APPENDIX B

FINAL
ENVIRONMENTAL ANALYSIS

FOR THE
LOW CARBON FUEL STANDARD
AND
ALTERNATIVE DIESEL FUEL REGULATIONS

APPENDIX B
Final Environmental Analysis

Prepared for the
Low Carbon Fuel Standard and
Alternative Diesel Fuel Regulations

Air Resources Board
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PREFACE

The California Air Resources Board (ARB) released a Draft Environmental Analysis (EA) for the proposed Low Carbon Fuel Standard and Alternative Diesel Fuel Regulations on January 2, 2015 for a 45-day public review and comment period that concluded February 17, 2015. Revisions to the LCFS Regulation were released for three 15-day comment periods starting on June 4, June 23, and July 31, 2015, and closing on June 19, July 8, and August 17, 2015, respectively. Revisions to the ADF Regulation were released on May 22, 2015. They were subject to a 15-day comment period, which ended on June 8, 2015. In all, a total of 18<u>3</u> comment letters were received on the proposed regulations during the public comment periods, <u>23</u> of which addressed the Draft EA.

ARB staff made minor modifications to the EA based on responses to comments and other updates. To facilitate identifying modifications to the document, modified text is presented in the final EA with ~~strike-through~~ for deletions and <u>underline</u> for additions. None of the modifications alter any of the conclusions reached in the EA or provide new information of substantial importance relative to the EA. As a result, these minor revisions do not require recirculation of the document pursuant to the California Environmental Quality Act (CEQA) Guidelines, California Code of Regulations, title 14, section 15088.5, before consideration by the Board.

1. INTRODUCTION AND BACKGROUND

A. Background on Low Carbon Fuel Standard and Alternative Diesel Fuel Regulations

Executive Order S-01-07, ordering the establishment of the Low Carbon Fuel Standard (LCFS), calls for a reduction of at least 10 percent in the carbon intensity (CI) of transportation fuels sold for use in California by 2020 as one of the measures to meet the reductions in statewide greenhouse gas (GHG) emissions mandated by the California Global Warming Solutions Act of 2006 (Assembly Bill (AB) 32, codified at Health and Safety Code section 38500 *et seq.*). Under the LCFS, CI is an expression of the combined carbon emissions from all production, distribution, and consumption steps in the life cycle of a transportation fuel —steps that occur due to demand for and consumption of transportation fuels in California. The LCFS is a performance-based and fuel-neutral standard that allows the market to determine how the overall CI of California's transportation fuels would be reduced. Implementation of the LCFS regulation is intended to decrease GHG emissions from transportation fuels and to realize additional benefits, including diversification of the State's fuels portfolio, reduced dependence on petroleum and the associated economic impacts of gasoline and diesel price spikes, greater innovation and development of cleaner fuels, and support for California's ongoing efforts to improve ambient air quality. The reductions in CI by 2020 are also expected to set the stage for greater changes in the State's transportation fuel portfolio in subsequent years.

On April 23, 2009, the California Air Resources Board (ARB or the Board) approved the original LCFS regulation for adoption. The regulation became effective on January 12, 2010; additional provisions became effective on April 15, 2010. The first year of the program, 2010, was intended solely as a reporting year for regulated parties to begin acclimating to the recordkeeping, reporting, and other administrative provisions by using the LCFS Reporting Tool and filing demonstrations of pathways. Actual implementation of the CI requirements began on January 1, 2011. The Board amended crude oil and other provisions in the original LCFS regulation in 2011, and those amendments took effect November 26, 2012.

In December, 2009, POET, LLC initiated litigation alleging that ARB violated the California Environmental Quality Act (CEQA) and Administrative Procedure Act (APA) in adopting the LCFS. On July 15, 2013, the State of California Court of Appeal, Fifth Appellate District (Court) issued its opinion in *POET, LLC v. California Air Resources Board* (2013) 218 Cal.App.4th 681 (POET vs. ARB). Although the Court found there were CEQA and APA issues associated with the original adoption of the regulation, the Court left the LCFS in place, holding that ARB could continue to implement and enforce

the 2013 regulatory standards until ARB could consider re-adoption of the regulation.

Specifically, the Court held that a proposal to address potentially significant impacts of nitrogen oxides (NO_X) associated with biodiesel use through a future rulemaking constituted improperly deferred mitigation. The proposed regulation on the commercialization of alternative diesel fuels (ADF) (hereinafter referred to as the "proposed ADF regulation") includes in-use requirements and fuel specifications for biodiesel that would, among other things, ensure that the proposed LCFS regulation would not result in increased NO_X emissions compared to current conditions and also ensure that past increases in NO_X emissions from biodiesel in comparison to ARB diesel emissions would be eliminated by 2020. The proposed ADF regulation would also establish a regulatory process for other new, emerging diesel fuel substitutes to enter the commercial market in California, while managing and minimizing environmental and public health impacts and preserving the emissions benefits derived from ARB vehicle and fuel regulations.

To address the Court's 2013 ruling and achieve the State's objectives with the two regulations, ARB staff is proposing that the Board take the following actions in 2015: (1) set aside adoption of the existing LCFS regulation; (2) re-adopt the newly proposed LCFS regulation (including revisions to the original regulation); and (3) adopt the proposed ADF regulation. ARB staff is proposing a suite of revisions to the existing LCFS regulation as part of the re-adoption which would promote investments in and production of the cleanest fuels, offer additional flexibility, update critical technical information, and provide for improved efficiency and enforcement of the regulation. The proposed LCFS regulation with revisions (hereinafter referred to as the "proposed LCFS regulation"), and the proposed ADF regulation are analyzed in this Environmental Analysis (EA) to meet CEQA requirements under ARB's certified regulatory program.

The proposed LCFS and ADF regulations will be considered by the Board in separate proceedings. However, the two regulations are being analyzed as one project under CEQA because they are interrelated in two important ways: 1) the proposed ADF regulation defines specifications for biodiesel, which is among the low-carbon fuels that LCFS encourages, and 2) compliance responses by fuel producers and suppliers would be influenced concurrently by both regulations. Assessing them together captures the compliance responses, which are the physical actions reasonably expected to occur in response to the proposed regulatory action, without regard to whether they are attributable to the LCFS, ADF, or a combination of the two proposed regulations. This approach is consistent with CEQA's requirement that an agency consider the whole of an action when it assesses a project's environmental effects, even if the project consists of separate approvals (Title

14 of the California Code of Regulations [14 CCR], hereafter "CEQA Guidelines," Section 15378(a)).

B. Objectives of the Proposed LCFS and ADF Regulations

The objective of the proposed LCFS regulation is to reduce the CI of transportation fuels in the California market by at least 10 percent of its 2010 level by 2020. The lower CI is expected to reduce GHG emissions from the State's transportation sector by about 35 million metric tons (MMT) during 2016-2020 and achieve other important benefits as well, including greater diversification of the state's fuel portfolio, a reduced dependence on petroleum and a decrease in the associated economic impacts of gasoline and diesel price spikes caused by volatile oil price changes, greater innovation and development of cleaner fuels, and support for California's ongoing efforts to improve ambient air quality. The reductions in CI by 2020 are expected to account for almost 20 percent of the total GHG emission reductions needed to meet the AB 32 mandate of reducing California's GHG emissions to 1990 levels by 2020 and are also expected to set the stage for greater changes in the State's transportation fuel portfolio in subsequent years.

The primary objective of the proposed ADF regulation is to establish a comprehensive path to bring new or emerging diesel fuel substitutes to the commercial market in California as efficiently as possible while preserving or enhancing public health, the environment, and the emissions benefits of the State's existing diesel regulations. The proposed ADF regulation also establishes specific rules governing the use of biodiesel fuel to ensure its use would meet the program goals of protecting public health and the environment.

C. Scope of Analysis and Assumptions

The degree of specificity required in a CEQA document corresponds to the degree of specificity inherent in the underlying activity it evaluates. Environmental analysis for broad programs cannot be as detailed as for specific projects (CEQA Guidelines 15146). For example, the assessment of a construction project would naturally 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 15146 (a)). This analysis addresses a broad market-based regulatory program, so a general level of detail is appropriate, however, this EA makes a rigorous effort to evaluate significant adverse impacts and beneficial impacts of the regulatory program and contains as much information about those impacts as is currently available, without being unduly speculative.

The scope of analysis in this EA is intended to help focus public review and comments on the proposed regulations, and ultimately to inform the Board of the environmental benefits and adverse impacts of the proposed action prior to Board action. This analysis specifically focuses on potentially significant adverse and beneficial impacts on the physical environment resulting from reasonably foreseeable compliance responses to proposed changes to existing State regulations regarding fuel standards.

The analysis of potentially significant adverse environmental impacts from the proposed LCFS and ADF regulations is based on the following assumptions:

1. This analysis addresses the potentially significant adverse environmental impacts resulting from implementing the proposed LCFS and ADF regulations compared to existing conditions, which include existing compliance with the LCFS left in place by the Court at the 2013 regulatory standards.

2. The analysis of environmental impacts and determinations of significance are based on reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations; compliance with the existing State and federal regulatory framework is considered part of the baseline of existing conditions.

3. The analysis in this EA addresses environmental impacts both within California and outside the State to the extent they are reasonably foreseeable and do not require speculation.

4. The level of detail provided in each impact analysis is necessarily and appropriately general, because the nature of the proposed LCFS and ADF regulations is programmatic. Furthermore, industry decisions regarding the specific location and design of new facilities and other infrastructure undertaken in response to the proposed regulations are speculative, if not impossible, to predict with precision, given the influence of other business and market considerations in those decisions and the numerous locations where those facilities might be built. Specific development projects undertaken in response to the proposed LCFS and ADF regulations would undergo required project level environmental review and compliance processes.

5. This EA generally does not analyze site-specific impacts when the location of future facilities or other infrastructure is speculative. However, the EA does examine regional (e.g., air basin) and local issues to the degree feasible where appropriate. As a result, the impact conclusions in the resource-oriented sections of Chapter 4, Impact Analysis and Mitigation Measures, cover broad types of impacts, considering the potential effects of the full range of

reasonably foreseeable actions undertaken in response to the proposed regulations. Chapter 5 provides a summary of potential cumulative impacts of the proposed LCFS and ADF regulations.

D. Organization of the Environmental Analysis

The EA is organized into the following chapters to assist the reader in obtaining information about the proposed LCFS and ADF regulations and their specific environmental issues.

- Chapter 1, Introduction and Background – provides a project overview and background information, and other introductory material.
- Chapter 2, Project Description – summarizes the proposed LCFS and ADF regulations, implementation assumptions, and reasonably foreseeable compliance responses taken in response to the proposed regulations.
- Chapter 3, Environmental and Regulatory Setting, in combination with Attachment 1 – contains the environmental setting and regulatory framework relevant to the environmental analysis of the proposed LCFS and ADF regulations.
- Chapter 4, Impact Analysis and Mitigation – identifies the potential environmental impacts associated with the proposed LCFS and ADF regulations and mitigation measures for each resource impact area.
- Chapter 5, Cumulative and Growth-Inducing Impacts – identifies the cumulative effects of implementing the proposed regulations against a backdrop of past, present, and reasonably foreseeable future projects.
- Chapter 6, Mandatory Findings of Significance – discusses whether the proposed regulations have the potential to degrade the quality of the environment, cause substantial adverse impacts on human beings, and cause cumulatively considerable environmental impacts.
- Chapter 7, Alternatives Analysis – discusses a reasonable range of potentially feasible alternatives that could reduce or eliminate adverse environmental impacts associated with the proposed regulations.
- Chapter 8, References – identifies sources of information used in this EA.

E. Environmental Review Process

1. Requirements under the California Air Resources Board Certified Regulatory Program

ARB is the lead agency for the proposed LCFS and ADF regulations and has prepared this EA pursuant to its CEQA-certified regulatory program. Public Resources Code (PRC) Section 21080.5 allows public agencies with regulatory programs to prepare a "functionally equivalent" or substitute document in lieu of an environmental impact report or negative declaration once the program has been certified by the Secretary for Resources Agency as meeting the requirements of CEQA. ARB's regulatory program was certified by the Secretary of the Resources Agency in 1978 (CEQA Guidelines 15251(d)). As required by ARB's certified regulatory program, and the policy and substantive requirements of CEQA, ARB has prepared this EA to assess the potential for significant adverse and beneficial environmental impacts associated with the proposed actions and to provide a succinct analysis of those impacts (17 CCR 60005(a) and (b)). The resource areas from the CEQA Guidelines Environmental Checklist (Appendix G) were used as a framework for assessing potentially significant impacts. In accordance with ARB's certified regulatory program for proposed regulations, this EA is included in the Staff Report prepared for the rulemaking (17 CCR 60005).

ARB has determined that adoption and implementation of both the proposed LCFS and ADF regulations is a "project" as defined by CEQA. Section 15378(a) of the CEQA Guidelines define a project as "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 … an activity directly undertaken by any public agency." Although the policy aspects of the proposed LCFS and ADF regulations do not directly change the physical environment, the proposed LCFS and ADF regulations qualify together as a project under CEQA because they have the potential to result in a reasonably foreseeable indirect physical change in the environment from actions undertaken by entities in response to the regulations.

