a propagation adjustment to these reference levels. In addition, with respect to prevention of human disturbance, bulldozing and blasting could exceed recommended levels (e.g., 80 VdB) within 50 and 275 feet, respectively.

Table III.J-3. Representative Groundborne Noise and Vibration Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec)[1]	Approximate L_v (VdB) at 25 feet[2]
Blasting		109
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Trucks	0.076	86
Rock Breaker		
Jackhammer	0.035	79
Small Bulldozer	0.003	58

1 Where PPV is the peak particle velocity
2 Where Lv is the root mean square velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.

Source: FTA 2006

Long-Term Operational

Implementation of the renewable energy projects could result in additional vehicle trips on the affected roadway systems from worker commute-, maintenance/operation-, and material delivery-related trips) and, consequently, an increase in traffic source noise. The exact number of daily trips required for project operations or the location of affected roadways segments is not known at this time. However, when the average daily traffic (ADT) volume is doubled on a roadway segment in comparison to existing conditions, the resultant increase is approximately 3 dB CNEL/L_{dn}, which is typically considered substantial as a change of this magnitude is perceivable to the human ear. ADT volumes on roadway segments in the project area vary considerable (e.g., from hundreds to hundreds of thousands) under existing no project conditions. Therefore, project operations could result in a doubling of ADT volumes, especially in rural areas where existing ADT volumes would be lower and considering the increased tire and engine source noise from material delivery-related heavy-duty truck trips, along affected roadway segments. Consequently, based on the information above, exterior noise levels at noise-sensitive receptors located near affected roadways could substantially (e.g., 3 dB CNEL/L_{dn}) increase.

Additionally, implementation of the renewable energy projects could introduce new on-site stationary noise sources, including rooftop heating, ventilation, and air conditioning (HVAC) equipment; mechanical equipment (e.g., turbines, engines, pumps, blowers); emergency generators; parking lot activities; loading operations; and other related operational activities. Noise levels associated with these types of sources vary greatly, but would generally range from 70 dBA L_{eq} to 80 dBA L_{max} at 50 feet. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within hundreds of feet from the location of renewable energy project sites could exceed typical standards (e.g., 50/60 dBA L_{eq}/L_{max} during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours).

Summary

In summary, the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known at this time. However, nearby sensitive receptors could be located within the distances modeled above that are correlated with typical noise (and vibration) standards and recommended-acceptance levels. Thus, implementation of new renewable energy projects could result in substantial increases in ambient noise levels and expose persons to or generate noise levels in excess of applicable standards. It is important to note that there is no difference in the impacts that would occur under the 20 percent RPS versus the 33 percent RES.

Consequently, because the specific noise (and vibration) impacts of the 33 percent RES cannot be identified with any certainty, and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, this impact is considered **potentially significant.**

IMPACT J-2

Impacts to People Residing or Working in the Project Area from Exposure to Excessive Airport-Related Noise Levels. This impact would only apply to projects that may be constructed near airports. Because the specific noise (and vibration) impacts of new renewable projects cannot be identified with any certainty, and these projects could potentially result in exposure of new workers to noise levels in excess of standards for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level Therefore, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).

All Renewable Energy Project Types

As described above under Impact J-1, all renewable energy projects no matter their size, location within the State or out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the State CEQA Guidelines. For those projects that would be located out-of-state, it is assumed that these projects would be located in areas that would subject to comparable Federal environmental review requirements (e.g., NEPA). The environmental review process for all renewable project types under either the 20 percent RPS or 33 percent RES would assess whether project implementation would expose people residing or working in the project area to excessive airport-related noise levels.

This type of impact (exposure of people residing or working in the project area to excessive airport-related noise levels) is initially assessed based on whether renewable energy projects would be located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, or within the vicinity of a private airstrip. That said, there are over 10 international airports and many other public and private facilities scattered throughout the project area. For example, two airports/airstrips are located near the proposed CREZ project areas. The Palmdale Air Force Plant 42 located to west of the Fairmont CREZ and the Imperial County Airport located to the southeast of the Imperial North CREZ, which are both a minimum of 2 miles from the nearest proposed CREZ project area. Implementation of the renewable energy projects would not be anticipated to include land use types for which people would reside, but could result in new locations where people work. At this time, the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known. Thus, depending on the exact location of renewable energy projects, implementation could result in the exposure of new workers to noise levels in excess of applicable standards. It is important to note that there is no difference in the impacts that would occur under the 20 percent RPS versus the 33 percent RES.

Consequently, because the specific noise impacts the 33 percent RES cannot be identified with any certainty, and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, this impact is considered **potentially significant.**

4. MITIGATION

Mitigation Measure J-1

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**

- **Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.**

- **Comply with local plans, policies, and ordinances regarding acceptable noise and vibration levels.**

- **Ensure noisy construction activities (including truck deliveries, pile driving and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors.**

- **Consider use of noise barriers such as berms and vegetation to limit ambient noise at property lines, especially where sensitive receptors may be present.**

- **Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment.**

- **All construction equipment used shall be adequately muffled and maintained.**

- **Consider use of battery powered forklifts and other facility vehicles.**

- **Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby sensitive receptors.**

- **If blasting or other noisy activities are required during the construction period, notify nearby sensitive receptors and the permitting agencies 24 hours in advance.**

- **Properly maintain mufflers, brakes and all loose items on construction and operational-related vehicles to minimize noise and ensure safe**

operations. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum.

- **Use noise controls on standard construction equipment; shield impact tools.**
- **Consider use of flashing lights instead of audible back-up alarms on mobile equipment.**
- **Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines.**
- **Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.**
- **Contain facilities within buildings or other types of effective noise enclosures.**
- **Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with the provision of water, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

Mitigation Measure J-2

Implement Mitigation J-1 above.

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with the provision of water, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

III.K. RECREATION

This section describes the existing outdoor recreation areas and activities within the CREZ potentially affected by renewable energy generation and transmission facilities as a result of adoption of the 33 percent RES. Large land areas within and near the CREZ have been set aside by Federal, State, and local government for recreation uses, such as off-highway motor vehicle recreation (OHMVR), hiking, horseback riding, wilderness appreciation, wildlife viewing, hunting, fishing, boating, and camping. Impacts are identified and mitigation recommended, where necessary

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, presence of recreation uses on or near the project site, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

As described in the Project Description, the RES Calculator was used to identify in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

Development of renewable energy resources would occur in various locations throughout California, including the following general areas: Tehachapi, Pisgah, Solano, Mountain Pass, Fairmont, Riverside East, and Imperial North. In addition, some out-of-state renewable energy project would be developed. Depending on the alternative, renewable energy projects could be developed in most Western U.S. states, although this would more likely occur in states closest to California with substantial renewable energy resources and transmission routes, e.g., Arizona, Nevada, and Utah.

(a). EXISTING OUTDOOR RECREATION AREAS

Many areas are designated for land conservation within the 11 western states; these areas provide substantial opportunities for outdoor recreation. They include National Parks, National Historic and Scenic Trails, National Wildlife Refuges, Wild and Scenic Rivers, and federally designated Wilderness Areas, along with state parks and wildlife areas, and regional or local recreation areas. The U.S. Bureau of Land Management (BLM) is the largest manager of public lands in the West. BLM has organized their lands into the National Landscape Conservation System (NLCS), including National Conservation Areas (NCAs), National Monuments, National Recreation Areas, Forest Reserves, Outstanding National Areas, Cooperative Management and Protection Areas, Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, National Scenic Trails, and National Historic Trails (BLM 2000). A BLM brochure on the NLCS (available at http://www.blm.gov/nlcs) provides links to maps that show the locations of the various NLCS areas and to the individual NCAs and National Monuments. Within the 11 Western State, BLM manages a total of 15 National Monuments (4,800,000 acres), 161 Wilderness Areas (6,500,000 acres), 623 Wilderness Study Areas (14,800,000 acres), and 14 National Conservation Areas (13,200,000 acres), among other resource lands (BLM 2005).

Along with BLM, the U.S. Forest Service (USFS), National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS) also manage large land holdings that provide outdoor recreation opportunities within the National Forest System (NFS), National Park System, and National Wildlife Refuge System. Other federal agencies also provide recreation areas in the Western States, including the U.S. Bureau of Reclamation (BOR), U.S. Army Corps of Engineers (USACE), and others. Within these federal lands, various types of motorized and non-motorized outdoor recreation opportunities are offered. The types of recreational areas are quite diverse. The BLM manages more than 3,500 recreation sites and facilities. The BOR and USACE primarily manage reservoirs, lakes, and dams. Recreational areas managed by the USFS are mostly associated with National Forests and Wilderness Areas. The USFWS-managed recreational areas include National Wildlife Refuges, Wildlife Management Areas, Wilderness Areas, waterfowl production areas, and hatcheries. Areas managed by the NPS include National Monuments, National Parks, recreational areas, and national historic sites. The DOT-managed recreational areas are the America's Byways. This is an umbrella term used for the 96 distinct and diverse roads designated by the U.S. Secretary of Transportation, which include the National Scenic Byways and the All-American Roads. Table III.K-1 summarizes the number of recreation areas managed by Federal agencies within the 11 Western States.

Table III.K-1 Number of Federal Recreation Areas within the 11 Western States

State	BLM	BOR	DOT	USFWS	NOS	NPS	SIAP	USACE	USFS	Total
AZ	110	14	1	14	0	27	10	1	45	222
CA	130	36	3	26	6	39	12	23	66	341
CO	25	34	6	8	0	17	2	5	41	138
ID	56	17	0	7	0	10	1	4	14	109
MT	8	12	0	22	0	8	2	2	21	75
NV	62	4	2	6	0	10	7	0	13	104
NM	34	11	4	10	0	17	4	7	24	111
OR	57	24	6	13	1	8	0	19	52	180
UT	89	25	2	6	0	16	0	0	19	157
WA	12	19	2	22	2	16	2	13	34	122
WY	40	23	0	9	0	11	0	0	20	113

Abbreviations: BLM – Bureau of Land Management; BOR – Bureau of Reclamation; DOT – U.S. Department of Transportation; USFWS – U.S. Fish and Wildlife Service; NOS – National Ocean Service; NPS – National Park Service;, SIAP – Smithsonian Institution Affiliation Program; USACE – U.S. Army Corps of Engineers; USFS – U.S. Forest Service.

Source: BLM, 2005

In addition to the federally managed recreational areas, there are many state parks, recreational areas and sites, or points of recreational interest within the 11 western states. For example, Table III.K-2 lists the number of state parks in each of the 11 states and the Web addresses for each state. Most of the websites have maps showing the locations of the state parks and links to each park.

Table III.K-2 Number of State Parks within the 11 Western States

State	Number of State Parks	Web Site
Arizona	29	http://www.pr.state.az.us/parksites.html
California	279	http://www.parks.ca.gov/parkindex/results.asp
Colorado	40	http://www.parks.state.co.us/default.asp
Idaho	27	http://www.idahoparks.org/parks/parks-atoz.html
Montana	42	http://parks.fwp.state.mt.us/parks/default.aspx
Nevada	24	http://parks.nv.gov/parkmap.htm
New Mexico	31	http://www.emnrd.state.nm.us/nmparks
Oregon	181	http://www.oregonstateparks.org/searchpark.php
Utah	40	http://parks.state.ut.us/visiting/tour.htm
Washington	117	http://www.parks.wa.gov/alpha.asp
Wyoming	12	http://wyoparks.state.wy.us/Sphslist.htm

Source: BLM 2005

(b). Existing Outdoor Recreation Uses

A wide variety of recreation uses occur on public lands in the West. Water-oriented recreation uses include motorized boating, non-motorized boating, swimming, and fishing. Land-based motorized recreation includes OHMVR use, driving for pleasure, specialized motor sports and events, and snowmobiling in winter. Land-based, non-motorized recreation uses include camping, picnicking, hiking, horseback riding, mountain bicycling, road bicycling, hunting, wildlife viewing, interpretation and educational activities, and skiing or snowshoeing in winter. Applying BLM recreation activity as an indicator of recreational use, camping and picnicking are the most popular activity with over 29 million user-days on BLM land. Other popular outdoor recreation on BLM land include OHMVR at 5.7 million user-days, non-motorized travel at 5.6 million user-days (hiking, horseback riding, cycling), and hunting at 4.8 million user-days (BLM 2005).

2. REGULATORY SETTING

The following provides a brief description of the Federal and State regulations that could be applicable to a renewable energy project. Local regulations may also apply; however, because the specific siting of the renewable energy facilities is not known at this time it would be speculative to present a discussion of applicable local regulations.

Table III.K-3. Applicable Laws and Regulations for Recreation

Law or Regulation	Description
Federal	
Federal Land Policy and Management Act (FLPMA), 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the management, protection, development, and enhancement of public lands. In particular, the FLPMA's relevance to the proposed project is that Title V, Section 501 establishes BLM's authority to grant rights-of-way for generation, transmission, and distribution of electrical energy (FLPMA 2001).
Bureau of Land Management – California Desert Conservation Area (CDCA) Plan, 1980 as Amended	The 25 million-acre CDCA Plan Area contains over 12 million acres of public lands spread within the area known as the California Desert, which includes the following three deserts: the Mojave, the Sonoran, and a small portion of the Great Basin. The 12 million acres of public lands administered by the BLM are half of the CDCA. The CDCA Plan is a comprehensive, long-range plan with goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA, and it is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The plan's goals and actions for each resource are established in its 12 elements. Each of the plan elements provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.
Yuha Desert Management Plan (1985)	The BLM's Yuha Desert Management Plan establishes goals and planned actions that are designed to meet the goals of the CDCA Plan. They emphasize the protection of wildlife and cultural resource values while permitting a compatible level of competitive vehicle use and energy development.

Table III.K-3. Applicable Laws and Regulations for Recreation	
Law or Regulation	Description
Public Rangelands Improvement Act (1978)	Establishes and reaffirms the national policy and commitment to inventory and identifies current public rangeland conditions and trends; manages, maintains and improves the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; and continues the policy of protecting wild free-roaming horses and burros from capture, branding, harassment, or death, while at the same time facilitating the removal and disposal of excess wild free-roaming horses and burros which pose a threat to themselves, their habitat, and to other rangeland values.
Northern and Eastern Colorado Desert (NECO) Coordinated Management Plan	The NECO plan is a landscape- scale planning effort for most of the California portion of the Sonoran Desert ecosystem. The planning area encompasses over five million acres.
West Mojave Habitat Conservation Plan (WEMO); 2006	Amendment to CDCA in 2006, with an amended Biological Opinion in December 2007. The West Mojave Plan (Plan) is a habitat conservation plan and federal land use plan amendment that (1) presents a comprehensive strategy to conserve and protect the desert tortoise, the Mohave ground squirrel (MGS) and nearly 100 other sensitive plants and animals and the natural communities of which they are a part, and (2) provides a streamlined program for complying with the requirements of the California and federal Endangered Species Acts (CESA and FESA, respectively).
State	None applicable
Local	General plans for cities and counties contain designations for recreational areas. These are policy documents with planned land use maps and related information that are designed to give long-range guidance to those local officials making decisions affecting the growth and resources of their jurisdictions. Because of the number and variety of general plans and related local plans, they are not listed individually.

3. PROJECT IMPACTS

This section describes the 33 percent RES's effects on recreation. The discussion includes the criteria for determining the level of significance of the effects and a description of the methods and assumptions used to conduct the analysis.

(a). METHODOLOGY

Potential impacts to recreation were assessed based on the potential for the 33 percent RES to exceed the thresholds of significance identified below. The analysis that is presented below evaluates the change from existing conditions to the 33 percent RES in 2020. However, an incremental portion of these impacts would occur regardless of whether the 33 percent RES is implemented. The CPUC approved the 20 percent RPS and this regulation would be implemented by 2020. The 33 percent RES would further the renewable energy objective and would be added to the 20 percent RPS. Therefore, the analysis below describes the impacts that would occur under the 20 percent RPS, the total impacts that would occur under the 33 percent RES (i.e., existing conditions to 33 percent RES), and the incremental impacts from 20 percent RPS to 33 percent RES. For each of these alternatives, a high and low load scenario is also evaluated (see Section II, Project Description, for additional details).

For some impacts below, the same type and magnitude would occur under each scenario and each alternative. Where this occurs, a combined analysis is presented to streamline the presentation of environmental impacts to avoid unnecessary repetition.

(b). THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance were used to determine whether implementing the 33 percent RES would result in a significant impact related to recreation. The project would result in a significant impact if it would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Directly or indirectly disrupt activities in established federal, state, or local recreation areas and/or wilderness areas or the values that contribute to their recreational quality.

In the context of RES, the consequences that could lead to a significant increase in use of other recreational facilities would be the displacement of existing outdoor recreation resources or use, disruption or division of lands designated for or supporting outdoor recreation opportunities or use, or interference with accessibility to outdoor recreation resources.

IMPACT K-1	**Impact to Recreation Resources, Opportunities, or Uses. The construction of substantial additional renewable generation and transmission capacity in California and the Western U.S. would occur as a result of the RES, with much of it expected to be on public land. Public land in the West currently supports extensive recreation resources and use. The potential exists to directly disrupt, indirectly interfere with use of, or reduce the recreation resource qualities and availability of public lands. Also, new renewable energy generation and transmission facilities could directly disrupt, indirectly interfere with use of, or reduce the recreational resource qualities of private land occupied by or located near renewable energy projects. While the specific location of projects cannot be identified with any certainty, the magnitude of increased renewable energy facilities could result in significant recreational impacts. This impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).**

All Renewable Energy Project Types

Economic modeling has been conducted to define reasonably expected locations and overall generation capacities of new or expanded renewable energy projects to comply with the RES. This approach is used to provide reasonably foreseeable scenario of compliance for impact analysis. Although this is a valid and appropriate method for conduct impact analysis under CEQA, it is important to emphasize that the precise size, location, and configuration of renewable energy projects cannot be precisely predicted. The modeling results allow a reasonable explanation of potential environmental impacts, based on the evidence of economic factors that typically influence siting and development decisions.

The recreation impacts of implementing the 33 percent RES would be caused by the occupation of land by renewable energy generation and transmission facilities that also provides important recreation opportunity, supports recreation uses, or provides access to recreation resources elsewhere. This could affect any type of outdoor recreation known to occur on public and private lands throughout rural California and/or nearby Western States. Recreation uses most likely to be affected are activities that involve large land areas, such as off-highway motorized recreation, non-motorized recreational travel (such as hiking, horseback riding, cycling), or hunting. If these recreation activities were displaced by renewable energy projects, additional use pressure would be transferred to other similar recreation resource lands in the same region of project.

Increase in use from transferred demand could result in deterioration of environmental conditions, if nearby recreational areas are already experiencing use levels at or near their capacity. For instance, in the California desert, where solar, wind, and geothermal resourced are concentrated, substantial areas of public land under the management control of BLM are used for off-highway motorized recreation. If renewable energy projects displace off-highway motor vehicle use from some federal land, other already heavily used, nearby federal off-highway vehicle areas or State Vehicular Recreation Areas would likely experience increased activity. The California State Parks Off-

Highway Motor Vehicle Recreation Division recognizes the closure of federal lands for conversion to renewable energy projects as a threat to off-highway recreation use in the desert region (California State Parks 2009). This type of displacement or disruption of outdoor recreation uses could result in potentially significant impacts.

The economic modeling conducted to identify potential locations for renewable energy projects under the 33 percent RES (high load or low load) indicated that increases in generation would occur primarily in six CREZs. The recreational impact potential of each CREZ is summarized below.

Mountain Pass

The Mountain Pass CREZ primarily contains BLM land and is located adjacent to the Mohave National Preserve. To the extent that the BLM public land in the CREZ is used for recreation, renewable energy projects could displace or disrupt this use.

Fairmont

The Fairmont CREZ is located south of Edwards AFB on mostly non-federal land. Portions of the CREZ approach the El Mirage OHV Recreation Area, which is a BLM-operated recreational facility. As long as renewable energy projects do not encroach into the El Mirage OHV Recreation Area, significant impacts to recreation in this CREZ are not expected.

Solano

The Solano CREZ contains non-federal land that does not support a substantial public recreation area. Private agricultural land occupies much of the CREZ. Recreational impacts would not be expected in this CREZ.

Riverside East

Riverside East CREZ encompasses a large area with recreational resources, including dry lake beds and substantial BLM lands. The CREZ is also adjacent to Joshua Tree National Park and Wilderness land managed by either NPS or BLM. Potentially significant impacts to recreation use and opportunities could occur.

Pisgah

The Pisgah CREZ contains mostly BLM land along Interstate 40, along with another small area to the southeast near Bristol Lake. The CREZ is adjacent to and may encroach into the area proposed for a new national monument (Mojave Trails). Potentially significant impacts to recreation use and opportunities could occur.

Imperial North

Imperial North is a CREZ that covers a large area at the south end of the Salton Sea. This vicinity includes substantial recreational use related to the Salton Sea, Ocotillo Wells State Vehicular Recreation Area (SVRA), and Anza Borrego Desert State Park. The CREZ is located on the west and south sides of the SVRA. It includes a patchwork of BLM, California State Parks, and private land. The potential exists for renewable energy projects to occupy land used by off-highway motor vehicle recreation, which would result in potentially significant recreational impacts.

4. MITIGATION

Mitigation is required for the following significant or potentially significant impacts.

Mitigation Measure K-1

- **Proponents for proposed renewable energy projects shall coordinate with Federal, State, and regional/local land management agencies with responsibilities for providing outdoor recreation opportunities where facilities are proposed on land supporting outdoor recreation resources, opportunities, or use. If facilities would displace, disrupt, reduce access to, or otherwise adversely affect recreation resources, opportunities, or use, the project siting and/or design shall be modified to the extent feasible to avoid or minimize the impact. Proponents shall also consult with affected outdoor recreation user groups. The information demonstrating that all feasible measures are being taken to avoid or minimize the recreation impact shall be included in the necessary environmental review (i.e., CEQA and/or NEPA).**
- **For proposed renewable energy project that would indirectly reduce the recreation resource qualities of public lands, as part of the public involvement process for environmental reviews of proposed renewable energy projects, proponents shall consult with affected land management agencies with recreation responsibilities and affected outdoor recreation user groups to identify and implement potential, feasible mitigating solutions.**

The proponents and land management agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation for recreation impacts. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with recreation resources, opportunities, and use, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

III.L. PUBLIC SERVICES, UTILITIES, AND SOLID WASTE

This section generally describes the existing public services, utilities, and solid waste facilities and services that would be required for renewable energy development, presents the regulatory framework under which these resources and services would need to be provided, and evaluates the potential impacts that would occur from implementing the proposed renewable energy development scenarios. Where appropriate, mitigation has been recommended to reduce significant environmental impacts.

Development of renewable energy resources would occur in various locations throughout California, including the following general areas: Tehachapi, Solano, Pisgah, Mountain Pass, Fairmont, Riverside East, and Imperial North. In addition, some out-of-state renewable energy projects would be developed. Renewable energy projects could be developed in most Western U.S. states, although this would more likely occur in states closest to California with substantial renewable energy resources and transmission routes, e.g., Arizona, Nevada, and Utah. Public services, utilities, and solid waste and landfill services would be provided in a relatively consistent manner and would not be dependent upon the location of a particular project. However, the supply, capacity, and delivery requirements in a particular area may influence how and when a project is developed. Nonetheless, because local jurisdictions, agencies, or special districts would be responsible for providing these services consistent with their approved policies and plans, these agencies, or the local governing land use authority would be responsible for analyzing, approving, and extending services to the proposed facility (e.g., solar thermal facility, biomass facility, etc.). Potential services that could be required for a renewable energy project are described below in Table III.L-1.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

As described in the Project Description, the RES Calculator was used to identify in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. Tables II-3 through II-4 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

(a). LAW ENFORCEMENT

Statewide law enforcement service is provided by the California Highway Patrol (CHP). The CHP is responsible for protecting state resources and providing crime prevention services and traffic enforcement along the State's highways and byways.

Local law enforcement service is also provided by local agencies (i.e., cities and counties) to prevent crime, respond to emergency incidents, and provide traffic enforcement on local roadways.

(b). FIRE PROTECTION AND EMERGENCY MEDICAL RESPONSE SERVICES

Statewide fire protection and emergency response service is provided by the State of California, Department of Forestry and Fire Protection (CAL FIRE). CAL FIRE is an emergency response and resource protection department. CAL FIRE protects lives, property and natural resources from fire, responds to emergencies of all types, and protects and preserves timberlands, wildlands, and urban forests.

Local fire protection service is provided by local fire districts and/or local agencies (e.g., cities and counties). In addition to providing fire response services most fire agencies also provide emergency response services (i.e., ambulance services) within their service areas.

(c). SCHOOLS

Statewide the regulation of education for youth is provided by the State of California, Department of Education. The State Board of Education (SBE) is the governing and policy-making body of the California Department of Education. The SBE sets K-12 education policy in the areas of standards, instructional materials, assessment, and accountability (California State Board of Education website, date accessed May 14, 2010).

Locally, school districts are responsible for the management and development of elementary, middle, and high-school facilities. Throughout California there are 1,039 school districts.

(d). WATER SUPPLY AND DISTRIBUTION

Statewide principal water supply sources are regulated by the U.S. Bureau of Reclamation (USBR) and the State of California, Department of Water Resources (DWR). The USBR is a federal agency and it is the largest wholesaler of water in the United States and the second largest producer of hydroelectric power (USBR 2010). In California, the Mid-Pacific Region of the USBR is responsible for the management of the Central Valley Project (CVP). The CVP serves farms, homes, and industry in California's Central Valley as well as the major urban centers in the San Francisco Bay Area. The CVP consists of 20 dams and reservoirs, 11 power plants, and 500 miles of major canals and reaches from the Cascade Mountains near Redding in the north to the Tehachapi Mountains near Bakersfield in the south. In addition to delivering water for municipal and industrial uses and the environment, the CVP produces electric power and provides flood protection, navigation, recreation, and water quality benefits (USBR 2010).

DWR is a State agency that is responsible for managing and implementing the State Water Project (SWP). The SWP is a water storage and delivery system of reservoirs, aqueducts, power plants and pumping plants. Its main purpose is to store water and distribute it to 29 urban and agricultural water suppliers in Northern California, the San

Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California (DWR 2010).

Local water supply districts, special districts, and jurisdictions (e.g., cities and counties) manage and regulate the availability of water supplies and the treatment and delivery of water to individual projects. Depending on their location and the source of their supplies, these agencies may use groundwater, surface water through specific water entitlements, or surface water delivered through the CVP or SWP. In some remote areas not served by a water supply agency, individual developments may need to rely upon the underlying groundwater basin for their water supply. In these cases, the project would be required to secure a permit from the local land use authority and seek approval for development of the groundwater well(s).

(e). WASTEWATER COLLECTION AND TREATMENT

The State of California, Water Resources Control Board (SWRCB) is the State agency responsible for the regulation of wastewater discharges to surface waters and groundwater via land discharge. The SWRCB is made up of nine regional water quality control boards (RWQCB) whose responsibility is to develop and enforce water quality objectives and implementation plans that will best protect the beneficial uses of the State's waters (SWRCB 2010). The RWQCB's are responsible for issuing permits or other discharge requirements to individual wastewater dischargers and for ensuring that they are meeting the requirements of the permit through monitoring and other controls.

Wastewater collection, treatment, and discharge service for developed and metropolitan areas is typically provided by local wastewater service districts or agencies that may or may not be operated by the local jurisdiction (e.g., city or county). These agencies are required to secure treatment and discharge permits for the operation of a wastewater facility from the RWQCB. Wastewater is typically collected from a specific development and conveyed through a series of large pipelines to the treatment facility where it is treated to permitted levels and discharged to surface waters or the land.

In areas that are remote or that are not served by an individual wastewater service provider, developments would be required to install an individual septic tank or other on-site wastewater treatment system. These facilities would need to be approved by the local land use authority and the RWQCB.

(f). ELECTRICITY AND NATURAL GAS

The California Public Utilities Commission (CPUC) regulates investor-owned electric and natural gas companies located within California. The CPUC's Energy Division develops and administers energy policy and programs and monitors compliance with the adopted regulations. One-third of California's electricity and natural gas is provided by one of three companies: Pacific Gas and Electric Company, Southern California Edison, San Diego Gas and Electric Company (CPUC 2010).

Locally, energy service is provided by a public or private company. New development projects would need to coordinate with the local service provider to ensure adequate capacity is available to serve the development.

(g). SOLID WASTE COLLECTION AND DISPOSAL

Statewide, the State of California, Department of Resources Recycling and Recovery (CAL Recycle), which is a department of the newly formed California Natural Resources Agency (CNRA), is responsible for the regulation of the disposal and recycling of all solid waste generated in California. Cal Recycle acts as an enforcement agency in the approval and regulation of solid waste disposal and recycling facilities. Local agencies can create local enforcement agencies (LEA) and once approved by Cal Recycle they can serve as the enforcement agency for landfills and recycling facilities with their jurisdictions (Cal Recycle 2010).

Local agencies or private companies own and operate landfill facilities and solid waste is typically hauled to these facilities by private or public haulers. Individual projects would need to coordinate with the local service provider and landfill to determine if adequate capacity exists to serve the project.

2. REGULATORY SETTING

The following provides a brief description of the Federal and State regulations that could be applicable to a renewable energy project. Local regulations may also apply; however, because the specific siting of the renewable energy facilities is not known at this time it would be speculative to present a discussion of applicable local regulations.

Table III.L-1. Applicable Laws and Regulations for Public Services, Utilities, and Solid Waste

Regulation	Description
Federal	
American with Disabilities Act	Guidelines to ensure that facilities are accessible to individuals with disabilities. Implements requirements for the design and construction of buildings.
State	
California Public Utilities Commission, Section 95-08-038	This section contains the rules for planning and construction of new transmission facilities, distribution facilities, and substations. The CPUC requires permits for the construction of certain power line facilities or substations if the voltages would exceed certain thresholds.

Table III.L-1. Applicable Laws and Regulations for Public Services, Utilities, and Solid Waste	
Regulation	**Description**
State Fire Responsibility Areas	Areas delineated by the State of California, Department of Forestry and Fire Protection (CAL FIRE) for which the State assumes primary financial responsibility for protecting natural resources from damages of fire. Local jurisdictions are required to adopt minimum recommended requirements for road design, road identification, emergency fire suppression and fuel breaks and greenbelts. All projects within or adjacent to a State Fire Responsibility Area must meet these requirements.
State School Funding	Education Code Section 17620 authorizes school districts to levy a fee, charge, dedication, or other requirement for any development project for the construction or reconstruction of school facilities.
Section 21151.9 of the Public Resources Code/ Section 10910 et seq. of the Water Code	Required the preparation of a water supply assessment (WSA) for large developments. These assessments are prepared by public water agencies responsible for providing service and address whether there are adequate existing and projected future water supplies to serve the proposed project. All projects that meet the qualifications for preparing a WSA must identify the water supplies and quantities that would serve the project as well as project the total water demand for the service area (including the project's water demands) by source in 5-year increments over a 20-year period. This information must include data for a normal, single-dray, and multiple-dry years. The WSA is required to be approved by the water service agency before the project can be implemented.
Building Energy Efficiency Standards, California Code of Regulations, Title 24	All new renewable energy projects would be required to comply with the adopted energy efficiency standards.

3. PROJECT IMPACTS

This section describes the 33 percent RES's effects on public services, utilities, and solid waste. The discussion includes the criteria for determining the level of significance of the effects and a description of the methods and assumptions used to conduct the analysis.

(a). METHODOLOGY

Potential impacts to public services, utilities, and solid waste services were assessed based on the potential for the 33 percent RES to exceed the thresholds of significance identified below. The analysis that is presented below evaluates the change from existing conditions to the 33 percent RES in 2020. However, an incremental portion of these impacts would occur regardless of whether the 33 percent RES is implemented. The CPUC approved the 20 percent RPS and this regulation would be implemented by 2020. The 33 percent RES would further the renewable energy objective and would be added to the 20 percent RPS. Therefore, the analysis below describes the impacts that would occur under the 20 percent RPS, the total impacts that would occur under the 33 percent RES (i.e., existing conditions to 33 percent RES), and the incremental impacts from 20 percent RPS to 33 percent RES. For each of these alternatives, a high and low load scenario is also evaluated (see Section II, Project Description, for additional details).

For some impacts below, the same type and magnitude would occur under each scenario and each alternative. Where this occurs, a combined analysis is presented to streamline the presentation of environmental impacts to avoid unnecessary repetition.

(b). THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance were used to determine whether implementing the 33 percent RES would result in a significant impact related to public services, utilities, and solid waste services. The project would result in a significant impact if it would:

- Result in a substantial adverse physical impacts associated with the provision of new or physically altered governmental facility, or need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable capacity, service ratios, response times, or other performance objectives for any of the following:
  - Law enforcement
  - Fire protection
  - Emergency medical response
  - Schools
  - Solid waste facilities
  - Electricity

   - Natural Gas
   - Wastewater services
   - Water supply services

- Create a water supply demand in excess of existing entitlements and resources;
- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board (RWQCB);
- Violate state, federal, or local statues or regulations related to solid waste

The project's impacts to open space, recreation, and park resources are discussed in Section III.J., Recreation.

IMPACT L-1	**Impacts to Public Services, Utilities, and Solid Waste Services. Because the specific public service, utilities, and solid waste impacts of renewable electricity projects needed to comply with the 33 percent RES cannot be identified with any certainty, and these projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, for purposes of this analysis, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).**

All Renewable Energy Project Types

All renewable energy projects no matter their size, location within the State or out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the State CEQA Guidelines. For those projects that would be located out-of-state, it is assumed that these projects would be located in areas that would subject to comparable Federal environmental review requirements (e.g., NEPA). The environmental review process for all renewable project types under either the 20 percent RPS or 33 percent RES would assess whether adequate public services and utilities (i.e., law enforcement, fire protection, emergency medical response, schools, solid waste facilities, electricity, natural gas, wastewater services, and water supply services) would be available and whether the project would result in the need to expand or construct new facilities to serve the project. Through the environmental review process, utility and public service demands would be calculated, agencies would provide input on available capacity and service, and resulting impacts would be determined.

At this time, the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, energy demands, environmental constraints, and other market constraints. Nonetheless, the analysis provided herein provides a reasonable accounting of the types of environmental impacts that would occur with implementation of the 33 percent RES (high or low load conditions). Further, subsequent environmental review would be conducted at such time that a renewable energy project is proposed and land use entitlements are sought.

In some cases, the proposed renewable project may require that additional facilities be constructed, the construction of which could result in significant environmental impacts. In other cases, the proposed renewable project may result in the exceedance of adopted service ratios and policies. It is important to note that there is no difference in the impacts that would occur under the 20 percent RPS versus the 33 percent RES. For school and park facilities it is likely that impacts would be less-than-significant because the 33 percent RES would not generate substantial demand for these facilities because of their remote location and the minimal number of employment opportunities that would be created.

Because the specific public service, utilities, and solid waste impacts of the 33 percent RES cannot be identified with any certainty, and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, for purposes of this analysis, this impact is considered potentially significant for law enforcement, fire protection, emergency medical response, and solid waste facilities

IMPACT L-2	**Water Supply Impacts. Because the specific water supply impacts of renewable electricity projects needed to comply with the 33 percent RES cannot be identified with any certainty and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, for purposes of this analysis, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).**

All Renewable Energy Project Types

As described above under Impact L-1, all renewable energy projects no matter their size, location within the State or out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process would be to determine whether there is adequate water available to serve the proposed development. In the case of the proposed renewable energy projects, most of the project types would have minimal water demands (i.e., wind power, solid-fuel biomass, geothermal, and biogas gas) primarily related to municipal use, maintenance, and landscaping. However, the solar thermal, solar photovoltaic, and small hydroelectric renewable energy projects could have substantial water demands because of the use of water in the electricity generation, operation, or maintenance process. Nonetheless, all project types would be required to seek the approvals of local water service agencies indicating that adequate water supplies exist to serve the project. For projects located in California and that exceed adopted thresholds, a WSA would need to be prepared and approved by the local water purveyor.

Some of the projects regardless of their total water demand may result in the need to secure new water supply entitlements, construct new water delivery and/or treatment facilities the construction of which could result in significant environmental impacts. It is important to note that there is no difference in the impacts that would occur under the 20 percent RPS versus the 33 percent RES.

Because the specific water supply impacts of the 33 percent RES cannot be identified with any certainty and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, for purposes of this analysis, this impact is considered potentially significant for all renewable energy types under the 33 percent RES (high and low load).

IMPACT L-3

Exceed Wastewater Treatment Requirements. Renewable energy projects that would be served by a municipal wastewater service provider or would operate individual septic systems or on-site wastewater treatment plants would not be anticipated to exceed wastewater treatment requirements because the treatment facilities would operate under approved wastewater treatment requirements and would be monitored by appropriate regulatory agencies to ensure compliance. Therefore, this impact would be *less than significant*.

All Renewable Energy Project Types

As described above under Impact L-1, all renewable energy projects no matter their size, location within the State or out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process would be to determine whether there is adequate wastewater treatment and conveyance capacity is available to serve the proposed development. For those projects that would receive wastewater treatment service from an agency or other provider, it is assumed that all necessary permits and waste discharge requirements have been secured such that the discharge from these facilities would not exceed any adopted requirements. Further, these treatment facilities would be regularly monitored to ensure they are meeting compliance requirements Therefore, less-than-significant impacts are anticipated to occur with implementation of the 33 percent RES (high and low load conditions). For those renewable energy projects that would be served by an individual septic system or on-site treatment facility, it is anticipated that these facilities would comply with appropriate wastewater treatment requirements because appropriate permits and approvals from the RWQCB, land use agency, or other regulatory agency specifying treatment requirements would be required prior to construction of the project.