Furthermore, the requirements of PRC section 21159 apply when ARB adopts a rule or regulation requiring the installation of pollution control equipment, or a performance standard or treatment requirement. As explained in section 15187 of the CEQA Guidelines, ARB shall 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.

2. Public Review Process for the Environmental Analysis

At a public workshop on May 30, 2014, ARB staff described plans to prepare an EA of the proposed LCFS and ADF regulations, and invited public feedback on the scope of the analysis. The planned environmental review was also discussed at two public meetings ~~the May 19, 2014 public meeting~~ of the LCFS Advisory Panel in 2014: May 19th and October 6th. The ~~advisory~~ panel ~~is~~ ~~scheduled to~~ submitted a report to the Board ~~by January 1, 2015~~ on May 13, 2015.

In accordance with ARB's certified regulatory program, and consistent with ARB's commitment to public review and input on regulatory actions, this EA is subject to a public review process through the posting of the Staff Reports for each of the proposed regulations. The Staff Reports, which included ~~this~~a Draft EA, ~~will be~~were posted for a public review period that ~~begins~~ began on January 2, 2015 and ended on February 17, 2015. This period complies with regulatory requirements for a minimum of 45 days of public review.

At the conclusion of the public review period, the Board ~~will hold~~ held public hearings on the proposed LCFS and ADF regulations. At the first hearing ~~those~~ ~~hearings~~, ~~currently scheduled for~~ held on February 19~~ or 20~~, 2015, the Board ~~will~~ did not take any approval action on the proposals~~; the Board may provide direction to staff on modifications to make in the proposals prepared by staff~~. Staff ~~will address~~ proposed changes in both regulations in ~~a~~ notices ~~that will be issued with modified regulatory language, along with supporting documentation,~~dated May 22, 2015 for the ADF regulation and June 4, June 23, and July 31, 2015 for the LCFS regulation. Those proposed changes were made available for public review and comment ~~for one or more 15-day review and comment periods~~ from May 22, 2015 to June 8, 2015 for the ADF regulation; and from June 4, 2015 to June 19, 2015,~~-~~June 23, 2015 to July 8, 2015, and July 31, 2015 to August 7, 2015 for the LCFS regulation. ~~At the conclusion of all review periods, staff~~ Staff has ~~will~~ compiled public comments and ~~responses, including~~ responded to comments on the EA, and prepared the Final Regulation Orders along with this Final EA for both the proposed LCFS and ADF regulations for the Board's consideration at a second public hearing planned ~~later in~~ for September 24, 2015. If the finalized regulations are adopted by the Board at that time, the Final Statements of Reasons (FSORs) for the regulations ~~will be prepared by staff~~ and

the completed regulatory packages will be filed with the Office of Administrative Law. ~~When the packages are filed with the Office of Administrative Law, a~~A Notice of Decision for each of the regulations will be posted on ARB's website, filed with the Secretary of the Natural Resources Agency, and transmitted to the State Clearinghouse.

2. PROJECT DESCRIPTION

The "project" for purposes of this environmental analysis (EA) includes two proposed regulations: (1) re-adoption of a Low Carbon Fuel Standard (LCFS) regulation ("proposed LCFS") that revises the existing LCFS regulation, which would be set aside; and (2) adoption of the proposed Alternative Diesel Fuel (ADF) regulation. For the purposes of this EA, the proposed LCFS and ADF regulations are referred to as the "proposed regulations." While the proposed regulations constitute the "project" for CEQA purposes (CEQA Guidelines 15378), this document also uses "project" to refer to reasonably foreseeable activities such as construction of fuel facilities that might be undertaken in response to the proposed regulations.

This first part of this chapter provides a background summary of the proposed LCFS regulation, including essential concepts related to its implementation, applicable fuel types and sources, fuel pathway analysis, credit market provisions. It also provides an overview of the proposed ADF regulation. Additional details about the two regulations are available in the Initial Statements of Reasons (ISORs) associated with each proposed regulation. Sections D, E, and F of this chapter, describe particular provisions (e.g., fuel pathways) and the potential compliance scenarios resulting from the proposed regulations. This information, along with the information in section G, are described to provide a basis for the subsequent discussion of the reasonably foreseeable environmental effects of the proposed regulations in Chapter 4, as required by CEQA (Public Resources Code [PRC] 21159).

For a description of how the proposed LCFS regulation is different from the existing regulation as last amended in 2012, see Section II of the ISOR. For a description of the regulatory background driving the need for the proposed LCFS and ADF regulations, see Chapter VIII.

A. Background Information on Proposed Low Carbon Fuel Standard Regulation

The existing and proposed LCFS regulations are designed to reduce the carbon intensity (CI) of fuels used in California's transportation sector by requiring annual reductions in the volume-weighted average CI of transportation fuels used in the state. While fuels with higher CIs can and will be used, the regulations create financial incentives for the development and use of fuels with lower CIs. Regulated parties, such as fuel producers or distributors, must meet the annual CI standard through mechanisms such as: producing lower-carbon fuels; buying such fuel from producers to sell on the market; purchasing credits generated by others; using banked credits generated in previous years; or a combination of these strategies. The existing and proposed LCFS regulations establish two sets of performance standards that regulated parties must meet each compliance year: 1) a standard for gasoline and alternative fuels that substitute for gasoline and 2) a

standard for diesel fuel and its substitutes. The standards were established to achieve an average 10 percent reduction in the CI of the statewide mix of transportation fuels by 2020, as compared to 2010.

LCFS standards are expressed in terms of the CI of gasoline and diesel fuel and their substitutes, measured in grams of carbon dioxide equivalent per megajoule of fuel energy (gCO_2e/MJ). Each step in the life cycle of the fuel, including production, transportation, distribution, and consumption, is modeled to determine the CI of the fuel. In addition to the direct life cycle emissions, indirect land use change emissions are calculated on a fuel-by-fuel basis and included in their total CI. The various factors used to determine a fuel's CI value are referred to as the fuel pathway.

The existing and proposed LCFS regulations both apply to most types of transportation fuels used in California, including:

- California reformulated gasoline;
- California ultra-low sulfur diesel fuel;
- Compressed or liquefied natural gas;
- Electricity;
- Compressed or liquefied hydrogen;
- Any fuel blend containing hydrogen;
- Any fuel blend containing greater than 10 percent ethanol by volume;
- Any fuel blend containing biomass-based diesel;
- Neat denatured ethanol;
- Neat biomass-based diesel; and
- Any other liquid or non-liquid fuel not otherwise exempted from the regulation.

The regulatory requirements initially apply to California producers and California importers of fuels, although the compliance obligations can be transferred to downstream owners of the fuel. Providers of certain low-CI fuels—including for example electricity, hydrogen, and biogas fuels—are not subject to LCFS unless they opt into the program to generate credits from the supply of the fuel to the California market.

Table 2-1 provides the CI reductions required under the existing LCFS regulation (under the *POET* decision) through 2015 and those that would be required under the proposed LCFS regulation. As indicated, CI is required to be reduced through a series of annual targets to reach the 2020 goal of a 10 percent reduction in the average CI of fuels in California compared to 2010.

Table 2-1: Carbon Intensity Reduction Requirements through 2020[1, 2]

	Existing LCFS			Proposed LCFS				
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Required CI Reduction	1.0%	1.0%	1.0%	2.0%	3.5%	5.0%	7.5%	10.0%

[1]http://www.arb.ca.gov/fuels/lcfs/CleanFinalRegOrder112612.pdf
[2]http://www.arb.ca.gov/lispub/rss/displaypost.php?pno=6938

B. Background Information on Proposed Alternative Diesel Fuel Regulation

Complementary State and federal policies, such as the federal Renewable Fuel Standard (RFS) and LCFS, are expected to drive increased demand in California for ADFs. ADFs ~~are~~ include any fuel used in diesel engines that is not a reformulated diesel fuel as defined in sections 2281 and 2282 of Title 13, CCR, and does not require engine or fuel system modifications for the engine to operate, other than minor modifications (e.g., recalibration of the engine fuel control) that may enhance performance. Examples of ADFs include, but are not limited to, biodiesel, Fischer-Tropsch fuels, and emulsions of water in diesel fuel. ~~liquid fuels that are not hydrocarbon, but can replace petroleum-based diesel fuel, and are not covered under existing alternative fuels specifications (13 CCR 2290 et seq).~~ The purpose of the proposed ADF regulation is twofold: 1) establish a comprehensive, multi-stage process governing the commercialization of ADF formulations in California's market; and, 2) to establish special provisions for biodiesel as the first recognized ADF and to permit its use within California's commercial fuels market in volumes and blends that would result in no significant adverse impacts on public health or the environment relative to conventional petroleum CARB diesel. Regulation of ADFs is necessary to ensure that the rapid development of these fuels in response to LCFS and RFS does not interfere with the public health and environmental standards enforced by ARB.

Biodiesel is the first ADF fuel subject to the proposed ADF regulation. Information related to the biodiesel pathways and specifications are provided below in Section 2.F, Alternative Diesel Fuels.

C. Essential Concepts

1. Life Cycle Analysis

The CI of a fuel represents the amount of life cycle greenhouse gas (GHG) emissions per unit of energy of fuel delivered, expressed in gCO_2e/MJ. Use of fuels with higher CI values result in more GHG emissions. The primary goal of the proposed LCFS regulation is to achieve lower average CI values for transportation fuel used in California.

The CI of a fuel is determined by evaluating the direct and indirect GHG emissions of the fuel life cycle. Direct emissions that are a result of fuel production, transportation, distribution, and consumption are determined for each step in the fuel pathway. For example, these steps may involve the following activities needed for the production of soy biodiesel:

- Farming practices (e.g., frequency and type of fertilizer used);
- Crop yields;
- Carbon dioxide absorbed by the crop;
- Collection and transportation of the crop;
- Type of fuel production;
- Fuel used in the production (e.g., coal, biomass);
- Energy efficiency of the production;
- Co-products generated that may be applied to other uses;
- Transport and distribution of the fuel; and
- Combustion of the fuel in vehicles.

Emissions that result from the change in land use or other market-mediated outcomes of fuel production or consumption, both direct and indirect, are also evaluated and reflected in the fuel CI value. For some crop-based biofuels, land use changes may be a substantial source of additional GHG emissions. Three models are used to determine CI value, which are described below.

Direct emissions under the proposed LCFS regulation would be assessed using an updated version of the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation model, developed by Argonne National Laboratory and modified for use in California (CA-GREET). The revised model, called CA-GREET 2.0 to distinguish it from the model currently used, is similar to the model used with the current regulation, and incorporates many specific numeric inputs that allow for the calculation of the life cycle GHG emissions associated with producing, transporting, distributing, and consuming various fuels. The updated CA-GREET 2.0 includes refinements to both Argonne's basic model and the California-specific modifications. The proposed LCFS regulation would require regulated parties to use the CA-GREET 2.0 calculator for determining CIs of certain fuels; ARB will also use the model to calculate CIs.

To generate the CI values associated with crude oil production and transportation, the proposed LCFS regulation would use an updated version of the Oil Production Greenhouse Emissions (OPGEE) model developed at Stanford University. The existing LCFS regulation uses an earlier version of OPGEE.

To assess indirect emissions from land use changes, the proposed LCFS regulation would use an updated version of the Global Trade Analysis Project (GTAP) model. GTAP is used to evaluate the worldwide land use conversion associated with the production of crops for fuel production. Different types of land use have different rates of storing carbon. A coefficient associated with a particular land use type is used to estimate the GHG emissions associated with particular fuels, referred to as indirect land use change values (iLUC).

The proposed updates to these three models will result in different CI values for many fuels compared to values included in the existing LCFS regulation. Some pathways will receive higher CIs, while other CI values would be reduced. In addition, use of the updated models would change the 2010 base year CI used to determine standards under the proposed regulation.

2. Low Carbon Fuel Standard Credit Market

As described above, the proposed LCFS regulation is intended to incent the innovation and deployment of lower-carbon transportation fuels. Regulated parties achieve compliance through methods such as: producing lower-carbon fuels; buying such fuel from producers to sell on the market; purchasing credits generated by others; using banked credits generated in previous years; or a combination of these

strategies. Regulated parties may purchase credits to offset deficits to meet requirements for transportation fuels with a CI that exceeds the permitted values. LCFS credits may be generated as well, and banked to meet compliance obligations in future years. Credits and deficits associated with the proposed LCFS are described in the following section.

3. Compliance by Regulated Parties

Under the proposed LCFS regulation, a regulated party is a California fuel producer, provider, or importer that must meet the annual CI requirements in the regulation. Supplying a fuel with a CI that is below the standard in a given year generates credits; conversely, supplying a fuel with a CI above the standard would generate deficits. Credits and deficits are determined on a quarterly basis. For a given annual compliance period, a regulated party's overall credit balance would be determined by adding up all the quarterly deficits and credits assessed to that party, and an overall deficit balance at the end of the year results in a shortfall that is required to be reconciled. Reconciliation could be accomplished by purchasing credits from the market, surrendering credits that the regulated party already has accumulated, or by any other means prescribed in the regulation. Credits earned from CI reductions from diesel and diesel substitutes may be used to offset deficits generated from the supply of gasoline and gasoline substitutes, and vice versa. Under the proposed LCFS regulation, a regulated party may also under certain circumstances pass the LCFS compliance obligation for that fuel to the buyer of the fuel as part of the sales transaction.

A fuel pool is the full collection of fuels that a regulated party produces in California for use in the State, imports into California for use in the state, and/or buys in California for use in the State. A regulated party's fuel pool may include gasoline, diesel, blendstocks, and substitutes. Blendstocks are components that are either used alone or are blended with other component(s) (e.g., ethanol), to produce a finished fuel. A blendstock generally has one or more fuel pathways. A substitute is a fuel that is used in place of the standard fuel for that type of application (e.g., diesel is typically used in heavy-duty vehicle applications, so a fuel substitute for that diesel might be compressed natural gas [CNG] or liquefied natural gas [LNG]).

The LCFS regulation specifically exempts a number of lower-carbon fuels, because they have been determined to meet the CI targets through 2020. These include the following:

- Electricity;
- Hydrogen;
- Hydrogen blends;
- Fossil CNG derived from North American sources;
- Biogas CNG; and
- Biogas LNG.

Providers of these fuels have no obligation to participate in the LCFS program. However, as noted previously, the LCFS regulation provides the opportunity to generate credits for these fuels, and credits could be sold to or surrendered by regulated parties who need the credits to meet compliance obligations. To generate credits for exempt fuels that meet the CI standard through 2020, parties may opt into the LCFS program to become regulated parties. The provider of an exempt fuel opts in by registering as a regulated party and agreeing to be bound by LCFS compliance, recordkeeping, reporting, and other requirements.

The LCFS Reporting Tool (LRT) is an accounting system that records the credit or deficit "obligation" based on the type of fuel and business transactions. The LRT calculates the overall credit/deficit for the quarter based on the annual standard, fuel CI, volume, and Energy Economy Ratio (EER), if applicable. EERs are used to adjust credits associated with a vehicle's fuel efficiency. On an annual basis regulated parties are required to review these submittals and submit an annual report verifying the validity of the four quarterly reports. The results would be used to determine compliance with LCFS targets for that given year. The proposed LCFS regulation would require regulated parties to use the LRT to report fuel and credit transactions subject to the regulation.

4. Petroleum-Based Fuels in California

Petroleum-based fuels, such as California Reformulated Gasoline Blendstock for Oxygenate Blending (CARBOB) or diesel, are assigned a CI value based on average production data from several providers. The following describes how crude oil becomes a finished fuel that can be marketed in California.

a) Crude Oil

Crude oil is the petroleum feedstock for gasoline. The CIs of crude oils are provided by the LCFS regulation, based on production and transport of crude oil supplied to California refineries. The volume-weighted average CI of all crude oil supplied to refineries in a year is calculated and used to determine what “base” and “incremental” deficits apply to gasoline and diesel supplied to California during the year. A crude oil producer or refinery receiving the crude may generate credit for crude oil that has been produced using innovative, GHG-reducing methods. A crude production facility is the location at which processing of production fluids from oil wells occurs to separate out key components and prepare them for export. Fluids extracted from wells consist of oil, gas, and water.

Crude oil that is pumped out of the ground is composed of thousands of different hydrocarbon compounds. The carbon atoms link together in chains of different lengths, shapes and sizes. Each individual chain length or molecular size has different properties including progressively higher boiling points, so they can be separated by boiling or distillation. Components of crude include, from lightest to heaviest: propane, naphtha (used to make gasoline), and diesel.

b) California Reformulated Gasoline Blendstock for Oxygenate Blending

CARBOB is a petroleum-derived refined fuel that is intended to be, or is represented as, a product that will constitute California gasoline upon the addition of oxygenates. An oxygenate is an oxygen-containing, ashless, organic compound that increases the amount of oxygen in gasoline. Typically, ethanol is used to oxygenate gasoline. Oxygenates are added to motor vehicle fuels to make them burn more cleanly, thereby reducing harmful tailpipe emissions, particularly carbon monoxide. California law requires CARBOB to be blended with oxygenates before it is used as a fuel in Imperial County and the South Coast Air Basin during late fall and winter; however, reformulated gasoline producers typically blend 10 percent ethanol by volume statewide year around. Ethanol is currently the only gasoline oxygenate approved in California.

c) Diesel

The U.S. Environmental Protection Agency (EPA) requires that the sulfur content in on-road diesel fuel be no more than 15 parts per million (ppm) (ultra-low-sulfur diesel). California has cleaner diesel regulations that require diesel to meet an aromatic hydrocarbon content of 10 percent or less, or to meet specifications determined to be equivalent in emissions to diesel containing 10 percent or less aromatic hydrocarbons.

5. Biodiesel

Biodiesel is not a petroleum-based fuel; it is produced from vegetable oils, yellow grease, used cooking oils, tallow, or other triglyceride feedstocks. The production process converts oils and fats into chemicals called long-chain mono alkyl esters, or biodiesel. These chemicals are commonly referred to as fatty acid methyl esters (FAME), created through a process called transesterification. Through this process, 100 pounds of oil or fat are reacted with 10 pounds of a short-chain alcohol (usually methanol) in the presence of a catalyst (e.g., sodium hydroxide) to form 100 pounds of biodiesel and 10 pounds of glycerin. Glycerin, which is used in pharmaceuticals and cosmetics, among other markets, is a co-product.

Biodiesel can be blended with conventional or renewable diesel and used in many different concentrations, including B100 (pure biodiesel), B20 (20 percent biodiesel, 80 percent petroleum diesel), B5 (5 percent biodiesel, 95 percent petroleum diesel) and B2 (2 percent biodiesel, 98 percent petroleum diesel). B20 is a common biodiesel blend in the U.S. Blending specifications, described below, have been established by ASTM International standards (formerly known as the American Society for Testing and Materials). Biodiesel is currently used in California, and subject to the following ASTM standards. In 2013, nine biodiesel producers had an annual capacity of 61 million gallons (EIA 2014).

a) B5

ASTM International develops specifications for conventional diesel fuel (ASTM D975). These specifications consider biodiesel concentrations of up to 5 percent (B5) to be approved for safe operation in any compression-ignition engine designed to be operated on petroleum diesel. This can include light-duty and heavy-duty diesel cars and trucks, tractors, boats, and

electrical generators. B5 is the most common blend level in California.

b) B20

B20 and lower-level blends generally do not require engine modifications. Engines operating on B20 have similar fuel consumption, horsepower, and torque as engines running on petroleum diesel. B20 has higher lubricity (the ability to lubricate fuel pumps and fuel injectors) than petroleum diesel. Biodiesel blends between B6 and B20 must meet prescribed quality standards (described in ASTM D7467).

c) B100, blends above B20

ASTM International specifications consider B100 to be a blendstock rather than a fuel blend (ASTM D6751). B100 and other high-level biodiesel blends are less common than B5 or B20. B100 can be used in some engines built since 1994 with biodiesel-compatible material for parts, such as hoses and gaskets. Generally, the higher the percentage of biodiesel above 20 percent, the lower the energy content per gallon. High-level biodiesel blends can also negate engine warranties, gel in cold temperatures, and suffer from microbial contamination in tanks.

D. Low-Carbon Fuel Types and Sources

The LCFS is a fuel-neutral, performance-based standard, which neither mandates nor prohibits the use of specific fuels. Regulated fuel providers are free to make available any mix of fuels that meets other pertinent fuel standards. Under the proposed LCFS regulation, fuel pathways developed and approved under the existing LCFS regulation will receive new CI values based on the updated models, as explained above. Under the proposed LCFS regulation, CI values for “Tier 1” conventionally-produced alternative fuels will be generated using a calculator. Other “Tier 2” fuels will obtain CIs from a lookup table in the regulation or through a “Method 2” process for obtaining fuel-specific CIs. The lookup table must be used for CIs for CARBOB, gasoline, and diesel fuels. Method 2 fuel pathway applications are posted for public comment at www.arb.ca.gov, and considered for approval by the Board upon completion of a public hearing. The proposed LCFS regulation would allow the CI values approved prior to September 15, 2014, under the existing LCFS to be used for up to one year after the effective date of the new regulation; after this period, CIs calculated using the updated models would be required. As mentioned above, the proposed ADF

regulation identifies process specifications that would be followed by parties using biodiesel for LCFS compliance.

This section provides a discussion of the reasonably foreseeable types and feedstock sources of low-carbon fuels that could be developed to comply with the proposed LCFS regulation. In some cases, the fuels and feedstocks are already being supplied to California under the existing LCFS regulation and would be expected to continue under the proposed LCFS. Other reasonably foreseeable compliance responses that could occur as a result of implementation of the proposed LCFS and ADF regulations are also described.

1. Agriculture-Based Ethanol Production

Agriculture-based ethanol production involves the cultivation and production of crops for the primary use as ethanol fuel. Blending gasoline with ethanol can reduce CI values of the finished fuel. Carbon dioxide (CO_2) released when ethanol is used in vehicles is offset by the CO_2 captured when crops used to make the ethanol are grown. However, consideration of GHG emissions solely from fuel combustion does not provide a full life cycle analysis. GHGs are also emitted from ethanol production through agriculture practices to produce the ethanol crop, such as tillage and harvesting, agricultural chemical production, transport of crops, and the manufacture of ethanol from the crops.

Ethanol can be produced from a variety of crops, including corn, sugarcane, and sorghum. The proposed LCFS regulation includes updates to the CA-GREET model that is used to estimate life cycle emissions, resulting in revised CI values for the various crops used to produce ethanol. These updated CI values could influence the choice of crops and location of ethanol-producing crop farms, ethanol manufacturing facilities, and transport methods, to the extent ethanol is being produced for the California market.

Fuels pathways associated with ethanol could include:

- Corn ethanol (from South Dakota, North Dakota, Colorado, Idaho, Kansas, New Mexico, Nebraska, California, Minnesota, Iowa, and Texas);
- Sugarcane ethanol (from Brazil and Guatemala);
- Molasses ethanol (from Brazil, Central America, and Indonesia);

Potential compliance responses to the proposed regulation could include modifications to cultivation volume and transport of ethanol feedstocks, changes to the types and locations of feedstocks, and new or modified facilities to process ethanol. Co-generation systems could also be constructed in association with ethanol production.

2. Renewable Diesel and Biodiesel

Renewable diesel and biodiesel are derived from the same types of non-petroleum renewable resources, including plant and algae oils, animal fats and wastes, municipal solid waste, sludge and oils derived from wastewater, and other wastes. The terms renewable diesel and biodiesel are defined according to the process by which they are produced, and thereby result in fuels that have different physical properties. Biodiesel is produced through a process called transesterification, in which alcohols (e.g., ethanol or methanol) and catalysts (sodium hydroxide, potassium hydroxide, or sodium methoxide) are combined with oils and fats to produce methyl esters and glycerol. The fatty acid methyl esters (i.e., FAME) are used as biofuel. Renewable diesel is produced through hydrotreating, a process that replaces sulfur, oxygen, and nitrogen with hydrogen. Renewable diesel can be produced in large refineries, while biodiesel is typically produced in smaller, independent facilities.

When used as a transportation fuel, a major difference between renewable diesel and biodiesel is that biodiesel is oxygenated, while renewable diesel is not—a result of the production process. While renewable diesel and biodiesel may be produced from various non-petroleum renewable sources, soybeans, used cooking oil, corn oil, and tallow are the most typical feedstocks. Currently, feedstocks for renewable diesel and biodiesel are provided from sources throughout North America, Europe, and Asia.

Other sources of biodiesel and renewable diesel feedstock may include:

- Used cooking oil (UCO) generated in California is transported by heavy-duty diesel truck to a rendering plant in California. The alternative fate of UCO is transport to a landfill, which is assumed to be the same transport distance on average as UCO transport to a rendering plant.

- The North American canola biodiesel pathway includes canola farming and canola oil extraction in Canada, followed by transportation of canola oil to the U.S. Canola oil is then

transesterified to biodiesel and transported to blending stations for use in California motor vehicles. Canada produces approximately 95 percent of the total North American production.

- Fuel-grade corn oil blendstock can be produced at corn ethanol plants by extracting the oil from the stillage produced at the plants (i.e., a solid residue of the distillation component of ethanol production). The extraction follows fermentation and distillation and occurs before drying of the plant's distiller's grains with solubles (DGS).

Potential compliance responses to the proposed regulation could include modifications to production volume and transport of feedstocks, changes to the types and locations of feedstocks, and new or modified facilities to process biodiesel and renewable diesel.