In conclusion, the 33 percent RES (high and low load conditions) would result in less-than-significant impacts related to exceeding wastewater treatment requirements.

IMPACT L-4 **Violate Solid Waste Regulations. All renewable energy projects would be provided solid waste services from an appropriately certified local provider that would haul the solid waste to an approved and permitted disposal facility. None of the renewable energy projects (in-State or out-of-state) would be anticipated to result significant impacts related to violation of solid waste regulations. Therefore, this impact would be *less than significant*.**

All renewable energy projects would be provided solid waste from a local provider that would haul the solid waste to an approved and permitted disposal facility. Some of the renewable energy projects may result in the generation of hazardous solid waste. In these cases, the project operators would contract with haulers certified to handle the hazardous waste and would dispose of the waste at a permitted facility that accepts hazardous waste. Therefore, the 33 percent RES (high and low load conditions) would result in less-than-significant impacts related to violating solid waste regulations.

4. MITIGATION

Mitigation is required for the following significant or potentially significant impacts.

Mitigation Measure L-1

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**
- **Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.**
- **Comply with local plans and policies regarding the provision of public service, utilities, and solid waste services.**
- **Where an on-site septic treatment system is proposed, submit a permit application to the appropriate local jurisdiction and include the application with applications to appropriate lead agencies.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with the provision of

public services and utilities, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

Mitigation Measure L-2

- **Implement Mitigation L-1 above.**
- **Where appropriate, prepare as Water Supply Assessment (WSA) consistent with the requirements of Section 21151.9 of the Public Resources Code/ Section 10910 et seq. of the Water Code. The WSA shall be approved by the local water agency/purveyor prior construction of the project.**
- **Comply with local plans and policies regarding the provision of wastewater treatment services.**

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with the provision of water, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).

III.M. TRANSPORTATION AND TRAFFIC

This section includes a general description existing conditions (e.g., types of transportation in the project area), a summary of applicable regulations, and evaluation of potential impacts associated with implementation of the proposed renewable energy development scenarios. Mitigation is recommended, as necessary, to reduce significant impacts.

As described in the Project Description, the RES Calculator was used to identify in- and out-of-state electricity generation by resource type for: 2008 conditions; 20 percent RPS in 2020 under low and high load conditions; and 33 percent RES in 2020 under low and high load conditions. Tables II-1 and II-2 illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS and RES under low and high load conditions, respectively. TablesII-3 throughII-6 illustrate electricity generation by resource type, by CREZ, for each scenario. Figure II-1 illustrates CREZ locations.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects would actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and would depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

As described in Chapter I.E, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected herein are based on changes from existing physical conditions, in keeping with CEQA requirements. Much of this environmental impact is expected to occur without the implementation of the RES, however. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

In addition, as with the existing RPS, renewable energy projects that contribute to compliance with the RES will not be carried out by ARB, but will be proposed by others, reviewed and approved by other federal, State, and local agencies, and permitted by agencies with authority over resources affected by individual projects. Responsibility to mitigate for potentially significant effects identified at the project-specific level will lie with lead agencies with the decision-making authority to approve such projects.

1. ENVIRONMENTAL SETTING

The development of renewable energy resources would occur in various locations throughout California, including the following general areas: Tehachapi, Solano, Mountain Pass, Pisgah, Fairmont, Riverside East, and Imperial North. In addition, some out-of-state renewable energy projects would be developed. Renewable energy projects could be developed in most Western U.S. states, although this would more likely occur in states closest to California with substantial renewable energy resources and transmission routes, e.g., Arizona, Nevada, and Utah.

The existing roadway systems in the project area are comprised of highways, freeways, arterials, local streets, and intersections/ramps. The existing average annual daily traffic (AADT) volumes on the roadway segments that comprise these systems vary considerable (e.g., from hundreds to hundreds of thousands) under existing no project conditions. The level of service (LOS), a scale used to determine the operating quality of a roadway segment or intersection based on volume-to-capacity ratio (V/C) or average delay, also vary from LOS A, the best and smoothest operating conditions, to LOSF, most congested operating conditions. Other roadway and traffic volume characteristics such as roadway length, number of lanes and facility type (e.g., two-lane freeway), right-of-way width and pavement width, terrain classification (e.g., flat), percent of heavy-duty truck traffic, and accident rates (e.g., number of accidents per million vehicle miles traveled) also vary substantially throughout the project area. In addition to the roadway systems, the circulation network in the project area also includes mass transit, airports, and non-motorized travel (e.g., pedestrian and bicycle paths).

2. REGULATORY SETTING

The following (Table III.M-1) provides a brief description of the Federal and State regulations that could be applicable to a renewable energy project. Local regulations may also apply; however, because the specific siting of the renewable energy facilities is not known at this time it would be speculative to present a discussion of applicable local regulations.

III.M-1. Applicable Laws and Regulations for Transportation and Traffic	
Regulation	Description
Federal	
40 Code of Federal Regulations (CFR) (National Environmental Policy Act [NEPA])	NEPA requires all federal agencies to consider environmental factors through a systematic interdisciplinary approach before committing to a course of action. The NEPA process is an overall framework for the environmental evaluation of federal actions.
40 CFR, Part 77 (Federal Aviation Administration)	Requires a determination of no hazard to air navigation for structures that will be more than 200 feet above ground level.
State	
California Vehicle Code (VC) Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620; California Health and Safety Code Section 25160 et seq.	These regulate the highway transport of hazardous materials.
VC Sections 13369; 15275 and 15278	These address the licensing of drivers and the classification of licenses required for the operation of particular types of vehicles and also requires certificates permitting operation of vehicles transporting hazardous materials.
VC Sections 35100 et seq.; 35250 et seq.; 35400 et seq.	These specify limits for vehicle width, height, and length.
VC Section 35780	This requires permits for any load exceeding Caltrans weight, length, or width standards on public roadways.
California Streets and Highways Code Section 117, 660-672	This requires permits for any load exceeding Caltrans weight, length, or width standards on County roads.
California Streets and Highways Code Sections 117, 660-670, 1450, 1460 et seq., and 1480 et seq.	These regulate permits from Caltrans for any roadway encroachment from facilities that require construction, maintenance, or repairs on or across State highways and County roads.

3. PROJECT IMPACTS

This section describes the project's effects on transportation and traffic by scenario. The discussion includes the criteria for determining the level of significance of the effects and a description of the methods and assumptions used to conduct the analysis.

As with all of the impacts, the precise magnitude and extent of the impact would depend on the type of renewable energy project authorized, its specific location, its total length and size, and a variety of site-specific factors that are not known at this time. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

(a). METHODOLOGY

Potential impacts to transportation and traffic were assessed based on the potential for the 33 percent RES to exceed the thresholds of significance identified below. The analysis that is presented below evaluates the change from existing conditions to the 33 percent RES in 2020. However, an incremental portion of these impacts would occur regardless of whether the 33 percent RES is implemented. The CPUC approved the 20 percent RPS and this regulation would be implemented by 2020. The 33 percent RES would further the renewable energy objective and would be added to the 20 percent RPS. Therefore, the analysis below describes the impacts that would occur under the 20 percent RPS, the total impacts that would occur under the 33 percent RES (i.e., existing conditions to 33 percent RES), and the incremental impacts from 20 percent RPS to 33 percent RES. For each of these alternatives, a high and low load scenario is also evaluated (see Section II., "Project Description," for additional details).

For some impacts below, the same type and magnitude would occur under each scenario and each alternative. Where this occurs, a combined analysis is presented to streamline the presentation of environmental impacts to avoid unnecessary repetition.

(b). THRESHOLDS OF SIGNIFICANCE

For purposes of this analysis, the following applicable thresholds of significance were used to determine whether implementing the 33 percent RES would result in a significant transportation and traffic impact. The project would result in a significant impact if it would:

- conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

- conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access; or
- conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

IMPACT M-1

Project-Generated Short-Term Construction and Long-Term Operational Impacts to Transportation and Traffic. New renewable electricity and transmission projects could result in substantial construction traffic, but are expected to result in generally moderate operational traffic. However, because the specific transportation and traffic impacts of the 33 percent RES cannot be identified with any certainty, and these projects could potentially result in significant environmental impacts (e.g., conflict with applicable programs, plans, ordinances, or policies; result in a change in air traffic patterns; substantially increase hazards due to a design feature; result in inadequate emergency access) for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).

All Renewable Energy Project Types

All renewable energy and transmission projects no matter their size, location within the State or out-of-state, or type would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the State CEQA Guidelines. For those projects that would be located out-of-state, it is assumed that these projects would be located in areas that would subject to comparable Federal environmental review requirements (e.g., NEPA). The environmental review process for all renewable project types under either the 20 percent RPS or 33 percent RES would assess whether project implementation would result in transportation or traffic impacts.

At this time, the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, energy demands, environmental constraints, and other market constraints. Nonetheless, the analysis provided herein provides a reasonable accounting of the types of environmental impacts that would occur with implementation of the 33 percent RES scenarios (high or low load conditions) as discussed below for short-term construction and long-term operational transportation and traffic impacts. Further, subsequent environmental review would be conducted at such time that a renewable energy project is proposed and land use entitlements are sought.

Although detailed information is not currently available, renewable energy projects would be anticipated to result in short-term construction and long-term operational traffic (both motorized and non-motorized) from worker commute-, maintenance/operation-, and material delivery-related trips; and include the building of permanent structures (e.g., towers, panels). The amount of construction activity would fluctuate depending on the particular type, number, and duration of usage for the varying equipment; and the phase of construction (e.g., demolition, construction, erection). These variations would affect the amount of project-generated traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the location of the renewable energy project, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazards and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. Long-term operation of the renewable energy projects could result in similar impacts, in addition to permanent structure (e.g., towers, panels) that could result in a change in air traffic patterns due to interference from tall structures and/or glare concerns.

In summary, the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known at this time. However, project construction and operational activities could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); result in a change in air traffic patterns; substantially increase hazards due to a design feature; result in inadequate emergency access. It is important to note that there is no difference in the impacts that would occur under the 20 percent RPS versus the 33 percent RES. Consequently, because the specific transportation and traffic impacts of the 33 percent RES cannot be identified with any certainty, and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, this impact is considered ***potentially significant*****.**

4. MITIGATION

Mitigation is required for the following significant or potentially significant impacts.

Mitigation M-1

- **Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development.**
- **Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project.**
- **Minimize the number and length of access, internal, service and maintenance roads and use existing roads when feasible.**
- **Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements, in coordination with applicable federal, state, and local transportation agencies.**
- **If new roads are necessary prepare a road siting plan and consult standards contained in federal, state, or local requirements. The plans should include design and construction protocols to ensure roads will meet the appropriate standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and minimize side-hill cuts. Roads internal to a project site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils.**
- **Prepare a Construction Traffic Control Plan and a Traffic Management Plan.**
- **If railroad crossings need improvements to provide for safe crossing, consult with the appropriate railroad and CPUC for permitting requirements.**
- **Meet with the local Airport Land Use Commission. In applications to appropriate lead agencies, provide a copy of a letter stating that the proposed project is compatible with the Airport Land Use Compatibility Plan. The following locations and design features may contribute to a decision that the facility is incompatible with operations of a nearby airport:**

- Siting the facility within 20,000 feet (3.8 miles) of a runway that is at least 3,200 feet in actual length, or 5,000 feet from a heliport.
- Locating any portion of a facility within a designated airport safety zone, airport influence area or airport referral area.
- Introducing a thermal plume, visible plume, glare, or electrical interference into navigable airspace on or near an airport.
- Proposing a structure that will exceed 200 feet in height above ground level.

- Consult with FAA regarding the heights of the project structures and avoid conflicts with aviation. Design the project to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports or landing strips.
- Complete FAA Form 7460, provide to FAA and include a copy in applications to appropriate lead agencies.
- Consult with representatives from the appropriate military installation for projects to be located under aircraft low fly zones. Design the project to address military concerns.

The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).

IV. ALTERNATIVES ANALYSIS

The California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines) (Section 15126.6[a]) require evaluation of "a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of the alternatives analysis is to determine whether or not a variation of the project would reduce or eliminate significant project impacts, within the basic framework of the objectives.

Thus, alternatives considered in an environmental document should be feasible and should attain basic project objectives. As described in Chapter II, Project Description, the objective of the RES is primarily to reduce GHG emissions from providers of electricity for use in California.

The range of alternatives studied in an environmental document is governed by the "rule of reason," requiring evaluation of only those alternatives "necessary to permit a reasoned choice" (State CEQA Guidelines Section 15126.6[f]). Further, an agency "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (State CEQA Guidelines Section 15126.6[f][3]). The analysis should focus on alternatives that are feasible (i.e., that may be accomplished in a successful manner within a reasonable period of time) and that take economic, environmental, social, and technological factors into account. Alternatives that are remote or speculative need not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project as proposed.

As described in Chapter I, Introduction and Background, CEQA requires that the baseline for determining the significance of environmental impacts is normally the existing physical conditions at the time the environmental review is initiated (State CEQA Guidelines Section 15125[a]). Therefore, the significance determinations reflected in the FED are based on changes from existing physical conditions, in keeping with CEQA requirements. It is important to note, however, that much of this environmental impact is expected to occur without the implementation of the RES. A substantial portion of the environmental effects of additional future renewable energy generation capacity and transmission facilities is in response to the existing 20 percent RPS, or the no-project alternative. Implementation of the RES only leads to the increment of contribution intended to extend the proportion of renewable energy from 20 percent to 33 percent.

A. NO PROJECT ALTERNATIVE, 20 PERCENT RPS

The State CEQA Guidelines (Section 15126.6[e]) require that, among other alternatives, a "no-project" alternative be evaluated in comparison to the project and that it "discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with the available infrastructure and community services."

The information and analysis herein satisfies these requirements. Existing conditions are described for each technical issue area in Chapter III, Impact Assessment. While useful as one type of baseline from which to assess environmental impacts, existing conditions, or status quo is not considered a reasonable "no-project" alternative with regard to the proposed adoption of the Renewable Electricity Standard. As described in Chapter II, Project Description, the proposed RES is intended to be patterned after the existing Renewable Portfolio Standard (RPS), currently administered by the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC), which calls for the achievement of 20 percent of total electricity sales from eligible energy resources. Because the RPS requires electric corporations to increase procurement from eligible energy resources with the goal of achieving 20 percent of the total from those sources, the RES is essentially an extension of that program that sets a higher renewable electricity goal and applies to all load-serving entities. Without adoption of the 33 percent RES, additional renewable resources would continue to be developed to satisfy the RPS; California would continue in any case to move toward a greater reliance on renewable electricity.

Under the no-project alternative, ARB would not adopt the proposed RES, and the existing RPS would remain in effect. For purposes of analysis, therefore, ARB developed 20 percent scenarios, also referred to as the "reference scenarios," to serve as a benchmark for comparison between the 20 percent RPS and 33 percent RES programs in 2020. These scenarios incorporate use of the CEC's 2009 Integrated Energy Policy Report (IEPR) forecast and represent California's likely renewable energy mix in 2020 based on current state law and existing RPS contracts. As such, these scenarios provide the most relevant benchmark against which to measure incremental cost and environmental implications of increasing renewable resources to a 33 percent target.

The no project alternative would result in additional renewable energy generation of approximately 25,000 GWh under the low load scenario and approximately 30,000 GWh under the high load scenario in 2020, primarily in wind, geothermal, and solar resources. Under the low load scenario, nearly 12,000 GWh would be generated distributed resources, and nearly 3,000 GWh would come from new wind and solar energy from the Tehachapi CREZ. The high load scenario would result in the same nearly 12,000 GWh from distributed resources, and over 8,500 GWh from new wind and solar energy from the Tehachapi CREZ. Approximately 30 to 40 percent of the new renewable energy would come from outside the State under the high and low load scenarios, respectively. The no project alternative would also require approximately 230 miles of new transmission lines, primarily from the Imperial North and Tehachapi CREZ areas to points of delivery.

Environmental impacts of the no-project alternative are identified and assessed for each technical issue area in Chapter III, Impact Assessment. In summary, the no-project alternative would result in impacts from development of additional wind and solar resources and transmission lines, including potentially significant adverse impacts to: scenic resources, biological resources, cultural resources, soils, water resources, land use, noise, and recreation.

B. INCREMENTAL IN-STATE GENERATION

The In-State Generation alternative considers a scenario in which the incremental difference in energy between the 20 percent RPS program and the proposed 33 percent RES would come from resources within California; no out-state resources would be used. Therefore, these scenarios (Incremental In-State high and low load) represent the use of up to 20 percent in-state and out-of-state bundled resources with an energy delivery requirement, and 13 percent renewable resources from within California.

Tables II-7 and II-8 in Chapter II, Project Description, illustrate comparative data for 2008 (existing conditions for purposes of analysis), RPS, proposed RES and the incremental in-state generation alternative RES under low and high load conditions, respectively. Tables II-9 and II-10, also in Chapter II, Project Description, illustrate electricity generation by resource type, by CREZ, for the In-State Generation alternative, low and high load scenarios, respectively.

In summary, the Incremental in-State alternative would be substantially similar to the proposed RES and would result in substantially similar impacts. Based on modeling by the RES Calculator, this alternative would result in a 10 percent increase in solar thermal generation and an approximately 8 percent increase in solar photovoltaic generation under the low load scenario, and a 5 percent increase in wind, a 4 percent increase in solar thermal, and a 3 percent increase in solar photovoltaic. The Incremental In-State alternative high load scenario would also require approximately 790 gigawatt hours (GWh) of new wind energy from the Palm Springs CREZ. Therefore, the Incremental In-State alternative would result in an increase in impacts to areas that support solar and wind, primarily the southeast desert areas. The alternative would consume additional desert lands, resulting in slightly greater direct and indirect impacts to desert species and habitat, scenic qualities, and other desert areas and resources (e.g. recreation areas, communities). Air quality impacts would be similar to the proposed RES, but additional in-state renewable development would result in lower criteria air pollutant emissions. Potential impacts to other environmental resource areas (cultural resources, soils, water resources, land use, noise, and recreation) may also increase proportionately, As with the proposed RES, mitigation for significant and potentially significant impacts would be implemented on a project-specific basis and would likely include the same or similar measures recommended in the environmental analysis for the RES.

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V. CUMULATIVE IMPACTS

A cumulative impact is one that results from the combined effects of projects and activities. CEQA requires a discussion of those cumulative impacts to which the project would contribute, and whether that contribution would be considerable in the context of past, present, and reasonably foreseeable future projects.

Recognizing the programmatic nature of the FED, cumulative impacts for resource topics are disclosed in general qualitative terms as they pertain to reasonably foreseeable development. The State CEQA Guidelines require that cumulative impacts be addressed when the cumulative impacts are expected to be significant and when the project's incremental contribution to the effect is cumulatively considerable (State CEQA Guidelines Section 15130[a]). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant, but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

Cumulative impacts are impacts on the environment that result from the incremental impacts of a proposed project when added to other past, present, and reasonably foreseeable future actions (State CEQA Guidelines Section 15355[b]). Such impacts can result from individually minor but collectively significant actions taking place over time. CEQA Guidelines Section 15130 states that the discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone. The level of detail in this section has been guided by what is practical and reasonable.

Because of the statewide reach of the RES, the WECC-wide area of potential environmental effect, and the longer-term future horizon of the achievement of the 33 percent proportion of renewable energy, the impact analysis is inherently cumulative in nature, rather than site or project specific. As a result, the character of the impact conclusions in the resource-oriented sections of Chapter III, Impact Assessment, are cumulative, considering the potential effects of the full range of reasonably foreseeable methods of compliance, along with expected background growth in California and the western U. S., as appropriate.

A summary of the cumulative impact conclusions for each resource topic is provided below.

A. AESTHETICS

A significant cumulative aesthetic impact would depend on the degree to which: 1) the viewshed is altered; 2) the view of a scenic resource is impaired; or 3) visual quality is diminished. In the Western U. S., there are many past projects and activities that have already modified the rural landscape and changed the naturally evolving scenic character. Some of these past activities have adversely affected natural-appearing landscape character and visual quality. The construction of additional renewable energy facilities would further increase the industrial character of some parts of the State where the landscape still possesses a strong sense of rural, open space character. This change from an open space landscape to a more industrial character is considered a significant cumulative impact to which the project's contribution would be considerable.

B. AIR QUALITY

Impacts associated with the 33 percent RES would combine on a cumulative basis with other cumulative renewable energy development and other urban development that occurs throughout the State and in out-of-state areas. As described in Section M, Air Quality, all State and out-of-state renewable energy projects and other cumulative development projects would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review and through this process, air quality levels and associated exposure of sensitive receptors would be calculated and resulting impacts would be determined. With respect to long-term operational criteria air pollutants, implementation of the new renewable energy projects would result in a less-than-significant impact due to the fact that renewable generation produces less pollutants per unit of electrical output than fossil-fuel generation it would displace and in comparison to existing conditions less total electricity would be generated in and out-of-state under the 33 percent RES. However, depending upon their location, size, and character, development of renewable energy projects necessary for compliance with the 33 percent RES regulation could generate short-term construction-related emissions that conflict with applicable air quality plans, or violate or contribute substantially to an existing or projected violation. Additionally, implementation could also result in the exposure of sensitive receptors to substantial pollutant concentrations. Implementation of Mitigation B-1 and B-2 would reduce these impacts to a less-than-significant level. Thus, all potentially significant air quality impacts associated with the implementation of the 33 percent RES would be reduced to a less-than-significant level with mitigation and would not result in a considerable contribution to a cumulative air quality impact.

C. BIOLOGICAL AND FOREST RESOURCES

The future development of renewable energy projects under the proposed regulation change could result in the following potentially significant impacts: (1) loss of special-status plants and animals due to construction, operation, and maintenance of energy generating structures and transmission lines; (2) placement of fill material into waters of the United States, including wetlands, or removal of riparian or other habitats considered sensitive by resource agencies; (3) loss, degradation, or fragmentation of common habitats. Large areas of native habitat could be substantially reduced or fragmented on a regional scale due to renewable energy development; (4) interfere with wildlife movement or impede the migration of fish populations. These projects could reduce the ability of terrestrial wildlife populations to move unimpeded through an area. In addition, impacts to aquatic habitat, such as diversion of stream flows, could impede movement of native fishes and aquatic wildlife; (5) conflict with adopted HCPs, NCCPs, other conservation plans or other policies to protect natural resources; and (6) loss or conversion of forest lands. The continued development of undeveloped lands within the CREZs would result in incremental decline in the number and diversity of plant and animal species, including sensitive species. Mitigation C-1 through C-6 of this FED address these impacts and applies to both the 20 percent RPS and 33 RES. The Desert Renewable Energy Conservation plan currently in development would protect covered species sufficiently to maintain their continued existence and contribute to their recovery. Also, the DRECP would sustain biodiversity by the protection of covered habitats. In addition, state and/or Federal laws and regulations protect threatened and endangered species, wetlands, and streambeds, so individual project impacts would require mitigation that would reduce their contribution to cumulative biological impacts. The DRECP and state and Federal requirements would reduce cumulative impacts on covered species, covered sensitive habitats, wetlands, and streambeds to less than significant levels.

D. CULTURAL RESOURCES IMPACTS

For cultural resources, the geographic extent of cumulative impacts encompasses a broad area because the significance or importance of any individual resource can only be judged in terms of its regional context and relationship to other resources. In the absence of knowing the locations where renewable energy projects would be developed, the significance of impacts on any given resource or group of resources must be examined in light of the integrity of the regional resource base. Because the number of cultural resources is finite, limited, and non-renewable in any given setting, any assessment of cumulative impacts must take into consideration the impacts of the proposed project on resources within its Area of Potential Effect; the extent to which those impacts degrade the integrity of the regional resource base; and impacts other projects may have on the regional resource base. If these effects, taken together, result in a collective degradation of the resources base, then those impacts would be considered cumulatively considerable.

For any renewable energy project, the regional resource base is defined geographically, ethnographically, and with reference to the specific relevant administrative and management units. The geographic scope of the cumulative impact analysis must take in a broad region encompassing the various physiographical zone encompassed by the project area of potential impact. The analysis also takes into consideration the cultural geography of the native people who occupied the region prehistorically, considering the integrity of the entire suite of resources that make up the cultural patrimony of these groups. Finally, the cumulative impact analysis takes into account the resource base under the direct management and care of the land managing agency(ies) involved within the project.

Because new construction has the potential to diminish the integrity of properties eligible for inclusion in the NRHP or the CRHR, preparation of regional cultural resources overviews and research designs, interpretation of cultural resources in regional perspective, and expanded public interpretation of resources will lessen the cumulative degradation of the regional resource base due to the development of large, land-consuming projects such as the development of solar projects and wind farms. Such mitigations have been completed and would be required for any present or reasonably foreseeable projects; therefore, once data is synthesized or otherwise made available, the proposed project would have a less-than-significant cumulative impact on cultural resources.

E. GEOLOGY, SOILS, AND MINERAL RESOURCES

Cumulative impacts result when the effects of an action are added to or interact with other effects in a particular place and within a particular time; that is, it is the combination of these effects, and any resulting environmental degradation. Cumulative impacts take into account all disturbances that result in the compounding of the effects of all actions over time. Thus the cumulative impacts of an action can be viewed as the total effects on a resource of that action and all other activities affecting that resource.

While any one project may not create a significant impact to the geology, soils, and mineral resources, the combination of the new renewable energy project(s) with all existing or planned projects in an area may create significant impacts. A significant cumulative impact would depend on the use of existing geologic and mineral resources, how the use of these resources impairs future access, and how quality of these resources is diminished.

Within the identified CREZs, there are many past projects and activities that have already modified the landscape and reduced access to geologic formations and potential mineral resource deposits. . The construction of additional renewable energy facilities will further reduce the availability and/or access to geological and mineral resources, expose people and structures to potential geologic hazards, increase the impact caused by erosion, and increase the impact to the natural geological formations caused by the construction of renewable energy facility structures. These are considered potentially significant cumulative impacts and the project's contribution to these impacts would be cumulatively considerable. While mitigation is recommended to reduce significant geology, soils, and mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, these impacts would remain significant and unavoidable.

F. GREENHOUSE GAS EMISSIONS

Please refer to Chapter IX of the RES Staff Report for a discussion of GHG impacts.

G. HAZARDS AND HAZARDOUS MATERIALS

Construction and operation of renewable energy facilities will require proper design and planning to ensure the proper handling of any hazardous materials/wastes that are generated. While individual projects may have impacts related to the handling of hazardous materials or waste, these effects do not combine to create an overall cumulative impact issue. Also, implementation of Mitigation G-1 would reduce the significance of impacts to a less than significant level. This is a less-than-significant cumulative impact and the project's contribution would be less than considerable.

H. HYDROLOGY, WATER QUALITY, AND SUPPLY

1. OPERATIONS-RELATED EFFECTS TO GROUNDWATER HYDROLOGY AND WATER SUPPLY

Communities exist throughout the western states where water supplies are inadequate for the demand and must be shared and conserved in an equitable manner, particularly during drought conditions (DOE and BLM 2008). Renewable energy facilities that generate energy with steam turbines may use large quantities of water for steam generation and cooling, and large solar facilities may use considerable amounts of water for periodic solar panel/mirror cleaning or onsite dust control operations. Long-term operations-related water use at renewable energy facilities could cause or contribute to groundwater pumping exceeding the natural rate of recharge to an aquifer. Excessive groundwater withdrawals could result in localize effects including reduced groundwater levels, lower well yields, need to construct deeper wells, or reduced quality of pumped groundwater if wells need to be constructed into deeper aquifers with poorer quality characteristics. Additionally, water use could contribute to overdrafting of aquifers, which tends to be associated with the combined regional water use of multiple municipal and agricultural properties overlying an aquifer.

The impact to local groundwater resources under the 33 percent RES is considered to be potentially significant based on the potential for substantial water use at individual renewable energy facilities to adversely affect local adjacent landowner wells. Moreover, due to the uncertainty regarding availability and technical feasibility of mitigation measures, the impact may remain unavoidable under certain situations. Therefore, because operations-related water use could cause substantial localized adverse effects to groundwater resources, or contribute to regional conditions where water supplies are inadequate for the demands, implementation under the 33 percent RES could result in a cumulatively considerable contribution to a significant impact. Implementation of Mitigation Measure H-1 would reduce, and may result in avoidance of, the RES-related contribution to the impact.

2. CONSTRUCTION- AND OPERATIONS-RELATED EFFECTS TO STORMWATER DRAINAGE AND FLOODING HAZARDS

Potentially significant cumulative flooding conditions tend to exist in and around towns and cities where there is a concentration of inhabitants that may be exposed to the potential adverse effects of property damage or risk to life. Flooding conditions along streams and rivers that are of such magnitude to expose communities to these risks are, by definition, infrequent and generally associated with watershed-scale geographic features and hydrology associated with large precipitation or snowmelt events. Therefore, in general, regional flooding conditions along stream channels may occur with or without changes in land use or management activities. Moreover, the exposure of communities to flooding risks is typically a function of historic development occurring within the floodplain prior to the development of modern hydrologic assessment and modeling techniques and land-use planning regulations.

Construction and operation of renewable energy facilities under the 33 percent RES may contribute to localized drainage effects and flood flows along stream channels, through creation of additional impervious surfaces or grading that changes the distribution of drainage flows to offsite channels. Dispersed renewable energy facilities also are anticipated to generally be constructed in rural areas where existing floodplains have not been assessed. Consequently, project proponents and land-use regulatory authorities may proceed with projects accepting that they may be constructed in areas with some potential for exposure to flooding or inundation. However, the localized drainage effects of RES project implementation are not anticipated to result in creation of new watershed-scale flooding conditions. Moreover, implementation of Mitigation Measure H-2 would be expected to fully avoid or minimize the potential localized adverse effects to drainage and flooding exposure. Therefore, implementation of the 33 percent RES would not be expected to result in a considerable contribution to cumulatively significant drainage or flooding conditions.

3. CONSTRUCTION- AND OPERATIONS-RELATED WATER QUALITY EFFECTS

Based on the large number of surface water bodies identified on the Section 303(d) lists for the western states as currently being impaired by one or more constituents, it is reasonable to assume that future renewable energy facilities may be developed in watersheds that have adverse water quality conditions in some water bodies. Moreover, groundwater quality conditions in many arid or desert regions may be marginal as a result of high natural salinity levels. Construction and operation of renewable energy facilities under the 33 percent RES may result in waste discharges that could contribute to these localized water quality problems.

By definition, temporary construction activities and related potential for soil erosion or contaminant discharges (e.g., suspended sediment, oil, grease, concrete, or other toxic construction materials) would be short-term and generally localized to the construction site, and would not be likely to contribute substantially to any existing long-term water quality problems. Moreover, as required by Mitigation Measure H-3 and pursuant to the statewide NPDES stormwater permit for general construction (Order 2009-0009-DWQ) and local applicable grading and erosion control regulations, BMPs would be implemented during construction of renewable energy facilities to fully mitigate any construction-related water quality effects to less-than-significant levels. With respect to long-term RES facility operations, the potential contaminant discharges are relatively limited to site activities such as stormwater runoff at industrial sites (e.g., oil, grease), domestic wastewater, or potential discharges of cooling water from renewable energy facilities that use steam power. Based on the small workforce required for long-term operations of renewable energy facilities, and widely dispersed location of facilities across the western states, implementation of standard domestic wastewater management (e.g., onsite wastewater treatment) consistent with local regulations would be expected to result in minimal and localized water quality effects. Implementation of

Mitigation Measure H-4 would require renewable energy facilities to be designed and constructed with stormwater BMPs, pursuant to the statewide NPDES stormwater permit for general industrial activity (Order 97-003-DWQ), to fully mitigate stormwater discharges. Additionally, Mitigation Measure H-4 would require cooling discharges to be designed to avoid adverse effects to receiving water bodies and permitted through an individual NPDES permit, consistent with state policies and procedures. Therefore, the fully mitigated effects of RES facility construction and operations to past, present, and reasonably foreseeable future water quality conditions, would not result in a considerable contribution to any significant cumulative water quality condition.

I. LAND USE, PLANNING, AND AGRICULTURE

Information about the likely locations and types of future development is unknown; as such, this section addresses cumulative effects in general terms. Cumulative impacts to the areas developed for renewable energy would combine to result in adverse effects on agricultural lands and, where inconsistent with existing or planned uses, land use planning. The conversion of these lands would preclude numerous existing and potential land uses, including agriculture, recreation, wilderness, rangeland, open space, residential and commercial development. Because ARB does not have approval authority over future renewable energy development, it cannot guarantee that mitigation measures potentially available to reduce these impacts would be implemented. Therefore, for purposes of this analysis, these impacts would remain potentially significant and unavoidable and the project would have a substantial contribution to significant cumulative impacts on land use, planning, and agriculture.

J. NOISE

Impacts associated with the 33 percent RES would combine on a cumulative basis with other cumulative renewable energy development and other urban development that occurs throughout the State and in out-of-state areas. As described in Section J, Noise, of this FED, all renewable energy projects and other cumulative development projects would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review and through this process, noise (and vibration) levels and associated exposure of sensitive receptors would be calculated and resulting impacts would be determined. While the 33 percent RES could result in potentially significant and unavoidable impacts related to the noise (and vibration), mitigation has been recommended to reduce these impacts where feasible. Similarly, other cumulative projects would be required to implement similar mitigation to reduce their significant impacts. While mitigation for the project is recommended to reduce significant impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be significant and unavoidable for all renewable energy types under the 33 percent RES (high and low load conditions) and would have a substantial contribution to a potentially significant and unavoidable cumulative impact.

K. RECREATION

Cumulatively, other land uses are competing for space in the rural open lands of the Western U. S. with recreation uses. A large number of renewable energy facilities have been proposed or built and the number is projected to increase with implementation of the RES. In addition, transmission lines, military bases, and sensitive habitat protection areas have further reduced land availability for outdoor recreation. The addition of renewable energy generation and transmission capacity as a result of compliance with the RES would contribute more pressure for conversion of open land with recreation resource quality, opportunities, or uses. Considering the magnitude of the need for additional renewable energy, cumulative conversion of recreation land or displacement of recreation use would be an expected, cumulative impact issue. The contribution to the cumulative conversion of open public and private land with recreation opportunities and uses by the construction of renewable energy and generation would be considerable. The cumulative recreation impact of the RES would, therefore be significant and unavoidable.

L. PUBLIC SERVICES, UTILITIES, AND SOLID WASTE IMPACTS

Impacts associated with the 33 percent RES would combine on a cumulative basis with other cumulative renewable energy development and other urban development that occurs throughout the State and in out-of-state areas. All renewable energy projects and other cumulative development projects would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review and through this process, utility and public service demands would be calculated, agencies would provide input on available capacity and service, and resulting impacts would be determined. New facilities under the proposed project would be provided solid waste from an appropriately certified local provider that would haul the solid waste to an approved and permitted disposal facility. Therefore, the project would result in a less-than-significant impact related to exceeding wastewater treatment requirements and violation of solid waste regulations and would make a less-than-significant cumulative contribution to solid waste impacts.

Because the specific public services and utilities impacts (i.e., law enforcement, fire response, emergency response, water supply, wastewater services, and solid waste) of the 33 percent RES cannot be identified with any certainty, and these projects could result in potentially significant environmental impacts for which it is unknown whether Mitigation L-1 and L-2 of the FED would be available to reduce the impact to a less-than-significant level, these impacts are considered significant and unavoidable for purposes of this analysis and would have a substantial contribution to a potentially significant and unavoidable cumulative impact.

M. TRANSPORTATION

Although the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known at this time, project construction and operational activities could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); result in a change in air traffic patterns; substantially increase hazards due to a design feature; or result in inadequate emergency access.

Impacts associated with the 33 percent RES would combine on a cumulative basis with other cumulative renewable energy development and other urban development that occurs throughout the State and in out-of-state areas. As described in Section M, Transportation and Traffic, all renewable energy projects and other cumulative development projects would be required to seek local land use approvals prior to their implementation. Part of the land use entitlement process requires that each of these projects undergo environmental review and through this process, transportation and traffic impacts would be determined. While the 33 percent RES could result in potentially significant and unavoidable impacts related to the transportation and traffic, mitigation has been recommended to reduce these impacts where feasible. Similarly, other cumulative projects would be required to implement similar mitigation to reduce their significant impacts. However, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, the 33 percent RES would result in potentially significant and unavoidable transportation and traffic impacts and would have a substantial contribution to a potentially significant and unavoidable cumulative impact.

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VI. DISCUSSION OF IMPACTED COMMUNITIES

The following section discusses the potential impact of the proposed 33 percent RES on existing natural gas electrical generation located within or near disadvantaged communities. This analysis is incorporated wholly from Chapter IX of the RES Staff Report.

A. IMPACTED AREAS

The following section discusses the potential impact of the proposed RES on existing natural gas electrical generation located within or near highly impacted communities. ARB staff used the criteria developed for ARB's Carl Moyer (Moyer) program to identify highly impacted communities. Based on the location of these highly impacted communities, staff worked with air districts to identify facilities generating electricity that are either located within or near these impacted communities.