3. Compressed Natural Gas and Liquefied Natural Gas

CNG and LNG consist mostly of methane and are drawn from gas wells or in conjunction with crude oil production. They can be used in place of gasoline, diesel fuel, and propane. While both are stored forms of natural gas, the key difference is that CNG is gas that is stored at high pressure (in gaseous form), and LNG is stored at low temperatures, becoming liquid in the process. LNG is often used for transporting natural gas, and converted to CNG before distribution to the end user. Fuels pathways associated with CNG and LNG include North American gas fields, landfills, and dairy digesters (e.g., biogas as described below). Life cycle emissions include those associated with natural gas recovery, processing, transport and distribution, compression at refueling stations, and use in internal combustion vehicles.

Landfills provide a source of natural gas that may be used to comply with the LCFS. In 2010, ARB approved the regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills. This measure requires the installation and proper operation of gas collection and control systems at active, inactive, and closed municipal solid waste landfills that control greater than 450,000 tons of waste-in-place and have been in operation after January 1, 1977. When derived from landfills, natural gas is first contained by using soil, compacted clay, geomembrane, biocovers, or other surface covers. Collection and control systems, which are typically vertical wells or horizontal trenches, are used to capture the gas. Performance standards for the gas collection and control systems and specific monitoring

requirements ensure that the system is being maintained and operated in a manner to minimize methane emissions. In addition, leak standards for gas collection and control system components, a monitoring requirement for wellheads, methane destruction efficiency requirements for most control devices, surface methane emission standards, and reporting requirements are included in the regulation. While methane collection and control systems already exist at many landfills in California, the LCFS could incent the installation of these systems beyond the regulatory requirements, for example at smaller landfills (e.g., less than 450,000 tons of solid waste) or at facilities in other states.

Natural gas is also collected at large dairies; a pathway has been prepared for this fuel under the existing LCFS. The Methane Capture at Large Dairies Protocol, effective January 1, 2012, provides methods to quantify and report GHG emission reductions associated with the installation of a biogas control system (BCS) for manure management on dairy cattle and swine farms for offset credits under California's Cap-and-Trade Program. The protocol focuses on quantifying the change in methane emissions, but also accounts for effects on CO_2 emissions.

The updated CA-GREET 2.0 model that is part of the proposed LCFS regulation would use higher methane leakage rates than the previous CA-GREET model, although upcoming studies on methane leakage will inform what values will be included in CA-GREET 2.0. Studies indicate that leakage during the production and handling of natural gas is higher than shown in the existing LCFS model. This change would mean the CIs for CNG and LNG pathways would generally be higher under the proposed regulation than they are under the existing regulation. The effects of the higher leakage rate would also show up in the CIs of other transportation fuels that use natural gas in their production or transportation. For example, a substantial percentage of electricity generation in California is by natural gas-fired plants, so electricity CIs would be affected by adjustments to the methane leakage rate.

Potential compliance responses to the proposed regulation could include modifications to landfills and dairies, such as pipelines, for collection and distribution of natural gas.

4. Cellulosic Ethanol

Cellulosic ethanol is a fuel derived from the structural parts of plant materials (e.g., plant stems, barks, and leaves composed largely of

cellulose). As described above, under Agriculture-Based Ethanol Production, blending gasoline with ethanol could reduce CI values of the finished fuels. Cellulosic ethanol could be produced from a variety of biomass sources, including farmed trees, forest waste, grasses, and inedible parts of plants. In cellulosic ethanol plants, cellulose from biomass is converted into ethanol through an enzymatic process. The lignin portion could be burned in ethanol plants to provide needed steam. Some amount of extra electricity could be generated in cellulosic plants and exported to the electric grid. Fuel pathways for cellulosic ethanol could include:

- Cellulosic ethanol from farmed trees (including from Colorado, Oregon, and Washington);
- Cellulosic ethanol from forest waste (including from U.S. Forest Service lands in the Sierra foothills, Northern California, Oregon, and Washington); and
- Cellulosic ethanol from crop residues (including from Central Valley of California and the Midwest).

Potential compliance responses to the proposed regulation could include construction of processing plants that are likely to rely on hydrolysis and gasification procedures to produce ethanol. Collection of source materials for cellulosic ethanol production would be expected to increase, including tree cultivation at farms, collection of yard waste, or removal of forest litter. Co-generation systems could also be included in combination with construction of processing facilities.

5. Biomethane

Certain businesses produce organic waste that could be repurposed into a clean, renewable fuel source called biogas. When biogas is conditioned to pipeline-quality natural gas, it becomes biomethane. Biomethane can be produced from the following biogas sources:

- Dairies;
- Food processing companies; and
- Waste water treatment plants.

Potential compliance responses to the proposed regulation would generally include construction of infrastructure needed to collect biogas and produce biomethane. Biogas collected from the anaerobic

digestion of organic matter (mostly methane and CO_2) would be purified to pipeline quality biomethane, or be made available onsite at the facility to fuel transit buses and other CNG fueled-vehicles. Pipeline quality fuel from the purified biomethane (e.g., product gas) would be compressed and injected into the utility company's natural gas transmission grid at a connector located within five miles from the processing facility (high-solids anaerobic digestion). Additionally, the process solid residue (e.g., digestate) would be composted using either the in-vessel composting (IVC) or the covered aerated static pile (CASP) mechanisms. Open-window composting would also be an acceptable composting method, albeit with higher estimated fossil fuel usage than either CASP or IVC. The result would be a high-quality compost co-product that could be marketed as either a fertilizer or soil amendment.

6. Potential Use of Innovative Technologies

The proposed LCFS regulation provides a method to create new fuel pathways. Examples of new, innovative pathways include: biodiesel from algae, drop-in renewable biofuels, and production of Fisher-Tropsch diesel. These technologies are described below. Section 95489 of the proposed LCFS regulation also would include the ability for oil producers or refiners to earn credits based on (1) using crude oil produced in an innovative manner and (2) making qualifying, emissions-reducing improvements at refineries.

a) Biofuel from Algae

Algae can be cultivated on otherwise non-productive land that is unsuitable for agriculture, including wastewater treatment plant locations. Algal-based biofuel production facilities could potentially integrate several different conversion technologies to produce many biofuels, including biodiesel, renewable diesel and renewable gasoline, aviation fuel (commercial and military), ethanol, and methane, as well as valuable co-products including oils, protein, and carbohydrates.

Potential compliance responses to the proposed regulation associated with biodiesel from algae include construction of facilities that could process feedstock into oils and fuels. Wastewater treatment plants are the most likely location for algae cultivation, as they often use algae in the wastewater treatment process.

b) Carbon Capture and Sequestration or Solar Steam Generation

Carbon capture and sequestration (CCS) is a process whereby CO_2 emissions are captured from large industrial sources, such as power plants, natural gas processing facilities, fertilizer plants, ethanol plants, and hydrogen plants, and transported and injected into underground geological formations, such as depleted oil and gas fields or deep saline aquifers. The injection is designed to prevent the captured CO_2 from being released into the atmosphere. In some cases, enhanced oil recovery (EOR) has been proposed in conjunction with CCS projects in existing oil fields. EOR involves the injection of gaseous CO_2 into a formation to push additional oil to a production wellbore and, under the right conditions, improve oil viscosity and flow rate. Solar-generated steam may also be used for EOR. CCS projects used to produce transportation fuels may generate LCFS credits for the innovative crude producer.

Potential compliance responses to the regulation could include the development and construction of CCS or solar steam generation projects. These projects could include the modification of existing or new industrial facilities to capture CO_2 emissions or produce steam generated by solar energy, along with construction of new infrastructure such as pipelines, wells, and other surface facilities in various locations to enable the transport and injection of CO_2 or steam into a geological formation for sequestration. The transport distances and pipeline construction requirements for the captured CO_2 or steam would vary considerably, depending on the locations of specific industrial sources of the captured CO_2 or solar-generated steam. The proposed LCFS regulation requires that CCS be used at the site of oil or gas production to qualify for LCFS credits.

c) Drop-In Renewable Biofuels

Drop-in biofuels are fuels substantially similar to gasoline, diesel, or jet fuels. These fuels can be made from a variety of biomass feedstocks including crop residues, woody biomass, dedicated energy crops, and algae. The goal for drop-in fuels is to meet existing diesel, gasoline, and jet fuel quality specifications and be ready to “drop-in” to existing infrastructure by being chemically indistinguishable from and compatible with

petroleum derived fuels. Researchers are exploring a variety of technology pathways. Potential technology pathways include:

- Upgrading alcohols to hydrocarbons;
- Catalytic conversion of sugars to hydrocarbons;
- Fermentation of sugars to hydrocarbons;
- Upgrading of syngas (carbon monoxide and hydrogen gas) from gasification; and
- Pyrolysis or liquefaction of biomass to bio-oil with hydroprocessing.

Potential compliance responses to the proposed regulation associated with drop-in biofuels consist of construction and operation of new facilities, and collection and distribution of feedstocks. Production plants may be stand-alone or co-located at petroleum refineries where there are multiple places drop-in fuels can be inserted into the refinery process.

d) Fischer-Tropsch Diesel

The Fischer-Tropsch process uses hydrogen and carbon-monoxide to make different types of hydrocarbons. Any type of biomass can be used as a feedstock, including woody and grassy materials and agricultural and forestry residues. The biomass is gasified to produce synthesis gas (syngas), which is a mixture of carbon monoxide and hydrogen. Prior to synthesis, this gas can be conditioned using the water gas shift to achieve the required ratio for the synthesis. The liquids produced from the syngas, which comprise various hydrocarbon fractions, are clean (sulfur free) straight-chain hydrocarbons, and can be converted further to internal combustion engine fuels.

Potential compliance responses to the proposed regulation associated with Fischer-Tropsch diesel may include construction and operation of fuel plants capable of producing these diesels.

E. Provisions to Opt Into the Low Carbon Fuel Standard Program

1. Electricity Provisions

Currently, regulated parties are eligible to generate credits for electricity used in on-road vehicles. Under the proposed LCFS regulation, most of these provisions would stay the same: (1) allow electrical service utilities to generate credits through charging of electric vehicles (EVs) at residences and public charging stations installed by them, (2) allow an Electric Vehicle Service Provider who is not an electrical service utility to generate credits through public charging stations that they install and maintain, (3) allow fleet owners to generate credits for charging of fleet EVs, and (4) allow businesses to generate credits for charging of EVs at the workplace. The proposed regulation would allow continued use of an estimation method for calculating the amount of electricity used for EV charging. It would also continue a requirement that utilities earning credits for EV charging must use revenues from sale of those credits to benefit EV customers.

The proposed LCFS regulation would also allow regulated parties to generate credits for electricity used in fixed guideway systems and electric forklifts. A fixed guideway system, for the purposes of the proposed LCFS regulation, consists of light rail or heavy rail, exclusive right-of-way for electric bus operations, and electric trolley coaches using rails and/or a fixed electric catenary wire. The proposed LCFS regulation would allow transit agencies to generate credits for fixed guideway systems and electrical distribution utilities to generate credits for electric forklifts. Values for Energy Economy Ratios (EERs) for each new electric vehicle category are included in the proposed regulation.

The proposed regulation includes one additional modification to EER values. The EER in the existing LCFS regulation for electricity used in heavy-duty applications would be revised from the current value of 2.7 to 4.2 based on data from electric buses operating in California.

Potential compliance responses to the proposed regulation that could result from these modifications to electricity provisions would include:

- Revenue generated from credit sales by transit agencies could be used to increase ridership through ticket price reduction, adding transit cars on existing routes, or helping fund the construction of new transit lines.

- Additional revenue generated from electric bus credit sales by fleet operators as a result of a higher EER value could be used to expand electric bus service.

- Revenue generated from credit sales could be used to increase charging infrastructure, introduce electricity rate plans favorable to EV customers, or fund other programs that promote EV use.

2. Low-Energy-Use Refinery Provisions

The proposed LCFS regulation would also include provisions to address simple processes that require relatively low energy levels to produce fuels, or low-energy-use refining processes.

Refinery energy use is reflected in the facility's Nelson Complexity Score. Nelson Complexity scores are based on the types of processing equipment at the refineries. The more processing equipment (e.g., hydrocrackers and cokers) operating at the refinery, the higher the Nelson Complexity value will be. "Modified Nelson Complexity" scores do not include equipment used for producing asphalt or lubes oils. Under these provisions, to be considered a low-complexity/low-energy-use refinery, a facility must have a modified Nelson Complexity score of five or less and annual energy use of five trillion British Thermal Units (expressed as 5 million MMBtu) or less. Each refinery would have to comply with both parts of the metric to be considered a low-complexity and low-energy-use refinery. This provision would recognize that these simpler refineries consume less energy in producing transportation fuels and deserve some CI credit for those energy savings.

These provisions would not be expected to result in modifications to existing refineries, but provide qualifying refineries with a new, more tailored option of calculating the CI values of fuels they produce.