AB 1390 established environmental justice requirements for the Moyer program. This law required air districts with a population of more than one million inhabitants to allocate at least 50 percent of their Moyer funding for the benefit of low-income communities and communities that are disproportionately affected by air pollution. Air districts affected by the legislation identified these areas within their jurisdictions. ARB staff used these designations developed for the Moyer program for the Bay Area Air Quality Management District (BAAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), San Diego Air Pollution Control District (SDAPCD), and South Coast Air Quality Management District (SCAQMD) to identify the impacted communities. Additionally, the areas identified pursuant to the Moyer program are consistent with the areas identified in the Proposed Screening Method for Low-Income Communities Highly Impacted by Air Pollution for AB 32 assessments.

While specific areas of impacted communities have not been identified for out-of-state areas because specific locations (other than by state) have not been identified for out-of-state renewable energy facilities, the analysis that follows provides a reasonable assessment of the type and magnitude of impacts that would occur should out-of-state renewable energy facilities be located in or adjacent to an identified impacted community.

1. EXISTING NATURAL GAS GENERATION

(a). INTRODUCTION

The addition of renewable generation to satisfy the 33 percent requirement would reduce the overall operation of California's natural gas fleet. This fleet is generally composed of boilers, closed-circuit cooling towers (CCCTs), and cooling towers (CTs). Additionally, the natural gas generation fleet includes some cogeneration facilities and engine-based facilities. Cogeneration facilities are typically operated to satisfy the electricity or heat requirements for a host facility and do not provide electricity to the grid. Hence, the proposed RES is not expected to significantly affect the operation of cogeneration facilities. Finally, there are only a few engine-based generation facilities. Because of the small number of these types of generators, staff will not further discuss the impact of the proposed RES on this category.

The boilers are the oldest combustion based generation in the State. Their operation has largely been displaced by more efficient CCCTs and CTs. However, these boilers still operate a significant amount of time during the summer, primarily due to operational limitations[1] and local reliability requirements. Consequently, the overall capacity factor[2] for boilers is low—in 2008, the capacity factor for these boilers was 15 percent.

CTs are mainly operated to provide peak generation. As discussed below, these units typically operate a few hundred hours to a thousand hours a year, primarily in the summer months.

CCCTs provide the majority of the load-following generation. Consequently, these units operate throughout the year and have a capacity factor between 50 and 60 percent. The generation from renewable generation would largely displace generation provided today by CCCTs.

(b). Impact of RES on Existing Natural Gas Generating Fleet

The renewable generation that would result from the implementation of the proposed RES would largely displace generation used for load-following. As indicated above, the increased renewable generation is likely to replace generation provided by CCCTs. Consequently, while the overall generation from CCCTs would be reduced by renewable generation, the reduced production would not necessarily result in many CCCTs shutting down. Instead, most existing CCCTs are likely to operate at a lower capacity factor. It is unclear how much of the renewable generation would displace generation from the existing fleet or delay the construction of new CCCTs. CAISO, as part of their 33 percent integration study, is evaluating the impact of integrating renewable generation on the existing generation fleet. As part of this research, CAISO would also examine the need for additional generation for the 20 percent RPS and the proposed RES. As indicated earlier, this study is not expected to be completed until the end of 2010.

(c). Backing-up Wind and Solar Generation

Wind and solar generation are considered variable generation. Both wind and solar generation are affected by the availability of the resource and changing weather conditions. This generation must be firmed and shaped so that it can be incorporated into the grid. Firming and shaping refer to using additional power to make the variable generation constant and packaging the variable generation so that it can be imported into the transmission system.

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[1] Boilers need a significant amount of time for start up and shutdown. Consequently, many units operate throughout the summer—operating at minimum generation during the overnight hours and increasing operation during the day.

[2] Capacity factor is defined as the actual hours operated divided by 8,760 hours, the number of hours in a year.

For wind and solar generation occurring out-of-state and being delivered to California, the shaping and firming occurs outside of California and the associated emissions would occur outside California. If the energy comes from the Pacific Northwest, hydroelectric generation is typically used for shaping and firming. In this case, there are no additional emissions associated with the generation. Wind and solar generation occurring within the State would be shaped and firmed with available local generation, which would be mainly be CCCTs and CTs. Therefore, in-state emissions from backing-up variable generation would be from the State's fleet of CCCTs and CTs.

To the extent that wind and solar do not providing the expected generation, CCCTs and to a lesser extent CTs, would need to increase generation to replace the missing generation from wind and solar. Consequently, during these instances, the benefit attributed to wind and solar generation would not be fully realized. These emissions would not be considered emissions that are the result of implementing the RES, but are emission reductions that are not realized because of the variable generation of wind and solar resources.

As discussed in Chapter V, there are periods when wind and solar generation experience sharp increases and decreases in generation. In these situations, CTs and occasionally hydroelectric generation will be needed to balance the generation with load. This would be needed at sunrise and sunset when both wind and solar generation generally experience sharp increased and decreases, respectively. The operation of the CTs in this manner is directly attributable to the additional variable renewable generation being added to the grid. The emission increases attributed to the operation of the CTs in this manner would be allocated to the RPS program and to the proposed RES program. The next section discusses the current operation of various natural gas generation resources located within or near highly impacted communities.

(d). EXISTING CCCTS AND CTS

Staff evaluated potential air impacts from additional natural gas generation that may be needed to shape and firm new generation from variable renewable energy resources such as wind and solar. Staff evaluated existing natural gas-fueled facilities located within or near highly impacted communities within the jurisdiction of the BAAQMD, SJVAPCD, and SCAQMD. The types of facilities evaluated include CCCTs, CTs, cogeneration, and engine peaking facilities. Overall, staff evaluated 28 facilities within these three air districts—three facilities located in BAAQMD, 15 facilities located in SJVAPCD, and 10 facilities located in SCAQMD. Specific information for each facility is listed in Appendix D of the RES Staff Report. Table VI-1 summarizes the information for the 28 facilities evaluated.

Table VI-1. Operating Data for Natural Gas Generation Located Within BAAQMD, SJVAPCD, and SCAQMD

	CCCT	CT	Cogeneration	Engine
Total Units at the 28 Facilities	14	37	4	1
Range of Capacity Factor (%)	4 - 74	0 – 61	2 - 95	NA
Average Capacity Factor (%)	31	13	39	50

The capacity factors shown above are based on operating information for 2008, the most recent information available for all three air districts. CCCT, CT, and cogeneration facilities all exhibit a wide range of capacity factors for 2008. (Because there is only one example of an engine peaking plant, staff did not include a discussion of this facility) Because CCCTs provide load-following generation and cogeneration facilities provide baseload generation, both CCCTs and cogeneration facilities are expected to operate more than CTs. For the facilities being reviewed, the CCCTs and cogeneration facilities are operating between two to three times more than the CTs.

The average capacity factor for CTs is particularly low, with 22 of the 37 CTs, or 60 percent of the CTs reviewed, operating at a capacity factor that is less than the average capacity factor for CTs. The average capacity factor for CTs represents an average of 600 hours of operation per year. These values are consistent with the CTs being used to provide power for a few hours a day during the peak summer season. Because these units are subject to air district permitting requirements, many of the units have operational restrictions that typically limit operation to 50 percent of capacity. For example, a facility can operate 8,760 hours annually, but the permit may restrict the facility to 4,500 hours of operation annually. A facility that operates 450 hours in 2008 would have a permitted capacity of ten percent.

In addition to operational limits, nearly all units evaluated were required to install best available control technology to reduce NO_x, VOC, and CO emissions. Nearly all generation facilities were required to achieve a NO_x emission limit of 2.5 to 3 ppmv at 15 percent O_2—a level requiring NOx reduction of 95 percent or more. The few CTs that were allowed to satisfy less stringent standards are subject to limited hours of operation on an annual basis. The applicable air district permits limit these units to 400 hours per year. Before these units can operate more hours, the operators would need to satisfy more stringent NO_x limits. Consequently, the criteria pollutant emissions from the natural gas-fueled generating fleet are well controlled.

Staff also reviewed available operational information for these units for 2007 to evaluate the variability in their operation from year to year. Table VI-2 compares the hours of operation in 2008 to 2007, by each major category, and shows the variable nature of these types of generation (e.g., the operation varies regionally and year to year). For example, the table shows that CTs in the BAAQMD operated 50 percent less in 2008 than they operated in 2007—in other words, the CTs operated more in 2007 than in

2008. This variation would depend upon the amount of hydroelectric generation available and the amount of air conditioning needed during a hot summer day (i.e., a hotter than usual summer would mean a higher load demand and more operation of CTs).

Table VI-2. 2008 Facility Operation Versus 2007 Facility Operation

Type of Generation	Percent Change in Electrical Generation in 2008 Versus 2007			Overall for Projects Reviewed
	BAAQMD	SCAQMD	SJVAPCD	
CT	-50 percent	+30 percent	-2 percent	+11 percent
CCCT		+50 percent	-3 percent	+25 percent
Cogeneration			+5 percent	
Engine			+70 percent	

While CT operation was generally higher overall in 2008 than in 2007 for the facilities reviewed, about half of the individual facilities operated more in 2007 than in 2008. Additionally, on a regional basis, from 2007 to 2008, CT operation increased significantly for CTs located within SCAQMD, but CTs located in SJVAPCD operated at similar levels for both years. This illustrates the difficulty in forecasting the amount of generation a specific facility may provide in a given year.

The CCCTs located in SCAQMD operated 50 percent more in 2008 than in 2007. This shows that CCCTs are not immune to significant changes in operation from year to year.

(e). SUMMARY

The proposed RES would add a significant amount of variable renewable generation to the grid whose availability would be based on daily and seasonal fluctuations in sunlight or wind patterns. The electricity from all renewable generation, including the variable generation, would largely displace generation used in load-following applications. In California, CCCTs are the main units used for load-following applications. Consequently, it is anticipated that there would be a reduction in emissions at many of the CCCTs, including some CCCTs located at or near highly impacted communities.

The variable renewable generation would need to be backed-up. The backup is needed when the renewable generation is not providing the expected generation or when there is a sharp increase or decrease in generation. In the case where not enough generation is being provided by the variable generation, the CCCT may need to operate at a higher level for a short duration. Because the renewable generation has already reduced the operation of the CCCT, the increased operation to provide backup generation would result in less electricity being displaced on average. In no case would the increased operation to makeup the shortfall in generation from the variable resource result in the CCCT operating at the same level prior to the influx of renewable generation. This increased operation would reduce the benefit that can be derived from variable resources.

Conversely, if the proposed RES is enacted, CTs would likely be needed to compensate for these potential sharp changes in generation. A portion of these potential emission increases would be attributed to the proposed RES.

For the existing fleet of CTs, the potential increases in operation would be allowed by air district permits. Staff expects the overall increase in operation for this function to be modest. Additionally, because the fleet of CTs within California is both large in number and spread throughout the State, staff anticipates that the operational increases and associated increases in air emissions would be a small amount for any one facility.

As discussed above, CAISO is evaluating the need for additional resources to support the integration of 33 percent renewables. At this time, it’s unclear if additional CTs would be necessary to fully integrate the variable renewable generation resulting from the proposed RES.

ARB staff used the criteria developed for ARB’s Carl Moyer (Moyer) program to identify disadvantaged communities. Based on the location of these disadvantaged communities, staff worked with local air districts to identify facilities generating electricity that are either located within or near these impacted communities.

Assembly Bill (AB) 1390 established environmental justice requirements for the Moyer program. This legislation required air districts with a population of more than one million inhabitants to allocate at least 50 percent of their Moyer funding for the benefit of low-income communities and communities that are disproportionately affected by air pollution. Districts affected by the legislation identified these areas within their jurisdictions. ARB staff used these designations developed for the Moyer program for the Bay Area Air Quality Management District (BAAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), San Diego Air Pollution Control District (SDAPCD), and South Coast Air Quality Management District (SCAQMD) to identify the impacted communities. Additionally, the areas identified pursuant to the Moyer program are consistent with the areas identified in the Proposed Screening Method for Low-Income Communities Disadvantaged by Air Pollution for AB 32 assessments.

B. EXISTING NATURAL GAS GENERATION

2. UTILITY BOILERS

There are 25 facilities in California employing natural gas-fueled utility boilers to generate electricity. Seventeen of these facilities, representing about 16,000 MW of generation, are at coastal locations. These coastal units largely use a once through cooling (OTC) process. OTC refers to the practice of taking water directly from the ocean or estuary to cool the utility boiler and then returning the resulting warmer water to the ocean or estuary. The practice adversely affects the habitat near the OTC generators. The OTC generators represent one of the oldest combustion-based generation technologies in California in that these units initially came into service between 1952 and 1978. The State Water Resources Control Board (SWRCB) recently approved a Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, which would affect the 17 facilities using utility boilers at coastal locations. Four of these facilities are located within or are near disadvantaged communities: El Segundo, Harbor, Scattergood, and South Bay. To satisfy the SWRCB policy, operators of these facilities would need to do one of the following: modify the cooling intake system and operation to comply with the requirement, switch to a dry cooling or wet cooling system, repower the utility boiler with a closed circuit cooling tower (CCCT) using a dry cooling or wet cooling system, or simple cycle cooling tower (CT), or shutdown the utility boiler. These facilities will be referred to as OTC facilities for the remainder of this section.

Today, both new CCCTs and CTs are more efficient to operate than utility boilers. Consequently, the capacity factor (the hours of actual operation divided by total hours in a year or 8,760 hours) for utility boilers has declined 20 percent since 2002, as their generation has been replaced by the generation from new CCCTs and CTs.

Currently, boiler based generation occurs only in the summer time when the State's energy needs are the greatest. As a group, the OTC facilities have low operating capacities—the average capacity factor for all 52 units in 2008 was 15 percent. When these units are in operation, because of operational constraints, they would stay in operation 24 hours a day—operating at higher levels in the day and at minimum levels during the overnight hours. The average number of hours associated with this capacity factor is 2,800 hours or about four months annually.

Due to the age of the OTC facilities, staff expects many of these facilities to be shutdown in the next few years. However, due to a lack of sufficient transmission, some of these OTC facilities are located in areas that require sufficient local generation, and thus, would need to be repowered.

Table VI-3 presents the annual NO_x emissions for a utility boiler, CCCT, and CT. The emission estimates are based on each generator having the same rating, 400 MW capacity, and being equipped with best available control technology to minimize NO_x emissions. As shown in the table, the NOx emission rate, on a pound per megawatt hour (lb/MWh) basis, for the CCCT and CT, is substantially lower than the utility boiler due to the higher efficiency of the CCCT and CT. Overall, CCCTs operate at higher capacity factors, from 50 to 60 percent, and emit 25 percent less NO_x than a utility boiler operating at 20 percent capacity. Additionally, if the boiler is repowered with a CT, and the CT operated the same number of hours as the boiler, the CT would emit 60 percent less NO_x than the boiler.

Table VI-3. Comparison of NO_x Emissions Between a Utility Boiler, CCCT, and CT			
	Boiler	CCCT	CT
NO_x Emissions (ppmv / lb/MWh)	2.5 / 0.2	2.5 / 0.05	2.5 / 0.08
Annual Hours of Operation	1,700	5,300	1,700
NO_x Emissions (tpy)	70	53	28

Source: ARB Staff Report Chapter IX, Environmental Impacts
ppmv = parts per million by volume; tpy = tons per year

ARB staff believes that there would be significant emissions benefits with the eventual shutdown and replacement of some of the OTC facilities. For example, if the OTC facility is shutdown and not replaced, then there are clear air quality improvements. However, because some of these facilities are located in local reliability areas (i.e., areas that need additional power generation for reliability and redundancy), some of these facilities would need to be retrofitted or repowered. Staff anticipates that in these cases, the utility boiler unit would likely be repowered with a CCCT. Because of the significantly higher efficiency of a new CCCT as compared to a utility boiler (CCCTs are 20 to 25 percent more efficient), substantial emissions benefits (at a minimum 20-25 percent reductions) are expected when a utility boiler is replaced by a CCCT.

3. EXISTING CCCTS AND CTS

In addition to evaluating the air quality impacts of SWRCB's OTC Policy on utility boilers used to generate electricity, ARB staff also evaluated air impacts from additional natural gas generation that may be needed to shape and firm new generation from variable renewable energy resources such as wind and solar. Staff evaluated existing natural gas-fueled facilities located within or near disadvantaged communities within the jurisdiction of the BAAQMD, SJVAPCD, and SCAQMD. The types of facilities evaluated included CCCTs, CTs, cogeneration, and engine peaking facilities. Overall, staff evaluated 28 facilities within these three districts—three facilities located in BAAQMD, 15 facilities located in SJVAPCD, and 10 facilities located in SCAQMD. Specific information for each facility is listed in Appendix D of the ARB Staff Report. Table VI-4 summarizes the information for the 28 facilities evaluated.

Table VI-4. Operating Data for Natural Gas Generation Located Within BAAQMD, SJVAPCD, and SCAQMD				
	CCCT	CT	Cogen	Engine
Total Units	14	38	3	1
Range of Capacity Factor (%)	2 - 74	0 – 65	2 - 95	NA
Average Capacity Factor (%)	32	11	42	50
Mean Capacity Factor (%)	36	4	28	NA

Source: ARB Staff Report Chapter IX, Environmental Impacts

The capacity factors shown above are based on operating information for 2008, the most recent information available for all three districts. Only 12 of the 56 units operated at a capacity factor greater than 40 percent. Seven of the 12 units operating at higher capacity are either CCCTs or cogeneration units.

The average capacity factor for CTs is particularly low, with 22 of the 38 CTs operating at a capacity factor of less than 11 percent. The average capacity factor for CTs represents an average of 700 hours per year. These values are consistent with the CTs being used to provide power for a few hours a day during the peak summer season. Because these units are subject to air district permitting requirements, many of the units have operational restrictions that typically limit operation to 50 percent of capacity. For example, a facility can operate 8,760 hours annually, but the permit may restrict the facility to 4,500 hours of operation annually. A facility that operates 450 hours in 2008 would have a capacity factor of ten percent.

CCCTs and cogeneration facilities are expected to operate more than a CT because the CCCT is expected to provide load-following generation and the cogeneration facility is providing baseload generation. Both CCCTs and cogeneration facilities have capacity factors much higher than CTs.

In addition to operational limits, nearly all units evaluated were required to install best available control technology to reduce NO_x, VOC, and CO emissions. Nearly all CTs were required to achieve a NO_x emission limit of 2.5 to 3 ppmv at 15 percent O_2—a level requiring NO_x reduction of 95 percent or more. Most CCCT and congeneration facilities were required to achieve 2 to 3 ppmv at 15 percent oxygen (O_2). The few CTs that were allowed to satisfy less stringent standards are subject to limited hours of operation on an annual basis. The applicable air district regulations limit these units to 400 hours per year. These units can operate more hours, but the operators of these units would need to satisfy more stringent NO_x limits.

Staff also reviewed available operational information for these units for prior years to evaluate the variability in their operation from year to year. Table VI-5 compares the hours of operation in 2008 to 2007 by each major category. In general, the information in Table VI-5 shows the variable nature for generation—the operation varies regionally and also from year to year, depending upon the amount of hydroelectric generation available and the amount of air conditioning needed (e.g., a hot summer day would mean a higher load demand on the grid).

While CT operation generally was higher overall in 2008 than in 2007 for the facilities reviewed, about half of the individual facilities operated more in 2007 than in 2008. Additionally, on a regional basis, from 2007 to 2008, CT operation increased significantly for CTs located within SCAQMD, but CTs located in SJVAPCD operated at similar levels for both years. This illustrates the difficulty in forecasting the amount of generation a specific facility may provide in a given year.

Table VI-5. 2008 Facility Operation Versus 2007 Operation				
Type of Generation	BAAQMD	SCAQMD	SJVAPCD	Overall for Projects Reviewed
CT	-50 percent	+30 percent	-2 percent	+11 percent
CCCT		+50 percent	-3 percent	+25 percent
Cogen			+5 percent	
Engine			+70 percent	

Source: ARB Staff Report Chapter IX, Environmental Impacts

The CCCTs located in SCAQMD had a 50 percent change in operation between 2007 and 2008. This shows that CCCTs are not immune to significant changes in operation from year to year.

In summary, the proposed 33 percent RES would add a significant amount of variable renewable generation to the grid. This variable generation would need to be backed up with CTs. Therefore, some CTs would experience increases in operation that are allowed by local air district permits. Because the fleet of CTs within California is both large in number and spread throughout the State, staff expects the operational increase for any one facility and associated increases in air emissions to be small.

In addition to existing natural gas generation, staff has analyzed two hypothetical scenarios to evaluate potential criteria pollutant emission impacts of the proposed 33 percent RES regulation on disadvantaged communities. In each scenario, staff estimated changes in criteria pollutant emissions. These emission changes may or may not occur, depending on the permit requirements and project costs.

C. NEW SOLID-FUEL BIOMASS FACILITY

Staff estimated criteria pollutant emissions from a new 50 megawatt (MW) solid-fuel biomass facility. This facility would generate about 425 GWh per year of renewable power. Biomass power generation is considered to be baseload generation that does not require fossil-fuel backup power. Table VI-6 summarizes the air pollution impacts from such a facility. In addition to power generation emissions, this table shows the annual diesel truck emissions from hauling feedstock to the facility. The diesel truck emissions estimates assume a 20-ton truck capacity, average fleet truck emissions in 2020, and 80 miles per round trip. Appendix D of the ARB Staff Report shows the details of this analysis.

Table VI-6. Estimated Criteria Pollutant Emissions in 2020 Solid-Fuel Biomass Facility (50 MW Capacity)					
Source	(tpy)				
	ROG	NO_x	SO_x	CO	$PM_{2.5}$
Operation Emissions (425 GWh)	3	88	22	46	80
Diesel Trucks Emissions	2	30	1	13	1
Total Emissions	**5**	**118**	**23**	**59**	**81**

Source: ARB Staff Report Chapter IX, Environmental Impacts

Depending on the pollutant, this analysis shows that a new 50 MW solid-fuel biomass plant would emit criteria pollutants, ranging from five tpy of ROG to 118 tpy of NOx. This facility would have to meet best available control technology (BACT) and emission offset requirements from the appropriate air district. These requirements ensure that any negative air quality impacts from the facility would be minimized.

D. NEW NATURAL GAS PEAKER FACILITY

In the second hypothetical case, staff estimated criteria pollutant emissions from a new natural gas peaker at a new or existing facility. In general, these peakers provide additional power supply for baseload generation or backup power for variable renewable generation.

Staff assumed a new 250 MW capacity peaker that would generate about 750 GWh per year, assuming a capacity factor of 35 percent. Table VI-7 shows additional criteria pollutant emissions that would be emitted from a new peaker, ranging from about 8 tpy for ROG to 75 tpy for CO. The new facility must meet all air district requirements, such as BACT and emission offsets, to minimize any negative air quality impacts from the facility.

Table VI-7. Estimated Criteria Pollutant Emissions in 2020 Additional New Natural Gas Peaker (250 MW Capacity)					
Source	(tpy)				
	ROG	NO_x	SO_x	CO	$PM_{2.5}$
Operation Emissions (750 GWh)	8	38	8	75	23

Source: ARB Staff Report Chapter IX, Environmental Impacts

However, the emission impacts would be less if the new facility replaced an existing facility. Assuming both facilities provided the same power, the new replacement would reduce some of the existing emissions. Table VI-8 shows the emission reductions would range from about 18 tpy for ROG to 112 tpy for NO_x.

Table VI-8. Estimated Criteria Pollutant Emission Reductions in 2020 Replacement of Existing Natural Gas Peaker (250 MW Capacity)

Source	(tpy)				
	ROG	NO_x	SO_x	CO	$PM_{2.5}$
Old Natural Gas Peaker Operation Emissions (750 GWh)	26	150	8	150	23
New Natural Gas Peaker Operation Emissions (750 GWh)	8	38	8	75	23
Emission Reductions	**18**	**112**	**0**	**75**	**0**

Source: ARB Staff Report Chapter IX, Environmental Impacts

VII. IMPACTS TO PUBLIC HEALTH AND SAFETY

This section describes the emission impacts of criteria and toxic air pollutants on statewide public health associated with the operation of renewable electricity generation facilities. Electricity generated by various renewable resource technologies is evaluated for potential public health impacts. This section incorporates by reference the analysis provided in Chapter IX of the RES Staff Report.

In conjunction with GHG reductions from the implementation of the RES, the level of $PM_{2.5}$ would be expected to be reduced. These reductions, in turn, would likely lead to reductions in the incidence of a variety of associated adverse health impacts. This conclusion is based on the evidence provided by the epidemiologic studies described in U.S. EPA's "Integrated Science Assessment for Particulate Matter" and "Quantitative Health Risk Assessment for Particulate Matter, Second External Review Draft".

The U.S. EPA Integrated Science Assessment (U.S. EPA 2009) concluded that long-term $PM_{2.5}$ exposure can "causally" exacerbate chronic cardiovascular disease, leading to mortality and hospitalizations related to cardiovascular diseases. The review also concluded that long-term $PM_{2.5}$ exposure has a "likely causal" relationship with exacerbation of chronic respiratory diseases, leading to mortality and hospitalization. Moreover, $PM_{2.5}$ exposure has been associated with a number of other health endpoints that could adversely impact public health in California. For example, reports in the scientific literature have associated $PM_{2.5}$ exposure with other adverse health effects such as myocardial infarction (heart attack), chronic bronchitis, acute bronchitis, emergency room visits for asthma, asthma symptoms, other respiratory symptoms, low birth weight, preterm birth, reduced lung function growth in children, minor restricted activity days and work loss days. Because implementation of the RES would be expected to reduce $PM_{2.5}$ emissions, the proposed RES would not cause or contribute to, and may reduce incidences of such adverse health effects.

The implementation of the RES would likely also result in a reduction of NO_x emissions, which are a precursor to nitrates, a secondary PM formed in the atmosphere. This would result in further reduction in ambient $PM_{2.5}$ levels beyond the direct $PM_{2.5}$ reductions noted above. Secondary $PM_{2.5}$ represents a portion of total $PM_{2.5}$, and a fraction of the health impacts associated with total $PM_{2.5}$ can be attributed to secondary PM. Hence, reduced exposure to both primary and secondary $PM_{2.5}$ is anticipated to result in a reduction in the statewide number of premature deaths and hospitalizations due to exacerbated respiratory and cardiovascular disease, as well as other adverse health effects.

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VIII. MANDATORY FINDINGS OF SIGNIFICANCE

Consistent with the requirements of State CEQA Guidelines, Appendix G, Environmental Checklist, Section 18, this FED addresses the mandatory findings of significance for a project.

A. MANDATORY FINDINGS OF SIGNIFICANCE

1. DOES THE PROJECT HAVE THE POTENTIAL TO DEGRADE THE QUALITY OF THE ENVIRONMENT, SUBSTANTIALLY REDUCE THE HABITAT FOR A FISH OR WILDLIFE SPECIES, CAUSE A FISH OR WILDLIFE POPULATION TO DROP BELOW SELF-SUSTAINING LEVELS, THREATEN TO ELIMINATE A PLANT OR ANIMAL COMMUNITY, REDUCE THE NUMBER OR RESTRICT THE RANGE OF A RARE OR ENDANGERED PLANT OR ANIMAL, OR ELIMINATE IMPORTANT EXAMPLES OF THE MAJOR PERIODS OF CALIFORNIA HISTORY OR PREHISTORY?

Under Section 15065(a) of the CEQA Guidelines, a finding of significance is required if a project “has the potential to substantially degrade the quality of the environment.” In practice, this is the same standard as a significant effect on the environment, which is defined in Section 15382 of the CEQA Guidelines as “a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.” As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level. All of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies (e.g., cities, counties, CPUC) or other regulatory bodies at such time the projects are proposed for implementation. ARB would not be the agency responsible for conducting the project-specific environmental review because it is not the agency with authority for making land use decisions.

This FED, in its entirety, addresses and discloses potential environmental effects associated with construction and operation of the proposed project, including direct, indirect, and cumulative impacts in the following resource areas:

- Aesthetics
- Air Quality
- Biological and Forestry Resources
- Cultural Resources
- Geology, Soils, and Mineral Resources
- Greenhouse Gas Emissions

- Hazards and Hazardous Materials
- Hydrology, Water Quality, and Supply
- Land Use and Agricultural Resources
- Noise
- Recreation
- Public Services, Utilities, and Solid Waste
- Transportation and Traffic

As described in Chapter III., “Impact Assessment”, this FED discloses potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures.

(a). IMPACTS ON SPECIES

Under Section 15065(a)(1) of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to (1) substantially reduce the habitat of a fish or wildlife species; (2) cause a fish or wildlife population to drop below self-sustaining levels; or (3) substantially reduce the number or restrict the range of an endangered, rare, or threatened species. Chapter III.C., “Biological and Forestry Resources,” of this FED addresses impacts related to the reduction of the fish or wildlife habitat, the reduction of fish or wildlife populations, and the reduction or restriction of the range of special-status species. Potential impacts on biological and forest resources from the proposed regulation change were evaluated primarily on the basis of the information and analyses presented in large-scale renewable energy projects, review of pertinent literature, and information provided in the Renewable Energy Transmission Initiative (RETI), which identifies competitive renewable energy zones (CREZ) in California and in neighboring states that can provide significant electricity to California consumers by the year 2020.

(b). IMPACTS ON HISTORICAL RESOURCES

Section 15065(a)(1) of the CEQA Guidelines states that a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to eliminate important examples of a major period of California history or prehistory. Section 15065(a)(1) amplifies Public Resources Code (PRC) Section 21001(c) requiring that major periods of California history are preserved for future generations. It also reflects the provisions of PRC Section 21084.1 requiring a finding of significance for substantial adverse changes to historical resources. Section 15064.5 of the CEQA Guidelines establishes standards for determining the significance of impacts to historical resources and archaeological sites that are a historical resource. Chapter III.C., “Cultural Resources,” of this FED addresses impacts related to California history and prehistory, historic resources, archaeological resources, and paleontological resources.

In general, the types of historical resources likely to be affected by new development includes prehistoric and historical archaeological sites such as prehistoric habitation sites, lithic tool and debris scatters, bedrock milling stations, quarries, rock art, historical refuse scatters, mining pits, ranching and agricultural artifact scatters or structural ruins, native plant gathering areas, traditional cultural properties, and sacred sites.

It is important to note that while the RES Calculator output represents the best available data to represent the results of the proposed regulation and a reasonable set of assumptions upon which to assess impacts, the manner in which renewable energy projects actually come on line cannot be known with certainty. The number of potential future combinations of renewable resource mix, location, and timing, and degree that would satisfy RES requirements is nearly infinite and will depend upon myriad economic, political, and environmental factors. The scenarios identified by ARB and modeled using the RES Calculator represent a reasonable characterization of the way in which the future could unfold; analysis of additional potential future scenarios would not meaningfully add to the body of evidence necessary for ARB to make an informed decision with regard to the proposed regulation.

In addition, as with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level.

2. DOES THE PROJECT HAVE IMPACTS THAT ARE INDIVIDUALLY LIMITED, BUT CUMULATIVELY CONSIDERABLE?

As required by Section 15065 of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has potential environmental effects that are individually limited, but cumulatively considerable. As defined in Section 15065(a)(3) of the CEQA Guidelines, cumulatively considerable means “that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.” Cumulative impacts are addressed for each of the environmental topics listed above and are provided in Chapter V, “Cumulative Impacts,” of this FED.

3. DOES THE PROJECT HAVE ENVIRONMENTAL EFFECTS THAT WILL CAUSE SUBSTANTIAL ADVERSE EFFECTS ON HUMAN BEINGS, EITHER DIRECTLY OR INDIRECTLY?

Consistent with Section 15065(a)(4) of the CEQA Guidelines, a lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to cause substantial adverse effects on human beings, either directly or indirectly. Under this standard, a change to the physical environment that might otherwise be minor must be treated as significant if people would be significant affected. This factor relates to adverse changes to the environment of human beings generally, and not to effects on particular individuals. While changes to the environment that could indirectly affect human beings would be represented by all of the designated CEQA issue areas, those that could directly affect human beings include air quality, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation/traffic, and utilities, which are addressed in Chapter III, “Impact Assessment,” of this FED.

IX. CONCLUSIONS

This section presents the major conclusions of the FED.

A. SUMMARY OF IMPACTS BY RESOURCE AREA

1. AESTHETICS

Depending upon their location, size, and character, development of renewable energy projects necessary for compliance with the 33 percent RES regulation may result in adverse effects on designated scenic vistas, scenic resources, the visual character or quality of sites where renewable energy projects would occur, and could create a new source of substantial light or glare. Implementation of mitigation (A-1 through A-10) may reduce the severity of such impacts, but it is uncertain whether mitigation would be sufficient to reduce potential impacts to less-than-significant levels. Therefore, these impacts would be potentially significant and unavoidable and the project would have a substantial contribution to significant cumulative visual impacts.

2. AIR QUALITY

Because renewable electricity generation produces lower levels of pollutants per unit of electrical output than fossil-fuel generation it would displace and, in comparison to existing conditions less total electricity would be generated in and out-of-state in 2020 under the 33 percent RES, long-term operational criteria air pollutant impacts resulting from implementation of the RES would be less-than-significant. However, depending upon their location, size, and character, development of renewable energy projects necessary for compliance with the 33 percent RES regulation could generate short-term construction-related emissions that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, or result in a cumulatively considerable net increase in non-attainment areas. Construction of any new facilities would be subject to site-specific mitigation imposed by local and potentially federal lead agencies and local air districts. Mitigation for construction related air quality impacts is expected to be the same or similar to those detailed in Mitigation B-1 and B-2, and would reduce these impacts to less-than-significant levels.

3. BIOLOGICAL AND FOREST RESOURCES

The future development of renewable energy projects under the 33 percent RES could result in the following: (1) loss of special-status plants and animals due to construction, operation, and maintenance of energy generating structures and transmission lines; (2) placement of fill material into waters of the United States, including wetlands, or removal of riparian or other habitats considered sensitive by resource agencies; (3) loss, degradation, or fragmentation of common habitats. The WECC service area supports a number of native habitats that are important to wildlife. Large areas of native habitat could be substantially reduced or fragmented on a regional scale due to renewable energy development; (4) interfere with wildlife movement or impede the migration of fish populations. These projects could reduce the ability of terrestrial wildlife populations to move unimpeded through an area. In addition, impacts to aquatic habitat, such as diversion of stream flows, could impede movement of native fishes and aquatic wildlife; (5) conflict with adopted HCPs, NCCPs, other conservation plans or other policies to protect natural resources; and (6) loss or conversion of forest lands.

Mitigation C-1 through C-6 address the impacts above and applies to both the 20 percent and 33 percent plausible compliance scenarios. Because ARB has no regulatory oversight on the implementation of the mitigation, impacts to biological and forestry resources may not be fully mitigated and, therefore, would remain potentially significant. In addition, some impacts to biological and forest resources may not be feasible to mitigate fully due to the nature of the impact. Therefore, these impacts would be potentially significant and unavoidable and the project would have a substantial contribution to significant cumulative biological and forest resources impacts.

4. CULTURAL RESOURCES

All new renewable energy projects proposed for construction as part of the 33 percent RES, no matter their location in-state or out-of-state, would have the potential to result in significant impacts to cultural and paleontological resources depending on their location in proximity to cultural resources and their potential to result in ground disturbance. The types of cultural resources that could potentially be affected with renewable energy facility construction could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological site associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist. Such resources may occur individually, in groupings of modest size, or in districts. Implementation of mitigation (D-1 through D-10) may reduce the severity of such impacts, but it is uncertain whether mitigation would be sufficient to reduce potential impacts to less-than-significant levels. Therefore, these impacts would be potentially significant and unavoidable and the project would have a substantial contribution to significant cumulative cultural resources impacts.

5. GEOLOGY, SOILS, AND MINERAL RESOURCES

Proposed renewable energy projects located within the identified CREZ's would be subject to substantial risk of loss and possible injury or death due to the probable strong seismic ground shaking associated with earthquake activity. This includes the risk of seismic-related ground failure, including liquefaction and in some locations landslides. In addition, it is not known which, if any, of the proposed CREZ renewable energy project areas would require the use of septic tanks or alternative waste water disposal systems. The amount of fine-grained material in the alluvium is not known and can affect its suitability to support such a system. As a result, the risk of impact to the proposed project located within the identified CREZ's due to strong seismic ground shaking and unsuitable soils to support septic tanks or alternative waste water disposal systems is considered potentially significant. While Mitigation E-1 is recommended to reduce significant seismic hazard impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. It is also uncertain if, following the implementation of Mitigation E-3, suitable areas that would support the installation of septic tanks or alternative waste water disposal systems can be located. Therefore, these impacts would be potentially significant and unavoidable and the project would have a substantial contribution to significant cumulative geology and mineral resources impacts.

All proposed CREZ project areas are susceptible to erosion or loss of top soil, unstable geologic units or soil, and the presence of expansive soils. Without implementation of Mitigation GEO-2 and GEO-3, this would be a potentially significant impact. However, with implementation of mitigation, the potential impacts would be reduced to less-than-significant levels.

6. Greenhouse Gas Emissions

Please refer to Chapter IX of the RES Staff Report for a discussion of GHG impacts.