3. Greenhouse Gas Emission Reductions at Refineries

The proposed LCFS regulation includes a new provision to allow refineries to generate credits for certain GHG-reducing investments at refineries. This provision is consistent with full life cycle analyses; and LCFS credits would be awarded for qualifying GHG emissions reductions at the refineries. ~~These investments would also create the co-benefit of reducing associated toxic air contaminants and criteria air pollutants.~~ These investments will result in compliance with all local, state, and national environmental and health and safety regulations regarding criteria air pollutants or toxic air contaminants. Refineries

would submit a project plan to ARB for approval and ARB would determine the difference between the refinery's baseline CI for transportation fuel and what the CI would be after taking the GHG-reducing project into account. The difference would be used to calculate credits for the refinery.

Each refinery that generates a Refinery Investment Credit would have the CI of its transportation fuel reviewed periodically to ensure that the calculated difference has remained the same. Changes in the CI could result in an increase, decrease, or elimination of the credit in future years.

Potential compliance responses to the proposed regulation that could reduce GHG emissions at refineries include installation of energy management systems (e.g., high efficiency motors, lighting efficiency improvements, steam recovery systems, solvent scrubbing, and membrane technology), combined heat and power (CHP), flare gas recovery, and cogeneration systems.

F. Commercialization of Alternative Diesel Fuels

ARB's existing diesel fuel regulations focus on controlling criteria air pollutant emissions from hydrocarbon-based fuels and are not intended to provide a market pathway for ADFs such as biodiesel. The proposed ADF regulation contains two main elements: 1) provisions that establish a clear path for commercialization of new emerging diesel fuel alternatives, and 2) special provisions governing biodiesel use as the first ADF.

1. Process for Commercialization of Alternative Diesel Fuels

Allowing for commercialization of ADFs would streamline the existing requirements and allow for a more efficient timeline for fuels to reach the market. This process includes a multimedia evaluation comparing an ADF to the fuel it replaces, development of consensus standards, and engine manufacturer approval. This multi-stage process would include a determination as to what, if any, limitations on use of the new ADF would be needed to avoid significant emissions impacts.

Fuels subject to ADF could include fuels currently on the market, and new types of alternative diesels could be used in California regardless of adoption of the proposed ADF regulation. To the extent the proposal increases the number of ADFs on the market or reduces the timeframe for bringing them to market, it would also be expected to spur research and development activities related to these fuels. Research and development activities would be completed at

appropriate existing facilities and would not be expected to require substantial modifications to existing facilities or construction of new facilities.

2. Specifications for Biodiesel

Due to its chemical properties, under certain conditions, biodiesel can result in increased combustion-related nitrogen oxides (NO_X) emissions. Based on ARB's understanding of NO_X impacts from biodiesel use, several viable options have been identified for offsetting or reducing biodiesel NO_X emissions: (1) use of renewable diesel or other very high cetane diesel fuels; (2) use of the additive di-tert butyl peroxide (DTBP); and (3) use of biodiesel in light- or medium-duty vehicles or heavy-duty vehicles with new technology diesel engines.

Biodiesel blends above the NO_X control level that contain DTBP by volume in the amounts specified in the table below meet the in-use requirements for biodiesel. Low saturation refers to a cetane number ~~or biodiesel cetane index~~ of less than 56; high saturation levels indicate a cetane number ~~or biodiesel cetane index~~ of greater than or equal to 56 (see Section 2293.6 of the proposed ADF regulation). Proposed DTBP mitigation control levels are shown in Table 2-2.

Table 2-2: Di-Tert Butyl Peroxide (DTBP) Mitigation Control Level

Biodiesel Saturation Level	Biodiesel Blend Level	Required level of DTBP
Low Saturation	>B5 to <B10	≥ 0.5 percent
	B10 to <B15	≥0.75 percent
	B15 to B20	≥1.0 percent
High Saturation	B10 to <B15	≥ 0.25 percent
	B15 to B20	≥0.5 percent

Additionally, it has been determined that use of new technology diesel engines (NTDE), light-duty diesel vehicles, or medium duty diesel vehicles results in similar levels of NO_X emissions resulting from combustion of biodiesel compared to CARB diesel. In addition, ARB would establish a certification methodology by which regulated parties could certify additives or biodiesel blends that are NO_X-neutral.

Potential compliance responses associated with the biodiesel provisions in the proposed ADF regulation would include changes to biodiesel blending, distribution practices, and increased use of diesel additives that are approved to reduce NO_X emissions. Sales of biodiesel blends higher than B5 are more likely to be sold to fleets with light or medium duty vehicles, or new technology diesel

engines (NTDEs) that are exempt from the NO_X mitigation requirement. Biodiesel blends higher than B20 may be used less than they are now, or disappear entirely from the California market.

G. Compliance Response Scenario

The following provides an illustrative, reasonably foreseeable compliance response scenario to achieve a 10 percent reduction in average CI by 2020 under the proposed LCFS and ADF regulations. As discussed above, the LCFS is based on a system of credits and relies on an incented market to achieve the proposed compliance standards. Compliance with the CI reduction standards would be based upon available fuel types and sources. The compliance scenario described in this section is based on assumptions that ARB staff has determined to be reasonably foreseeable in light of existing fuel types and sources, recent fuel supply trends, and anticipated production and transportation capacities in coming years. Actual compliance responses under the proposed LCFS and ADF regulations may vary from those set forth here because the LCFS is a market-based program and as such, fuel producers and suppliers would ultimately determine how the required reduction in CI is achieved. While innumerable variations in these compliance responses could be posited as possible outcomes of the proposed LCFS regulation, those variations are considered by ARB to be largely speculative. The compliance responses described here are based on a reasonable range of assumptions and therefore provide a sound basis for evaluating the proposed action's reasonably foreseeable environmental impacts.

The precise location and quantities of CARBOB-blending sources and alternative diesel fuels cannot be predicted with certainty because market interest may inform future feedstock supplies. However, as described above, under Section 2.D.A, Agriculture-Based Ethanol Production, locations from which ethanol could be sourced include:

- Corn ethanol: South Dakota, North Dakota, Colorado, Idaho, Kansas, New Mexico, Nebraska, California, Minnesota, Iowa, and Texas;
- Sugarcane ethanol: Brazil and Central America;
- Molasses ethanol: Brazil, Central America, and Indonesia;
- Sorghum ethanol: South Dakota, Kansas, Nebraska, California, and Texas;
- Sorghum/Corn/Wheat Slurry Ethanol: Kansas; and

- Cellulosic ethanol: plants could be sited near areas where feedstock is available (e.g., fuel treatment projects such as tree thinning and collection of forest litter, in the Sierra foothills, Midwest, Northern California, Oregon, and Washington, and crop residues within the Midwest and the Central Valley of California).

Feedstock sources for ADFs could include the following:

- Used cooking oil for renewable diesel and biodiesel provided from sources throughout the Midwest, Singapore, Europe, and Asia;
- Tallow from Southeast Asia, Australia, New Zealand, and California;
- Canola farming and canola oil extraction in Canada, followed by transportation of canola oil to the U.S. Canola oil could then be transesterified to biodiesel and transported to blending stations for use in California motor vehicles. Canadian canola production is about 95 percent of the total North American production, the remainder occurring in North Dakota, Idaho, and Montana;
- Biomethane that could be sourced primarily from landfills, dairy farms, and wastewater treatment plants; and
- Extraction of natural gas from the U.S. and Canada.

In addition, various potential innovative technologies could result in new pathways including biodiesel sourced from algae, CCS/EOR projects, creation of drop-in renewable biofuels, and synthesis of Fischer-Tropsch diesel. It is important to note that, because the LCFS is a market-driven regulation, the ability to investigate and develop a full range of conceivable sources of fuels for the future is difficult; however, based on a series of factors grounded in ARB's current understanding of known and expected fuel pathways, ARB has developed one projected compliance response scenario to reflect what may reasonably occur under the proposed LCFS and ADF regulations. The following factors are considered to determine the types of fuels that would reasonably be expected for use in compliance with the proposed regulations:

- CI value;
- Feedstock cost and availability;
- Compatibility with the existing vehicle fleet;
- Physical/transportation routes for the fuel;

- Available infrastructure; and
- Economic feasibility.

CI values can vary widely, even among biofuels, based on the feedstocks and processes used to produce them. For instance, cellulosic ethanol made from sugarcane straw can have a CI under 10 gCO_2e/MJ while ethanol produced from corn-based DGS or canola-based biodiesel can have a CI of more than 60, even when the sugarcane ethanol is shipped a longer distance.

ARB has developed a plausible scenario to quantify CARBOB blending sources and ADF source types through 2020. This information is based upon reasonable assumptions and known fuel availability compiled by industry experts, and is intended to provide an illustrative reasonably foreseeable scenario that could meet compliance standards. Tables 2-3 and 2-4 contain plausible, illustrative quantities of CARBOB blending source types and ADFs, respectively, through 2020 (see Appendix B of the ISOR for an explanation of the ~~assumptions~~ methodology used to create this compliance curve).

Table 2-3: Illustrative California Reformulated Gasoline Blendstock for Oxygenate Blending Source Types through 2020

Fuel	Units	2014	2015	2016	2017	2018	2019	2020
Corn & Related Ethanol	mm gal	~~1,400~~ 1,418	1,350	1,250	1,175	1,000	925	875
Cane and Sugar Ethanol	mm gal	~~1208~~	170	240	290	410	460	510
Cellulosic Ethanol	mm gal	0	0	5	15	50	75	100
Renewable Gasoline	mm gal	0	0	0	0	5	15	25
Hydrogen	mm gal GGE	0.03	0.4	1	2	4	5	7
Electricity for LDVs	mm gal GGE	9	14	19	24	31	40	51
Notes: mm gal = million gallons; GGE = gasoline gallon equivalent								

Table 2-4: Illustrative Alternative Diesel Fuel Source Types through 2020

Fuel	Units	2014	2015	2016	2017	2018	2019	2020
Biodiesel	mm gal	~~72~~65	97	129	160	180	180	180
Renewable Diesel	mm gal	~~120~~ 114	180	250	300	320	360	400
Conventional NG	mm gal DGE	~~70~~86	~~80~~70	~~80~~75	~~80~~75	~~80~~75	~~80~~75	~~60~~55
Renewable NG	mm gal DGE	~~50~~23	~~60~~55	~~80~~70	~~100~~90	~~140~~ 130	~~180~~ 170	~~240~~ 230

Table 2-4: Illustrative Alternative Diesel Fuel Source Types through 2020								
Fuel	**Units**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Electricity for HDVs/Rail	mm gal DGE	0	0	24	24	24	24	24
Total biodiesel %		~~1.99~~ 1.76%	~~2.65~~ 2.64%	~~3.51~~ 3.49%	~~4.30~~ 4.28%	~~4.81~~ 4.79%	~~4.79~~ 4.77%	~~4.76~~ 4.74%
Renewable Diesel %		~~3.3~~ 3.09%	4.9%	~~6.8~~ 6.77%	~~8.1~~ 8.03%	~~8.6~~ 8.52%	~~9.6~~ 9.52%	~~10.6~~ 10.53 %
Notes: NG = natural gas; HDVs = heavy-duty vehicles; mm gal = million gallons; DGE = diesel gallon equivalent;								

The existing and proposed LCFS regulations are not the only driving forces behind the change in transportation fuels used in California. The federal 2007 Renewable Fuels Standard (RFS) and federal tax incentives both play a role in incentivizing use of some of the same fuels, including ethanols and biodiesels. The influence of these other programs is demonstrated in part by the substantial increase in the volume of renewable transportation fuels in California prior to 2011, which was the first year an LCFS standard was applied in California. Separating the intertwined effects of the proposed LCFS regulation from the effects of the federal RFS and tax incentives is complex and too speculative to conduct for this EA analysis. Consequently, this EA takes the conservative approach by attributing all of the projected changes in California's fuel portfolio shown in Tables 2-5 and 2-6 to the proposed LCFS regulation. This approach tends to overstate the environmental impacts of the proposed regulations.

In consideration of these factors, ARB has developed estimates of potential changes in land use, shipment patterns, infrastructure needs, and other changes to the environment that could occur as a result of the proposed regulation. These are described as follows.

1. Land Use Changes

As discussed in this chapter, biofuels rely on feedstock production and are driven by economic demand and supply factors associated with the market for these feedstock products. Feedstocks include byproducts of existing operations (e.g., tallow, UCO) and crops grown for the specific purpose of becoming biofuel (e.g., corn, soy, and sugarcane). Fuel ethanol and biodiesel are traded among many countries in the world, and are generally anticipated to trend toward increased quantities as demand rises. Tables 2-5 and 2-6 show net export and imports of ethanol and biodiesel in 5-year increments from 2011, projected through 2021 (FAPRI 2012).

Table 2-5: Global Ethanol Trade										
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	MM Gal	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**
Net Exporters										
Brazil	289	660	1,155	1,259	1,418	1,729	2,235	2,778	3,222	3,437
China	0	-29	-63	-72	-79	-79	-79	-84	-91	-105
Net Importers										
Canada	158	148	144	152	159	157	156	159	162	171
European Union-25	370	456	479	522	557	586	606	636	664	709
India	11	95	108	54	29	1	-29	-52	-70	-79
Japan	96	125	147	159	173	186	198	212	226	242
South Korea	78	94	114	127	137	148	158	169	180	193
United States	-673	-551	-175	-113	-13	263	749	1,242	1,629	1,744
Rest of World	250	263	275	286	297	308	318	329	340	352
Note: MM Gal = million gallons; 1 gallon = 3.7857 liters; 1 metric ton = 1237.1644 liters.										
* Total net exports are the sum of all positive net exports. FAPRI baseline projections are grounded in a series of assumptions about the general economy, agricultural policies, the weather, and technological change. The projections generally assume that current agricultural policies will remain in force in the United States and other trading nations during the projection period. The projections are also based on average weather conditions and historical rates of technological change.										
Source: FAPRI 2012										

Table 2-6: Global Biodiesel Trade										
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	MM Gal	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**	**MM Gal**
Net Exporters										
Argentina	423	497	547	581	603	616	620	622	621	619
Brazil	-2	17	24	29	32	36	40	44	49	53
Indonesia	66	87	98	107	114	119	122	124	126	127
Malaysia	15	13	15	18	23	27	31	35	40	44
United States	60	44	-6	-6	1	14	25	36	45	56
Net Importers										
European Union	661	751	771	824	868	906	934	957	976	994
Japan	4	8	8	7	7	7	8	8	8	8
Rest of World	-103	-101	-101	-102	-102	-103	-103	-103	-104	-104
Note: MM Gal = million gallons; 1 gallon = 3.7857 liters; 1 metric ton = 1136.36 liters.										
* Total net exports are the sum of all positive net exports.										

The RFS and federal tax incentives both play a role in incentivizing use of some of the same fuels as the proposed LCFS, including ethanols and biodiesels. The influence of these other programs is demonstrated in part by the substantial increase in the volume of renewable transportation fuels in California prior to 2011, which was the first year an LCFS standard was applied in California.

EPA administers the RFS program with volume requirements for several categories of renewable fuels. EPA establishes the volume requirements for each category based on the Energy Independence and Security Act of 2007 (EISA) legislated volumes and fuel availability. EPA also tracks compliance through the Renewable Identification Number (RIN) system, which assigns a RIN to each gallon of renewable fuel.

Entities regulated by RFS include oil refiners, blenders, and gasoline and diesel importers. The volumes required of each obligated party are based on a percentage of its petroleum product sales. Refiners, blenders, and importers can meet their obligations by either selling required biofuels volumes or purchasing RINs from parties that exceed their requirements. Failure to meet requirements results in a substantial fine.

EISA established life cycle GHG emission thresholds for each category, requiring a percentage improvement relative to a baseline of the gasoline and diesel they replace.

- Conventional Biofuel: Any fuel derived from starch feedstocks (corn, sorghum, wheat). This category includes corn ethanol. Conventional biofuels produced in plants built after 2007 must demonstrate a 20 percent reduction in life cycle GHG emissions, compared to the baseline.

- Biomass-Based Diesel: A diesel fuel substitute made from renewable feedstocks, including biodiesel and non-ester renewable diesel. It cannot be co-processed with petroleum (such fuels fall under an undifferentiated advanced biofuels category). RFS requires a life cycle GHG emissions reduction of 50 percent, compared to the baseline.

- Cellulosic Biofuel: Any fuel derived from cellulose, hemicellulose, or lignin, which are nonfood-based renewable feedstocks. Cellulosic biofuels must have life cycle GHG emissions at least 60 percent lower than the baseline petroleum fuel.

- Other Advanced Biofuels: Any fuel derived from other renewable feedstocks. This may include sugarcane or sugar beet-based fuels; renewable diesel co-processed with petroleum; and other biofuels that may exist in the future. Both biomass-based diesel and cellulosic biofuel that are produced in volumes that exceed the requirements of their respective categories may be used to meet this category. Fuels in this category must demonstrate life cycle GHG emissions reductions of 50 percent, compared to the baseline.

The U.S. produces the majority of ethanol and biodiesel the nation consumes; however, through 2022, an increase in ethanol imports and biodiesel exports is expected (Table 2-7). These data indicate that only a small portion of biofuels would be imported into the U.S. through 2022.

Table 2-7: U.S. Biofuels Production and Consumption

	2011 (Million Gallons)	2016 (Million Gallons)	2021 (Million Gallons)	2022 (Million Gallons)
Ethanol				
Production	13,823	16,439	16,948	16,994
Consumption	13,118	16,677	18,804	19,132
Net Trade	673	-263	-1,864	-2,143
Biodiesel				
Production	899	924	979	987
Consumption	960	1,000	1,000	1,000
Net Trade	60	14	66	78
Source: FAPRI 2012				

Studies have shown that the amount of land use change occurring because of demand for biofuels depends on a variety of factors, including the crop type and yield, the fertility of the land used, elasticity of food demand to price, and elasticity of area to price (ICCT 2014; Tyner et al. 2011). For instance, a 2011 assessment of past effects of global biofuel demand found a connection between increased soybean cultivation and deforestation in Brazil (Gao et al. 2011).

Upstream production of agriculture-based feedstocks may result in direct and indirect land use change impacts. Direct land use change, in the context of biofuels, is defined as the displacement of existing cropland or conversion of native habitat to cropland solely for the purpose of producing a biofuel crop. Indirect land use change occurs when displaced cultivation is relocated onto native habitat or other non-

agricultural lands. In terms of determining CI values under the proposed LCFS regulation, both direct and indirect land use changes are considered as part of the life cycle GHG emissions analysis.

Land use changes caused by increased demand for fuel feedstocks incented by the proposed LCFS and ADF regulations will be scattered around several continents, given the global nature of transportation fuels markets. The proposed action would incent fuels that have lower CI values, including fuels made from sugarcane, sorghum, wheat, cellulosic sources, corn, and soy. With continued increased demands on biofuel crops, regardless of their CI values, the proposed LCFS and ADF regulations could contribute to increased direct and indirect land use change to accommodate new croplands. As described above, ARB has developed an illustrative, reasonably foreseeable scenario related to the type of fuels and feedstocks that could be used to meet CI reductions through 2020. These are provided in Tables 2-4 and 2-5.

Demands are likely to be realized through increased cultivation of feedstocks including:

- Corn Ethanol: South Dakota, North Dakota, Colorado, Idaho, Kansas, New Mexico, Nebraska, California, Minnesota, Iowa, and Texas;
- Sugarcane ethanol: Brazil and Central America;
- Molasses ethanol: Brazil, Central America, and Indonesia;
- Sorghum ethanol: South Dakota, Kansas, Nebraska, California, and Texas;
- Sorghum/Corn/Wheat Slurry Ethanol: Kansas; and
- Canola farming: Canada

As discussed above, as demand for biofuel crops increases, it could displace production of food crops, resulting in conversion of both fallow and cultivated lands to biofuel feedstock crop production. This displacement would be expected to occur in regions where prior crop displacement has taken place (e.g., Brazil and the Midwest).

2. Changes to Fuel-Associated Shipment Patterns

As shown in Table 2-3, demand in California for corn ethanol and sorghum corn ethanol could decrease through 2020, due to a shift somewhat toward lower-CI ethanols such as cane ethanol, sorghum ethanol, cellulosic ethanol, and molasses ethanol. The potential shift could affect agriculture-based ethanol pathways, resulting in a potential decrease in shipments of corn ethanol to elsewhere and an increase in shipments of sugarcane and molasses ethanol from Brazil and Central America. It is expected that ethanol shipments into California ports would not likely increase substantially in the very short term due to infrastructure restraints. Shipments of ethanol that cannot be accommodated through the Panama Canal might enter through a U.S. port other than those in California (e.g., Houston) and be delivered to California by rail. Therefore, while ethanol shipments by rail from locations within the U.S. may decrease, they are expected to be replaced by ethanol shipments delivered to out-of-state ports. In addition, processing plants and collection/cultivation of feedstock for cellulosic ethanol production could increase throughout the U.S. and Canada, with the resulting fuels possibly provided to California via rail.

In addition, the proposed ADF allows for the commercialization of ADFs. Through 2020, increased levels of diesel substitutes such as biodiesel and renewable diesel would be needed to meet the anticipated demand (see Table 2-4). This is likely to result in increased imports from Asia, Europe, and North America to California.

3. Additional Infrastructure Needs

In general, infrastructure already exists to support increased shipments of feedstock crops and fuels via rail and ocean-going vessels. Processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane could be constructed and operated to meet future demands. Similarly, construction and operation of future innovative technology facilities for drop-in renewable biofuels and Fisher-Tropsch diesel could be developed. Finally, modifications to existing facilities and construction of new facilities would be expected to meet specifications associated with proposed ADF.

Because credits could be generated through the use of solar-generation of steam, electricity, and heat in oil fields, development of these types of facilities would be incented. Potential compliance responses associated with these methods could result in modifications to existing crude production facilities to accommodate solar, and wind

electricity, heat, and/or steam generation. These would be located within crude oil production facility sites.

Potential compliance responses associated with credits from the use of CCS in crude oil production could include the development and construction of CCS projects. As described above, under Section 2.D.6, Potential Use of Innovative Technologies, CCS is a process whereby CO_2 emissions are captured from large industrial sources, such as power plants, natural gas processing facilities, fertilizer plants, ethanol plants, and hydrogen plants, and are then transported and injected into underground geological formations, such as depleted oil and gas fields, or deep saline aquifers. Captured CO_2 may be used for CI credits under the proposed LCFS and ADF regulations, including when used for EOR projects.

These projects could include the modification of existing or new industrial facilities to capture CO_2 emissions, along with construction of new infrastructure, such as pipelines, wells, and other surface facilities within or near the emitting facility to enable the transport and injection of CO_2 into a geological formation for sequestration. The transport distances and pipeline construction requirements for the captured CO_2 would vary depending on the locations of specific industrial sources of the captured CO_2 and proposed underground formations, recognizing, however, that pipeline cost could reasonably limit the distance of CO_2 transport. CCS would be required to be onsite at locations of oil or gas production facilities to obtain credits through the proposed LCFS.

4. Other Credit Sources

While it is difficult to predict the potential market response, additional options are available to obtain CI credits by opting into the proposed LCFS credit market. Methods to obtain other credits sources would be anticipated to result in the following reasonably foreseeable compliance responses:

- Reducing GHG emissions at refineries could result in the installation of energy management systems (e.g., high efficiency motors, lighting efficiency improvements, steam recovery systems, solvent scrubbing, and membrane technology), CHP, flare gas recovery, and cogeneration systems.

- Electricity provisions in the proposed LCFS regulation could provide financial support for the construction of fixed-guideway systems and the increased use of electric forklifts. Fixed guideway system components could include dedicated rail lines,

overhead wires, and the manufacture of passenger rail cars. Incentivizing electric-powered forklifts would result in increased production of equipment, installation of charging stations, and increased energy demand associated with recharging electric batteries.

3. ENVIRONMENTAL AND REGULATORY SETTING

The California Environmental Quality Act (CEQA) Guidelines require an environmental impact report to include an environmental setting section which discusses the current environmental conditions in the vicinity of the project. This environmental setting constitutes the baseline physical conditions by which an impact is determined to be significant (CEQA Guidelines 15125). As discussed above in Chapter 1, the California Air Resources Board (ARB) is exempt from preparing an environmental impact report; however, in an effort to comply with the policy objectives of CEQA, an environmental setting, as well as a regulatory setting with relevant environmental laws and regulations, has been included as Attachment 1 to this document.

4. IMPACT ANALYSIS AND MITIGATION MEASURES

This chapter contains an analysis of environmental impacts and mitigation measures that could result from the proposed Low Carbon Fuel Standard (LCFS) and Alternative Diesel Fuel (ADF) regulations. Section A provides an overview of the basis for conducting environmental impact analysis and determining the potential significance of impacts that could occur as a result of adoption and implementation of these regulations. Section B provides a programmatic environmental analysis of an illustrative, reasonably foreseeable compliance scenario that could result from implementation of the proposed LCFS and ADF regulations. A summary of environmental impacts and mitigation measures analyzed in this chapter is included in Attachment 2.

A. Basis for Environmental Impact Analysis and Significance Determinations

The existing LCFS regulation, established in previous rulemakings, defines the current requirements for the carbon intensity (CI) of fuels in California. The California Environmental Quality Act (CEQA) states the baseline for determining the significance of environmental impacts will normally be the existing conditions at the time the environmental review is initiated (CEQA Guidelines 15125 (a)). Therefore, significance determinations reflected in this Environmental Analysis (EA) are based on a comparison of the potential environmental consequences of the proposed regulations with the regulatory setting and physical conditions in 2014.

Compliance responses to the existing LCFS regulation are already in place and underway. As noted in Chapter 1 of this EA, the LCFS is an existing regulatory program that was approved by ARB in 2009 and implemented in 2010, with amendments made in 2011, which became effective in November 2012 and enforced in January 2013. Compliance standards became effective in 2011.