7. Hazards and Hazardous Materials

The risk of impact due to routine transport, use or disposal of hazardous materials would be less-than-significant for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions) because construction and operation of renewable energy facilities would generally be located substantial distances from highways, major developments, and other sensitive receptors, and would be required to comply with all appropriate Federal, State, and local laws regarding the transportation of hazardous materials. The potential for hazardous emission release within one quarter mile of a school would be a less-than-significant impact under the 20 percent RPS and 33 percent RES (low and high load conditions) because no school facilities are located within ¼-mail of any of the proposed CREZs. Similarly, no public or private airports are located within 2 miles of any of the proposed CREZs and no airport land use plans would apply to the CREZs. Therefore, future development of renewable energy projects under the proposed regulation change would result in less-than-significant hazard impacts to schools and airports under the 20 percent RPS and 33 percent RES (high and low load conditions). Implementation of renewable energy projects would result in less-than-significant emergency response plan impacts under the 20 percent RPS and 33 percent RES (low and high load conditions) because these projects would be subject to local land use approvals that would ensure the proposed facilities provide adequate emergency response and access to and from the site. In addition, wildland fire risks would be less-than-significant for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions) because projects would be required to use construction/maintenance equipment with appropriate spark-suppression controls and would be required to provide adequate fire suppression facilities onsite.

The future development of renewable energy projects required to comply with the proposed regulation change could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Although precautions can be taken (refer to Mitigation G-1) to ensure that any spilled fuel is properly contained and disposed, the potential still remains for a significant release of hazardous materials into the environment and it is unknown whether mitigation would be available or could feasible reduce this impact to a less-than-significant level. Therefore, this impact would be potentially significant and unavoidable and the project would have a substantial contribution to significant cumulative visual impacts.

Proposed renewable energy projects located within the identified CREZs are not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment. This would be a less-than-significant impact.

8. HYDROLOGY, WATER QUALITY, AND SUPPLY

Because the specific hydrology, water quality, and supply impacts (i.e. lowering of groundwater levels, stormwater drainage and flooding hazards, construction-related impact to water quality, and long-term operations-related effects to surface and groundwater quality) of new renewable projects cannot be identified with any certainty and the availability and feasibility of mitigation for potentially significant impacts is unknown, these water supply impacts would remain potentially significant and the a substantial contribution to a significant cumulative impact is possible.

9. LAND USE, PLANNING, AND AGRICULTURE

Because implementation of renewable projects generally require large, contiguous land areas, construction and implementation of projects necessary to comply with the proposed 33 percent RES would be unlikely to physically divide an existing community, this impact is considered less-than-significant. However, implementation of the 33 percent RES would likely result in conflicts with certain applicable land use plans, policies, or regulations of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect. The proposed project could also result in the conversion of farmland to non-agriculture uses. Because ARB has no land use authority, mitigation measures are not available to mitigate these impacts to a less-than-significant level. Compliance with existing land use policies, ordinances, and regulations would serve to minimize this impact and land use impacts would be further addressed for individual projects through the project's CEQA and/or NEPA review. However, because ARB cannot guarantee proposed renewable energy projects would be consistent with any applicable land use policies, ordinances, or regulations, these impacts are considered significant and unavoidable and the project would have a substantial contribution to a significant cumulative land use, planning, and agricultural impact.

Implementation of the proposed 33 percent RES would likely result in conflicts with existing zoning for agricultural uses or Williamson Act contracts. The areas identified by the RETI as most suitable for alternative energy development contain land zoned for agricultural uses and that are currently under Williamson Act contracts. Although mitigation measures, such as BMP's, may be available to reduce such impacts, ARB cannot guarantee their implementation or effectiveness. Therefore, impacts related to conflicts with existing zoning for agricultural uses or Williamson Act contracts would remain significant and unavoidable and the project's contribution to this significant cumulative impact would be cumulatively considerable.

10. NOISE

The specific noise (and vibration) impacts related to future development of renewable energy projects under the proposed regulation cannot be identified with any certainty because the specific location, type, and number of renewable energy projects constructed in-State or out-of-state is not known at this time. However, nearby sensitive receptors could be located within the distances modeled in the FED (see Chapter III.J., 'Noise') that are correlated with typical noise (and vibration) standards and recommended-acceptance levels. In addition, these projects could potentially result in exposure of new workers to noise levels in excess of standards for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level. Thus, implementation of new renewable energy projects could result in substantial increases in ambient noise levels and expose persons to or generate noise levels in excess of applicable standards. While mitigation is recommended to reduce significant impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be significant and unavoidable and the project would have a substantial contribution to a potentially significant and unavoidable cumulative impact.

11. RECREATION

The construction of substantial additional renewable generation and transmission capacity in California and the Western U.S. would occur as a result of the RES, with much of it expected to be on public land. The potential exists to directly disrupt, indirectly interfere with use of, or reduce the recreation resource qualities and availability of public lands. Also, new renewable energy generation and transmission facilities could directly disrupt, indirectly interfere with use of, or reduce the recreational resource qualities of private land occupied by or located near renewable energy projects. While the specific location of projects cannot be identified with any certainty, the magnitude of increased renewable energy facilities could result in significant recreational impacts. This impact is considered potentially significant for all renewable energy types under the 33 percent RES (high and low load). While mitigation is recommended to reduce significant impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be significant and unavoidable and the project would have a substantial contribution to a potentially significant and unavoidable cumulative impact.

12. Public Services, Utilities, and Solid Waste

Because the specific public service and utilities (e.g., police, fire, emergency response, electricity, natural gas, water supply, wastewater capacity), impacts of the 33 percent RES cannot be identified with any certainty, and these projects could potentially result in potentially significant environmental impacts. While mitigation L-1 and L-2 has been recommended to reduce the impact, it is unknown whether this mitigation could feasibly reduce the impact to a less-than-significant level. Therefore, the project's public services and utilities impacts would be significant and unavoidable and the project would have a substantial contribution to a significant cumulative impact.

Renewable energy projects that would be served by a municipal wastewater service provider or would operate individual septic systems or on-site wastewater treatment plants would not be anticipated to exceed wastewater treatment requirements because the treatment facilities would operate under approved wastewater treatment requirements and would be monitored by appropriate regulatory agencies to ensure compliance. In addition, all renewable energy projects would be provided solid waste from an appropriately certified local provider that would haul the solid waste to an approved and permitted disposal facility. None of the renewable energy projects (in-State or out-of-state) would be anticipated to result significant impacts related to a violation of solid waste regulations.

13. Transportation/Traffic

Construction and operation of new renewable energy projects and transmission lines may have the potential to conflict with applicable transportation programs, plans, ordinances, or policies (e.g., performance standards, congestion management); result in a change in air traffic patterns; substantially increase hazards due to a design feature; or result in inadequate emergency access. Consequently, because the specific transportation and traffic impacts of renewable energy projects needed to comply with the 33 percent RES cannot be identified with certainty, and the availability and feasibility of mitigation for potentially significant impacts is unknown, this impact is considered potentially significant and the project would have a substantial contribution to a significant cumulative impact.

14. Alternatives

(a). No Project Alternative, 20 Percent RPS

Under the no-project alternative, ARB would not adopt the proposed RES, and the existing RPS would remain in effect. For purposes of analysis, therefore, ARB developed 20 percent scenarios, also referred to as the "reference scenarios," to serve as a benchmark for comparison between the 20 percent RPS and 33 percent RES programs in 2020.

Environmental impacts of the no-project alternative are identified and assessed for each technical issue area in Chapter III, Impact Assessment. In summary, the no-project alternative would result in impacts from development of additional wind and solar resources, including potentially adverse impacts to: scenic resources, biological resources, cultural resources, soils, water resources, land use, noise, and recreation.

(b). INCREMENTAL IN-STATE ALTERNATIVE

The Incremental in-State alternative considers a scenario in which the incremental difference in energy between the 20 percent RPS program and the proposed 33 percent RES comes from resources within California; no out-state resources would be used.

Environmental effects of the alternative would be substantially similar to the proposed RES and would result in substantially similar impacts. Based on modeling by the RES Calculator, this alternative would result in a 10 percent increase in solar thermal generation and an approximately 8 percent increase in solar photovoltaic generation under the low load scenario, and a 5 percent increase in wind, a 4 percent increase in solar thermal, and a 3 percent increase in solar photovoltaic. The Incremental In-State alternative high load scenario would also require approximately 790 gigawatt hours (GWh) of new wind energy from the Palm Springs CREZ. Therefore, the Incremental In-State alternative would result in an increase in impacts to areas that support solar and wind, primarily the southeast desert areas. The alternative would consume additional desert lands, resulting in slightly greater direct and indirect impacts to desert species and habitat, scenic qualities, and other desert areas and resources (e.g. recreation areas, communities). Air quality impacts would be similar to the proposed RES, but additional in-state renewable development would result in lower criteria air pollutant emissions. Potential impacts to other environmental resource areas (cultural resources, soils, water resources, land use, noise, and recreation) may also increase proportionately, As with the proposed RES, mitigation for significant and potentially significant impacts would be implemented on a project-specific basis and would likely include the same or similar measures recommended in the environmental analysis for the RES.

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X. SUMMARY OF IMPACTS AND MITIGATION MEASURES

The significance determinations identified below reflect the programmatic nature of the analysis of the reasonably foreseeable methods of compliance with the Renewable Electricity Standard (RES), i.e., the construction of additional generation capacity and transmission facilities for renewable energy. Because of this, the FED analysis addresses broadly defined types of impacts without the ability to determine the specific project locations, facility size, character, or site-specific environmental characteristics affected by the facilities. As a result, many impact issues are determined to be potentially significant, because of the inherent uncertainties about the relationship between future renewable energy projects and environmentally sensitive resources or conditions. This is a conservative approach (i.e., tending to overstate environmental impacts), in light of these uncertainties, to satisfy the good-faith, full-disclosure purpose of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts recognized as potentially significant can be avoided or maintained at a less-than-significant level.

Another inherent uncertainty in the FED analysis is the degree of implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the RES as a regulation, it does not have authority over the proposal, approval, or implementation of renewable energy generation and transmission projects. Other agencies are responsible for the environmental analysis of proposed renewable energy projects, definition and adoption of project-specific feasible mitigation, and monitoring of mitigation implementation. For example, the California Energy Commission must approve thermal energy generation projects of 50 MW or greater capacity and local governments are often the lead agencies approving wind, non-thermal solar projects, and smaller thermal generation projects. Additionally, Federal land management agencies must approve projects and require mitigation for impacts on their lands and state and/or Federal permits are needed for specific environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because ARB is not responsible for implementation of renewable energy project-specific mitigation and the programmatic analysis does not allow description of the details of project-specific mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Consequently, the FED takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable. It is expected that renewable energy projects will be able to feasibly avoid or mitigate to a less-than-significant level many of these potentially significant impacts as an outcome of their project-specific environmental review processes.

Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
Aesthetics		
Impact A-1: Adverse Effects on Scenic Vistas, Scenic Resources, and Visual Character. Depending upon their location, size, and character, development of renewable energy projects and transmission lines necessary for compliance with the 33 percent RES may result in adverse effects on designated scenic vistas, scenic resources, and visual character by degrading or substantially modifying the visual environment of renewable development areas. Scenic resources, including trees, rock outcroppings, and historic buildings within a State scenic highway could be directly or indirectly impaired. Therefore, this would be a potentially ***significant*** impact.	Mitigation A-1 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. ◢ The project proponent shall color and finish the surfaces of all project structures and buildings visible to the public to ensure that they: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. Project components shall be non-specular and non-reflective. The project proponent shall submit a surface treatment plan to the lead agency for review and approval. The surface treatment plan shall include: A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes; B. A list of each major project structure and building, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;	SU

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Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	C. One set of color brochures or color chips showing each proposed color and finish; D. A specific schedule for completing the treatment; and E. A procedure to ensure proper treatment maintenance for the life of the project. ◢ To the extent feasible, the sites selected for use as construction staging and laydown areas shall be areas that are already disturbed and/or are in locations of low visual sensitivity. Where possible, construction staging and laydown areas for equipment, personal vehicles, and material storage shall be sited to take advantage of natural screening opportunities provided by existing topography and vegetation. All construction-related areas shall be kept clean and tidy by storing construction materials and equipment within the proposed construction staging and laydown areas and/or generally away from public view. ◢ Where screening topography and vegetation are absent, natural-looking earthwork berms and vegetative or architectural screening shall be used where possible to minimize visual impacts. ◢ All operation and maintenance areas shall be kept clean and tidy by storing all renewable energy equipment, parts, and supplies in areas that are screened from view and/or are generally not visible to the general public. ◢ To protect landscape character and promote visual quality, the project proponent shall construct project facilities using the existing and already maintained network of access roads to the greatest practical extent. The project proponent shall submit plans for any new access roads and any maintenance plans for un-maintained access roads to the CPUC for review and approval at	

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Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	least 60 days prior to the start of construction. ◢ The project proponent shall revegetate and regrade disturbed soil areas that must be cleared during the construction process to restore the area to an appearance that will blend back into the overall landscape context. The project proponent shall submit plans for revegetation and revegetation to the CPUC for review and approval at least 60 days prior to the start of construction. ◢ Among the FAA-approved lighting devices available, the project proponent shall use those that are designed to be least visible from ground level of the surrounding landscape. ◢ Because the eye is naturally drawn to prominent landscape features, siting projects and their associated elements next to such features shall be avoided to the greatest extent practical. ◢ Because the landscape setting observed from national historic sites, national trails, and cultural resources may be a part of the historic context contributing to the historic significance of a proposed site for development, project siting shall avoid locating facilities to the greatest extent practical that would alter the visual setting such that they would reduce the historic significance or function. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant visual impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this	

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Impact A-2: Adverse Effects of Light and Glare. Depending upon their location, size, and character, and proximity to sensitive receptors, development of renewable energy projects necessary for compliance with the RES regulation may generate new sources of substantial light or glare that would adversely affect day or nighttime views in areas of renewable energy development. This would be a potentially ***significant*** impact**.**	Mitigation Measure A-2 ◢ Prior to start of commercial operation, the project proponent shall design and install all temporary lighting for project construction and permanent lighting for project operation such that light bulbs and reflectors are not visible from public viewing areas and illumination of the vicinity and the nighttime sky is minimized during both project construction and operation. The project proponent shall develop and submit a lighting plan for the project to the CPM for review and approval. The lighting plan shall include: ▰ Lighting shall be designed so that during both construction and operation, highly directional, exterior light fixtures are hooded, with lights directed downward or toward the area to be illuminated and so that backscatter to the nighttime sky is minimized. The design of this outdoor lighting shall be such that the luminescence or light source is shielded to prevent light trespass outside the project boundary, consistent with operational safety and security; ▰ High illumination areas not occupied on a continuous basis such as maintenance platforms shall be provided with switches or motion detectors to light the area only when occupied; and ▰ A lighting complaint resolution form shall be used by facility operators, to record all lighting complaints received and to document the resolution of those complaints. All records of	SU

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	lighting complaints shall be kept in the onsite compliance file. ◢ At least 90 days prior to ordering any permanent exterior lighting, the project proponent shall contact the lead agency to discuss the documentation required in the lighting mitigation plan. ◢ At least 60 days prior to ordering any permanent exterior lighting, the project proponent shall submit to the lead agency for review and approval a plan that describes the measures to be used and that demonstrates that the requirements of this condition will be satisfied. The submittal to the CPM shall include the county's comments. The project proponent shall not order any exterior lighting until receipt of lead agency approval of the lighting mitigation plan. ◢ At least thirty (30) days prior to start of commercial operation, the project proponent shall notify the lead agency that the lighting has been completed and is ready for inspection. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant visual impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
Air Quality		
Impact B-1: Short-Term Construction Impacts to Air Quality from Out-of-State Project-Generated Emissions of Criteria Air Pollutants and Precursors. Because the specific air quality impacts of the 33 percent RES cannot be identified with any certainty, and construction activities associated with these projects could generate levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, or result in a cumulatively considerable net increase in non-attainment areas, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).	Mitigation B-1 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. ◢ Comply with local plans, policies, ordinances, rule, and regulations regarding air quality-related emissions and associated exposure. ◢ Apply for, secure, and comply with all appropriate air quality permits for project construction and operations from the local agencies with air quality jurisdiction and from other applicable agencies (e.g., EPA), if appropriate, prior to construction mobilization. ◢ Prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation	LTS

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Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	is implemented. Implementation of the above mitigation would reduce this impact to a less-than-significant level for all renewable energy types under the 33% RES plausible compliance scenarios (high and low load conditions).	
Impact B-2: Long-Term Operational Impacts to Air Quality from Out-of-State Project-Generated Emissions of Criteria Air Pollutants and Precursors. Because renewable generation produces lower levels criteria air pollutants per unit of electricity output than fossil-fuel generation it would displace and less total electricity would be generated out-of-state in comparison to existing conditions, these projects would not be anticipated to result in significant environmental impacts (e.g., generate levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected violation, or result in a cumulatively considerable net increase in non-attainment areas). This impact is considered *less than significant* for all renewable energy types under	Mitigation B-2 ◢ Implement Mitigation M-1 above. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. Implementation of the above mitigation would reduce this impact to a less-than-significant level for all renewable energy types under the 33% RES (high and low load conditions).	LTS

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
the 33 percent RES (high and low load).		
Impact B-3: Impacts to Sensitive Receptors in the Project Area from Exposure to Substantial Pollutant Emissions (e.g., localized criteria air pollutants, toxic air contaminates) and Odors. Because the specific out-of-state air quality impacts of the 33 percent RES cannot be identified with any certainty, and these projects could potentially expose sensitive receptors to substantial localized criteria air pollutants, toxic air contaminants , or odors, this impact is considered *potentially significant* for all renewable energy types under the 33 percent RES (high and low load).		LTS
Biological and Forestry Resources		
Impact C-1: Loss of special-status species. The future development of renewable energy projects and transmission lines under the proposed regulation change could result in the loss of	Mitigation Measure C-1 All Types of Renewable Energy Development ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA).	LTS

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
special-status plants and animals due to construction, operation, and maintenance of energy generating structures and transmission lines. Special-status species may be afforded protection under the federal or California endangered species acts, California Fish and Game Code, CEQA or other regulations. Therefore, loss of special-status species is ***potentially significant*.**	The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. ◢ As part of the environmental analysis, mitigation to avoid, minimize, and compensate for impacts to special-status species shall be developed, as appropriate, by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to special-status species. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. It provides recommendations to renewable energy developers, and federal, state, local and Tribal governments for improving the efficiency of the regulatory process in California and protecting environmental and cultural resources, and human health and safety. Recommendations include 1) guidance for preparing applications for renewable energy projects located in the California desert region and 2) best management practices for the permitting/pre-construction, construction, operation, repowering or retrofitting, and decommissioning phases of desert renewable energy facilities. The manual also provides recommendations for project design features to be considered when developing such renewable energy projects. This may include the following types of activities:	

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	During Project Siting and Design ◢ To the extent feasible, site facility construction and other ground disturbing activities to avoid areas federally designated as critical habitat for listed species, identified as core areas in recovery plans for listed species, or otherwise identified as essential habitat for the conservation of state or federally listed species. ◢ Follow the California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC and DFG 2007). ◢ Follow *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006) or the standard at the time of project design for reducing avian mortality from power lines and transmission poles. Prior to construction ◢ Conduct pre-construction surveys for special-status species that could be affected by the project. ◢ Consult with USFWS, DFG, or other regulatory agency as appropriate in compliance with federal and state regulations to develop appropriate avoidance and minimization measures. ◢ If take of listed species cannot be avoided, secure appropriate incidental take permits from USFWS and/or DFG and implement terms and conditions of the permits. ◢ Compensate for impacts to special-status species that cannot be avoided or minimized. This may include developing a compensatory mitigation plan that will result in no net loss of acreage, function, and value of affected habitat. Unavoidable effects could be mitigated through a combination of creation, preservation, and restoration of habitat or purchase of credits at a mitigation bank approved by the regulatory agencies.	

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Impact	Mitigation Measure	Significance After Mitigation
	During construction and operation ◢ Minimize disturbance to natural vegetation to the extent feasible. If potential habitat for special-status species is present and can be avoided on the project site, establish appropriate sized buffers prior to ground disturbing activities and maintain them until ground disturbing activities in that area are completed. ◢ If special-status species or their habitat are present and can be avoided, implement additional measures such as worker awareness training, dust and erosion control plans, and periodic biological monitoring to ensure minimization measures are being maintained. ◢ Consider other minimization measures as needed, such as speed limits for vehicles during construction, prevention of invasive species, lighting and noise minimization measures, fire hazard reduction, and safe handling, transport and storage of toxic materials. ◢ The projects would comply with other laws and regulations protecting special-status species. If federally listed would be affected, a biological opinion (BO), which may include an incidental take permit, from USFWS may be required. The project applicant(s) would abide by conditions in the BO (including conservation and minimization measures). If take of California state listed species would occur, a 2081(b) incidental take permit from DFG would be required. DFG requires impacts to listed species to be minimized and fully mitigated. No Section 2081(b) permit may authorize the take of "fully protected" species and "specified birds" (Fish and Game Code Sections 3505, 3511, 4700, 5050, 5515, and 5517). If a project is planned in an area	

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	where a fully protected species or a specified bird occurs, an applicant must design the project to avoid all take; DFG cannot provide take authorization for the species under CESA. ◢ California Energy Commission, DFG, USFWS and BLM are developing a Desert Renewable Energy Conservation Plan (DRECP). The geographic area in the DRECP focuses on the Mojave and Colorado Desert bioregions. The goal of DRECP will coordinate and consider desert land uses and activities during the planning process and will identify areas for conservation and declining species management. As the DRECP is developed, renewable energy projects in the Mojave and Colorado Desert bioregions should coordinate with this planning effort, which may help streamline agency approvals and endangered species permitting.	
Impact C-2: Removal, Degradation, and Fragmentation of Sensitive Habitats. The future development of renewable energy projects under the proposed regulation change could result in the placement of fill material into waters of the United States, including wetlands, or removal of riparian or other habitats considered sensitive by resource agencies. The removal, degradation and fragmentation of sensitive habitats, including waters of the	Mitigation C-2 All Types of Renewable Energy Development ◢ In order to reduce potential impacts to waters of the United States and other sensitive habitats, the lead agency for renewable energy development projects shall conduct a project-specific analysis and evaluate the potential impacts to waters of the United States and sensitive habitats in accordance with CEQA. ◢ As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for impacts to sensitive habitats would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to sensitive habitats. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of	LTS

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
United States, are ***potentially significant.***	activities: ▪ Redesign or modify the project to avoid direct and indirect impacts on sensitive habitats, if feasible. ▪ If waters of the United States and other sensitive habitats can be avoided on site, installing barrier fencing between the construction site and the sensitive areas to avoid indirect or accidental impacts. ▪ Avoid construction activities in saturated or ponded wetlands and streams during the wet season to the maximum extent possible. Where such activities are unavoidable, protective practices, such as use of padding or vehicles with balloon tires, will be employed. ▪ Develop other minimization measures such as stormwater pollution prevention plan (SWPPP) and erosion control plans and others to protect sensitive habitats and waters of the United States. ▪ Before the approval of grading and improvement plans and before any groundbreaking activity associated with each distinct project phase, the project applicant(s) for each project requiring fill of wetlands or other waters of the United States or waters of the state would obtain all necessary permits under Sections 401 and 404 of the CWA or the State's Porter-Cologne Act for the respective phase. The project applicant(s) would commit to replace, restore, or enhance on a "no net loss" basis (in accordance with USACE and the appropriate RWQCB) the acreage of all wetlands and other waters of the United States that would be removed, lost, and/or degraded with implementation of project plans for that phase. Wetland	

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Impact	Mitigation Measure	Significance After Mitigation
	habitat would be restored, enhanced, and/or replaced at an acreage and location and by methods agreeable to USACE, the RWQCB, and other regulatory agencies, as appropriate, depending on agency jurisdiction, and as determined during the Section 401 and Section 404 permitting processes. ◢ As part of the Section 404 permitting process, a draft wetland mitigation and monitoring plan (MMP) would be developed for the project on behalf of the project applicant(s). Before any ground-disturbing activities that would adversely affect wetlands and before engaging in mitigation activities associated with each phase of development, the project applicant(s) would submit the draft wetland MMP to USACE, the appropriate RWQCB, and other appropriate regulatory agencies for review and approval of those portions of the plan over which they have jurisdiction. Once the MMP is approved and implemented, mitigation monitoring would continue for a minimum of 5 years from completion of mitigation, or human intervention (including recontouring and grading), or until the performance standards identified in the approved MMP have been met, whichever is longer. ◢ As part of the MMP, the project applicant(s) would prepare and submit plans for the creation of aquatic habitat at an adequate mitigation ratio to offset the aquatic functions and services that would be lost at the project site, account for the temporal loss of habitat, and contain an adequate margin of safety to reflect anticipated success. Restoration of previously altered and degraded wetlands would be a priority of the MMP for offsetting losses of aquatic functions and values on the project site because it is typically easier to achieve functional success in restored	

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Impact	Mitigation Measure	Significance After Mitigation
	wetlands than in those created from uplands. The MMP must demonstrate how the aquatic functions and values that would be lost through project implementation will be replaced. ◢ The habitat MMP for jurisdictional wetland features would be consistent with USACE's and EPA's April 10, 2008 Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332 and 40 CFR Part 230). In keeping with these guidelines, mitigation banks would be used to the maximum extent possible for compensatory mitigation for project impacts on aquatic habitats. According to the Final Rule, mitigation banks should be given preference over other types of mitigation because a lot of the risk and uncertainty regarding mitigation success is alleviated by the fact that mitigation bank wetlands must be established and demonstrating functionality before credits can be sold. This also alleviates temporal losses of wetland function while compensatory wetlands are being established. Mitigation banks also tend to be on larger, more ecologically valuable parcels and are subjected to more rigorous scientific study and planning and implementation procedures than typical permittee-responsible mitigation sites (USACE and EPA, 2008). ◢ The project would comply with other laws and regulations protecting waters of the United States and sensitive habitats. If these resources would be affected, permits may be required. Examples of these include a Section 408 permit under the Clean Water Act for work in navigable waters or Section 1600 permit under the California Fish and Game Code for stream or lakebed alteration. All terms and conditions of these permits would be implemented.	

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Impact	Mitigation Measure	Significance After Mitigation
Impact C-3: Loss and Fragmentation of Wildlife Habitat or Plant Community. The future development of renewable energy projects under the proposed regulation change could result in loss, degradation, or fragmentation of common habitats. The WECC service area supports a number of native habitats that are important to wildlife. Large areas of native habitat could be substantially reduced or fragmented on a regional scale due to renewable energy development. The removal, degradation and fragmentation of native habitats is ***potentially significant*.**	Mitigation C-3 All Types of Renewable Energy Development ◢ In order to reduce potential impacts to common native habitats, the lead agency for renewable energy development projects would conduct a project-specific analysis and evaluate the potential impacts to important wildlife habitats and plant communities in accordance with CEQA. ◢ As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for impacts to common native habitats would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to common habitats. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of activities: ▰ Avoiding siting new renewable facilities in areas of important native habitats or fragmenting large areas of contiguous habitat ▰ Minimizing loss of native habitats by designing compact facilities to the extent feasible ▰ Using existing roads for access rather than creating new roadways With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.	LTS
Impact C-4: Interference with Wildlife Movement. The future development of renewable energy projects under the proposed	Mitigation C-4 All Types of Renewable Energy Development ◢ In order to reduce potential impacts to wildlife and fisheries movement corridors, the lead agency for renewable energy	LTS

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
regulation change could interfere with wildlife movement or impede the migration of fish populations. These projects could reduce the ability of terrestrial wildlife populations to move unimpeded through an area. In addition, impacts to aquatic habitat, such as diversion of stream flows, could impede movement of native fishes and aquatic wildlife. This impact is ***potentially significant*.**	development projects would conduct a project-specific analysis and evaluate the potential impacts to movement corridors in accordance with CEQA. ◢ As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for impacts to movement corridors would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of impacts to movement corridors. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of activities: ▰ Avoiding siting new renewable facilities in areas of important movement corridors for native fish or wildlife ▰ Avoid developing areas identified as essential habitat and corridor linkages between wildlands as identified in The California Essential Habitat Connectivity Project (http://www.dfg.ca.gov/habcon/ connectivity/) or other scientifically defensible source such as recovery plans for listed species, federally designated critical habitat maps, or agency management plans. ▰ Provide for passage of native species by designing fish ladders on dams, undercrossing on roadways, or other proven methods to allow for fish and wildlife movement. With implementation of the above mitigation, biological impacts would be reduced to a less-than-significant level.	

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Impact	Mitigation Measure	Significance After Mitigation
Impact C-5: Conflict with adopted HCPs, NCCPs, other conservation plans or other policies to protect natural resources. The future development of renewable energy projects under the proposed regulation change could conflict with adopted HCPs, NCCPs, other conservation plans or other policies to protect natural resources. However, because a project would not be likely to be approved if it was not consistent with these plans, it is assumed that any renewable energy project would be consistent. This impact is ***less than significant*.**	Mitigation C-5 All Types of Renewable Energy Development ◢ In order to reduce potential conflicts with adopted HCPs, NCCPs or other local policies designed to protect biological resources, the lead agency for renewable energy development projects would conduct a project-specific analysis and evaluate the potential conflicts with these plans and policies in accordance with CEQA. ◢ As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for conflicts with adopted plans and policies would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of conflicts. The mitigation should follow the Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009) as applicable. This may include the following types of activities: ▰ Site facilities in a manner that is consistent with the goals and strategies of adopted HCPs, NCCPs, General Plan, or other approved local plan, to the extent feasible. ▰ If plans or policies are applicable to the project and conflicts cannot be avoided, the lead agency will compensate the effects consistent with the conservation plan and policy and implement all applicable measures required by the conservation plan or policy. ◢ California Energy Commission, DFG, USFWS and BLM are developing a Desert Renewable Energy Conservation Plan (DRECP). The geographic area in the DRECP focuses on the Mojave and Colorado Desert bioregions. The goal of DRECP will coordinate and consider desert land uses and activities during the planning process and will identify areas for conservation and	

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Impact	Mitigation Measure	Significance After Mitigation
	declining species management. As the DRECP is developed, renewable energy projects in the Mojave and Colorado Desert bioregions should be coordinate with this planning effort, which may help streamline the approval and permitting process.	
Impact C-6: Loss or conversion of forest land. The future development of renewable energy projects under the proposed regulation change could result in the loss or conversion of forest lands. This impact is ***potentially significant*.**	Mitigation C-7 All Types of Renewable Energy Development ◢ In order to reduce potential impacts to forestry resources, the lead agency for renewable energy development projects would conduct a project-specific analysis and evaluate the potential impacts to forest and timber land in accordance with CEQA. ◢ As part of the CEQA analysis, mitigation to avoid, minimize, and compensate for loss of forest or timberland would be developed by the lead agency. The mitigation would be designed to reduce the magnitude, severity, or duration of the impact. This may include the following types of activities: ▰ Develop compensation for loss of forest consist with lead agency, local government, agencies with regulatory or management authority, or other applicable standards. For example, oak woodland in California is often subject to county policies which require specific compensation and replacement. Compensation may be in the form of replacement plantings at specific ratios or contribution of funds to the Oak Woodlands Conservation Fund, as established under subdivision (a) of Section 1363 of the Fish and Game Code, for the purpose of purchasing oak woodlands conservation easements. ◢ Compile with other laws and regulations pertaining to forests. For removal of trees for commercial timber land (or Timber Production Zone), a Timber Harvest Plan (THP) may need to be prepared.	LTS

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	The THP would provide details on planned logging operations and the steps that will be taken to minimize environmental impacts of these operations. CAL FIRE enforces the laws that regulate logging on privately-owned lands in California, including the Forest Practice Act and rules enacted by the State Board of Forestry and Fire Protection. For federal lands, USFS, BLM, and other federal land managers maintain rules and regulations protecting forest lands.	
	Cultural Resources	
Impact D-1: Adverse Impacts to Cultural Resources from Ground Disturbance. All new renewable energy projects proposed for construction as part of the 33 percent RES no matter their location in-State or out-of-state would have the potential to result in significant impacts to cultural and paleontological resources depending on their location in proximity to cultural resources and their potential to result in ground disturbance. This would be a ***potentially significant*** impact.	Mitigation D-1 Proponents of new renewable energy projects shall: ◢ Coordinate with local land use agencies to seek entitlements for development of the projects including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA).The local land use agency or governing body shall certify that the environmental documents are prepared in compliance with applicable regulations and shall approve the projects for development. ◢ Implement all mitigation identified in the environmental documents to reduce or substantially lessen the environmental impacts of the projects. ◢ Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR Part 61).	SU

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	◢ Seek guidance from the state and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes. ◢ Consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies will provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes. ◢ Define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE should include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access. ◢ Retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontologic Resources: Standard Procedures, Society of Vertebrate Paleontology, 1995 http://www.vertpaleo.org/society/polstateconfomimpactmigig.cfm. ◢ Conduct initial scoping assessments to determine whether proposed construction activities would disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided	

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	by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment should be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements. ◢ The project proponent's qualified paleontological resources specialist should determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossilferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps: ▰ a preliminary survey (if not conducted earlier) and surface salvage prior to construction; ▰ physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries; ▰ monitoring and salvage during excavation; ▰ specimen preparation; ▰ identification, cataloging, curation and storage; and ▰ a final report of the findings and their significance. ◢ Choose sites that avoid areas of special scientific value.	