For the purpose of determining whether the proposed regulations have a potential effect on the environment, ARB evaluated the potential physical changes to the environment resulting from a reasonable foreseeable compliance scenario for the proposed LCFS regulation. Approval and implementation of the proposed LCFS regulation would result in re-adoption of an LCFS with the revisions described in Chapter 2. The environmental effects of the proposed LCFS regulation would, therefore, build upon the compliance responses of the existing LCFS regulation. In many instances, compliance responses associated with the proposed LCFS regulation would be a continuation of actions that are already occurring.

1. Adverse Environmental Impacts

The analysis of adverse effects on the environment, and significance determinations for those effects, reflect the programmatic nature of the analysis of the reasonably foreseeable compliance responses of the regulated entities and the marketplace. These reasonably foreseeable compliance responses were described in more detail in Chapter 2. The EA analysis addresses broadly defined types of impacts or actions that may be taken by others in the future as a result of the proposed LCFS and ADF regulations, without the ability to determine specific projects or locations, facility size and character, or site-specific environmental characteristics affected by any potential future facilities. For purposes of this impact analysis section, the term “project” refers to any activities undertaken by entities and the marketplace in response to the proposed regulations; and the term “project-level” refers to the site-specific facility level activities that are reasonably foreseeable. These references to “project” should not be confused with the reference to the two proposed regulations as a “project” for purposes of CEQA, as discussed in section 1.A and section 2 above.

This EA takes a conservative approach and considers some environmental impacts as potentially significant because of the inherent uncertainties in the relationship between physical actions that are reasonably foreseeable under the proposed LCFS and ADF regulations and environmentally sensitive resources or conditions that may be affected. This approach tends to overstate environmental impacts in light of these uncertainties and is intended to satisfy the good-faith, full-disclosure intention of CEQA. If and 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 EA, that are not already mitigated or avoided with this proposed approval, can later be avoided or reduced to a less-than-significant level. If a potentially significant environmental effect cannot be feasibly mitigated with certainty, this EA identifies it as significant and unavoidable. If the Board re-adopts the proposed LCFS and ADF with one or more significant, unavoidable environmental effects identified in this EA, as part of that approval action, the Board would adopt findings for each significant impact as well as a statement of overriding considerations (i.e., other benefits of the action including economic, legal, social, technological are determined to outweigh and override its unavoidable significant effects).

2. Mitigation Measures

The EA contains a degree of uncertainty regarding implementation of mitigation for potentially significant impacts. While ARB is responsible for adopting the proposed LCFS and ADF regulations, it does not have authority over all of the potential infrastructure and development projects that could be carried out in response to the proposed LCFS and ADF regulations. Also, because the fuel standards are performance-based and not prescriptive, the proposed LCFS regulation is not mandating any specific fuel or technology. Other agencies are responsible for the review and approval, including any required environmental analysis, of any facilities and infrastructure that are reasonably foreseeable, including any definition and adoption of feasible project-specific mitigation measures, and any monitoring of mitigation implementation. For example, local cities or counties must approve proposals to construct new facilities, such as for fuel blending or distribution facilities. Additionally, State and/or federal permits may be needed for specific environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because ARB cannot predict the location, design, or setting of specific projects that may result, and does not have authority over implementation of specific infrastructure projects that may occur, the programmatic analysis in this EA does not allow for a precise description of the details of project-specific mitigation. As a result, there is inherent uncertainty in the degree of mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in this EA. Consequently, this EA 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, where appropriate. It is also possible that the amount of mitigation necessary to reduce environmental impacts to below a significant level may be far less than disclosed in this EA on a case-by-case basis. It is expected that facility and infrastructure projects would 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.

3. Beneficial Effects to the Environment

Where applicable, consistent with ARB’s certified regulatory program requirements (17 CCR 60005 (b)) this EA also acknowledges potential beneficial effects on the environment in each resource area that may

result from implementation of the proposed LCFS and ADF regulations.

B. Impact Analysis and Mitigation Measures

The following discussion provides a programmatic analysis of the reasonably foreseeable compliance responses that could result from implementation of the proposed LCFS and ADF regulations, which are described in Chapter 2 of this EA. The impact analysis is organized by environmental resource areas in accordance with the topics presented in the Environmental Checklist in Appendix G to the CEQA Guidelines. The reasonably foreseeable compliance responses associated with the proposed regulations are analyzed in a programmatic manner for several reasons: (1) any individual action or activity would be carried out under the same authorizing regulatory authority (i.e., the proposed LCFS and ADF regulations); (2) the reasonably foreseeable compliance responses would result in generally similar environmental effects that can be mitigated in similar ways (17 CCR 15168 (a)(4)); and (3) while the types of foreseeable compliance responses can be reasonably predicted, the specific location, design, and setting of the potential actions cannot feasibly be known at this time. If a later activity would have environmental effects that are not examined within this EA, the public agency with authority over the later activity would be required to conduct additional environmental review as required by CEQA or other applicable statute.

The analysis is based on an illustrative reasonably foreseeable compliance response scenario that is based on a set of reasonable assumptions. While the compliance response scenario described for each impact is not the only conceivable one, it provides a credible basis for the EA conclusions that is consistent with available evidence. It also includes actions that could likely occur under a broad range of the potential scenarios. Because the specific location, extent, and design of potential new and/or modified facilities cannot be known at this time, the impact discussions reflect a conservative assessment to describe the type and magnitude of effects that may occur (i.e., in that the conclusions tend to overstate adverse effects). These impact discussions are followed by the types of mitigation measures that could be required to reduce potentially significant environmental impacts.

1. Aesthetics

Impact 1.a: Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and

biomethane. The proposed regulations could also incent minor expansions to existing operations, such as collection of natural gas from landfills, dairies, and wastewater treatment plants; modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity); and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of carbon capture and sequestration (CCS) facilities and operation of expanded fixed guideway systems.

Landscape character can be defined as the visual and cultural image of a geographic area. It consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique. Visual character may range from predominately natural to heavily influenced by human development. Its value is related, in part, to the importance of a site to those who view it. Viewer groups typically include: residents, motorists, and recreation users.

Although it is reasonably foreseeable that activities associated with new or modified facilities could occur, there is uncertainty as to the exact location or character of any new facilities or modification of existing facilities. Some of the reasonably foreseeable compliance responses could be accomplished with minimal ground-disturbing activity. For instance, collection of natural gas from landfills, dairies, and wastewater treatment plants would generally consist of modifications that would result in minimal visual intrusion compared to the existing operations. These modifications could include the construction of digesters to produce methane, pipelines for transport, and ancillary outbuildings. These types of projects would likely be located adjacent to, or within, existing landfills, dairies, and wastewater treatment plants, and would involve structures of similar size, scale, and visual character to those typically found within these types of facilities; thus, visual impacts would not be substantial in these cases.

Projects that would require the use of biomass, such as the collection of forest materials or agricultural wastes for cellulosic ethanol facilities, are likely to involve regular silvicultural, timber harvest, and farmland soil preparation activities. These activities could result in areas where an unnatural appearance would be created that is out of character with adjacent forested areas, and could be visible from residences, highways and roadways, and recreational areas. However, this appearance would be similar in character to activities already typical of these environments (e.g., soil maintenance for agricultural lands, and fuel treatment and timber harvest procedures). As a result, fuel pathways associated with biomass feedstocks would not be expected to substantially alter existing aesthetic resources.

However, development of new facilities, although expected to occur in areas appropriately zoned, could conceivably introduce or increase the presence of visible artificial elements (e.g., heavy-duty equipment, vegetation removal, new or expanded buildings) in areas of scenic importance, such as visibility from State scenic highways. The visual impact of such development would depend on several variables, including the type and size of facilities, distance and angle of view, visual prominence, and placement in the landscape. In addition, facility operation may introduce substantial sources of glare, exhaust plumes, and nighttime lighting for safety and security purposes. These types of impacts could result in significant effects on aesthetic resources.

Therefore, short-term construction-related impacts and long-term operational impacts on aesthetics associated with implementation of the proposed LCFS and ADF regulations could be potentially significant.

Potential scenic and nighttime lighting impacts could be reduced to a less-than-significant level by mitigation measures prescribed by local or State land use or permitting agencies with approval authority over specific development projects.

Mitigation Measure 1.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of aesthetic resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities or infrastructure that would be approved by other State agencies or local jurisdictions. The ability to require such measures is within the purview of jurisdictions with land use approval and/or permitting authority. Project-specific impacts and mitigation would be identified during the project review process carried out by agencies with approval authority. Recognized practices routinely required to avoid and/or minimize impacts to aesthetic resources include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must certify that the environmental document was

prepared in compliance with applicable regulations prior to approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project.

- The project proponent would color and finish the surfaces of all project structures and buildings visible to the public to: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The project proponent would submit a surface treatment plan to the lead agency for review and approval.

- To the extent feasible, the sites selected for use as construction staging and laydown areas would be areas that are already disturbed and/or are in locations of low visual sensitivity. Where feasible, construction staging and laydown areas for equipment, personal vehicles, and material storage would be sited to take advantage of natural screening opportunities provided by existing structures, topography, and/or vegetation. Temporary visual screens would be used where helpful, if existing landscape features did not screen views of the areas.

- All construction, operation, and maintenance areas would be kept clean and tidy, including the re-vegetation of disturbed soil and storage of construction materials and equipment would be screened from view and/or are generally not visible to the public, where feasible.

- Siting projects and their associated elements next to important scenic landscape features or in a setting for observation from State scenic highways, national historic sites, national trails, and cultural resources would be avoided to the greatest extent feasible.

- The project proponent would contact the lead agency to discuss the documentation required in a lighting mitigation plan, submit to the lead agency a plan describing the measures that demonstrate compliance with lighting requirements, and notify the lead agency that the lighting has been completed and is ready for inspection.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant scenic and nighttime lighting impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operational scenic and nighttime lighting impacts resulting from the development of new facilities or modification of existing facilities associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

2. Agricultural and Forest Resources

Impact 2.a: Conversion of Agricultural and Forest Resources Related to New Facilities

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. The proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of CCS facilities, and operation of expanded fixed guideway systems.

Reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations that could affect agricultural and forest resources are associated with feedstock cultivation, methane collection at dairies, and new digester facilities. Regarding impacts to agricultural resources, it is unknown how much of the land on which digesters would be constructed is currently designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance; land zoned for agricultural uses; or land under a Williamson Act contract. However, new digester facilities (including any potential new community digester facilities) would be considered an agricultural use; they support livestock operations by providing additional benefits from

the livestock manure. Therefore, development of new digester facilities would be consistent with existing agricultural uses or would not result in the conversion of agricultural land to non-agricultural uses, conflict with existing zoning, or conflict with Williamson Act contracts.

Operations to produce LCFS credits could include development of renewable energy projects, such as solar and wind operations. In response to proposals for development of renewable energy projects on important farmland, local governments, and the State have faced the challenge of balancing competing public interests in conserving agricultural land and meeting goals for expanding renewable energy generation. Utility-scale solar and wind energy facilities proposed to be located on Important Farmland and/or property under Land Conservation (Williamson Act) contracts, have resulted in land use conversion. In 2013, a California appellate court upheld an Environmental Impact Report's (EIR) evaluation of agricultural land impact and mitigation for a proposed solar project on grazing land and Williamson Act contract land where a contract cancellation was proposed. The mitigation measures adopted by the lead agency in the case included agricultural conservation easements and measures to restore the site after conclusion of the project's useful life. The Court decision confirmed that it was appropriate for the local lead agency to consider the State's interest in increasing renewable energy generation as a reason to permit the cancellation of a Williamson Act contract (*Save Panoche Valley v. San Benito County, 2013, 217 Cal.App.4th 503).* Consequently, conversion of important farmland could occur in response to the recommended actions in the proposed LCFS and ADF regulations. Because ARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels. While compliance with existing land use policies, ordinances, and regulations would serve to moderate this impact, because of local priorities for protection of agricultural land, the record of recent project approvals in the State demonstrate the impact has not been avoided.

If facilities are proposed in response to the proposed LCFS and ADF regulations, potential impacts to Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, Williamson Act conservation contracts, or forest land or timberland, must be reviewed by local or State lead agencies in the context of future project approvals. Many local governments have adopted land use policies to protect important agricultural and forest land from conversion to urban development, including industrial facilities. While it is reasonable to anticipate that land use policies controlling the location of new industrial facilities would generally avoid conversion of important agricultural land, the

potential cannot be entirely dismissed. If a facility were located on important farmland or property under a Williamson Act Contract, conversion of the agricultural land to urban uses could occur.

Therefore, impacts associated with implementation of the proposed LCFS and ADF regulations on agricultural and forest resources could be potentially significant. This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 2.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of agricultural and forest resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities or infrastructure that would be approved by other State agencies or local jurisdictions. The ability to require such measures is within the purview of jurisdictions with land use approval and/or permitting authority. Project-specific impacts and mitigation would be identified during the project review process and carried out by agencies with approval authority. Recognized practices routinely required to avoid and/or minimize impacts to agriculture and forest resources include:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance response to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. Because ARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels. Any mitigation specifically required for a new or modified facility would be determined by the local lead agency and future environmental documents by local and State lead agencies should include analysis of the following:.