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	The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33% RES (high and low load conditions).	
Geology, Soils, and Mineral Resources		
Impact E-1: Seismic Hazard Impacts Related Fault Rupture, Ground Shaking, Ground Failure/Liquefaction or Landslides. Strong seismic ground shaking could cause damage to structures and access roads, blocking access and posing safety hazards to people. The CREZs with the greatest risk of seismic hazards are Solano, Tehachapi, Fairmont, and Pisgah because of their close proximity to major active faults and/or crossing of Alquist-Priolo Earthquake Fault Zones. The specific design details, siting	Mitigation E-1 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Prior to the issuance of any development permits, proponents for the proposed renewable energy projects shall prepare a geotechnical investigation/study, which shall include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, minerals resources and	SU

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Impact	Mitigation Measure	Significance After Mitigation
locations, and seismic hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the risk of impact to the proposed project due to strong seismic ground shaking would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).	the presence of hazardous materials. ◢ Proponents shall provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents shall avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible. ◢ Proponents shall submit a draft Notice of Intent and a draft Storm Water Pollution Prevention Plan (SWPPP) to the State Water Resources Control Board (SWRCB) or RWQCB for advance review. Ensure the SWPPP is prepared by a qualified consultant. If the facility will be subject to the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Construction Permit), ensure the plan addresses the latest SWRCB requirements and is submitted to the SWRCB. Structures and/or facilities shall be designed to meet all applicable Federal, State and local regulations. If found to be situated in areas where seismic hazards cannot be mitigated to less-than-significant levels subsequent to the findings of the required geotechnical investigations and implementation of the applicable engineering standards, the affected structures and/or facilities shall be relocated. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant	

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Impact	Mitigation Measure	Significance After Mitigation
	geology, soils, and mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Impact E-2: Substantial soil erosion or the loss of topsoil. All identified CREZs are susceptible, although not all areas within any particular CREZ would exhibit similar vulnerability. The specific design details, siting locations, and soil erosion hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential soil erosion hazard impacts would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).	Mitigation E-2 Implement Mitigation E-1. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).	SU

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Impact	Mitigation Measure	Significance After Mitigation
Impact E-3: Unstable Geologic Unit or Soil Impacts. Proposed renewable energy projects located within the identified CREZ's and transmission footings for lines along delivery routes could be potentially located on a geologic unit or soil that is unstable, or would become unstable as a result of the project, and potentially could result in on- or off-site landslide, subsidence, liquefaction or collapse. The specific design details, siting locations, and soil stability hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential soil stability hazard impacts would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).	Mitigation E-3 Implement Mitigation E-1. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be *significant and unavoidable* for all renewable energy types under the 33 percent RES (high and low load conditions).	SU
Impact E-4: Adverse Impacts from Construction on Expansive Soil. All proposed CREZs are potentially susceptible to the	Mitigation E-4 ◢ Implement Mitigation E-1. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the	SU

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Impact	Mitigation Measure	Significance After Mitigation
presence of expansive soils particularly in areas of fine-grained sediment accumulation typically associated with playas, valley bottoms, and local low-lying areas. The specific design details, siting locations, and expansive soil hazards for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, the potential expansive soil impacts would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).	renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Impact E-5: Adverse Soils Impacts from Septic Tanks or Alternative Waste Water Disposal Systems. The soils in the identified CREZs could support materials that would not be able to adequately support septic tanks or alternative wastewater disposal systems. The specific design details, siting locations, and hazards for a particular renewable energy project	Mitigation E-5 Implement Mitigation E-1. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant***	SU

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Impact	Mitigation Measure	Significance After Mitigation
are not known at this time. Therefore, for purposes of this analysis, the impacts related to adequately supporting septic tanks or alternative wastewater disposal systems would be considered ***potentially significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).	***and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Impact E-6: Loss of Mineral Resource of Value to Region and the Residents of the State and Loss of Locally Important Mineral Resources. All identified CREZs support mines or other regionally or locally important mineral resources. The specific design details, siting locations, and regionally or locally significant mineral resources for a particular renewable energy project are not known at this time. Therefore, for purposes of this analysis, because mineral resources could be affected with implementation of renewable energy projects, this impact would	Mitigation E-6 Implement Mitigation E-1. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant mineral resource impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	SU

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be considered *potentially significant* for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).		
Hazards and Hazardous Materials		
Impact G-1: Routine transport, use or disposal of hazardous materials. Because the proposed renewable energy facilities would generally be located substantial distances from highways, major developments, and other sensitive receptors, and the proposed renewable energy facilities would be required to comply with all appropriate Federal, State, and local laws regarding the transportation of hazardous materials, the risk of impact to the proposed project due to routine transport, use or disposal of hazardous materials would be ***less than significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).		LTS

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Impact	Mitigation Measure	Significance After Mitigation
Impact G-2: Upset and accident conditions involving the release of hazardous materials into the environment. The project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. This would be a ***potentially significant*** impact under the 20 percent RPS and 33 percent RES (low and high load conditions).	Mitigation G-2 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. ◢ Handling of potentially hazardous materials/wastes should be performed under the direction of a licensed professional with the necessary experience and knowledge to oversee the proper identification, characterization, handling and disposal or recycling of the materials generated as a result of the project. As wastes are generated, they shall be placed, at the direction of the licensed professional, in designated areas that offer secure, secondary containment and/or protection from stormwater runoff. Other forms of containment may include placing waste on plastic sheeting (and/or covering with same) or in steel bins or other suitable containers pending profiling and disposal or recycling. ◢ The temporary storage and handling of potentially hazardous materials/wastes should be in areas away from sensitive receptors such as schools or residential areas. These areas should be secured with chain-link fencing or similar barrier with controlled	SU

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	access to restrict casual contact from non-Project personnel. All project personnel that may come into contact with potentially hazardous materials/wastes will have the appropriate health and safety training commensurate with the anticipated level of exposure. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant hazards and hazardous material impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be significant and unavoidable for all renewable energy types under the 33% RES (high and low load conditions).	
Impact G-3: Hazardous emission release within one quarter mile of a school. No school facilities are located within ¼-mail of any of the proposed CREZs. Therefore, this would be a ***less-than-significant*** impact under the 20 percent RPS and 33 percent RES (low and high load conditions).		LTS

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Impact G-4: Location within an area that is included on a hazardous materials list compiled pursuant to Government Code Section 65962.5. Proposed renewable energy projects located within the identified CREZ's are not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would not create a significant hazard to the public or the environment. As a result, the proposed project would have *no impact* for all renewable energy project types under the 33 percent RES (low and high load conditions).		LTS
Impact G-5: Hazards associated with proximity to a public or private airport or location within an Airport Land Use Plan. No public or private airports are located within 2 miles of any of the proposed CREZs and not airport land use plans would apply to the CREZs. Therefore, implementation		LTS

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of renewable energy projects would result in ***less-than-significant*** hazard impacts under the 20 percent RPS and 33 percent RES (high and low load conditions).		
Impact G-6: Conflicts with an adopted emergency response plan. Proposed renewable energy projects would be subject to local land use approvals, which would ensure that the proposed facilities provide adequate emergency response and access to and from the site. Therefore, implementation of renewable energy projects would result in ***less-than-significant*** emergency response plan impacts under the 20 percent RPS and 33 percent RES (low and high load conditions).		LTS
Impact G-7: Wildland fire risk. Proposed renewable energy projects would be required to use construction/maintenance equipment with appropriate spark-suppression controls and would be required to provide adequate fire		LTS

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Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
suppression facilities onsite. Therefore, wildland fire risks would be ***less than significant*** for all renewable energy project types under the 20 percent RPS and 33 percent RES (low and high load conditions).		
Hydrology, Water Quality, and Water Supply		
Impact H-1: Potential Operations-Related Effects to Groundwater Hydrology and Water Supply. Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the energy generation facilities constructed under the 33 percent RES that would likely rely on groundwater resources for steam generation, evaporative cooling, washing of solar panels, dust control, and domestic use by the workforce. In areas where groundwater resources are limited, reliance on groundwater has the potential to result in net lowering of groundwater levels and adversely affect resources on offsite properties. Therefore, the impact to	Mitigation H-1 ◢ As part of the subsequent project-level planning and environmental review for solar thermal, solar photovoltaic, geothermal, and biogas facilities, the project proponent shall coordinate with the local county groundwater management authority and prepare a detailed hydrogeologic analysis of the potential project-related effects on groundwater resources prior to issuance of any permits. The proponent shall mitigate for identified adverse changes to groundwater by incorporating technically achievable and feasible modifications into the project to avoid offsite groundwater level reductions, use alternative technologies or changes to water supply operations, or otherwise compensate or offset the groundwater reductions that occur to offsite properties. Consistent with state policies, the feasibility of using alternative water sources, such as treated municipal wastewater, shall be considered for use as source water for non-consumption purposes. The feasibility of alternative energy unit cooling methods should be considered that use less water, such as dry cooling methods. A program of monitoring and adaptive management during project implementation should be considered	SU

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
groundwater resources is considered ***potentially significant*** under the 20 percent RPS and 33 percent RES (high and low load scenarios).	to evaluate the effects of the project and effectiveness of mitigation actions. ◢ For any planned use of water, identify the water sources, legal entitlements, water rights, adequacy of capacity to serve project demands while maintaining aquatic and riparian resources, quantity of water used for project construction and operational needs, and water discharges, including but not limited to construction, systems testing, and process and cooling needs. ◢ Where a groundwater well is proposed to be drilled or used, submit an application to the appropriate local jurisdiction for a permit. Where use of surface water is proposed for industrial purposes, provide a “will serve” and an approved water service agreement with applications to appropriate lead agencies. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Further, because the quantity and location of suitable groundwater resources in the arid western United States, particularly in desert regions, can be highly variable, the technical and economic feasibility of the mitigation to avoid and minimize potential offsite groundwater effects is uncertain. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33% RES (high and low load conditions).	

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Table S-1
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Impact	Mitigation Measure	Significance After Mitigation
Impact H-2: Potential Construction- and Operations-Related Effects to Stormwater Drainage and Flooding Hazards. Relative to existing conditions and the 20 percent RPS, there would be a substantial increase in the energy generation facilities constructed under the 33 percent RES that may create new compacted or paved impervious surfaces that would increase the amount of stormwater runoff. Additional stormwater runoff may contribute to localized drainage-related problems such as increased drainage channel flows and streamflows, potential increases or exceedances of channel capacities leading to flooding, increased erosion and sedimentation, or damage from inundation of property and structures from increased drainage volumes. Facilities that encroach on floodplains may contribute to increased floodwater elevations and exposure of people to flood hazards. Therefore, the impact to stormwater drainage and flooding	Mitigation H-2 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project shall prepare a stormwater drainage and flood control analysis and management plan. The plans shall be prepared by a qualified professional and shall summarize existing conditions and the effects of project improvements, shall include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to protection downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features shall be designed to ensure no change in existing downstream flow conditions that would result in new or increased severity of offsite flooding. ◢ Establish drainage performance criteria for off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious areas; (b) maximizing	SU

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
hazards is considered ***potentially significant*** under the 20 percent RPS and 33 percent RES (high and low load scenarios).	permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the system design. ◢ The project proponent shall design and construct new facilities to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs shall be approved by the local land use agency. The project proponent shall also consult with the appropriate flood control authority on the design of offsite stream crossings such that the minimum elevations are above the predicted surface-water elevation at the agency's designated design peak flows. Drainage and flood prevention features shall be inspected and maintained on a routine schedule specified in the facility plans, and as specified by the county authority. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
Impact H-3: Temporary Construction-Related Water Quality Effects. Project-related construction activities for renewable energy facilities implemented in response to the RES have the potential to result in temporary soil erosion, discharges of construction-related contaminants, and off-site transport of wastes in stormwater runoff. Therefore, the potential construction-related impact to water quality is considered ***potentially significant*** under the 20 percent RPS and 33 percent RES (high and low load conditions).	Mitigation H-3 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project shall comply with applicable construction grading and erosion control ordinances. Additionally, in compliance with the requirements of the SWRCB general NPDES stormwater permit for construction (Order No. 2009-0009-DWQ), the project proponent shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and identify and implement construction-related BMPs to avoid and minimize erosion and contaminant runoff. The SWPPP describes the site, erosion and sediment controls, means of waste disposal, control of post-construction sediment and erosion control measures and maintenance responsibilities, water quality monitoring and reporting during storm events, corrective actions for identified water quality problems and non-storm water management controls. These measures included in the SWPPP shall ensure compliance with applicable regional, state and federal water quality standards. The project proponent shall obtain authorization under the statewide NPDES stormwater permit for general	SU

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	construction activity (or via local agency if construction activity is managed locally) before beginning work. ◢ Construction BMPs shall include, but may not be limited to the following: ▰ Limit construction access routes and stabilize access points; ▰ Stabilize denuded areas with seeding, mulching or other methods; ▰ Stake/mark construction limits; ▰ Designate specific areas of the site, away from storm drain inlets and drainage features for the storage, preparation and disposal of construction materials, chemical products and waste; for auto equipment parking; and for routine vehicle and equipment maintenance; ▰ Store stockpiled materials and wastes under a roof or plastic sheeting; berm around stockpile/storage areas to prevent contact with runoff; ▰ Perform major maintenance, repair and vehicle and equipment washing offsite or in designated and controlled areas on-site; ▰ Sweep up spilled dry construction materials (cement, fertilizer, etc.) immediately; water would not be used to wash them away; and ▰ Clean up liquid spills on paved or impermeable surfaces using "dry" clean-up methods (e.g. absorbent materials, cat litter, rags) and dispose of clean-up materials properly. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the	

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33% RES (high and low load conditions).	
Impact H-4: Long-term Operations-Related Effects to Surface and Groundwater Quality. Long-term operations-related discharges from renewable energy facilities implemented in response to the RES that use steam power for energy generation (solar thermal, geothermal, solid-fuel biomass, and biogas) have the potential to result in discharges of contaminants in stormwater runoff from industrial activity, and from cooling water discharges to surface water bodies. Therefore, the operations-related impact to water quality is considered to be ***potentially significant*** under the 20 percent RPS and 33 percent	**Mitigation H-4** ◢ Project proponents of solar thermal, geothermal, solid-fuel biomas, biogas proposed renewable energy projects shall comply with the requirements of the SWRCB general NPDES stormwater permit for industrial activity (Order 97-003-DWQ) and shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and identify and implement BMPs to avoid and minimize contaminant runoff from the industrial sites. The SWPPP shall describe the site, and proposed BMPs for contaminant storage and handling controls, stormwater runoff management and treatment, non-storm water management controls, waste disposal measures, water quality monitoring and reporting during storm events, and corrective actions for identified water quality problems. BMPs in the SWPPP shall be implemented to avoid and minimize contaminant discharges offsite, and ensure compliance with applicable state and federal water quality standards. ◢ Project proponents of solar thermal, geothermal, solid-fuel biomas, biogas proposed renewable energy projects shall comply prepare a Report of Waste Discharge (ROWD) for authorization of an	SU

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Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
RES (high and low load conditions).	individual NPDES discharge permit. The effects of the discharge of cooling water to the receiving water shall be evaluated by a qualified professional to assess the potential effects to aquatic life. The allowable discharge operations shall be identified that are necessary to avoid adverse effects to the receiving water beneficial uses. Such measures may include, but not be limited to: (a) controlling the allowable temperature in the discharge; and (b) stipulating the configuration of the allowable size, location, and required dilution of the discharge at the point of discharge to the stream. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce this impact, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce these impacts to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33% RES (high and low load conditions).	
Land Use Planning and Agricultural Resources		
Impact I-1: Physically divide an existing community. Depending upon the resource type, implementation of industrial scale renewable energy projects required to achieve compliance with the RES	Mitigation I-1 Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with existing land uses, including but not limited to existing communities, municipal uses, commercial and industrial operations, and sensitive lands, including wildlife habitat.	LTS

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Impact	Mitigation Measure	Significance After Mitigation
would be constructed on large tracts of land, which may be removed from existing urbanization. Smaller-scale projects would also need to be appropriately sited, with sufficient land available for equipment, transmission, and support facilities. As such it is unlikely that renewable electricity projects would physically divide an existing community. Therefore, this impact is ***less than significant*.**		
Impact I-2: Conflict with Land Use Plans, Policies or Regulations. Implementation of the proposed 33 percent RES would likely result in conflicts with certain applicable land use plans, policies, or regulations of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect. Therefore, impacts related to conflict with land use plans, policies, and regulations	Mitigation I-2 ◢ Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with land use plans, policies, and regulations of any agency with jurisdiction over the project, including general plans, specific plans, and zoning ordinances. ◢ Comply with ordinances, regulations and standards including the Subdivision Map Act, California Land Conservation Act, and local permitting requirements. ◢ Meet with local agencies and elected officials before filing permit or approval applications to ensure that the project is to be located on land zoned appropriately with no zoning, land use, or height restrictions. Include a statement from the local agency and the governing body that they have reviewed the proposed project and that it would be consistent with General Plan, zoning ordinances, and height restrictions. If a conditional use permit is required by the local agency, include a copy of the conditional use permit	LTS

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are potentially ***significant.***	application with applications to lead agencies. Processing of applications for projects requiring land use designation changes will likely be delayed. ◢ Consult the Office of Planning and Research mapping tool to identify whether their proposed project is located in the vicinity of military bases and military airspace. This mapping tool will help developers comply with legislation that requires the military to be notified of certain development applications and general plan actions. ◢ DOD entities request early notification with the military on proposed energy development to provide an opportunity for DOD to address potential concerns with the proposed energy development project as it may relate to current and future military testing and training missions to include, but not limited to: Military Operating Areas; Military Training Routes; air space; Special Use Airspace; airfield surfaces; Terminal Operations; air and ground safety operations; Remote Support Sites (radars, microwaves and communications towers); and installation access. ◢ If the BLM Resource Management Plan must be amended, include a completed BLM application. ◢ Provide U.S. Census Bureau data to determine whether the facility would be located within a two-mile radius of a minority population or a population where fifty percent or more of the residents have an income below the poverty level. ◢ Ensure the proposed facility site contains adequate area for construction laydown and staging, parking for construction and operation worker vehicles and site traffic circulation aisles).	

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Impact	Mitigation Measure	Significance After Mitigation
Impact I-3: Conflict with applicable Habitat Conservation Plan or Natural Communities Conservation Plan. Implementation of renewable electricity projects necessary for compliance with the proposed 33 percent RES could result in conflicts with an applicable habitat conservation plan or natural community conservation plan. Coordination with DFG, USFWS and other appropriate resource agencies, and implementation of mitigation I-3 and I-6 would reduce the severity of such impacts. Therefore, potential HCP/NCCP conflicts would be ***less than significant.***	Mitigation Measure I-3 Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with any habitat conservation plan (HCP) or natural communities conservation plan (NCCP). Appropriate consultation and coordination with agencies with jurisdiction by law over biological resources, including but not limited to the California Department of Fish and Game and U.S. Fish and Wildlife Service, shall be conducted.	LTS
Impact I-5: Conversion of Designated Farmland. Implementation of the proposed 33 percent RES could result in the conversion Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and	Mitigation Measure I-4 ◢ Renewable electricity projects shall be designed and sited so as to avoid or minimize impacts to, and conversion to non-agricultural uses of prime farmland, unique farmland, and farmland of Statewide importance, as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. ◢ On privately-owned lands, assess the impacts of the proposed project on agriculture, farmland, and grazing operations through	LTS

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Impact	Mitigation Measure	Significance After Mitigation
Monitoring Program of the California Resources Agency, to nonagricultural uses or involve other changes in the existing environment, which, due to their location, could result in the conversion of farmland to non-agriculture uses. Therefore, impacts to designated farmlands would be potentially ***significant.***	use of the California Agricultural Land Evaluation and Site Assessment model. Develop feasible measures to reduce the significance of impacts. Project developers should avoid when possible, the conversion of Prime Farmland, Unique Farmland or farmland of Statewide Importance, or lands under a current Williamson Act contract.	
Impact I-5: Conflict with Existing Agricultural Zoning or Williamson Act Contract. Implementation of projects necessary for compliance with the proposed 33 percent RES have the potential to conflict with existing zoning for agricultural use or a Williamson Act contract. Therefore, impacts to designated farmlands would be ***potentially significant.***	Mitigation Measure I-5 Renewable electricity projects shall be designed and sited so as to avoid or minimize conflicts with lands zoned for agriculture and lands under Williamson Act Contracts.	LTS
Noise		
Impact J-1: Impacts to Sensitive Receptors from Project-Generated Short-Term Construction and Long-Term Operational Noise (and Vibration) Levels. Construction and	**Mitigation J-1** ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA).	SU

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Impact	Mitigation Measure	Significance After Mitigation
operation of new renewable energy and transmission projects could result in substantial increases in ambient noise levels and expose persons to or generate noise levels in excess of applicable standards. Because the specific noise (and vibration) impacts of the 33 percent RES cannot be identified with any certainty, and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, this impact is considered *potentially significant* under the 20 percent RPS and 33 percent RES.	The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. ◢ Comply with local plans, policies, and ordinances regarding acceptable noise and vibration levels. ◢ Ensure noisy construction activities (including truck deliveries, pile driving and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors. ◢ Consider use of noise barriers such as berms and vegetation to limit ambient noise at property lines, especially where sensitive receptors may be present. ◢ Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment. ◢ All construction equipment used shall be adequately muffled and maintained. ◢ Consider use of battery powered forklifts and other facility vehicles. ◢ Ensure all stationary construction equipment (i.e., compressors and generators) is located as far as practicable from nearby sensitive receptors.	

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	◢ If blasting or other noisy activities are required during the construction period, notify nearby sensitive receptors and the permitting agencies 24 hours in advance. ◢ Properly maintain mufflers, brakes and all loose items on construction and operational-related vehicles to minimize noise and ensure safe operations. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum. ◢ Use noise controls on standard construction equipment; shield impact tools. ◢ Consider use of flashing lights instead of audible back-up alarms on mobile equipment. ◢ Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines. ◢ Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels. ◢ Contain facilities within buildings or other types of effective noise enclosures. ◢ Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant	

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Impact	Mitigation Measure	Significance After Mitigation
	impacts associated with the provision of water, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Impact J-2: Impacts to People Residing or Working in the Project Area from Exposure to Excessive Airport-Related Noise Levels. This impact would only apply to projects that may be constructed near airports. Because the specific noise (and vibration) impacts of new renewable projects cannot be identified with any certainty, and these projects could potentially result in exposure of new workers to noise levels in excess of standards for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level Therefore, this impact is considered ***potentially significant*** for all renewable energy types under the 33 percent RES (high and low load).	Mitigation J-2 Implement Mitigation J-1 above. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with the provision of water, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	SU

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Impact	Mitigation Measure	Significance After Mitigation
Recreation		
Impact K-1: Impact to Recreation Resources, Opportunities, or Uses. The construction of substantial additional renewable generation and transmission capacity in California and the Western U.S. would occur as a result of the RES, with much of it expected to be on public land. Public land in the West currently supports extensive recreation resources and use. The potential exists to directly disrupt, indirectly interfere with use of, or reduce the recreation resource qualities and availability of public lands. Also, new renewable energy generation and transmission facilities could directly disrupt, indirectly interfere with use of, or reduce the recreational resource qualities of private land occupied by or located near renewable energy projects. While the specific location of projects cannot be identified with any certainty, the magnitude of increased renewable energy	Mitigation K-1 ◢ Proponents for proposed renewable energy projects shall coordinate with Federal, State, and regional/local land management agencies with responsibilities for providing outdoor recreation opportunities where facilities are proposed on land supporting outdoor recreation resources, opportunities, or use. If facilities would displace, disrupt, reduce access to, or otherwise adversely affect recreation resources, opportunities, or use, the project siting and/or design shall be modified to the extent feasible to avoid or minimize the impact. Proponents shall also consult with affected outdoor recreation user groups. The information demonstrating that all feasible measures are being taken to avoid or minimize the recreation impact shall be included in the necessary environmental review (i.e., CEQA and/or NEPA). For proposed renewable energy project that would indirectly reduce the recreation resource qualities of public lands, as part of the public involvement process for environmental reviews of proposed renewable energy projects, proponents shall consult with affected land management agencies with recreation responsibilities and affected outdoor recreation user groups to identify and implement potential, feasible mitigating solutions. The proponents and land management agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation for recreation impacts. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with recreation	SU

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Impact	Mitigation Measure	Significance After Mitigation
facilities could result in significant recreational impacts. This impact is considered ***potentially significant*** for all renewable energy types under the 33 percent RES (high and low load).	resources, opportunities, and use, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Public Services, Utilities, and Solid Waste		
Impact L-1: Impacts to Public Services, Utilities, and Solid Waste Services. Because the specific public service, utilities, and solid waste impacts of renewable electricity projects needed to comply with the 33 percent RES cannot be identified with any certainty, and these projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, for purposes of this analysis, this impact is considered ***potentially significant*** for all renewable energy types under the 33 percent RES (high and low load).	Mitigation L-1 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. ◢ Comply with local plans and policies regarding the provision of public service, utilities, and solid waste services. ◢ Where an on-site septic treatment system is proposed, submit a permit application to the appropriate local jurisdiction and include the application with applications to appropriate lead agencies. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the	SU

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Impact	Mitigation Measure	Significance After Mitigation
	renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with the provision of public services and utilities, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Impact L-2: Water Supply Impacts. Because the specific water supply impacts of renewable electricity projects needed to comply with the 33 percent RES cannot be identified with any certainty and the renewable energy projects could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, for purposes of this analysis, this impact is considered ***potentially significant*** for all renewable energy types under the 33 percent RES (high and low load)**.**	Mitigation L-2 ◢ Implement Mitigation L-1. ◢ Where appropriate, prepare as Water Supply Assessment (WSA) consistent with the requirements of Section 21151.9 of the Public Resources Code/ Section 10910 et seq. of the Water Code. The WSA shall be approved by the local water agency/purveyor prior construction of the project. ◢ Comply with local plans and policies regarding the provision of wastewater treatment services. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts associated with the provision of water, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant	SU

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Impact	Mitigation Measure	Significance After Mitigation
	level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	
Impact L-3: Exceed Wastewater Treatment Requirements. Renewable energy projects that would be served by a municipal wastewater service provider or would operate individual septic systems or on-site wastewater treatment plants would not be anticipated to exceed wastewater treatment requirements because the treatment facilities would operate under approved wastewater treatment requirements and would be monitored by appropriate regulatory agencies to ensure compliance. Therefore, this impact would be ***less than significant***.		LTS
Impact L-4: Violate Solid Waste Regulations. All renewable energy projects would be provided solid waste services from an appropriately certified local provider that would haul the solid waste to		LTS

NI = No Impact LTS = Less than Significant PS=Potentially Significant S=Significant SU= Significant and Unavoidable MM = Mitigation Measure

Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
an approved and permitted disposal facility. None of the renewable energy projects (in-State or out-of-state) would be anticipated to result significant impacts related to violation of solid waste regulations. Therefore, this impact would be ***less than significant***.		
Transportation and Traffic		
Impact M-1: Project-Generated Short-Term Construction and Long-Term Operational Impacts to Transportation and Traffic. New renewable electricity and transmission projects could result in substantial construction traffic, but are expected to result in generally moderate operational traffic. However, because the specific transportation and traffic impacts of the 33 percent RES cannot be identified with any certainty, and these projects could potentially result in significant environmental impacts (e.g., conflict with applicable programs, plans, ordinances, or policies; result in a change in air traffic patterns;	Mitigation M-1 ◢ Proponents for the proposed renewable energy project shall coordinate with local land use agencies to seek entitlements for development of the project including completing all necessary environmental review requirements (e.g., CEQA and/or NEPA). The local land use agency or governing body shall certify that the environmental document was prepared in compliance with applicable regulations and shall approve the project for development. ◢ Based on the results of the environmental review, proponents shall implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. ◢ Minimize the number and length of access, internal, service and maintenance roads and use existing roads when feasible. ◢ Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements, in coordination with applicable	SU

NI = No Impact LTS = Less than Significant PS=Potentially Significant S=Significant SU= Significant and Unavoidable MM = Mitigation Measure

Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
substantially increase hazards due to a design feature; result in inadequate emergency access) for which it is unknown whether mitigation would be available to reduce the impact to a less-than-significant level, this impact is considered ***potentially significant*** for all renewable energy types under the 33 percent RES (high and low load).	federal, state, and local transportation agencies. ◢ If new roads are necessary prepare a road siting plan and consult standards contained in federal, state, or local requirements. The plans should include design and construction protocols to ensure roads will meet the appropriate standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and minimize side-hill cuts. Roads internal to a project site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils. ◢ Prepare a Construction Traffic Control Plan and a Traffic Management Plan. ◢ If railroad crossings need improvements to provide for safe crossing, consult with the appropriate railroad and CPUC for permitting requirements. ◢ Meet with the local Airport Land Use Commission. In applications to appropriate lead agencies, provide a copy of a letter stating that the proposed project is compatible with the Airport Land Use Compatibility Plan. The following locations and design features may contribute to a decision that the facility is incompatible with operations of a nearby airport: ▰ Siting the facility within 20,000 feet (3.8 miles) of a runway that is at least 3,200 feet in actual length, or 5,000 feet from a heliport.	

NI = No Impact LTS = Less than Significant PS=Potentially Significant S=Significant SU= Significant and Unavoidable MM = Mitigation Measure

Table S-1
Summary of Environmental Impacts and Mitigation Measures

Impact	Mitigation Measure	Significance After Mitigation
	▰ Locating any portion of a facility within a designated airport safety zone, airport influence area or airport referral area. ▰ Introducing a thermal plume, visible plume, glare, or electrical interference into navigable airspace on or near an airport. ▰ Proposing a structure that will exceed 200 feet in height above ground level. ◢ Consult with FAA regarding the heights of the project structures and avoid conflicts with aviation. Design the project to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports or landing strips. ◢ Complete FAA Form 7460, provide to FAA and include a copy in applications to appropriate lead agencies. ◢ Consult with representatives from the appropriate military installation for projects to be located under aircraft low fly zones. Design the project to address military concerns. The proponents and local land use agencies can and should be the parties responsible for the approval and implementation of the renewable energy project and its mitigation. ARB is not a land use agency and would not be responsible for ensuring that this mitigation is implemented. While mitigation is recommended to reduce significant impacts, it is unknown at this time whether feasible mitigation is available, or if available, if this mitigation would be able to reduce the impact to a less-than-significant level. Therefore, for purposes of this analysis, this impact is concluded to be ***significant and unavoidable*** for all renewable energy types under the 33 percent RES (high and low load conditions).	

NI = No Impact LTS = Less than Significant PS=Potentially Significant S=Significant SU= Significant and Unavoidable MM = Mitigation Measure

XI. REFERENCES

II. Project Description

BLM. 2005. Final Programmatic Environmental Impact Statement of Wind Energy Development on BLM-Administered Lands in the Western United States, Volume 1 Main Text. (June).

California Energy Commission (CEC), 2005a, *California Geothermal Resources, Staff Report*, April 2005, CEC-500-2005-070.

California Energy Commission (CEC), 2005b, *California Solar Resources, Staff Report*, April 2005, CEC-500-2005-072-D.

California Energy Commission (CEC), 2006, *A Preliminary Roadmap for the Development of Biomass in California, PIER Collaborative Report*, December 2006, CEC-500-2006-095-D.

California Energy Commission (CEC), 2009, *2009 Integrated Energy Policy Report*, Final Commission Report, December 2009, CEC-100-2009-003-CMF.

III. Impact Assessment

III.A Aesthetics

California Department of Transportation, California State Scenic Highway Mapping System, available at: http://www.dot.ca.gov/hq/LandArch/scenic_highways/index.htm (last updated December 7, 2007)

California Energy Commission, Draft EIS and Draft Desert Area Conservation Plan Amendment for the SES Solar Two Project, February, 2010, available at: http://www.energy.ca.gov/sitingcases/solartwo/documents/index.html

California Energy Commission, Final Staff Assessment (Part 1), Salton Sea Geothermal Unit #6 Power Project, 2003, available at: http://www.energy.ca.gov/sitingcases/saltonsea/documents/

California Energy Commission, Final Staff Assessment (Part 2), Salton Sea Geothermal Unit #6 Power Project, 2003, available at: http://www.energy.ca.gov/sitingcases/saltonsea/documents/

California Energy Commission, Final Staff Assessment, Beacon Solar Energy Project. *Application for Certification (08-AFC-2),* 2009, available at: http://www.energy.ca.gov/sitingcases/beacon/documents/

California Energy Commission, Final Staff Assessment, Ivanpah Solar Electric Generating System. *Application for Certification (07-AFC-5),* 2009, available at: http://www.energy.ca.gov/sitingcases/ivanpah/index.html

California Energy Commission, Preliminary Staff Assessment, Carrizo Energy Solar Farm, Application for Certification (07-AFC-8), November 2008, available at: http://www.energy.ca.gov/sitingcases/carrizo/documents/

California Energy Commission, Preliminary Staff Assessment, Volume 2, Palmdale Hybrid Power Project, February 2010, available at: http://www.energy.ca.gov/sitingcases/palmdale/documents/

California Public Utilities Commission, Development Plan for the Phased Expansion of the Transmission in the Tehachapi Wind Resource Area, Report of the Tehachapi Collaborative Study Group, OII 00-11-001, March 16, 2005, available at: http://docs.cpuc.ca.gov/Published/Graphics/48819.pdf

Imperial County, General Plan, Conservation and Open Space Element, 1993, available at: http://www.icpds.com/CMS/Media/Conservation-and-Open-Space-Element.pdf

Kern County, Alta Oak Creek Mojave Project, Draft Environmental Impact Report, August 2009, available at: http://www.co.kern.ca.us/planning/pdfs/eirs/AltaOakCreek/AltaOakCreek_Ch4-1.pdf

Los Angeles County, General Plan, Conservation and Open Space Element, 2008, available at: http://planning.lacounty.gov/assets/upl/project/gp_web-ch06.pdf

RETI Stakeholder Steering Committee, Renewable Energy Transmission Initiative Phase 1A Final Report, May 16, 2008 (prepared by Black and Veatch), available at: http://www.energy.ca.gov/2008publications/RETI-1000-2008-002/RETI-1000-2008-002-F.PDF

Shasta County Department of Resource Management, Draft Environmental Impact Report for the Hatchet Ridge Wind Project, December 2007, available at: http://www.co.shasta.ca.us/departments/resourcemgmt/drm/Hatchet%20Ridge/Hatchet%20Ridge.htm

U.S. Bureau of Land Management, Draft Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States, May 2008, available at: http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide/Documents/draft_programmatic.html

U.S. Bureau of Land Management, Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-administered Land in the Western United States, June 2005, available at: http://windeis.anl.gov/documents/fpeis/index.cfm

U.S. Department of Energy-U.S. Bureau of Land Management, Final Programmatic EIS, Designation of Energy Corridors on Federal Lands in the 11 Western States, November 2008, available at: http://corridoreis.anl.gov/documents/fpeis/vol1/WWEC_FPEIS_FrontI.pdf

U.S. Department of Energy-U.S. Bureau of Land Management, Staff Assessment and Draft Environmental Impact Statement, Blythe Solar Power Project, March 2010, available at: http://www.energy.ca.gov/2010publications/CEC-700-2010-004/CEC-700-2010-004.PDF

III.B Air Quality

U.S. Environmental Protection Agency. 2010. Air Data. Available: http://www.epa.gov/ air/data/. Accessed May 27, 2010.

III.C Biological and Forestry Resources

Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006.* Edison Electric Institute, APLIC, and the California Energy Commission, Washington D.C. and Sacramento, CA.

BLM. *See* Bureau of Land Management.

Boarman, W. I. 2003. Managing a Subsidized Predator Population: Reducing Common Raven Predation on Desert Tortoises. Environmental Management 32: 205-217.

Bureau of Land Management. 2005. Final Programmatic EIS on Wind Energy Development on BLM-administered Land in the Western United States, June 2005. http://windeis.anl.gov/documents/fpeis/index.cfm

Bureau of Land Management. 2008. *Draft Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States*, May 2008 http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide/Documents/draft_programmatic.html

Bureau of Land Management. 2009. *Proposed Resource Management Plan and Final Environmental Impact Statement for Carrizo Plain National Monument*. Prepared by the BLM Bakersfield Office. October 2009. DOI Control Number: FES 09-24

California Biomass Energy Alliance. 2010. White Paper. *Removal of Excess Biomass from Forest Lands is Independent of Logging Operations*. Available: <http://www.calbiomass.org/technical2.htm >. Accessed: May 17, 2010.

California Energy Commission. 2006 (December). A Preliminary Roadmap for the Development of Biomass in California, PIER Collaborative Report. Publication No.: CEC-500-2006-095-D.

California Energy Commission. 2009. *Best Management Practices & Guidance Manual: Desert Renewable Energy Projects.* Draft Staff Report. Prepared by California Energy Commission, Department of Fish and Game, Bureau of Land Management, and U.S. Fish and Wildlife Service. October 2009. CEC-700-2009-016-SD

California Energy Commission. 2010a. *Draft EIS and Draft Desert Area Conservation Plan Amendment for the SES Solar Two Project,* February 2010. http://www.energy.ca.gov/sitingcases/solartwo/documents/index.html

California Energy Commission. 2010b (January). *Biomass to Energy: Forest Management for Wildfire Reduction, Energy Production, and Other Benefits, PIER Final Project Report*. Prepared by USDA Forest Service, Pacific Southwest Research Station. Albany, California. Publication No.: CEC-500-2009-080.

California Energy Commission and California Department of Fish and Game. 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.* Commission Final Report. California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. CEC-700-2007-008-CMF. Available at http://www.energy.ca.gov/2007publications/CEC-700-2007-008/CEC-700-2007-008-CMF.PDF

California Forest Products Commission. 2008 (October). Fact Sheet. Biofuel From Wood: A Sustainable Energy Source. Available: <http://www.foresthealth.org/pdf/BiofuelsfromWoodSustainableEnergySourceOct.2008.pdf>. Accessed: May 17, 2010.

California Natural Diversity Database. 2010 [February]. *List of sensitive natural communities.* Rarefind (Version 3.1.1: A Database Application for the Use of the California Department of Fish and Game's Natural Diversity Database. California Natural Heritage Division, California Department of Fish and Game, Sacramento, CA.

CEC. *See* California Energy Commission.

CNDDB. *See* California Natural Diversity Data Base.

California Public Utilities Commission and U.S. Forest Service. 2009. *Southern California Edison's Tehachapi Renewable Transmission Project EIR*, SCH No: 2007081156 ftp://ftp.cpuc.ca.gov/gopher-data/environ/tehachapi_renewables/TRTP_Final%20EIR-EIS/TOC.htm

Department of Energy and Bureau of Land Management. 2008. *Final Programmatic EIS, Designation of Energy Corridors on Federal Lands in the 11 Western States*, November 2008. http://corridoreis.anl.gov/documents/fpeis/vol1/WWEC_FPEIS_FrontI.pdf

Department of Fish and Game. 2003. *Atlas of the Biodiversity of California*. California Department of Fish and Game. Sacramento, CA. http://www.dfg.ca.gov/biogeodata/atlas/samples.aspx

Department of Fish and Game. 2007. *California Wildlife: Conservation Challenges.* California's Wildlife Action Plan. Prepared by UC Davis Wildlife Health Center for the California Department of Fish and Game. Sacramento, CA. http://www.dfg.ca.gov/wildlife/WAP/docs/report/full-report.pdf

Department of Fish and Game. 2010a. *State and Federally Listed Endangered, Threatened, and Rare Plants of California .* Department of Fish and Game, Sacramento, CA. April 2010. http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf

Department of Fish and Game. 2010b. *State and Federally Listed Endangered and Threatened Animals of California.* Department of Fish and Game, Sacramento, CA. January 2010. http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf.

DFG. *See* Department of Fish and Game.

DOE. *See* Department of Energy.

Erickson, W., G. Johnson, D. Young, et al. 2002. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments. Prepared for: Bonneville Power Administration, Portland, OR. Prepared by WEST, Inc., Cheyenne, WY.

RETI. 2008. *Renewable Energy Transmission Initiative* RETI Phase 1B. Prepared for the RETI Coordinating Committee and RETI Stakeholder Steering Committee publication # RETI-1000-2008-003-PF. http://www.energy.ca.gov/2008publications/RETI-1000-2008-003/RETI-1000-2008-003-PF.PDF

Sawyer, J.O. and T. Keeler-Wolf. 1995*. A Manual of California Vegetation*. On-line version. http://davisherb.ucdavis.edu/cnpsActiveServer/intro.html

Shuford, W.D. and T. Gardali (Editors). 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA and California Department of Fish and Game, Sacramento, CA.

USFWS. *See* U.S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service. 2008a. *Birds of Conservation Concern*. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. <http://www.fws.gov/migratorybirds/>

U.S. Fish and Wildlife Service. 2008b. *Draft revised recovery plan for the Mojave population of the desert tortoise* (Gopherus agassizii). U.S. Fish and Wildlife Service, California and Nevada Region, Sacramento, California. 209 pp.

U.S. Fish and Wildlife Service. 2010. Species listed in each state based on published historic range and population data. http://www.fws.gov/ecos/ajax/tess_public/StateListing.do?state=all Accessed May 11, 2010.

III.D Cultural Resources

Antelope Valley Indian Museum. n.d. Antelope Valley Indian Peoples, http://www.avim.parks.ca.gov/people/. Antelope Valley Indian Museum website, accessed 8 December 2004.

Bean, Lowell J., and Charles R. Smith. 1978. Gabrielino. In *Handbook of North American Indians, Vol. 8 (California)*. William C. Sturtevant, general editor, Robert F. Heizer, volume editor. Smithsonian Institution, Washington, D.C.

Bean, Lowell J., and Sylvia B. Vane. 2001. *Eastside Reservoir Project Phase III: Ethnography and Ethnohistory*. Report prepared by Cultural Systems Research, Inc., Menlo Park, California. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, California.

Beck, Warren A., and Ynez D. Haase. 1974. *Historical Atlas of California.* University of Oklahoma Press, Norman.

California Energy Commission. 2009. Best Management Practices and Guidance Manual: Desert Renewable Energy Projects. Revise Draft Staff Report. energy.ca.gov/2009publication/CEC700-2009-016/CEC-700-2009-016-SD-REV.pdf. (May 11, 2010).

Cleland, J. H. 1998. From Paleo-Indian to Protohistoric: The Chronology of Human Occupation of the Salton Sea Test Base. KEA Environmental, Inc. *Proceedings of the Society for California Archaeology* 12:10–14.

County of Los Angeles Public Library. 2000. Antelope Valley Community History, http://www.colapublib.org/history/ antelopevalley/. County of Los Angeles Public Library website, accessed 14 January 2005.

Cultural Systems Research, Inc. (CSRI). 1986. *Cultural Resources Testing and Data Recovery, Tahquitz Canyon Project Research Design.* Cultural Systems Research, Inc., Menlo Park, California.

Davis, E.L., and R. Shutler, Jr.. 1969. Recent Discoveries in Fluted Points in California and Nevada. *Nevada State Museum Anthropological Papers* 14:154-169. Carson City.

Davis, E. L (editor). 1978. *The Ancient Californians: Rancholabrean Hunters of the Mojave Lakes Country.* Natural History Museum of Los Angeles County Science Series 29.

Davis, O. K., and W. D. Sellers. 1987. Contrasting Climatic Histories for Western North America During the Early Holocene. *Current Research in the Pleistocene* 4:87–89.

Earle, David D. 1990. New Evidence of the Political Geography on the Antelope Valley and Western Mojave Desert at Spanish Contact. In *Archaeology and Ethnohistory of Antelope Valley and vicinity*. Antelope Valley Archaeological Society Occassional Papers No. 2. Edited by Bruce Love and William H. De Witt. Lancaster, California.

Eerkens, Jelmer W. 1999. Common Pool Resources, Buffer Zones, and Jointly Owned Territories: Hunter-Gatherer Land and Resource Tenure in Fort Irwin, Southeastern California. *Human Ecology* 27(2):297–318.

Geiger, Maynard, O.F.M., and Clement W. Meighan. 1976. *As the Padres Saw Them: California Indian Life and customs as Reported by the Franciscan Missionaries, 1913-1815*. Santa Barbara Mission Archive Library, Santa Barbara, California.

Goldberg, S. K., C. J. Klink, J. A. Onken, W. G. Spaulding, M. C. Robinson, M. C. Horne, and R. L. McKim. 2001. *Metropolitan Water District of Southern California Eastside Reservoir Project Final Report of Archaeological Investigations, Vol. IV: Synthesis of Findings*. Report prepared by Applied EarthWorks, Inc., Hemet, California. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, California.

Grayson, D. K. 1993. *The Desert's Past: A Natural Prehistory of the Great Basin*. Smithsonian Institution, Washington, D.C.

Hall, M. C. 1993. *Archaeology of Seven Prehistoric Sites in Tiefort Basin, Fort Irwin, San Bernardino county, California*. Prepared by Far Western Anthropological Research Group for the U.S. Army National Training Center, Fort Irwin, California.

Horne, Melinda C., and Dennis P. McDougall. 2003. *Cultural Resources Element of the City of Riverside General Plan Update*. Applied EarthWorks, Inc., Hemet, California. Submitted to Cotton Bridges and Associates, Pasadena, California.

Johnson, Patti J. 1978. Patwin. In *Handbook of North American Indians*, Vol. 8: *California*, edited by Robert F. Heizer; pp. 350–360. Smithsonian Institution, Washington, D.C.

Kelly, Isabel T., and Catherine S. Fowler. 1986. Southern Paiute. In *Handbook of North American Indians*, Volume 11: *Great Basin*, volume editor Warren L. D'Azevedo. Smithsonian Institution, Washington D. C.

King, Chester, and Dennis G. Casebier. 1976. *Background to Historic and Prehistoric Resources of the East Mojave Desert Region*. Archaeological Research Unit, University of California, Riverside. Submitted to the Bureau of Land Management, Riverside, California.

Kroeber, A. L. 1925. Handbook of the Indians of California. *Bureau of American Ethnology Bulletin No. 78*. U.S. Government Printing Office, Washington, D.C.

Lech, Steve. 2004. *Along the Old Roads: A History of the Portion of Southern California That Became Riverside County, 1772-1893*. Steve Lech, Riverside, California.

Mehringer, P. J., Jr. 1986. Prehistoric Environments. In *Handbook of North American Indians*, vol. 11: *Great Basin,* edited by Warren L. d'Azevedo, pp. 31–50. William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Moratto, Michael. 1984. *California Archaeology*. Academic Press, Orlando.

Palmdale City Library. 2004. Antelope Valley History, http://www.cityofpalmdale.org/library/early_palmdale.html Palmdale City Library website, accessed 14 January 2005.

Smith, G. A. 1963. *Archaeological Survey of the Mojave River Area and Adjacent Regions*. San Bernardino County Museum Association, San Bernardino, CA.

Smith, B. D., and J. Brock. 1998. From Shoreline to Mesquite Dune: Changing Subsistence Strategies at CA-RIV-4754, La Quinta. Archaeological Advisory Group, Pioneertown. *Proceedings of the Society for California Archaeology* 12:1–4.

Solano County, California. n.d. Solano County History. Found at: http://www.co.solano.ca.us/about_solano/history.asp. Accessed on May 19, 2010.

Spaulding, W. G. 2001. Paleoenvironmental Context of the Study Area. In *Metropolitan Water District of Southern California Eastside Reservoir Project Archaeological Investigations, Vol. IV: Chapter 5,* Susan K. Goldberg, general editor. Report prepared by Applied EarthWorks, Inc., Hemet, California. Report submitted to the Metropolitan Water District of Southern California, Los Angeles, California.

Spaulding, W. G., and L. J. Graumlich. 1986. The Last Pluvial Climatic Episodes in the Deserts of Southwestern North America. *Nature* 320:441–444.

Sutton, Mark Q. 1988. *An Introduction to the Archaeology of the Western Mojave Desert, California.* Archives of California Prehistory Number 14. Coyote Press, Salinas, California.

———. 1996. The Current Status of Archaeological Research in the Mojave Desert. *Journal of California and Great Basin Anthropology* 18(2):221.

Tipton, Karla. 1988. Willow Springs: An Oasis in Antelope Valley History. *Antelope Valley Press,* May 25. Gold Ledge website, http://www.goldledge.com/history/docs_html/willow.html, accessed 14 January 2005.

Wallace, William J. 1978. Southern Valley Yokuts. In *California*, edited by Robert F. Heizer, pp. 448–461. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Warren, C. N. 1980. The Archaeology and Archaeological Resources of the Amargosa-Mojave Basin Planning Units. In A *Cultural Resources Overview for the Amargosa-Majove Basin Planning Units* by C. N. Warren, M. Knack, and E. von Till Warren. U.S. Bureau of Land Management, Cultural Resources Publication, Anthropology-History (unnumbered), Riverside, California.

———. 1984. The Desert Region. In *California Archaeology*, by M. J. Moratto. Academic Press, New York.

Warren, C. N., and R. H. Crabtree. 1986. Prehistory of the Southwestern Area. In Handbook of North American Indians, Vol. 11: Great Basin. William C. Sturdevant, general editor. Smithsonian Institution, Washington, D.C.

Zigmond, Maurice. 1986. Kawaiisu. In *Handbook of North American Indians*, Vol. 11: *Great Basin*. Warren L. d'Azevedo, editor, pp. 398–411. Smithsonian Institution, Washington, D.C.

III.E Geology, Soils, and Mineral Resources

CBC. 2001. California Building Code. Title 24. http://www.bsc.ca.gov/title_24/t24_2001tried.htm Accessed 05/12/10.

CDMG. 1977. Geologic Map of California. *California Department of Conservation, Division of Mines and Geology.* California Geologic Data Map Series. Scale 1:750,000.

CDMG. 1994. Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions. *California Department of Conservation, Division of Mines and Geology.* Scale: 1:750,000. http://www.consrv.ca.gov/cgs/information/publications/Pages/quaternaryfaults_ver2.aspx Accessed 05/14/10.

CDNR. 1953. California Journal of Mines and Geology. State of California Department of Natural Resources. Division of Mines. Volume 49, Numbers 1 and 2, January – April. Page 1 – 259. 3 Plates.

CGS. 2002. California Geomorphic Provinces. *California Department of Conservation, California Geological Survey*. Note 36.

CGS. 2006. Aggregate Availability in California, Fifty-Year Aggregate Demand Compared to Permitted Aggregate Resources. *California Department of Conservation, California Geological Survey*. Map Sheet 52. Scale: 1:1,100,000

CGS. 2007. Fault-Rupture Hazard Zones in California - Alquist-Priolo Earthquake Fault Zoning Act With Index to Earthquake Fault Zones Maps. *California Department of Conservation, California Geological Survey*. Special Publication 42, Interim Revision 2007.

CGS. 2010. Fault Activity Map of California. 150th Anniversary. *California Department of Conservation, California Geological Survey*. http://www.conservation.ca.gov/cgs/cgs_history/Pages/2010_faultmap.aspx Accessed 05/13/10.

EHSO. 2010. Environment, Health and Safety Online. http://www.ehso.com/cssepa/tsdflandfills.php Accessed 05/14/10

General Soil Map of the United States. http://www.gelib.com/general-soil-map-of-the-united-states.htm Accesses 05/12/10.

Guest, B., Niemi, N. and Wernicke, B. 2007. Stateline fault system: A new component of the Miocene-Quaternary Eastern California shear zone, *GSA Bulletin*; November/December, 2007; v. 119; no. 11-12; p. 1337-1347; DOI:10.1130/0016-7606(2007)119[1337:SFSANC]2.0.CO;2

Imperial County General Plan EIR. 1993. http://www.icpds.com/?pid=829 Accessed 05/14/10.

Los Angeles County General Plan (Draft). 2008. http://planning.lacounty.gov/generalplan#anc-download Accessed 05/12/10

Norris, R. M. and R. W. Webb. 1999. Geology of California. Second Edition. New York. John Wiley and Sons.

NRCS. 2010. Natural Resources Conservation Service. United State Department of Agriculture. http://soils.usda.gov/technical/classification/osd/index.html. Accessed 05/11/10.

Riverside County General Plan. (2003). http://www.rctlma.org/genplan/content/gp.aspx Accessed 05/12/10.

San Bernardino County General Plan. 2007. http://www.co.san-bernardino.ca.us/landuseservices/general_plan/Default.asp Accessed 05/13/10.

San Luis Obispo County General Plan. 1999. http://www.slocounty.ca.gov/planning/General_Plan__Ordinances_and_Elements.htm Accessed 05/12/10.

Solano County General Plan. 2008. http://solanocountygeneralplan.net/ Accessed 05/05/10.

UBC. 1994. Uniform Building Code. International Code Council. Volumes 1,2,3. May 1994. ISBN-10 9994475398.

UBC. 1997. Uniform Building Code. International Code Council. Volumes 1,2,3. May 1994. ISBN 099597.

USGS Mineral Resource Data System. http://mrdata.usgs.gov/mineral-resources/mrds-us.html Accessed 05/14/10.

USGS. 2002. Seismic Hazards Map, U. S. Geological Survey National http://gldims.cr.usgs.gov/website/nshmp2002/viewer.htm Accessed 05/12/10.

USGS. 2008. Earthquake Hazards Program http://earthquake.usgs.gov/hazards/qfaults/ Accessed 05/12/10.

III.G Hazards and Hazardous Materials

EHSO. 2010. Environment, Health and Safety Online. http://www.ehso.com/cssepa/tsdflandfills.php Accessed 05/14/10.

EnviroStor. 2010. California Department of Toxic Substances Control http://www.dtsc.ca.gov/SiteCleanup/Cortese_List.cfm Accessed 05/18/10.

NRDC. 2009. National Resources Defense Council. http://switchboard.nrdc.org/blogs/rperks/where_for_art_thou_coal_ash.html Accessed 05/17/10.

Norris, R. M. and R. W. Webb. 1990. Geology of California. Second Edition. New York. John Wiley and Sons.

Scorecard. 2010. http://www.scorecard.org/env-releases/land/ Accessed 05/16/10.

TRI. 2007. Toxics Release Inventory http://www.mapcruzin.com/2007-toxic-release-google-earth-maps/ Accessed 05/13/10.

USEPA. 2010. United State Environmental Protection Agency. News release dated 03/02/10.http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/b065739662ab84c0852576da006ad323!OpenDocument Accessed 05/19/10.

III.H Hydrology, Water Quality, and Supply

BLM and CEC. 2009. Ivanpaugh Solar Electric Generating System, Staff Assessment and Draft Environmental Impact Statement and Draft California Desert Conservation Area Plan Amendment. Application for Certification (07-AFC-5), San Bernardino County. (July).

BLM. 2005. Final Programmatic Environmental Impact Statement of Wind Energy Development on BLM-Administered Lands in the Western United States, Volume 1 Main Text. (June).

BLM. 2008. Final Programmatic Environmental Impact Statement of Geothermal Leasing in the Western United States, Volume 1 Programmatic Analysis. (October). Washington, D.C.

CEC. 2003. Salton Sea Geothermal Unit #6 Power Project, Final Staff Report. Application for Certification (102-AFC-2), Imperial County. (August).

CEC. 2009. Beacon Solar Energy Project, Final Staff Report. Application for Certification (08-AFC-2), Kern County. (August).

Department of Water Resources (DWR). 2009. California Water Plan Update 2009, Integrated Water Management, Bulletin 160-09. Volume 1 – The Strategic Plan. (March). Available at: <<http://www.waterplan.water.ca.gov/cwpu2009/index.cfm>> Sacramento, CA

DWR. 2003. California's Groundwater, Bulletin 118, Update 2003. (October). Available at: <<http://www.water.ca.gov/groundwater/#>>. Sacramento, CA

State Water Resources Control Board (SWRCB 2003). 2003. 2002 California 305(b) Report on Water Quality. (August). Sacramento, CA

U.S. Bureau of Land Management (BLM) and California Energy Commission (CEC). 2010. SES Solar Two Project, Staff Assessment and Draft Environmental Impact Statement and Draft California Desert Conservation Area Plan Amendment. Application for Certification (08-AFC-5), Imperial County. (February).

U.S. Department of Energy and BLM. 2008. Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States. Final Volume 1: Summary and Main Text. DOE/EIS-0386. (November).

U.S. Environmental Protection Agency (EPA). 2010. National compilation of Section 303(d) list of water quality impaired water bodies. Available at: <<http://iaspub.epa.gov/waters10/attains_index.regions>>. Last accessed May 18, 2010. Washington, D.C.

III.I Land Use and Agricultural Resources

Argone National Laboratory, Environmental Science Division, 2007. The Design, Construction, and Operation of Long-Distance High-Voltage Electricity Transmission Technologies, available at http://solareis.anl.gov/documents/ docs/APT_61117_EVS_TM_08_4.pdf. Accessed April 14, 2010.

Bureau of Land Management, Record of Decision, West Mojave Plan Amendment to the California Desert Conservation Area Plan March 2006, available at http://www.blm.gov/pgdata/etc/medialib//blm/ca/pdf/pdfs/ cdd_pdfs/wemo_pdfs.Par.4dfb777f.File.pdf/wemo_rod_3-06.pdf. Accessed April, 12, 2010.

Bureau of Land Management, Resource Management Plans for California's Public Lands, 2006, available at http://www.blm.gov/pgdata/etc/medialib/blm/ ca/pdf/pa/planning.Par.25515.File.dat/RMP.pdf. Accessed April 15, 2010.

Bureau of Land Management, The California Desert Conservation Area Plan, 1980, as amended, available at http://www.blm.gov/pgdata/etc/medialib/blm/ ca/pdf/cdd/cdcaplan.Par.15259.File.dat/CA_Desert_.pdf . Accessed April 10, 2010.

Bureau of Land Management. 2008a. Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States, October 2008, available at: http://www.blm.gov/wo/st/en/prog/energy/geothermal/ geothermal_nationwide/Documents/Final_PEIS.html Accessed April 10, 2010.

California Department of Conservation, Land Resource Protection (2010), available at http://www.conservation.ca.gov/dlrp/Pages/Index.aspx . Accessed April 10, 2010.

California Department of Transportation (Caltrans). 2000. Imperial County Transportation Plan Highway Element. http://www.dot.ca.gov/dist11/ departments/planning/pdfs/02_IC_TransportationPlan.PDF Accessed April 22, 2010.

California Energy Commission, RETI Phase IA Final Report (2008), available at http://www.energy.ca.gov/reti/documents/index.html. Accessed April 15, 2010.

California Energy Commission. 2009. Best Management Practices and Guidance Manual: Desert Renewable Energy Projects. Revise Draft Staff Report. energy.ca.gov/2009publication/CEC700-2009-016/CEC-700-2009-016-SD-REV.pdf. (May 11, 2010).

Federal Aviation Administration (FAA). 2007. Obstruction Marking and Lighting, Advisory Circular AC 70/7460-1K, available at http://www.airweb.faa.gov/ Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdfc37fcdc486 257251005c4e21/$FILE/AC70_7460_1K.pdf. Accessed April 22, 2010.

Kern County, Kern County General Plan, 2004, Land Use, Open Space, and Conservation Element, available at http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp1LandUse.pdf. Accessed April, 14, 2010.

Los Angeles County Draft General Plan, Background Report, Chapter 2.; Conservation and Open Space Element; and Land Use Element. Available at http://planning.lacounty.gov/generalplan. Accessed April 12, 2010.

Riverside County, County of Riverside General Plan (2003) available at http://www.rcip.org/generalplan.htm . Accessed April 15, 2010.

San Bernardino County, 2006 General Plan Program Final EIR, available at http://www.co.san-bernardino.ca.us/landuseservices/General%20Plan%20Update/. Accessed April 15, 2010.

San Bernardino County, County of San Bernardino 2007 General Plan, available at http://www.sbcounty.gov/landuseservices/general_plan/FINAL%20General%20Plan%20Text%20-%203-1-07_w_Images.pdf . Accessed April 14, 2010.

Solano County, Solano County. 2008a. General Plan, available at http://solanocountygeneralplan.net/ Accessed April 19, 2010.

Solano County, Solano County. 2008b. General Plan Final Environmental Impact Report, available http://solanocountygeneralplan.net/ Accessed April 19, 2010.

III.J Noise

California Department of Transportation. 2004 (June). *Transportation and Construction Induced Vibration Guidance Manual*. Sacramento, CA.

Caltrans. *See* California Department of Transportation.

Egan, M. David. 2007. *Architectural Acoustics*. J. Ross Publishing.

Federal Rail Administration. 2005 (October). High-Speed Ground Transportation. Noise and Vibration Impact Assessment. Washington D.C.

Federal Transit Administration. 2006 (May). *Transit Noise and Vibration Impact Assessment*. Washington, DC. Prepared by: Harris Miller Miller & Hanson Inc., Burlington, MA.

FTA. *See* Federal Transit Administration.

III.K Recreation

U. S. Bureau of Land Management (BLM). 2000. *Bureau of Land Management Strategic Plan FY 2000-2005*, as cited in BLM 2005.

U. S. Bureau of Land Management (BLM). 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. June, 2005.

California State Parks. 2009. California State Parks Off-Highway Motor Vehicle Recreation Division 2009 Strategic Plan.

III.L Public Services, Utilities, and Solid Waste

California Department of Resources Recycling and Recovery (CalRecycle). 2010. Website. Available at http://www.calrecycle.ca.gov/. Accessed May 14, 2010

California Department of Water Resources (DWR). 2010. California State Water Project Overview, Available at http://www.water.ca.gov/swp/. Accessed May 14, 2010.

California Public Utilities Commission (CPUC). 2010. Website. Available at http://www.cpuc.ca.gov/puc. Accessed May 14, 2010.

California State Board of Education. 2010. Website. Available at http://www.cde.ca.gov/be/. Accessed May 14, 2010.

California State Water Resources Control Board (SWRCB). 2010. Water Boards' Structure. Available at http://www.waterboards.ca.gov/about_us/water_boards_structure/. Accessed May 14, 2010.

United States Bureau of Reclamation (USBR). 2010. http://www.usbr.gov/main/about/. Accessed May 14, 2010.

V. Cumulative Impacts

U.S. Department of Energy and BLM. 2008. Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States. Final Volume 1: Summary and Main Text. DOE/EIS-0386. (November).

VII. Impacts to Public Health and Safety

CARB. 2002. Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates, ftp://ftp.arb.ca.gov/carbis/research/aaqs/std-rs/pm-final/exesum.pdf (CD: CARBPMHEALTH)

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XII. APPENDICES

A. APPENDIX C1. SPECIAL STATUS WILDLIFE SPECIES BY REGION IN CALIFORNIA

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Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Invertebrate	*Aegialia concinna*	Ciervo Aegialian Scarab Beetle						Sensitive		Dunes	*	Y	Y	--	--	--	--	--	--
Invertebrate	*Apodemia mormo langei*	Lange's Metalmark	Endangered							Dunes	*	--	Y	--	--	--	--	--	--
Invertebrate	*Branchinecta conservatio*	Conservancy Fairy Shrimp	Endangered							Vernal Pool	*	--	Y	--	--	--	--	--	--
Invertebrate	*Branchinecta longiantenna*	Longhorn Fairy Shrimp	Endangered							Vernal Pool	*	Y	Y	--	--	--	--	--	--
Invertebrate	*Branchinecta lynchi*	Vernal Pool Fairy Shrimp	Threatened							Vernal Pool		Y	Y	--	--	--	--	Y	Y
Invertebrate	*Branchinecta sandiegonensis*	San Diego Fairy Shrimp	Endangered							Vernal Pool	*	--	--	--	--	--	--	--	Y
Invertebrate	*Cicindela ohlone*	Ohlone Tiger Beetle	Endangered							Coastal Terrace Prairie	*	Y	--	--	--	--	--	--	--
Invertebrate	*Coelus gracilis*	San Joaquin Dune Beetle						Sensitive		Dunes	*	Y	Y	--	--	--	--	--	--
Invertebrate	*Desmocerus californicus dimorphus*	Valley Elderberry Longhorn Beetle	Threatened							Blue Oak Woodland, Blue Oak-Foothill Pine, Valley-Foothill Riparian, Chamise-Redshank Chaparral, Coastal ScrubMixed Chaparral, Urban, Valley Oak Woodland, Alkali Desert	*	Y	Y	--	--	--	Y	Y	--
Invertebrate	*Elaphrus viridis*	Delta Green Ground Beetle	Threatened							Freshwater Emergent Wetland, Vernal Pool	*	--	Y	--	--	--	--	--	--
Invertebrate	*Euphilotes battoides allyni*	El Segundo Blue Butterfly	Endangered							Dunes	*	--	--	--	--	--	--	--	Y
Invertebrate	*Euphilotes enoptes smithi*	Smith's Blue Butterfly	Endangered							Dunes	*	Y	--	--	--	--	--	--	--
Invertebrate	*Euphydryas editha bayensis*	Bay Checkerspot Butterfly	Threatened							Annual Grassland, Serpentine	*	Y	Y	--	--	--	--	--	--
Invertebrate	*Euphydryas editha quino*	Quino Checkerspot Butterfly	Endangered							Coastal Scrub, Mixed Chaparral		--	--	Y	--	--	--	--	Y
Invertebrate	*Euproserpinus euterpe*	Kern Primrose Sphinx Moth	Threatened							Cropland, Desert Scrub, Desert Wash	*	--	--	--	--	--	--	Y	--
Invertebrate	*Glaucopsyche lygdamus palosverdesensis*	Palos Verdes Blue Butterfly	Endangered							Annual Grassland, Coastal Scrub	*	--	--	--	--	--	--	--	Y
Invertebrate	*Hubbardia shoshonensis*	Shoshone Cave Whipscorpion						Sensitive		Cave	*	--	--	--	--	Y	--	--	--
Invertebrate	*Icaricia icarioides missionensis*	Mission Blue Butterfly	Endangered							Annual Grassland, Closed-Cone Pine-Cypress, Coastal Oak Woodland, Coastal Scrub, Mixed ChaparralDesert Riparian,	*	Y	Y	--	--	--	Y	--	--
Invertebrate	*Incisalia mossii bayensis*	San Bruno Elfin Butterfly	Endangered							Annual Grassland, Coastal	*	Y	Y	--	--	--	--	--	--
Invertebrate	*Lepidurus packardi*	Vernal Pool Tadpole Shrimp	Endangered							Vernal Pool	*	--	Y	--	--	--	Y	Y	--
Invertebrate	*Lycaeides argyrognomon lotis*	Lotis Blue Butterfly	Endangered							Wet Meadow	*	--	--	--	--	--	Y	--	--
Invertebrate	*Polyphylla barbata*	Mount Hermon June Beetle	Endangered							Dunes, Ponderosa Pine	*	Y	--	--	--	--	--	--	--
Invertebrate	*Pyrgus ruralis lagunae*	Laguna Mountains	Endangered							Mesic Meadow	*	--	--	--	--	--	--	--	Y
Invertebrate	*Rhaphiomidas terminatus abdominalis*	Delhi Sands Flower-Loving Fly	Endangered							Coastal Scrub	*	--	--	--	--	--	--	--	Y
Invertebrate	*Speyeria callippe callippe*	Callippe Silverspot Butterfly	Endangered							Coastal Scrub	*	--	Y	--	--	--	--	--	--
Invertebrate	*Speyeria zerene behrensii*	Behren's Silverspot Butterfly	Endangered							Closed-Cone Pine-Cypress	*	--	--	--	--	--	Y	--	--
Invertebrate	*Speyeria zerene hippolyta*	Oregon Silverspot Butterfly	Threatened							Dunes, Perennial Grassland		--	--	--	--	--	Y	--	--
Invertebrate	*Speyeria zerene myrtleae*	Myrtle's Silverspot Butterfly	Endangered							Coastal Scrub, Dunes, Perennial Grassland	*	Y	Y	--	--	--	Y	--	--
Invertebrate	*Streptocephalus woottoni*	Riverside Fairy Shrimp	Endangered							Vernal Pool	*	--	--	--	--	--	--	--	Y

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Invertebrate	*Syncaris pacifica*	California Freshwater Shrimp	Endangered	Endangered						Riverine	*	--	Y	--	--	--	Y	--	--
Invertebrate	*Trimerotropis infantilis*	Zayante Band-Winged Grasshopper	Endangered							Dunes	*	Y	--	--	--	--	--	--	--
Invertebrate	*Anodonta californiensis*	California Floater					Sensitive			Lacustrine, Riverine		--	--	--	--	--	Y	Y	--
Invertebrate	*Helisoma newberryi*	Great Basin Ram's-horn					Sensitive			Lacustrine, Riverine		--	--	--	Y	--	--	Y	--
Invertebrate	*Helminthoglypta walkeriana*	Morro Shoulderband Snail	Endangered							Coastal Scrub, Saline Emergent Wetland, Shoreline, Urban, Annual GrasslandClosed-Cone Pine-Cypress, Coastal Oak Woodland, Coastal Scrub,	*	Y	--	--	--	--	--	--	--
Invertebrate	*Juga acutifilosa*	Topaz Juga					Sensitive			Lacustrine, Riverine		--	--	--	Y	--	Y	Y	--
Invertebrate	*Juga occata*	Scalloped Juga					Sensitive			Riverine, Spring	*	--	--	--	--	--	--	Y	--
Invertebrate	*Monadenia circumcarinata*	Keeled Sideband						Sensitive		Blue Oak-Foothill Pine, Limestone, Talus Slope	*	--	--	--	--	--	--	Y	--
Invertebrate	*Monadenia mormonum hirsuta*	Hirsute Sierra Sideband						Sensitive		Blue Oak-Foothill Pine	*	--	--	--	--	--	--	Y	--
Invertebrate	*Monadenia setosa*	Trinity Bristle Snail		Threatened						Montane Hardwood, Montane Hardwood-Conifer	*	--	--	--	--	--	Y	--	--
Invertebrate	*Monadenia troglodytes*	Shasta Sideband					Sensitive			Limestone, Talus Slope	*	--	--	--	--	--	Y	Y	--
Invertebrate	*Pyrgulopsis owensensis*	Owens Valley Springsnail					Sensitive			Spring		--	--	--	--	--	--	Y	--
Invertebrate	*Pyrgulopsis wongi*	Wong's Springsnail					Sensitive			Riverine, Spring	*	--	--	--	--	Y	--	Y	--
Fish	*Lampetra similis*	Klamath River Lamprey				CSC				Lacustrine, Riverine		--	--	--	--	--	Y	Y	--
Fish	*Lampetra tridentata ssp. 1*	Goose Lake Lamprey				CSC	Sensitive			Lacustrine, Riverine		--	--	--	Y	--	--	--	--
Fish	*Acipenser medirostris*	Green Sturgeon	Threatened Proposed			CSC				Estuarine, Marine, Riverine		--	Y	--	--	--	Y	--	--
Fish	*Acipenser transmontanus*	White Sturgeon								Estuarine, Marine, Riverine		--	Y	--	--	--	Y	--	--
Fish	*Archoplites interruptus*	Sacramento Perch (Within Native Range)				CSC				Lacustrine, Riverine	*	Y	Y	--	--	--	Y	Y	--
Fish	*Catostomus fumeiventris*	Owens Sucker				CSC				Lacustrine, Riverine	*	--	--	--	--	--	--	Y	--
Fish	*Catostomus microps*	Modoc Sucker	Endangered	Endangered		Fully protected				Riverine		--	--	--	Y	--	--	--	--
Fish	*Catostomus occidentalis lacusanserinus*	Goose Lake Sucker				CSC	Sensitive			Lacustrine, Riverine		--	--	--	Y	--	--	--	--
Fish	*Catostomus platyrhynchus*	Mountain Sucker				CSC				Lacustrine, Riverine		--	--	--	Y	--	--	Y	--
Fish	*Catostomus santaanae*	Santa Ana Sucker	Threatened			CSC	Sensitive			Riverine	*	Y	--	--	--	--	--	--	Y
Fish	*Catostomus snyderi*	Klamath Largescale				CSC				Lacustrine, Riverine, Spring		--	--	--	Y	--	Y	Y	--
Fish	*Chasmistes brevirostris*	Shortnose Sucker	Endangered	Endangered		Fully protected				Lacustrine, Riverine		--	--	--	Y	--	Y	Y	--
Fish	*Cottus asperrimus*	Rough Sculpin		Threatened		Fully protected				Riverine, Spring	*	--	--	--	Y	--	--	Y	--
Fish	*Cottus klamathensis macrops*	Bigeye Marbled Sculpin				CSC				Riverine, Spring	*	--	--	--	Y	--	--	Y	--
Fish	*Cottus perplexus*	Reticulate Sculpin				CSC				Riverine		--	--	--	--	--	Y	--	--
Fish	*Cyprinodon macularius*	Desert Pupfish	Endangered	Endangered						Lacustrine, Riverine, Spring		--	--	Y	--	--	--	--	--
Fish	*Cyprinodon nevadensis amargosae*	Amargosa Pupfish				CSC		Sensitive		Riverine, Spring	*	--	--	--	--	Y	--	Y	--
Fish	*Cyprinodon nevadensis nevadensis*	Saratoga Springs Pupfish				CSC				Lacustrine, Riverine, Spring, Riverine, Spring	*	--	--	--	--	Y	--	--	--
Fish	*Cyprinodon nevadensis shoshone*	Shoshone Pupfish				CSC				Riverine, Spring	*	--	--	--	--	Y	--	--	--

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Fish	*Cyprinodon radiosus*	Owens Pupfish	Endangered	Endangered		Fully protected				Riverine, Spring	*	–	–	–	–	–	–	Y	–
Fish	*Cyprinodon salinus milleri*	Cottonball Marsh Pupfish		Threatened						Lacustrine	*	–	–	–	–	Y	–	–	–
Fish	*Cyprinodon salinus salinus*	Salt Creek Pupfish				CSC				Riverine, Spring	*	–	–	–	–	Y	–	–	–
Fish	*Deltistes luxatus*	Lost River Sucker	Endangered	Endangered		Fully protected				Lacustrine, Riverine		–	–	–	Y	–	Y	Y	–
Fish	*Eucyclogobius newberryi*	Tidewater Goby	Endangered			CSC				Estuarine, Riverine	*	Y	Y	–	–	–	Y	–	Y
Fish	*Gasterosteus aculeatus microcephalus*	Resident Threespine Stickleback					Sensitive (full species)			Lacustrine, Riverine		Y	–	–	–	–	–	–	Y
Fish	*Gasterosteus aculeatus santannae (=ssp. 1)*	Santa Ana (=Shay Creek) Threespine Stickleback					Sensitive (full species)			Riverine	*	–	–	–	–	–	–	–	Y
Fish	*Gasterosteus aculeatus williamsoni*	Unarmored Threespine Stickleback	Endangered	Endangered		Fully protected	Sensitive (full species)			Riverine	*	Y	–	–	–	–	–	–	Y
Fish	*Gila bicolor mohavensis*	Mohave Tui Chub	Endangered	Endangered		Fully protected				Lacustrine, Riverine, Spring	*	–	–	–	–	Y	–	–	–
Fish	*Gila bicolor pectinifer*	Lahontan Lake Tui Chub				CSC	Sensitive			Lacustrine		–	–	–	–	–	–	Y	–
Fish	*Gila bicolor snyderi*	Owens Tui Chub	Endangered	Endangered						Lacustrine, Riverine, Spring	*	–	–	–	–	–	–	Y	–
Fish	*Gila bicolor ssp. 1*	Eagle Lake Tui Chub				CSC				Lacustrine	*	–	–	–	Y	–	–	–	–
Fish	*Gila bicolor thalassina*	Goose Lake Tui Chub				CSC	Sensitive			Lacustrine, Riverine		–	–	–	Y	–	–	–	–
Fish	*Gila bicolor vaccaceps*	Cow Head Lake Tui Chub	Endangered Proposed			CSC				Riverine	*	–	–	–	Y	–	–	–	–
Fish	*Gila coerulea*	Blue Chub				CSC				Lacustrine, Riverine		–	–	–	Y	–	–	Y	–
Fish	*Gila elegans*	Bonytail	Endangered	Endangered						Lacustrine, Riverine		–	–	Y	–	–	–	–	–
Fish	*Gila orcutti*	Arroyo Chub				CSC	Sensitive			Riverine	*	Y	–	–	–	Y	–	–	Y
Fish	*Hypomesus transpacificus*	Delta Smelt	Threatened	Threatened						Estuarine, Riverine	*	–	Y	–	–	–	–	–	–
Fish	*Hysterocarpus traski pomo*	Russian River Tule Perch				CSC				Riverine	*	–	–	–	–	–	Y	–	–
Fish	*Lampetra ayresii*	River Lamprey				CSC				Estuarine, Marine, Riverine, Lacustrine, Riverine		–	Y	–	–	–	Y	–	–
Fish	*Lampetra hubbsi*	Kern Brook Lamprey				CSC				Riverine	*	–	Y	–	–	–	–	–	–
Fish	*Lavinia exilicauda chi*	Clear Lake Hitch				CSC	Sensitive			Lacustrine, Riverine	*	–	–	–	–	–	Y	–	–
Fish	*Lavinia symmetricus mitrulus*	Pit Roach				CSC				Riverine		–	–	–	Y	–	–	Y	–
Fish	*Lavinia symmetricus navarroensis*	Navarro Roach				CSC				Riverine	*	–	–	–	–	–	Y	–	–
Fish	*Lavinia symmetricus parvipinnis*	Gualala Roach				CSC				Riverine	*	–	–	–	–	–	Y	–	–
Fish	*Lavinia symmetricus ssp. 1*	San Joaquin Roach				CSC				Riverine	*	Y	Y	–	–	–	–	Y	–
Fish	*Lavinia symmetricus ssp. 2*	Tomales Roach				CSC				Riverine	*	–	–	–	–	–	Y	–	–
Fish	*Lavinia symmetricus ssp. 3*	Red Hills Roach				CSC		Sensitive		Riverine	*	–	–	–	–	–	–	Y	–
Fish	*Lavinia symmetricus subditus*	Monterey Roach				CSC				Riverine	*	Y	–	–	–	–	–	–	–
Fish	*Mylopharodon conocephalus*	Hardhead				CSC	Sensitive			Riverine	*	–	Y	–	Y	–	Y	Y	–

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Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Fish	*Oncorhynchus clarki clarki*	Coast Cutthroat Trout				CSC	Sensitive			Estuarine, Lacustrine, Marine, Riverine, EstuarineMarine, Riverine, Estuarine, Marine, Riverine		--	--	--	--	--	Y	--	--
Fish	*Oncorhynchus clarki henshawi*	Lahontan Cutthroat Trout	Threatened							Lacustrine, Riverine		--	--	--	--	--	--	Y	--
Fish	*Oncorhynchus clarki seleniris*	Paiute Cutthroat Trout	Threatened							Estuarine, Lacustrine, Marine, Riverine,	*	--	--	--	--	--	--	Y	--
Fish	*Oncorhynchus gorbuscha*	Pink Salmon				CSC				Estuarine, Marine, Riverine, Estuarine, MarineRiverine, Estuarine, Marine, Riverine		--	--	--	--	--	Y	--	--
Fish	*Oncorhynchus keta*	Chum Salmon				CSC				Estuarine, Marine, Riverine, Estuarine, MarineRiverine		--	--	--	--	--	Y	--	--
Fish	*Oncorhynchus kisutch*	Coho Salmon - Southern Oregon / Northern California ESU	Threatened			CSC				Estuarine, Marine, Riverine		--	--	--	--	--	Y	--	--
Fish	*Oncorhynchus kisutch*	Coho Salmon - Central California ESU	Threatened	Endangered						Estuarine, Marine, Riverine		Y	Y	--	--	--	Y	--	--
Fish	*Oncorhynchus kisutch*	Coho Salmon - Northern California Population		Threatened						Estuarine, Marine, Riverine, Estuarine, MarineRiverine, Estuarine, Marine, Riverine		--	Y	--	--	--	Y	--	--
Fish	*Oncorhynchus mykiss*	Klamath Mountains Province Steelhead				CSC	Sensitive			Estuarine, Marine, Riverine		--	--	--	--	--	Y	--	--
Fish	*Oncorhynchus mykiss*	Southern Steelhead - Southern California ESU	Endangered			CSC				Estuarine, Marine, Riverine		Y	--	--	--	--	--	--	Y
Fish	*Oncorhynchus mykiss*	Steelhead - South/Central California Coast ESU	Threatened			CSC				Estuarine, Marine, Riverine		Y	Y	--	--	--	--	--	--
Fish	*Oncorhynchus mykiss*	Steelhead-Northern California ESU	Threatened			CSC				Estuarine, Marine, Riverine		--	--	--	--	--	Y	--	--
Fish	*Oncorhynchus mykiss*	Steelhead-Central California Coast ESU	Threatened							Estuarine, Marine, Riverine, Estuarine, MarineRiverine		Y	--	--	--	--	--	--	--
Fish	*Oncorhynchus mykiss*	Steelhead - Central Valley ESU	Threatened							Estuarine, Marine, Riverine, Estuarine, MarineRiverine		--	Y	--	--	--	--	--	--
Fish	*Oncorhynchus mykiss*	Steelhead-Central California Coast ESU	Threatened							Estuarine, Marine, Riverine, Estuarine, MarineRiverine		--	Y	--	--	--	Y	--	--
Fish	*Oncorhynchus mykiss*	Summer-Run Steelhead Trout				CSC				Estuarine, Marine, Riverine, Estuarine, MarineRiverine		--	--	--	--	--	Y	--	--
Fish	*Oncorhynchus mykiss aguabonita*	Volcano Creek Golden Trout				CSC	Sensitive			Lacustrine, Riverine	*	--	--	--	--	--	--	Y	--
Fish	*Oncorhynchus mykiss aquilarum*	Eagle Lake Rainbow Trout				CSC	Sensitive			Lacustrine	*	--	--	--	Y	--	--	--	--
Fish	*Oncorhynchus mykiss gilberti*	Kern River Rainbow Trout				CSC				Riverine	*	--	--	--	--	--	--	Y	--
Fish	*Oncorhynchus mykiss ssp. 1*	Goose Lake Redband Trout				CSC	Sensitive			Lacustrine, Riverine		--	--	--	Y	--	--	--	--
Fish	*Oncorhynchus mykiss ssp. 2*	Mccloud River Redband Trout				CSC	Sensitive			Riverine, Spring	*	--	--	--	--	--	--	Y	--
Fish	*Oncorhynchus mykiss ssp. 3*	Warner Valley Redband Trout					Sensitive			Lacustrine, Riverine		--	--	--	Y	--	--	--	--
Fish	*Oncorhynchus mykiss whitei*	Little Kern Golden Trout	Threatened							Riverine	*	--	--	--	--	--	--	Y	--
Fish	*Oncorhynchus tshawytscha*	Chinook Salmon - Central Valley Fall / Late Fall-Run ESU				CSC	Sensitive			Estuarine, Marine, Riverine		--	Y	--	--	--	--	--	--
Fish	*Oncorhynchus tshawytscha*	Chinook Salmon - Spring-Run Klamath-Trinity Pop.				CSC	Sensitive			Estuarine, Marine, Riverine		--	--	--	--	--	Y	--	--

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Fish	*Oncorhynchus tshawytscha*	Chinook Salmon Winter Run	Endangered	Endangered						Estuarine, Marine, Riverine		--	Y	--	--	--	Y	--	--
Fish	*Oncorhynchus tshawytscha*	Spring-Run Chinook Salmon	Threatened	Threatened						Estuarine, Marine, Riverine		--	Y	--	--	--	Y	Y	--
Fish	*Oncorhynchus tshawytscha*	Chinook Salmon - California Coastal ESU	Threatened							Estuarine, Marine, Riverine, Estuarine, MarineRiverine		--	Y	--	--	--	Y	--	--
Fish	*Pogonichthys macrolepidotus*	Sacramento Splittail				CSC				Estuarine, Riverine	*	--	Y	--	--	--	--	--	--
Fish	*Rhinichthys osculus ssp. 1*	Amargosa Canyon Speckled Dace				CSC		Sensitive		Riverine		--	--	--	--	Y	--	--	--
Fish	*Rhinichthys osculus ssp. 2*	Owens Speckled Dace				CSC				Riverine, Spring	*	--	--	--	--	Y	--	Y	--
Fish	*Rhinichthys osculus ssp. 3*	Santa Ana Speckled Dace				CSC	Sensitive			Riverine	*	--	--	--	--	--	--	--	Y
Fish	*Spirinchus thaleichthys*	Longfin Smelt				CSC				Estuarine, Marine, Riverine		--	Y	--	--	--	Y	--	--
Fish	*Thaleichthys pacificus*	Eulachon				CSC				Estuarine, Marine, Riverine		--	--	--	--	--	Y	--	--
Fish	*Xyrauchen texanus*	Razorback Sucker	Endangered	Endangered		CSC, Fully Protected				Lacustrine, Riverine		--	--	Y	--	--	--	--	--
Amphibian	*Ambystoma californiense*	California Tiger Salamander	Threatened			CSC				Wide Variety of Habitats	*	Y	Y	--	--	--	Y	Y	Y
Amphibian	*Ambystoma macrodactylum croceum*	Santa Cruz Long-Toed Salamander	Endangered	Endangered		Fully protected				Chamise-Redshank Chaparral, Coastal Oak Woodland, Coastal Scrub, Freshwater Emergent	*	Y	--	--	--	--	--	--	--
Amphibian	*Ascaphus truei*	Western Tailed Frog				CSC				Wide Variety of Habitats		--	--	--	--	--	Y	Y	--
Amphibian	*Batrachoseps campi*	Inyo Mountains Slender Salamander				CSC	Sensitive	Sensitive		Low Sage, Montane Riparian, Riverine,	*	--	--	--	--	Y	--	Y	--
Amphibian	*Batrachoseps gabrieli*	San Gabriel Slender Salamander					Sensitive			Montane Hardwood, Montane Hardwood-	*	--	--	--	--	--	--	--	Y
Amphibian	*Batrachoseps major aridus*	Desert Slender Salamander	Endangered	Endangered						Barren, Desert Scrub, Desert Wash, Limestone, Palm OasisTalus Slope, Desert Scrub, Desert Wash, Palm	*	--	--	Y	--	--	--	--	--
Amphibian	*Batrachoseps relictus (=pacificus)*	Relictual Slender Salamander				CSC	Sensitive			Montane Hardwood, Montane Hardwood- Conifer, Montane Riparian	*	--	--	--	--	--	--	Y	--
Amphibian	*Batrachoseps robustus*	Kern Plateau Salamander					Sensitive			Jeffrey Pine, Pinyon-Juniper, Red Fir, Sagebrush, Blue Oak WoodlandBlue Oak-Foothill Pine, Mixed Chaparral, Montane Riparian, Talus Slope, Blue Oak-Foothill Pine	*	--	--	--	--	Y	--	Y	--
Amphibian	*Batrachoseps simatus*	Kern Canyon Slender Salamander	Threatened	Threatened			Sensitive			Blue Oak Woodland, Blue Oak-Foothill Pine, Mixed Chaparral, Montane Riparian, Talus SlopeBlue Oak-Foothill Pine, Montane	*	--	--	--	--	--	--	Y	--
Amphibian	*Batrachoseps sp. 1*	Breckenridge Mountain Slender Salamander				CSC	Sensitive			Blue Oak-Foothill Pine, Montane Riparian, Talus	*	--	--	--	--	--	--	Y	--
Amphibian	*Batrachoseps stebbinsi*	Tehachapi Slender Salamander	Threatened	Threatened			Sensitive	Sensitive		Blue Oak Woodland, Blue Oak-Foothill Pine, Talus Slope, Valley-Foothill	*	--	--	--	--	--	--	Y	--
Amphibian	*Bufo alvarius*	Colorado River Toad				CSC				Desert Riparian, Desert Scrub, Riverine, Spring, Annual GrasslandDesert Scrub, Perennial Grassland,		--	--	Y	--	--	--	--	--

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Amphibian	*Bufo californicus*	Arroyo Toad	Endangered			CSC				Desert Wash, Riverine, Shoreline, Valley-Foothill		Y	--	--	--	--	--	--	Y
Amphibian	*Bufo canorus*	Yosemite Toad	Candidate			CSC	Sensitive			Lacustrine, Lodgepole Pine, Riverine, Subalpine Conifer, Wet Meadow	*	--	--	--	--	--	--	Y	--
Amphibian	*Bufo exsul*	Black Toad	Threatened	Threatened		Fully protected				Freshwater Emergent Wetland, Shoreline, Spring, Wet Meadow	*	--	--	--	--	Y	--	--	--
Amphibian	*Ensatina eschscholtzii croceator*	Yellow-Blotched Salamander				CSC	Sensitive	Sensitive		Annual Grassland, Blue Oak Woodland, Blue Oak-Foothill Pine, Mixed Chaparral	*	--	Y	--	--	--	--	Y	--
Amphibian	*Ensatina klauberi*	Large-Blotched Salamander				CSC	Sensitive			Annual Grassland, Sierran Mixed Conifer		--	--	--	--	--	--	--	Y
Amphibian	*Hydromantes brunus*	Limestone Salamander	Threatened	Threatened		Fully protected	Sensitive			Chamise-Redshank Chaparral, Limestone, Montane Hardwood, Talus	*	--	--	--	--	--	--	Y	--
Amphibian	*Hydromantes platycephalus*	Mount Lyell Salamander				CSC				Barren	*	--	--	--	--	--	--	Y	--
Amphibian	*Hydromantes shastae*	Shasta Salamander	Threatened	Threatened			Sensitive			Cave, Limestone	*	--	--	--	--	--	Y	Y	--
Amphibian	*Hydromantes sp. 1*	Owens Valley Web-Toed Salamander (AKA Oak Creek Salamander)				CSC				Sagebrush	*	--	--	--	--	--	--	Y	--
Amphibian	*Plethodon elongatus*	Del Norte Salamander				CSC				Wide Variety of Habitats		--	--	--	--	--	Y	--	--
Amphibian	*Plethodon stormi*	Siskiyou Mountains Salamander	Threatened	Threatened			Sensitive			Douglas-Fir, Klamath Mixed Conifer, Montane Hardwood-Conifer, Ponderosa Pine, Red FirTalus Slope, Montane		--	--	--	--	--	Y	--	--
Amphibian	*Rana aurora aurora*	Northern Red-Legged Frog				CSC	Sensitive			Freshwater Emergent Wetland, Lacustrine, Riverine, Shoreline, Valley-Foothill RiparianWet Meadow, Freshwater Emergent Wetland,		--	--	--	--	--	Y	--	--
Amphibian	*Rana aurora draytonii*	California Red-Legged Frog	Threatened			CSC				Freshwater Emergent Wetland, Lacustrine, Riverine, Shoreline, Valley-Foothill RiparianWet Meadow, Lacustrine,		Y	Y	Y	--	Y	Y	Y	Y
Amphibian	*Rana boylii*	Foothill Yellow-Legged Frog				CSC	Sensitive	Sensitive		Riverine, Shoreline		Y	Y	--	--	--	Y	Y	--
Amphibian	*Rana cascadae*	Cascades Frog				CSC	Sensitive			Lacustrine, Montane Riparian, Riverine, Shoreline, Wet MeadowLacustrine, Riverine, Shoreline, Wet		--	--	--	--	--	Y	Y	--
Amphibian	*Rana muscosa*	Mountain Yellow-Legged Frog	Endangered			CSC	Sensitive			Lacustrine, Riverine, Shoreline, Wet Meadow		Y	--	Y	--	--	--	Y	Y
Amphibian	*Rana pipiens*	Leopard Frog				CSC	Sensitive			Freshwater Emergent Wetland, Lacustrine, Montane Riparian, Riverine, SpringWet Meadow,		--	Y	--	--	--	Y	Y	--
Amphibian	*Rana pretiosa*	Oregon Spotted Frog	Candidate			CSC	Sensitive			Freshwater Emergent Wetland, Lacustrine, Montane Riparian, Riverine, ShorelineSpring, Wet		--	--	--	Y	--	--	--	--
Amphibian	*Rhyacotriton variegatus*	Southern Torrent Salamander				CSC	Sensitive			Montane Riparian, Riverine, Shoreline, Spring		--	--	--	--	--	Y	--	--

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Amphibian	*Scaphiopus couchii*	Couch's Spadefoot				CSC		Sensitive		Cropland, Desert Riparian, Desert Scrub, Desert Succulent Shrub, Desert WashPalm Oasis, Desert		--	--	Y	--	--	--	--	--
Amphibian	*Spea (=Scaphiopus) hammondii*	Western Spadefoot				CSC		Sensitive		Annual Grassland, Blue Oak-Foothill Pine, Coastal Scrub, Freshwater Emergent Wetland, Mixed ChaparralRiverine, Vernal		Y	Y	--	--	--	Y	Y	Y
Amphibian	*Taricha torosa torosa*	Coast Range Newt (Monterey Co. South Only)				CSC				Lacustrine, Riverine, Valley-Foothill Riparian, Wide Variety of Habitats	*	Y	--	--	--	--	--	--	Y
Reptile	*Anniella pulchra nigra*	Black Legless Lizard				CSC	Sensitive (full species)			Coastal Scrub, Dunes, Shoreline	*	Y	--	--	--	--	--	--	--
Reptile	*Anniella pulchra pulchra*	Silvery Legless Lizard				CSC	Sensitive (full species)			Blue Oak-Foothill Pine, Coastal Scrub, Desert Scrub, Dunes, Mixed ChaparralShoreline, Wide	*	Y	Y	Y	--	Y	--	--	Y
Reptile	*Aspidoscelis hyperythra beldingi*	Orange-Throated Whiptail				CSC				Chamise-Redshank Chaparral, Coastal Scrub, Mixed Chaparral, Valley-Foothill Riparian, Annual GrasslandCoastal Scrub, Coastal Terrace Prairie,		--	--	Y	--	--	--	--	Y
Reptile	*Bogertiphis (=elaphe) rosaliae*	Baja California Rat Snake				CSC				Desert Scrub, Desert Wash, Palm Oasis, Estuarine,		--	--	Y	--	--	--	--	--
Reptile	*Charina trivirgata*	Rosy Boa					Sensitive (ssp. roseofusca)	Sensitive		Chamise-Redshank Chaparral, Coastal Scrub, Desert Scrub, Desert Succulent Shrub, Mixed ChaparralBlue Oak-Foothill Pine, Jeffrey Pine, Mixed Chaparral, Montane		--	--	Y	--	Y	--	--	Y
Reptile	*Charina umbratica*	Southern Rubber Boa		Threatened			Sensitive			Blue Oak-Foothill Pine, Jeffrey Pine, Mixed Chaparral, Montane Chaparral, Ponderosa PineSagebrush, Sierran Mixed Conifer, Desert	*	Y	Y	--	--	Y	--	Y	Y
Reptile	*Coleonyx switaki*	Barefoot Banded Gecko		Threatened						Barren, Desert Scrub, Desert Succulent Shrub, Douglas-Fir, Klamath Mixed ConiferLodgepole Pine, Montane Hardwood-Conifer, Red Fir, Redwood,		--	--	Y	--	--	--	--	--
Reptile	*Crotalus ruber ruber*	Northern Red-Diamond Rattlesnake				CSC				Annual Grassland, Chamise-Redshank Chaparral, Coastal Scrub, Desert Scrub, Desert Succulent ShrubMixed Chaparral, Barren, Cave		--	--	Y	--	Y	--	--	Y

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Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Reptile	*Diadophis punctatus modestus*	San Bernardino Ringneck Snake					Sensitive			Chamise-Redshank Chaparral, Coastal Scrub, Mixed Chaparral, Urban, Valley Oak WoodlandChamise-Redshank Chaparral, Coastal Scrub, Mixed Chaparral,	*	--	--	--	--	--	--	Y	Y
Reptile	*Diadophis punctatus similis*	San Diego Ringneck Snake					Sensitive			Chamise-Redshank Chaparral, Coastal Scrub, Mixed Chaparral, Urban, Chamise-Redshank		--	--	--	--	--	--	--	Y
Reptile	*Elgaria (=gerrhonotus) panamintinus*	Panamint Alligator Lizard				CSC	Sensitive	Sensitive		Alkali Desert Scrub, Desert Riparian, Desert Scrub, Joshua Tree, Pinyon-JuniperSagebrush, Talus Slope, Coastal Scrub, Valley-	*	--	--	--	--	Y	--	Y	--
Reptile	*Emys (=Clemmys) marmorata*	Western Pond Turtle				CSC				Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Reptile	*Emys (=Clemmys) marmorata marmorata*	Northwestern Pond Turtle				CSC	Sensitive			Wide Variety of Habitats		Y	Y	--	Y	--	Y	Y	--
Reptile	*Emys (=Clemmys) marmorata pallida*	Southwestern Pond Turtle				CSC	Sensitive	Sensitive		Wide Variety of Habitats		Y	Y	Y	--	Y	--	Y	Y
Reptile	*Eumeces skiltonianus interparietalis*	Coronado Skink				CSC		Sensitive		Annual Grassland, Chamise-Redshank Chaparral, Coastal Scrub, Mixed Chaparral, Wide Variety of Habitats		--	--	--	--	--	--	--	Y
Reptile	*Gambelia sila*	Blunt-Nosed Leopard Lizard	Endangered	Endangered		Fully protected				Alkali Desert Scrub, Annual Grassland	*	Y	Y	--	--	--	--	Y	--
Reptile	*Gopherus agassizii*	Desert Tortoise	Threatened	Threatened						Wide Variety of Habitats		--	--	Y	--	Y	--	--	--
Reptile	*Heloderma suspectum cinctum*	Banded Gila Monster (Population West Of The Colorado River)				CSC		Sensitive (full species)		Desert Scrub, Desert Succulent Shrub, Desert Wash		--	--	Y	--	Y	--	--	--
Reptile	*Kinosternon sonoriense*	Sonoran Mud Turtle				CSC				Desert Riparian, Lacustrine, Riverine, Shoreline, Mixed ChaparralMontane		--	--	Y	--	--	--	--	--
Reptile	*Lampropeltis zonata*	California Mountain Kingsnake (San Diego Population)				CSC	Sensitive			Mixed Chaparral, Montane Hardwood	*	--	--	Y	--	--	--	--	--
Reptile	*Lampropeltis zonata*	California Mountain Kingsnake (San Bernardino Population)				CSC	Sensitive			Mixed Chaparral, Sierran Mixed Conifer, Talus Slope	*	--	--	--	--	--	--	--	Y
Reptile	*Lampropeltis zonata*	California Mountain Kingsnake (San Diego Population)				CSC	Sensitive			Mixed Chaparral, Montane Hardwood	*	--	--	--	--	--	--	--	Y
Reptile	*Masticophis flagellum ruddocki*	San Joaquin Whipsnake				CSC				Alkali Desert Scrub, Annual Grassland	*	Y	Y	--	--	--	--	--	--
Reptile	*Masticophis lateralis euryxanthus*	Alameda Whipsnake	Threatened	Threatened						Annual Grassland, Blue Oak Woodland, Chamise-Redshank Chaparral, Coastal Oak Woodland, Coastal ScrubMixed Chaparral, Valley Oak Woodland, Wide	*	Y	Y	--	--	--	--	--	--
Reptile	*Phrynosoma coronatum (blainvillei)*	Coast (San Diego) Horned Lizard				CSC	Sensitive			Chamise-Redshank Chaparral, Coastal Scrub,		Y	--	Y	--	Y	--	Y	Y

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Reptile	*Phrynosoma coronatum (frontale)*	Coast (California) Horned Lizard				CSC		Sensitive		Wide Variety of Habitats		Y	Y	--	--	Y	--	Y	Y
Reptile	*Phrynosoma mcalli*	Flat-Tailed Horned Lizard				CSC	Sensitive	Sensitive		Alkali Desert Scrub, Desert Scrub, Desert Succulent Shrub, Desert Wash, DunesDouglas-Fir, Jeffrey Pine, Lodgepole Pine,		--	--	Y	--	--	--	--	--
Reptile	*Salvadora hexalepis virgultea*	Coast Patch-Nosed Snake				CSC				Chamise-Redshank Chaparral, Coastal Scrub, Mixed Chaparral, Saline		Y	--	--	--	--	--	--	Y
Reptile	*Sceloporus graciosus graciosus*	Northern Sagebrush Lizard						Sensitive		Desert Scrub, Sagebrush		--	--	--	Y	Y	--	Y	--
Reptile	*Thamnophis gigas*	Giant Garter Snake	Threatened	Threatened						Freshwater Emergent Wetland, Irrigated Row and Field Crops, Riverine, Shoreline, Valley-Foothill RiparianAnnual Grassland, Coastal Scrub, Freshwater	*	--	Y	--	--	--	--	--	--
Reptile	*Thamnophis hammondii*	Two-Striped Garter Snake				CSC	Sensitive	Sensitive		Coastal Oak Woodland, Coastal Scrub, Mixed Chaparral, Riverine, ShorelineValley-Foothill Riparian, Freshwater Emergent Wetland,		Y	--	Y	--	Y	--	--	Y
Reptile	*Thamnophis sirtalis spp.*	South Coast Garter Snake				CSC				Freshwater Emergent Wetland, Lacustrine, Riverine, Valley-Foothill Riparian, Desert Succulent	*	--	--	--	--	--	--	--	Y
Reptile	*Thamnophis sirtalis tetrataenia*	San Francisco Garter Snake	Endangered	Endangered		Fully Protected				Annual Grassland, Coastal Scrub, Freshwater Emergent Wetland, Riverine	*	Y	Y	--	--	--	--	--	--
Reptile	*Uma inornata*	Coachella Valley Fringe-Toed Lizard	Threatened	Endangered						Alkali Desert Scrub, Desert Scrub, Desert Wash, Dunes	*	--	--	Y	--	--	--	--	--
Reptile	*Uma notata*	Colorado Desert Fringe-Toed Lizard				CSC		Sensitive		Desert Scrub, Desert Wash, Dunes		--	--	Y	--	--	--	--	--
Reptile	*Uma scoparia*	Mojave Fringe-Toed Lizard				CSC		Sensitive		Alkali Desert Scrub, Desert Scrub, Desert Wash, Dunes, Montane ChaparralMontane Riparian, Pinyon-Juniper,		--	--	Y	--	Y	--	--	--
Reptile	*Xantusia gracilis*	Sandstone Night Lizard				CSC				Barren	*	--	--	Y	--	--	--	--	--
Reptile	*Xantusia vigilis sierrae*	Sierra Night Lizard				CSC	Sensitive			Barren	*	--	--	--	--	--	--	Y	--
Bird	*Accipiter gentilis*	Northern Goshawk				CSC	Sensitive		Sensitive	Wide Variety of Habitats		Y	Y	--	Y	Y	Y	Y	Y
Bird	*Agelaius tricolor*	Tricolored Blackbird			BCC	CSC		Sensitive		Annual Grassland, Cropland, Freshwater Emergent Wetland, Pasture, Perennial		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Aimophila ruficeps canescens*	Southern California Rufous-Crowned Sparrow				CSC				Chamise-Redshank Chaparral, Coastal Scrub,		Y	--	--	--	--	--	--	Y
Bird	*Amphispiza belli belli*	Bell's Sage Sparrow			BCC (full species)	CSC				Chamise-Redshank Chaparral, Coastal Scrub, Mixed Chaparral		--	--	--	--	--	Y	--	Y
Bird	*Aquila chrysaetos*	Golden Eagle			BCC	CSC, Fully Protected		Sensitive	Sensitive	Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y

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Bird	*Ardea alba*	Great Egret							Sensitive	Freshwater Emergent Wetland, Irrigated Row and Field Crops, Pasture, Saline Emergent Wetland, ShorelineValley-Foothill Riparian, Freshwater Emergent Wetland, Pasture,		Y	Y	Y	Y	--	Y	Y	Y
Bird	*Ardea herodias*	Great Blue Heron							Sensitive	Freshwater Emergent Wetland, Pasture, Saline Emergent Wetland, Shoreline, Valley-Foothill		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Asio flammeus*	Short-Eared Owl				CSC				Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Asio otus*	Long-Eared Owl				CSC				Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Athene cunicularia*	Burrowing Owl			BCC	CSC		Sensitive		Annual Grassland, Coastal Scrub, Coastal Terrace Prairie, Desert Scrub, Perennial GrasslandSagebrush, Montane Hardwood,		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Brachyramphus marmoratus*	Marbled Murrelet	Threatened	Endangered					Sensitive	Douglas-Fir, Marine, Redwood		Y	--	--	--	--	--	--	--
Bird	*Buteo regalis*	Ferruginous Hawk			BCC			Sensitive		Annual Grassland, Desert Scrub, Perennial Grassland,		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Buteo swainsoni*	Swainson's Hawk		Threatened	BCC		Sensitive			Annual Grassland, Blue Oak Woodland, Cropland, Pasture, Perennial GrasslandValley Oak Woodland, Valley-Foothill Riparian, Coastal Scrub,		--	Y	--	Y	Y	Y	Y	--
Bird	*Calypte costae*	Costa's Hummingbird			BCC					Coastal Scrub, Desert Riparian, Desert Scrub, Desert Succulent Shrub, Desert WashPalm Oasis, Valley-Foothill Riparian,		Y	Y	Y	--	Y	--	Y	Y
Bird	*Campylorhynchus brunneicapillus sandiegensis*	Coastal Cactus Wren			BCC	CSC	Sensitive			Coastal Scrub		--	--	Y	--	--	--	--	Y
Bird	*Carduelis lawrencei*	Lawrence's Goldfinch			BCC					Blue Oak Woodland, Blue Oak-Foothill Pine, Desert Riparian, Palm Oasis, Pinyon-		Y	Y	Y	--	Y	Y	Y	Y
Bird	*Centrocercus urophasianus*	Greater Sage-Grouse				CSC	Sensitive	Sensitive		Alkali Desert Scrub, Bitterbrush, Mesic Meadow, Perennial Grassland,		--	--	--	Y	--	--	Y	--
Bird	*Chaetura vauxi*	Vaux's Swift				CSC				Douglas-Fir, Redwood		Y	Y	--	Y	--	Y	Y	--
Bird	*Charadrius alexandrinus nivosus*	Western Snowy Plover (Coastal Population)	Threatened		BCC (full species)					Dunes, Shoreline		Y	Y	--	Y	Y	Y	Y	Y
Bird	*Charadrius montanus*	Mountain Plover			BCC	CSC				Alkali Desert Scrub, Annual Grassland, Cropland		Y	Y	Y	--	Y	--	--	Y
Bird	*Chlidonias niger*	Black Tern				CSC				Estuarine, Freshwater Emergent Wetland, Lacustrine, Marine, Wet		--	Y	--	Y	--	Y	Y	--
Bird	*Coccyzus americanus occidentalis*	Western Yellow-Billed Cuckoo	Candidate	Endangered	BCC (full species)		Sensitive			Desert Riparian, Valley-Foothill Riparian		Y	Y	Y	--	Y	Y	Y	Y

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Bird	*Colaptes chrysoides*	Gilded Flicker		Endangered	BCC					Desert Riparian		--	--	Y	--	--	--	--	--
Bird	*Contopus cooperi*	Olive-Sided Flycatcher			BCC					Douglas-Fir, Klamath Mixed Conifer, Lodgepole Pine, Montane Hardwood-Conifer, Red FirRedwood, Sierran Mixed Conifer, Wide		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Coturnicops noveboracensis*	Yellow Rail			BCC	CSC				Freshwater Emergent Wetland, Saline Emergent Wetland, Wet Meadow		Y	Y	--	--	--	Y	--	Y
Bird	*Cypseloides niger*	Black Swift			BCC	CSC				Barren, Cave		Y	Y	Y	Y	--	Y	Y	Y
Bird	*Dendrocygna bicolor*	Fulvous Whistling Duck				CSC				Cropland, Freshwater Emergent Wetland, Lacustrine, Pasture, RiverineMontane Riparian,		--	Y	Y	--	--	--	--	--
Bird	*Dendroica petechia brewsteri*	Yellow Warbler				CSC				Montane Riparian, Valley-Foothill Riparian		Y	Y	Y	--	Y	Y	Y	Y
Bird	*Dendroica petechia sonorana*	Sonoran Yellow Warbler			BCC	CSC				Desert Riparian		--	--	Y	--	--	--	--	--
Bird	*Empidonax traillii*	Willow Flycatcher		Endangered			Sensitive			Mesic Meadow, Montane Riparian, Sierran Mixed Conifer, Valley-Foothill		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Empidonax traillii extimus*	Southwestern Willow Flycatcher	Endangered							Coastal Scrub, Valley-Foothill Riparian		Y	--	Y	--	Y	--	Y	Y
Bird	*Falco mexicanus*	Prairie Falcon			BCC					Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Falco peregrinus anatum*	American Peregrine Falcon	Delisted	Endangered	BCC (full species)	Fully protected	Sensitive		Sensitive	Wide Variety of Habitats		--	Y	--	--	--	Y	Y	--
Bird	*Fratercula cirrhata*	Tufted Puffin				CSC				Marine, Offshore Rocks		Y	--	--	--	--	Y	--	--
Bird	*Geothlypis trichas sinuosa*	Saltmarsh Common Yellowthroat			BCC	CSC				Saline Emergent Wetland		Y	Y	--	--	--	Y	--	--
Bird	*Grus canadensis tabida*	Greater Sandhill Crane		Threatened		Fully protected	Sensitive			Annual Grassland, Cropland, Freshwater Emergent Wetland, Lacustrine, Perennial GrasslandWet		--	Y	--	Y	--	Y	Y	--
Bird	*Gymnogyps californianus*	California Condor	Endangered	Endangered		Fully protected			Sensitive	Wide Variety of Habitats		Y	Y	--	--	Y	--	Y	Y
Bird	*Haliaeetus leucocephalus*	Bald Eagle	Delisted	Endangered		Fully protected			Sensitive	Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Histrionicus histrionicus*	Harlequin Duck				CSC		Sensitive		Marine, Riverine, Shoreline		--	Y	--	Y	--	--	Y	--
Bird	*Icteria virens*	Yellow-Breasted Chat				CSC				Desert Riparian, Montane Riparian, Valley-Foothill		Y	Y	Y	--	Y	Y	Y	Y
Bird	*Ixobrychus exilis*	Least Bittern				CSC				Desert Riparian, Freshwater Emergent Wetland		--	Y	Y	Y	Y	Y	Y	Y
Bird	*Lanius ludovicianus*	Loggerhead Shrike			BCC	CSC				Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Laterallus jamaicensis coturniculus*	California Black Rail		Threatened	BCC (full species)	Fully protected				Freshwater Emergent Wetland, Saline Emergent Wetland		Y	Y	Y	--	--	Y	--	Y
Bird	*Melanerpes lewis*	Lewis' Woodpecker			BCC					Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Melanerpes uropygialis*	Gila Woodpecker		Endangered	BCC					Desert Riparian, Desert Wash		--	--	Y	--	--	--	--	--
Bird	*Melospiza melodia maxillaris*	Suisun Song Sparrow			BCC	CSC				Freshwater Emergent Wetland		--	Y	--	--	--	--	--	--

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Bird	*Melospiza melodia pusillula*	Alameda Song Sparrow			BCC	CSC				Saline Emergent Wetland		--	Y	--	--	--	--	--	--
Bird	*Melospiza melodia samuelis*	San Pablo Song Sparrow			BCC	CSC				Saline Emergent Wetland		--	Y	--	--	--	--	--	--
Bird	*Micrathene whitneyi*	Elf Owl		Endangered	BCC					Desert Riparian		--	--	Y	--	--	--	--	--
Bird	*Mycteria americana*	Wood Stork				CSC				Freshwater Emergent		--	--	Y	--	--	--	--	Y
Bird	*Myiarchus tyrannulus*	Brown-Crested Flycatcher				CSC				Desert Riparian		--	--	Y	--	Y	--	Y	--
Bird	*Numenius americanus*	Long-Billed Curlew			BCC	CSC				Annual Grassland, Cropland, Estuarine, Pasture, Perennial GrasslandSaline Emergent Wetland, Wet Meadow, Freshwater Emergent Wetland, Saline Emergent		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Nycticorax nycticorax*	Black-Crowned Night Heron						Sensitive		Freshwater Emergent Wetland, Saline Emergent Wetland, Shoreline		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Oceanodroma furcata*	Fork-Tailed Storm-Petrel				CSC				Marine, Offshore Rocks		--	--	--	--	--	Y	--	--
Bird	*Oceanodroma homochroa*	Ashy Storm-Petrel			BCC	CSC				Marine, Offshore Rocks, Talus Slope		--	--	--	--	--	Y	--	--
Bird	*Otus flammeolus*	Flammulated Owl			BCC					Douglas-Fir, Jeffrey Pine, Ponderosa Pine, Red Fir		Y	--	Y	Y	Y	Y	Y	Y
Bird	*Passerculus sandwichensis beldingi*	Belding's Savannah Sparrow		Endangered						Saline Emergent Wetland		Y	--	--	--	--	--	--	Y
Bird	*Passerculus sandwichensis rostratus*	Large-Billed Savannah Sparrow				CSC				Saline Emergent Wetland		Y	--	Y	--	--	--	--	Y
Bird	*Pelecanus erythrorhynchos*	American White Pelican				CSC				Estuarine, Lacustrine, Shoreline		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Pelecanus occidentalis californicus*	California Brown Pelican	Endangered	Endangered		Fully protected				Estuarine, Lacustrine, Marine, Offshore Rocks, Shoreline		Y	--	--	--	--	--	--	--
Bird	*Picoides albolarvatus*	White-Headed Woodpecker			BCC					Douglas-Fir, Jeffrey Pine, Lodgepole Pine, Ponderosa Pine, Red FirWhite Fir,		Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Pipilo crissalis eremophilus*	Inyo California Towhee	Threatened	Endangered						Desert Riparian		--	--	--	--	Y	--	--	--
Bird	*Piranga rubra*	Summer Tanager				CSC				Desert Riparian		--	--	Y	--	Y	--	Y	Y
Bird	*Polioptila californica californica*	Coastal California Gnatcatcher	Threatened							Chamise-Redshank Chaparral, Coastal Scrub,		--	--	--	--	--	--	--	Y
Bird	*Progne subis*	Purple Martin				CSC				Wide Variety of Habitats		Y	Y	Y	Y	--	Y	Y	Y
Bird	*Pyrocephalus rubinus*	Vermilion Flycatcher				CSC				Desert Riparian		Y	--	Y	--	Y	--	Y	Y
Bird	*Rallus longirostris levipes*	Light-Footed Clapper Rail	Endangered	Endangered		Fully protected				Saline Emergent Wetland		Y	--	--	--	--	--	--	Y
Bird	*Rallus longirostris obsoletus*	California Clapper Rail	Endangered	Endangered		Fully protected				Saline Emergent Wetland		Y	Y	--	--	--	Y	--	--
Bird	*Rallus longirostris yumanensis*	Yuma Clapper Rail	Endangered	Threatened		Fully protected				Freshwater Emergent Wetland		--	--	Y	--	Y	--	--	--
Bird	*Riparia riparia*	Bank Swallow		Threatened						Valley-Foothill Riparian		Y	Y	--	Y	--	Y	Y	Y
Bird	*Rynchops niger*	Black Skimmer			BCC	CSC				Estuarine, Lacustrine,		Y	Y	Y	--	--	--	--	Y
Bird	*Spizella atrogularis*	Black-Chinned Sparrow			BCC					Chamise-Redshank Chaparral, Juniper, Mixed Chaparral, Pinyon-Juniper,		Y	Y	Y	--	Y	Y	Y	Y

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Bird	*Spizella breweri*	Brewer's Sparrow			BCC					Desert Scrub, Pinyon-Juniper, Sagebrush		Y	--	Y	Y	Y	--	Y	Y
Bird	*Sterna antillarum browni*	California Least Tern	Endangered	Endangered		Fully protected				Estuarine, Lacustrine, Shoreline		Y	Y	--	--	--	--	--	Y
Bird	*Sterna caspia*	Caspian Tern			BCC					Estuarine, Freshwater Emergent Wetland, Lacustrine, Marine, RiverineSaline Emergent		Y	Y	Y	Y	--	Y	Y	Y
Bird	*Sterna nilotica*	Gull-Billed Tern			BCC	CSC				Freshwater Emergent Wetland, Lacustrine, Saline Emergent Wetland,		--	--	Y	--	--	--	--	--
Bird	*Strix nebulosa*	Great Gray Owl		Endangered			Sensitive		Sensitive	Lodgepole Pine, Red Fir, Sierran Mixed Conifer, Wet		--	--	--	Y	--	Y	Y	--
Bird	*Strix occidentalis caurina*	Northern Spotted Owl	Threatened						Sensitive	Klamath Mixed Conifer,		--	Y	--	Y	--	Y	Y	--
Bird	*Strix occidentalis occidentalis*	California Spotted Owl			BCC	CSC	Sensitive	Sensitive		Douglas-Fir, Klamath Mixed Conifer, Ponderosa Pine, Sierran Mixed Conifer,		Y	--	--	--	--	--	Y	Y
Bird	*Toxostoma bendirei*	Bendire's Thrasher			BCC	CSC		Sensitive		Desert Succulent Shrub, Joshua Tree		--	--	Y	--	Y	--	Y	Y
Bird	*Toxostoma crissale*	Crissal Thrasher			BCC	CSC				Desert Riparian, Desert Wash, Juniper, Pinyon-Juniper, SagebrushAlkali Desert Scrub, Desert Scrub, Desert Succulent Shrub,		--	--	Y	--	Y	--	--	--
Bird	*Toxostoma lecontei macmillanorum*	San Joaquin Le Conte's Thrasher			BCC (full species)	CSC				Alkali Desert Scrub, Desert Scrub, Desert Succulent Shrub		--	Y	--	--	--	--	--	--
Bird	*Vermivora virginiae*	Virginia's Warbler			BCC					Montane Chaparral, Montane Riparian, Pinyon-Juniper, Sierran Mixed		--	--	--	--	Y	--	Y	Y
Bird	*Vireo bellii arizonae*	Arizona Bell's Vireo		Endangered	BCC (full species)					Desert Riparian		--	--	Y	--	Y	--	--	--
Bird	*Vireo bellii pusillus*	Least Bell's Vireo	Endangered	Endangered	BCC (full species)					Valley-Foothill Riparian		Y	Y	Y	--	Y	--	Y	Y
Bird	*Vireo vicinior*	Gray Vireo			BCC	CSC		Sensitive		Chamise-Redshank Chaparral, Juniper, Pinyon-		--	--	Y	--	Y	--	Y	Y
Mammal	*Ammospermophilus nelsoni*	San Joaquin Antelope Squirrel		Threatened						Alkali Desert Scrub, Annual Grassland	*	Y	Y	--	--	--	--	Y	--
Mammal	*Antrozous pallidus*	Pallid Bat				CSC	Sensitive	Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Aplodontia rufa californica*	Sierra Nevada Mountain Beaver				CSC				Jeffrey Pine, Montane Riparian, Red Fir		--	--	--	--	--	--	Y	--
Mammal	*Aplodontia rufa nigra*	Point Arena Mountain Beaver	Endangered			CSC				Closed-Cone Pine-Cypress, Montane Riparian	*	--	--	--	--	--	Y	--	--
Mammal	*Aplodontia rufa phaea*	Point Reyes Mountain Beaver				CSC				Coastal Scrub, Montane Hardwood-Conifer,	*	--	--	--	--	--	Y	--	--
Mammal	*Arborimus albipes*	White-Footed Vole				CSC				Redwood		--	--	--	--	--	Y	--	--
Mammal	*Arborimus pomo*	Red Tree Vole				CSC				Douglas-Fir, Montane Hardwood-Conifer,	*	--	--	--	--	--	Y	--	--
Mammal	*Brachylagus idahoensis*	Pygmy Rabbit				CSC				Low Sage, Pinyon-Juniper, Sagebrush		--	--	--	Y	--	--	Y	--

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Mammal	*Chaetodipus californicus femoralis*	Dulzura Pocket Mouse				CSC				Annual Grassland, Chamise-Redshank Chaparral, Coastal		--	--	Y	--	--	--	--	Y
Mammal	*Chaetodipus fallax fallax*	Northwestern San Diego Pocket Mouse				CSC (full species)				Chamise-Redshank Chaparral, Coastal Scrub		--	--	Y	--	--	--	--	Y
Mammal	*Chaetodipus fallax pallidus*	Pallid San Diego Pocket Mouse				CSC (full species)				Desert Scrub, Desert Succulent Shrub, Desert Wash, Mixed Chaparral, Pinyon-JuniperDunes, Desert Riparian, Desert Scrub, Desert Succulent		--	--	Y	--	Y	--	--	Y
Mammal	*Choeronycteris mexicana*	Mexican Long-Tongued Bat				CSC				Shrub, Montane Riparian, Pinyon-JuniperUrban, Wide		--	--	--	--	--	--	--	Y
Mammal	*Corynorhinus townsendii*	Pale Big-Eared Bat				CSC	Sensitive	Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Dipodomys californicus eximius*	Marysville California Kangaroo Rat				CSC		Sensitive		Annual Grassland, Mixed Chaparral	*	--	Y	--	--	--	--	--	--
Mammal	*Dipodomys heermanni morroensis*	Morro Bay Kangaroo Rat	Endangered	Endangered		Fully protected				Annual Grassland, Coastal Scrub, Mixed Chaparral	*	Y	--	--	--	--	--	--	--
Mammal	*Dipodomys ingens*	Giant Kangaroo Rat	Endangered	Endangered						Alkali Desert Scrub, Annual Grassland	*	Y	Y	--	--	--	--	--	--
Mammal	*Dipodomys merriami parvus*	San Bernardino Kangaroo Rat	Endangered			CSC				Chamise-Redshank Chaparral, Coastal Scrub	*	--	--	--	--	--	--	--	Y
Mammal	*Dipodomys nitratoides brevinasus*	Short-Nosed Kangaroo Rat				CSC		Sensitive		Alkali Desert Scrub, Annual Grassland	*	Y	Y	--	--	--	--	--	--
Mammal	*Dipodomys nitratoides exilis*	Fresno Kangaroo Rat	Endangered	Endangered						Alkali Desert Scrub, Annual Grassland	*	--	Y	--	--	--	--	--	--
Mammal	*Dipodomys nitratoides nitratoides*	Tipton Kangaroo Rat	Endangered	Endangered						Alkali Desert Scrub, Annual Grassland	*	--	Y	--	--	--	--	--	--
Mammal	*Dipodomys stephensi*	Stephens' Kangaroo Rat	Endangered	Threatened						Annual Grassland, Chamise-Redshank Chaparral, Coastal	*	--	--	--	--	--	--	--	Y
Mammal	*Dipodomys venustus elephantinus*	Big-Eared Kangaroo Rat				CSC				Chamise-Redshank Chaparral, Coastal Scrub,	*	Y	--	--	--	--	--	--	--
Mammal	*Euderma maculatum*	Spotted Bat				CSC		Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Eumops perotis*	Western Mastiff Bat				CSC		Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Glaucomys sabrinus californicus*	San Bernardino Flying Squirrel				CSC	Sensitive			Jeffrey Pine, Ponderosa Pine	*	--	--	--	--	--	--	--	Y
Mammal	*Gulo gulo*	California Wolverine		Threatened		Fully protected	Sensitive Sensitive (ssp. Luteus)			Wide Variety of Habitats		--	--	--	Y	--	Y	Y	--
Mammal	*Lasiurus blossevillii*	Western Red Bat					Sensitive			Blue Oak-Foothill Pine, Jeffrey Pine, Montane Hardwood-Conifer, Montane Riparian, Orchard and VineyardFreshwater		Y	Y	Y	--	--	Y	Y	Y
Mammal	*Lepus americanus klamathensis*	Oregon Snowshoe Hare				CSC				Eastside Pine, Jeffrey Pine, Juniper, Klamath Mixed Conifer, Montane RiparianPonderosa Pine, Sierran Mixed Conifer,		--	--	--	Y	--	Y	Y	--
Mammal	*Lepus americanus tahoensis*	Sierra Nevada Snowshoe Hare				CSC				Jeffrey Pine, Montane Riparian, Ponderosa Pine, Red Fir, SagebrushSierran Mixed Conifer, White Fir, Alpine-Dwarf Shrub, Juniper,		--	--	--	--	--	--	Y	--

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Mammal	*Lepus californicus bennettii*	San Diego Black-Tailed Jackrabbit				CSC				Chamise-Redshank Chaparral, Coastal Scrub		--	--	Y	--	--	--	--	Y
Mammal	*Lepus townsendii*	Western White-Tailed Jackrabbit				CSC				Alpine-Dwarf Shrub, Juniper, Low Sage, Perennial Grassland, SagebrushSubalpine Conifer, Wet Meadow, Eastside Pine,		--	--	--	Y	Y	--	Y	--
Mammal	*Lontra canadensis sonora*	Southwestern River Otter				CSC		Sensitive		Desert Riparian, Riverine		--	--	--	--	Y	--	--	--
Mammal	*Macrotus californicus*	California Leaf-Nosed Bat				CSC	Sensitive			Alkali Desert Scrub, Desert Riparian, Desert Scrub, Desert Succulent Shrub, Desert WashPalm Oasis,		--	--	Y	--	Y	--	--	Y
Mammal	*Martes americana*	American Marten					Sensitive			Eastside Pine, Jeffrey Pine, Klamath Mixed Conifer, Lodgepole Pine, Red FirSierran Mixed Conifer, Subalpine Conifer, Wide		--	--	--	Y	--	Y	Y	--
Mammal	*Martes americana humboldtensis*	Humboldt Marten				CSC	Sensitive (full species)			Jeffrey Pine, Klamath Mixed Conifer, Lodgepole Pine, Red Fir, Subalpine ConiferEastside Pine, Jeffrey Pine, Lodgepole Pine, Red		--	--	--	--	--	Y	--	--
Mammal	*Martes americana sierrae*	Sierra Marten					Sensitive (full species)			Eastside Pine, Jeffrey Pine, Lodgepole Pine, Red Fir, Sierran Mixed ConiferSubalpine Conifer, Eastside Pine, Jeffrey Pine, Klamath Mixed Conifer,		--	--	--	Y	--	Y	Y	--
Mammal	*Martes pennanti pacifica*	Pacific Fisher	Candidate			CSC (full species)	Sensitive	Sensitive		Wide Variety of Habitats		--	--	--	Y	Y	Y	Y	--
Mammal	*Microtus californicus mohavensis*	Mohave River Vole				CSC				Desert Riparian	*	--	--	--	--	Y	--	--	--
Mammal	*Microtus californicus sanpabloensis*	San Pablo Vole				CSC				Annual Grassland, Saline Emergent Wetland	*	--	Y	--	--	--	--	--	--
Mammal	*Microtus californicus scirpensis*	Amargosa Vole	Endangered	Endangered						Desert Riparian, Freshwater Emergent Wetland	*	--	--	--	--	Y	--	--	--
Mammal	*Microtus californicus stephensi*	South Coast Marsh Vole				CSC				Saline Emergent Wetland	*	--	--	--	--	--	--	--	Y
Mammal	*Microtus californicus vallicola*	Owens Valley Vole				CSC				Freshwater Emergent Wetland, Montane Riparian	*	--	--	--	--	Y	--	Y	--
Mammal	*Myotis ciliolabrum*	Small-Footed Myotis						Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Myotis evotis*	Long-Eared Myotis						Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Myotis occultus*	Arizona Myotis				CSC				Desert Riparian		--	--	Y	--	--	--	--	--
Mammal	*Myotis thysanodes*	Fringed Myotis						Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Myotis velifer*	Cave Myotis				CSC		Sensitive		Cave, Desert Riparian, Desert Scrub, Desert Succulent Shrub, Desert		--	--	Y	--	Y	--	--	--
Mammal	*Myotis yumanensis*	Yuma Myotis						Sensitive		Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Neotoma fuscipes annectens*	San Francisco Dusky-Footed Woodrat				CSC				Chamise-Redshank Chaparral, Montane Chaparral, Montane Hardwood-Conifer, Redwood, Chamise-Redshank ChaparralCoastal	*	Y	--	--	--	--	--	--	--

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Mammal	*Neotoma fuscipes riparia*	Riparian (=San Joaquin Valley) Woodrat	Endangered			CSC				Valley-Foothill Riparian	*	--	Y	--	--	--	--	--	--
Mammal	*Neotoma lepida intermedia*	San Diego Desert Woodrat				CSC				Chamise-Redshank Chaparral, Coastal Scrub,		Y	--	Y	--	--	--	--	Y
Mammal	*Neotoma macrotis luciana*	Monterey Dusky-Footed Woodrat				CSC				Blue Oak Woodland, Blue Oak-Foothill Pine, Chamise-Redshank Chaparral, Coastal Oak Woodland, Annual GrasslandCropland, Estuarine, Pasture, Perennial Grassland, Saline Emergent	*	Y	--	--	--	--	--	--	--
Mammal	*Nyctinomops femorasaccus*	Pocketed Free-Tailed Bat				CSC				Wide Variety of Habitats		--	--	Y	--	Y	--	--	Y
Mammal	*Nyctinomops macrotis*	Big Free -Tailed Bat				CSC				Barren, Desert Scrub, Urban		Y	Y	Y	--	Y	--	--	Y
Mammal	*Onychomys torridus ramona*	Southern Grasshopper Mouse				CSC				Chamise-Redshank Chaparral, Coastal Scrub,		--	--	Y	--	Y	--	--	Y
Mammal	*Onychomys torridus tularensis*	Tulare Grasshopper Mouse				CSC		Sensitive		Alkali Desert Scrub, Coastal Scrub	*	Y	Y	--	--	Y	--	Y	--
Mammal	*Ovis canadensis californiana*	California Bighorn Sheep	Endangered	Endangered		Fully protected				Wide Variety of Habitats		--	--	--	--	--	--	Y	--
Mammal	*Ovis canadensis nelsoni*	Nelson's Bighorn Sheep					Sensitive	Sensitive		Wide Variety of Habitats		--	--	Y	--	Y	--	Y	Y
Mammal	*Ovis canadensis nelsoni dps*	Peninsular Bighorn Sheep	Endangered	Threatened		Fully protected				Wide Variety of Habitats	*	--	--	Y	--	--	--	--	Y
Mammal	*Perognathus alticolus alticolus*	White-Eared Pocket Mouse				CSC (full species)	Sensitive			Chamise-Redshank Chaparral, Mixed Chaparral, Ponderosa Pine	*	--	--	--	--	--	--	--	Y
Mammal	*Perognathus alticolus inexpectatus*	Tehachapi Pocket Mouse				CSC (full species)	Sensitive			Annual Grassland, Desert Scrub, Juniper, Mixed Chaparral, Pinyon-JuniperSagebrush, Chamise-	*	Y	Y	--	--	Y	--	Y	Y
Mammal	*Perognathus inornatus inornatus*	San Joaquin Pocket Mouse						Sensitive		Alkali Desert Scrub, Annual Grassland, Chamise-Redshank Chaparral, Coastal Scrub, Desert ScrubDesert	*	Y	Y	--	--	Y	Y	Y	--
Mammal	*Perognathus inornatus psammophilus*	Salinas Pocket Mouse				CSC				Annual Grassland, Coastal Scrub	*	Y	--	--	--	--	--	--	--
Mammal	*Perognathus longimembris bangsi*	Palm Springs Pocket Mouse				CSC				Desert Scrub, Desert Wash	*	--	--	Y	--	--	--	--	--
Mammal	*Perognathus longimembris brevinasus*	Los Angeles Pocket Mouse				CSC	Sensitive			Chamise-Redshank Chaparral, Coastal Scrub	*	--	--	--	--	--	--	--	Y
Mammal	*Perognathus longimembris internationalis*	Jacumba Pocket Mouse				CSC				Coastal Scrub, Desert Scrub, Desert Succulent Shrub, Desert Wash, Coastal Scrub		--	--	Y	--	--	--	--	Y
Mammal	*Perognathus longimembris pacificus*	Pacific Pocket Mouse	Endangered			CSC				Coastal Scrub		--	--	--	--	--	--	--	Y
Mammal	*Perognathus parvus xanthonotus*	Yellow-Eared Pocket Mouse						Sensitive		Desert Scrub, Sagebrush	*	--	--	--	--	Y	--	Y	--
Mammal	*Puma concolor browni*	Yuma Mountain Lion				CSC				Desert Riparian		--	--	Y	--	--	--	--	--
Mammal	*Reithrodontomys raviventris*	Salt-Marsh Harvest Mouse	Endangered	Endangered		Fully protected				Saline Emergent Wetland	*	Y	Y	--	--	--	--	--	--
Mammal	*Scapanus latimanus parvus*	Alameda Island Mole				CSC				Annual Grassland	*	--	Y	--	--	--	--	--	--
Mammal	*Sigmodon arizonae plenus*	Colorado River Cotton				CSC				Desert Riparian		--	--	Y	--	--	--	--	--

Taxon	*Scientific Name*	Common Name	ESA	CESA	FWS	DFG	USFS	BLM	CDF	Habitat Type(s)	Endemic Species	Central Coast	Central Valley/ Bay Delta	Colorado Desert	Modoc	Mojave	North Coast/ Klamath	Sierra	South Coast
Mammal	*Sigmodon hispidus eremicus*	Yuma Hispid Cotton Rat				CSC				Desert Riparian		--	--	Y	--	--	--	--	--
Mammal	*Sorex lyelli*	Mount Lyell Shrew				CSC				Montane Riparian, Annual Grassland, Freshwater Emergent	*	--	--	--	--	--	--	Y	--
Mammal	*Sorex ornatus relictus*	Buena Vista Lake Shrew	Endangered			CSC				Wetland, Valley-Foothill	*	--	Y	--	--	--	--	--	--
Mammal	*Sorex ornatus salarius*	Monterey Shrew				CSC				Dunes, Saline Emergent	*	Y	--	--	--	--	--	--	--
Mammal	*Sorex ornatus salicornicus*	Southern California Saltmarsh Shrew				CSC				Saline Emergent Wetland	*	--	--	--	--	--	--	--	Y
Mammal	*Sorex ornatus sinuosus*	Suisun Shrew				CSC				Saline Emergent Wetland	*	--	Y	--	--	--	--	--	--
Mammal	*Sorex vagrans halicoetes*	Salt-Marsh Wandering Shrew				CSC				Saline Emergent Wetland	*	--	Y	--	--	--	--	--	--
Mammal	*Spermophilus mohavensis*	Mohave Ground Squirrel		Threatened						Alkali Desert Scrub, Desert Scrub	*	--	--	--	--	Y	--	Y	--
Mammal	*Spermophilus tereticaudus chlorus*	Palm Springs Round-Tailed Ground Squirrel	Candidate			CSC				Desert Scrub, Desert Wash	*	--	--	Y	--	--	--	--	Y
Mammal	*Sylvilagus bachmani riparius*	Riparian Brush Rabbit	Endangered	Endangered						Valley-Foothill Riparian	*	--	Y	--	--	--	--	--	--
Mammal	*Tamias speciosus callipeplus*	Mount Pinos Chipmunk					Sensitive			Jeffrey Pine, Lodgepole Pine, Red Fir	*	Y	Y	--	--	--	--	--	--
Mammal	*Taxidea taxus*	American Badger				CSC				Wide Variety of Habitats		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Vulpes macrotis mutica*	San Joaquin Kit Fox	Endangered	Threatened						Wide Variety of Habitats	*	Y	Y	--	--	--	--	Y	--
Mammal	*Vulpes vulpes necator*	Sierra Nevada Red Fox		Threatened			Sensitive			Wide Variety of Habitats		--	--	--	Y	--	Y	Y	--
Mammal	*Zapus trinotatus orarius*	Point Reyes Jumping Mouse				CSC				Annual Grassland, Coastal Scrub	*	--	--	--	--	--	Y	--	--

B. APPENDIX C-2: ECOREGIONS IN THE WESTERN UNITED STATES

Source: http://www.epa.gov/wed/pages/ecoregions/level_iii.htm, accessed May 7, 2010

The primary distinguishing characteristics of Level III ecoregions identified in the western United States are summarized below.

1. COAST RANGE

The low mountains of the Coast Range are covered by highly productive, rain-drenched coniferous forests. Sitka spruce and coastal redwood forests originally dominated the fog-shrouded coast, while a mosaic of western red cedar, western hemlock, and seral Douglas-fir blanketed inland areas. Today Douglas-fir plantations are prevalent on the intensively logged and managed landscape.

2. PUGET LOWLANDS

This broad rolling lowland is characterized by a mild maritime climate. It occupies a continental glacial trough and is composed of many islands, peninsulas, and bays in the Puget Sound area. Coniferous forest originally grew on the ecoregion’s ground moraines. outwash plains, floodplains, and terraces. The distribution of forest species is affected by the rainshadow from the Olympic Mountains.

3. WILLAMETTE VALLEY

Rolling prairies, deciduous/coniferous forests, and extensive wetlands characterized the pre-19th century landscape of this broad, lowland valley. The Willamette Valley is distinguished from the adjacent Coast Range (1) and Cascades (4) by lower precipitation, less relief, and a different mosaic of vegetation. Landforms consist of terraces and floodplains that are interlaced and surrounded by rolling hills. Productive soils and a temperate climate make it one of the most important agricultural areas in Oregon.

4. CASCADES

This mountainous ecoregion is underlain by Cenozoic volcanics and has been affected by alpine glaciations. It is characterized by steep ridges and river valleys in the west, a high plateau in the east, and both active and dormant volcanoes. Elevations range upwards to 4,390 meters. Its moist, temperate climate supports an extensive and highly productive coniferous forest. Subalpine meadows occur at high elevations.

5. SIERRA NEVADA

The Sierra Nevada is a deeply dissected block fault that rises sharply from the arid basin and range ecoregions on the east and slopes gently toward the Central California Valley to the west. The eastern portion has been strongly glaciated and generally contains higher mountains than are found in the Klamath Mountains to the northwest. Much of the central and southern parts of the region is underlain by granite as compared to the mostly sedimentary formations of the Klamath Mountains and volcanic rocks of the Cascades. The higher elevations of this region are largely federally owned and include several national parks. The vegetation grades from mostly ponderosa pine at the lower elevations on the west side and lodgepole pine on the east side, to fir and spruce at the higher elevations. Alpine conditions exist at the highest elevations.

6. SOUTHERN AND CENTRAL CALIFORNIA CHAPARRAL AND OAK WOODLANDS

The primary distinguishing characteristic of this ecoregion is its Mediterranean climate of hot dry summers and cool moist winters, and associated vegetative cover comprising mainly chaparral and oak woodlands; grasslands occur in some lower elevations and patches of pine are found at higher elevations. Most of the region consists of open low mountains or foothills, but there are areas of irregular plains in the south and near the border of the adjacent Central California Valley ecoregion. Much of this region is grazed by domestic livestock; very little land has been cultivated.

7. CENTRAL CALIFORNIA VALLEY

Flat, intensively farmed plains having long, hot dry summers and cool wet winters distinguish the Central California Valley from its neighboring ecoregions that are either hilly or mountainous, forest or shrub covered, and generally nonagricultural. Nearly half of the region is in cropland, about three fourths of which is irrigated. Environmental concerns in the region include salinity due to evaporation of irrigation water, groundwater contamination from heavy use of agricultural chemicals, wildlife habitat loss, and urban sprawl.

8. SOUTHERN CALIFORNIA MOUNTAINS

Like the other ecoregions in central and southern California, the Southern California Mountains has a Mediterranean climate of hot dry summers and moist cool winters. Although Mediterranean types of vegetation such as chaparral and oak woodlands predominate, the elevations are considerably higher in this region, the summers are slightly cooler, and precipitation amounts are greater, causing the landscape to be more densely vegetated and stands of ponderosa pine to be larger and more numerous than in the adjacent regions. Severe erosion problems are common where the vegetation cover has been destroyed by fire or overgrazing.

9. EASTERN CASCADE SLOPES AND FOOTHILLS

The Eastern Cascade Slopes and Foothills ecoregion is in the rainshadow of the Cascade Mountains. Its climate exhibits greater temperature extremes and less precipitation than ecoregions to the west. Open forests of ponderosa pine and some lodgepole pine distinguish this region from the higher ecoregions to the west where fir and hemlock forests are common, and the lower dryer ecoregions to the east where shrubs and grasslands are predominant. The vegetation is adapted to the prevailing dry continental climate and is highly susceptible to wildfire. Volcanic cones and buttes are common in much of the region.

10. COLUMBIA PLATEAU

The Columbia Plateau is an arid sagebrush steppe and grassland, surrounded on all sides by moister, predominantly forested, mountainous ecological regions. This region is underlain by basalt up to two miles thick. It is covered in some places by loess soils that have been extensively cultivated for wheat, particularly in the eastern portions of the region where precipitation amounts are greater.

11. BLUE MOUNTAINS

This ecoregion is distinguished from the neighboring Cascades and Northern Rockies ecoregions because the Blue Mountains are generally not as high and are considerably more open. Like the Cascades, but unlike the Northern Rockies, the region is mostly volcanic in origin. Only the few higher ranges, particularly the Wallowa and Elkhorn Mountains, consist of intrusive rocks that rise above the dissected lava surface of the region. Unlike the bulk of the Cascades and Northern Rockies, much of this ecoregion is grazed by cattle.

12. SNAKE RIVER PLAIN

This portion of the xeric intermontane basin and range area of the western United States is considerably lower and more gently sloping than the surrounding ecoregions. Mostly because of the available water for irrigation, a large percent of the alluvial valleys bordering the Snake River are in agriculture, with sugar beets, potatoes, and vegetables being the principal crops. Cattle feedlots and dairy operations are also common in the river plain. Except for the scattered barren lava fields, the remainder of the plains and low hills in the ecoregion have a sagebrush steppe potential natural vegetation and are now used for cattle grazing.

13. CENTRAL BASIN AND RANGE

The Central Basin and Range ecoregion is internally drained and is characterized by a mosaic of xeric basins, scattered low and high mountains, and salt flats. It has a hotter and drier climate, more shrubland, and more mountain ranges than the Snake River Plain and Northern Basin and Range ecoregions to the north. Basins are covered by Great Basin sagebrush or saltbush-greasewood vegetation that grow in Aridisols; cool season grasses are less common than in the Mollisols of the Snake River Plain and Northern Basin and Range. The region is not as hot as the Mojave and Sonoran Basin and Range ecoregions and it has a greater percent of land that is grazed.

14. MOJAVE BASIN AND RANGE

This ecoregion contains scattered mountains which are generally lower than those of the Central Basin and Range. Potential natural vegetation in this region is predominantly creosote bush, as compared to the mostly saltbush-greasewood and Great Basin sagebrush of the ecoregion to the north, and creosote bush-bur sage with large patches of palo verde-cactus shrub and saguaro cactus in the Sonoran Basin and Range to the south. Most of this region is federally owned and there is relatively little grazing activity because of the lack of water and forage for livestock. Heavy use of off-road vehicles and motorcycles in some areas has caused severe wind and water erosion problems.

15. NORTHERN ROCKIES

The high, rugged Northern Rockies is mountainous and lies east of the Cascades. Despite its inland position, climate and vegetation are, typically, marine-influenced. Douglas fir, subalpine fir, Englemann spruce, and ponderosa pine and Pacific indicators such as western red cedar, western hemlock, and grand fir are found in the ecoregion. The vegetation mosaic is different from that of the Middle Rockies which is not dominated by maritime species. The Northern Rockies ecoregion is not as high nor as snow- and ice-covered as the Canadian Rockies although alpine characteristics occur at highest elevations and include numerous glacial lakes. Granitics and associated management problems are less extensive than in the Idaho Batholith.

16. IDAHO BATHOLITH

This ecoregion is a dissected, partially glaciated, mountainous plateau. Many perennial streams originate here and water quality can be high if basins are undisturbed. Deeply weathered, acidic, intrusive igneous rock is common and is far more extensive than in the Northern Rockies or the Middle Rockies. Soils are sensitive to disturbance especially when stabilizing vegetation is removed. Land uses include logging, grazing, and recreation. Mining and related damage to aquatic habitat was widespread. Grand fir, Douglas-fir and, at higher elevations, Engelmann spruce, and subalpine fir occur; ponderosa pine, shrubs, and grasses grow in very deep canyons. Maritime influence lessens toward the south and is never as strong as in the Northern Rockies.

17. MIDDLE ROCKIES

The climate of the Middle Rockies lacks the strong maritime influence of the Northern Rockies. Mountains have Douglas-fir, subalpine fir, and Engelmann spruce forests and alpine areas; Pacific tree species are never dominant. Forests can be open. Foothills are partly wooded or shrub- and grass-covered. Intermontane valleys are grass- and/or shrub-covered and contain a mosaic of terrestrial and aquatic fauna that is distinct from the nearby mountains. Many mountain-fed, perennial streams occur and differentiate the intermontane valleys from the Northwestern Great Plains. Granitics and associated management problems are less extensive than in the Idaho Batholith. Recreation, logging, mining, and summer livestock grazing are common land uses.

18. WYOMING BASIN

This ecoregion is a broad intermontane basin dominated by arid grasslands and shrublands and interrupted by high hills and low mountains. Nearly surrounded by forest covered mountains, the region is somewhat drier than the Northwestern Great Plains to the northeast and does not have the extensive cover of pinyon-juniper woodland found in the Colorado Plateaus to the south. Much of the region is used for livestock grazing, although many areas lack sufficient vegetation to support this activity. The region contains major producing natural gas and petroleum fields.

19. WASATCH AND UINTA MOUNTAINS

This ecoregion is composed of a core area of high, precipitous mountains with narrow crests and valleys flanked in some areas by dissected plateaus and open high mountains. The elevational banding pattern of vegetation is similar to that of the Southern Rockies except that aspen, chaparral, and juniper-pinyon and oak are more common at middle elevations. This characteristic, along with a far lesser extent of lodgepole pine and greater use of the region for grazing livestock in the summer months, distinguish the Wasatch and Uinta Mountains ecoregion from the more northerly Middle Rockies.

20. COLORADO PLATEAUS

Rugged tableland topography is typical of the Colorado Plateau ecoregion. Precipitous side-walls mark abrupt changes in local relief, often from 300 to 600 meters. The region is more elevated than the Wyoming Basin to the north and therefore contains a far greater extent of pinyon-juniper woodlands. However, the region also has large low lying areas containing saltbrush-greasewood (typical of hotter drier areas), which are generally not found in the higher Arizona/New Mexico Plateau to the south where grasslands are common.

21. SOUTHERN ROCKIES

The Southern Rockies are composed of high elevation, steep rugged mountains. Although coniferous forests cover much of the region, as in most of the mountainous regions in the western United States, vegetation, as well as soil and land use, follows a pattern of elevational banding. The lowest elevations are generally grass or shrub covered and heavily grazed. Low to middle elevations are also grazed and covered by a variety of vegetation types including Douglas fir, ponderosa pine, aspen, and juniper oak woodlands. Middle to high elevations are largely covered by coniferous forests and have little grazing activity. The highest elevations have alpine characteristics.

22. ARIZONA/NEW MEXICO PLATEAU

The Arizona/New Mexico Plateau represents a large transitional region between the semiarid grasslands and low relief tablelands of the Southwestern Tablelands ecoregion in the east, the drier shrublands and woodland covered higher relief tablelands of the Colorado Plateau in the north, and the lower, hotter, less vegetated Mojave Basin and Range in the west and Chihuahuan Deserts in the south. Higher, more forest covered, mountainous ecoregions border the region on the northeast and southwest. Local relief in the region varies from a few meters on plains and mesa tops to well over 300 meters along tableland side slopes.

23. ARIZONA/NEW MEXICO MOUNTAINS

The Arizona/New Mexico Mountains are distinguished from neighboring mountainous ecoregions by their lower elevations and an associated vegetation indicative of drier, warmer environments, which is also due in part to the region’s more southerly location. Forests of spruce, fir, and Douglas fir, that are common in the Southern Rockies and the Uinta and Wasatch Mountains, are only found in a few high elevation parts of this region. Chaparral is common on the lower elevations, pinyon-juniper and oak woodlands are found on lower and middle elevations, and the higher elevations are mostly covered with open to dense ponderosa pine forests.

24. CHIHUAHUAN DESERTS

This desertic ecoregion extends from the Madrean Archipelago in southeastern Arizona to the Edwards Plateau in south-central Texas. The region comprises broad basins and valleys bordered by sloping alluvial fans and terraces. Isolated mesas and mountains are located in the central and western parts of the region. Vegetative cover is predominantly arid grass and shrubland, except on the higher mountains where oak-juniper woodlands occur.

25. WESTERN HIGH PLAINS

Higher and drier than the Central Great Plains (27) to the east, and in contrast to the irregular, mostly grassland or grazing land of the Northwestern Great Plains (43) to the north, much of the Western High Plains comprises smooth to slightly irregular plains having a high percentage of cropland. Grama-buffalo grass is the potential natural vegetation in this region as compared to mostly wheatgrass-needlegrass to the north, Trans-Pecos shrub savanna to the south, and taller grasses to the east. The northern boundary of this ecological region is also the approximate northern limit of winter wheat and sorghum and the southern limit of spring wheat.

26. SOUTHWESTERN TABLELANDS

Unlike most adjacent Great Plains ecological regions, little of the Southwestern Tablelands is in cropland. Much of this elevated tableland is in sub-humid grassland and semiarid range land. The potential natural vegetation in this region is grama-buffalo grass with some mesquite-buffalo grass in the southeast and shinnery (midgrass prairie with open low and shrubs) along the Canadian River.

41. CANADIAN ROCKIES

As its name indicates, most of this region is located in Canada. It straddles the border between Alberta and British Columbia in Canada and extends southeastward into northwestern Montana. The region is generally higher and more ice-covered than the Northern Rockies. Vegetation is mostly Douglas fir, spruce, and lodgepole pine at lower elevations and alpine fir at middle elevations. The higher elevations are treeless alpine. A large part of the region is in national parks where tourism is the major land use. Forestry and mining occur on the nonpark lands.

42. NORTHWESTERN GLACIATED PLAINS

The Northwestern Glaciated Plains ecoregion is a transitional region between the generally more level, moister, more agricultural Northern Glaciated Plains to the east and the generally more irregular, dryer, Northwestern Great Plains to the west and southwest. The western and southwestern boundary roughly coincides with the limits of continental glaciation. Pocking this ecoregion is a moderately high concentration of semi-permanent and seasonal wetlands, locally referred to a Prairie Potholes.

43. NORTHWESTERN GREAT PLAINS

The Northwestern Great Plains ecoregion encompasses the Missouri Plateau section of the Great Plains. It is a semiarid rolling plain of shale and sandstone punctuated by occasional buttes. Native grasslands, largely replaced on level ground by spring wheat and alfalfa, persist in rangeland areas on broken topography. Agriculture is restricted by the erratic precipitation and limited opportunities for irrigation.

77. NORTH CASCADES

The terrain of the North Cascades is composed of high, rugged mountains. It contains the greatest concentration of active alpine glaciers in the conterminous United States and has a variety of climatic zones. A dry continental climate occurs in the east and mild, maritime, rainforest conditions are found in the west. It is underlain by sedimentary and metamorphic rock in contrast to the adjoining Cascades which are composed of volcanics.

78. KLAMATH MOUNTAINS

The ecoregion is physically and biologically diverse. Highly dissected, folded mountains, foothills, terraces, and floodplains occur and are underlain by igneous, sedimentary, and some metamorphic rock. The mild, subhumid climate of the Klamath Mountains is characterized by a lengthy summer drought. It supports a vegetal mix of northern Californian and Pacific Northwest conifers.

79. MADREAN ARCHIPELAGO

Also known as the Sky Islands in the United States, this is a region of basins and ranges with medium to high local relief, typically 1,000 to 1,500 meters. Native vegetation in the region is mostly grama-tobosa shrubsteppe in the basins and oak-juniper woodlands on the ranges, except at higher elevations where ponderosa pine is predominant. The region has ecological significance as both a barrier and bridge between two major cordilleras of North America, the Rocky Mountains and the Sierra Madre Occidental.

80. NORTHERN BASIN AND RANGE

This ecoregion contains arid tablelands, intermontane basins, dissected lava plains, and scattered mountains. Non-mountain areas have sagebrush steppe vegetation; cool season grasses and Mollisols are more common than in the hotter-drier basins of the Central Basin and Range where Aridisols are dominated by sagebrush, shadscale, and greasewood. Ranges are generally covered in Mountain sagebrush, mountain brush, and Idaho fescue at lower and mid-elevations; Douglas-fir, and aspen are common at higher elevations. Overall, the ecoregion is drier and less suitable for agriculture than the Columbia Plateau and higher and cooler than the Snake River Plain. Rangeland is common and dryland and irrigated agriculture occur in eastern basins.

81. SONORAN BASIN AND RANGE

Similar to the Mojave Basin and Range to the north, this ecoregion contains scattered low mountains and has large tracts of federally owned land, most of which is used for military training. However, the Sonoran Basin and Range is slightly hotter than the Mojave and contains large areas of palo verde-cactus shrub and giant saguaro cactus, whereas the potential natural vegetation in the Mojave is largely creosote bush.

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