- Avoidance of lands designated as Important Farmlands as defined by the Farmland Mapping and Monitoring Program.
- Analysis of the feasibility of using farmland that is not designated as Important Farmland prior to deciding on the conversion of Important Farmland.
- The feasibility, proximity, and value of the proposed project sites should be balanced before a decision is made to locate a facility on land designated as Important Farmland.
- Any action resulting in the conversion of Important Farmlands should consider mitigation for the loss of such farmland. Any such mitigation should be completed prior to the issuance of a grading or building permit by providing the permitting agency with written evidence of completion of the mitigation. Mitigation may include but is not limited to:
  - Permanent preservation of offsite Important Farmland (State defined Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) of equal or better agricultural quality, at a ratio of at least 1:1.
  - Preservation may include the purchase of agricultural conservation easement(s); purchase of credits from an established agricultural farmland mitigation bank; contribution of agricultural land or equivalent funding to an organization that provides for the preservation of farmland towards the ultimate purchase of an agricultural conservation easement.
  - Participation in any agricultural land mitigation program, including local government maintained, that provides equal or more effective mitigation than the measures listed.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant impacts related to the conversion of agriculture and forest resources.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that impacts to agriculture and forest resources resulting from the development of new facilities or modification of existing facilities associated with reasonably foreseeable compliance responses to the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

Impact 2.b: Agricultural and Forest Resource Impacts Related to Feedstock Cultivation

As discussed in Chapter 2, Project Description, the proposed LCFS and ADF regulations could alter the location and extent of fuel-based agricultural feedstock cultivation and production. Ethanol supplies could shift away from corn-based ethanol toward other feedstocks, such as cane, sorghum, cellulosic, and molasses. These shifts could lead to increased demand for and cultivation of fuel-based agricultural feedstocks that could displace food-based production on agricultural land currently used for row crops, orchards, and grazing. (See Section 4.B.11 below for a discussion of direct and indirect land use change.) This increased demand could, in turn, potentially result in indirect land use changes where food-based agriculture could shift to other areas, thereby increasing pressure for conversion of rangeland, grassland, forests, and other land uses to agriculture.

Compliance responses that would use farm wastes, such as rice or sugarcane straw for use as an ethanol feedstock, would have no effect on current land uses because these actions would be incidental and similar to normal farming practices. Similarly, cellulosic feedstocks are non-food-based feedstocks that include crop residues, wood residues, dedicated energy crops, and industrial and other wastes. These feedstocks are composed of cellulose, hemicellulose, and lignin typically extracted to provide process steam for ethanol production. When cultivated for ethanol production, cellulosic feedstock are expected to be grown on marginal lands not suitable for other crops, thereby maintaining agricultural lands that could otherwise be converted to other uses.

Because the LCFS program is market-driven, it is not possible to determine the exact locations where these feedstocks may be cultivated. The amount of land required to produce enough biofuel to meet projected demand depends entirely on the productivity of a given feedstock on a given parcel of land. Feedstocks may be sourced from

forest land agricultural lands, and would be dependent on available quantities and location of processing facilities. The productivity is, in turn, governed by a wide variety of physiological factors, including genetic diversity, agronomic practice, and environmental factors, such as soil quality, water availability, and climate. Thus, predicting the amount of land required to produce enough low-carbon biofuel to impact existing agricultural practices could result in variable conclusions. In addition, the use of residual biomass from agricultural, forestry, and municipal activities decreases the amount of land needed for energy crops. Likewise, the development of energy crops adapted to be highly productive on lands marginal for other agricultural uses could reduce the potential impact of biofuel production on non-fuel crop production. Decisions regarding land use and feedstock choices would have an impact on how much biofuel could be produced in a given area. However, because the proposed LCFS and ADF regulations would provide market-based incentives that could lead to an increase in the production of certain agricultural feedstocks for the production of low-carbon biofuels, and because such an increase could contribute to potential land use changes that could adversely affect agricultural and forest resources, this impact would be potentially significant.

Potential agricultural and forest resource impacts could be reduced to a less-than-significant level by mitigation measures prescribed by local, State, federal, or other land use or permitting agencies (either in the United States or abroad) with approval authority over the particular development projects. However, because ARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure 2.b: Implement Mitigation Measure 2.a

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant agricultural or forest land impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that agricultural and forest resource impacts resulting from increased fuel-based agricultural feedstock production associated with the

proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

3. Air Quality

Impact 3.a Short-Term Construction-Related Air Quality Impacts

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of CCS facilities and expansion of fixed guideway systems.

Proposed development of new or modified manufacturing facilities is expected to be required to secure local or State land use and/or air district approvals prior to their implementation. Part of the development review and approval process for projects located in California requires environmental review consistent with California environmental laws (e.g., CEQA) and other applicable local requirements (e.g., local air quality management district rules and regulations). The environmental review process would include an assessment of whether or not implementation of such projects could result in short-term construction-related air quality impacts.

At this time, the specific location, type, and number of construction activities is not known and would be dependent upon a variety of factors that are not within the control or authority of ARB and not within its purview. Nonetheless, the analysis presented herein provides a good-faith disclosure of the general types of construction emission impacts that could occur with implementation of these reasonably foreseeable compliance responses. Further, subsequent environmental review would be conducted at such time that an individual project is proposed and land use or construction approvals are sought.

Generally it is expected that during the construction phase for any facilities, criteria air pollutants and toxic air contaminants (TACs) could be generated from a variety of 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 particulate matter (PM) dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., respirable particulate matter [PM_{10}] and fine particulate matter [$PM_{2.5}$]) vary as a function of several 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 reactive organic gases (ROG) and nitrogen oxides (NO_X). These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment.

The site preparation phase typically generates the most substantial emission levels because of the onsite 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 information is not available at this time, based on the types of activities that could be conducted, 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 other parameters for above-mentioned equipment and activities, construction activities could result in hundreds of pounds of daily NO_X and PM emissions, which may exceed general mass emissions limits of a local or regional air quality management district depending on the location of generation. Thus, implementation of new regulations and/or incentives could generate levels that conflict with applicable air quality plans, exceed or contribute substantially to an existing or projected exceedance of State or national ambient air quality standards, or expose sensitive receptors to substantial pollutant concentrations.

As a result, short-term construction-related air quality impacts associated with the proposed LCFS and ADF regulations would be potentially significant.

This short-term construction-related air quality impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

Mitigation Measure 3.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of air quality. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is within the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would likely qualify as a "project" under CEQA, because they would generally need a discretionary public agency approval and could affect the physical environment. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices routinely required to avoid and/or minimize impacts to air quality include the following:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local jurisdiction with land use authority would determine that the environmental review process complied with CEQA and other applicable regulations, prior to project approval.

- Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the construction-related air quality impacts of the project.

- Project proponents would apply for, secure, and comply with all appropriate air quality permits for project construction from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to construction mobilization.

- Project proponents would comply with the federal Clean Air Act and the California Clean Air Act (e.g., New Source Review and Best Available Control Technology criteria, if applicable).

- Project proponents would comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure (e.g., construction-related

fugitive PM dust regulations, indirect source review, and payment into offsite mitigation funds).

- For projects located in PM nonattainment areas, prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. With mitigation, construction emissions, though not likely, could still exceed local air district threshold levels of significance depending on the magnitude of construction activities.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related air quality impacts resulting from the development of new facilities or modification of existing facilities associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

Impact 3.b: Long-Term Operational Air Quality Emissions

With regards to motor vehicle exhaust, adoption of the proposed LCFS and ADF regulations would be anticipated to result in changes from the 2014 baseline emissions level for several criteria air pollutants (e.g., emissions from the additional use of biodiesel and renewable diesel fuels). Biodiesel and renewable diesel fuels have been found to reduce PM emissions relative to conventional diesel. Renewable diesel has been found to decrease NO_X relative to conventional diesel; however, biodiesel has been found to increase NO_X emissions in some cases, depending on feedstock and type of engine of used.

For 2014, ~~ARB staff estimates that~~ approximately ~~72~~ 65 million gallons of biodiesel and ~~120~~ 114 million gallons of renewable diesel were consumed in California. These volumes, combined with the use of new technology diesel engines (NTDEs) resulted in an increase in NO_X of about ~~1.3~~ 1.2 tons per day (TPD) and a decrease in PM of about 0.8 TPD statewide compared to use of CARB diesel alone.

The proposed regulations provide a clear legal pathway to the commercialization of innovative, lower-carbon diesel fuel substitutes that would result in **beneficial** air quality impacts in regards to PM, CO, TAC, and other air pollutants. Specifically, the estimated total reduction of $PM_{2.5}$ emissions would be more than 1,200 tons from transportation fuels in California from 2016 through 2020. These emissions reductions include the reduced tailpipe emissions of $PM_{2.5}$ associated with the replacement of conventional diesel with substitute fuels net of any increased emissions of $PM_{2.5}$ associated with feedstock and fuel truck trips from additional California biofuel production facilities and transport from out-of-state biofuel production facilities. In addition, stationary source emissions associated with transportation fuel production would be subject to local rules and regulations (e.g., authority to construct and permit to operate requirements) and, consequently, would not be approved by local air districts if emissions were to exceed designated levels for attaining and maintaining ambient air quality standards, and/or exceed acceptable risk levels for TAC exposure. Refer to the LCFS ISOR at Chapter IV for further explanation of the air quality analysis.

Staff performed additional air quality analysis in response to three separate items: 1) the producer/importer exemption added as new text to section 2293.6(a)(5)(C); 2) updated 2014 volumes in the LCFS illustrative compliance scenario; and 3) a re-analysis of certain assumptions in the ADF staff report. Staff has determined that the combined effects of these changes do not change the significance determinations in the draft Environmental Analysis that was prepared for the proposed ADF and proposed LCFS regulations, and previously circulated for public comment. More details on this analysis are available in the ADF 15-day notice.

If the proposed ADF and LCFS regulations are adopted in 2015, staff anticipates that NO_X emissions would decrease from current levels as shown in Table 4-1 below. As a result of the in-use requirements on biodiesel, ARB staff anticipates that the use of biodiesel above B5 would result in lower NO_X emissions than use of biodiesel above B5 would currently produce. More detail on the emissions in the table below as well as the methodology are available in the ADF Staff Report in Appendix B, Technical Supporting information.

Table 4-1: Projected Statewide NO_X emissions 2014-2022									
Million gallons	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
B5 Low Saturation	~~72~~ 65	97	129	160	~~150~~152	~~150~~152	~~150~~152	~~150~~152	~~150~~152
RD	~~120~~114	180	250	300	320	360	400	500	550
NTDE VMT%	40%	51%	60%	66%	71%	75%	80%	85%	89%
Net NO_X TPD	0.0	-0.1	~~-0.1~~-0.2	~~-0.1~~-0.3	~~-0.5~~-0.6	~~-0.7~~-0.9	-1.0	-1.2	-1.3

As discussed above, the appropriate baseline to use for determining significance under CEQA is the current baseline condition, which for air quality shows declining emissions of all criteria pollutants, including NO_X.

Thus, the long-term impacts on air quality would be **beneficial.**

In the interest of public disclosure, ARB staff examined the current and expected future emissions of NO_X from biodiesel relative to the NO_X emissions from biodiesel that were occurring prior to the adoption of the original LCFS (2009). In 2009, there were few NTDEs, no renewable diesel, and little biodiesel in California, so the NO_X emissions from biodiesel were minimal. Staff re-evaluated the 2009 data and determined that NOx emissions were approximately 0.3 TPD greater than reported in the Draft ISOR and EA. However, since 2009, NO_X emissions from biodiesel have increased with the increased use of biodiesel resulting from multiple incentives related to biodiesel since 2009. Thus, it is unclear and impossible to determine what portion of the increase in use is attributable to the original LCFS. In addition to implementation of the LCFS (2009), biodiesel was incented by the federal 2007 Renewable Fuels Standard (RFS2) and tax credits, which staff believes were more instrumental in bringing biodiesel to California post-2009 because of their attractive economic incentives. California generally gets its “fair share” of the national supply of fuels, approximately 11 percent of U.S. supply. To date, California has not yet reached its fair share for biodiesel compared with other states. It is possible that the amount of biodiesel used in California was likely lower than it might have been due to the policy signals ARB was sending about its intent to regulate biodiesel. On the other hand, California has received more than its fair share of renewable diesel, which suggests the existing LCFS more clearly incented higher renewable diesel use in California. The use of this increased renewable diesel since 2009 has led to decreases in NO_X compared to the amount of renewable diesel

in 2009. It is expected that supply and use of renewable diesel will continue to grow, which decreases NO_X and offsets some the NO_X increases from biodiesel in those same years. This, combined with increased NTDE adoption, will cause biodiesel-related NO_X emissions in California to continue to decrease and ultimately return to 2009 levels by 2023. Given the RFS, federal tax incentives, and the growth of alternative fuel technologies and markets, it is certainly possible that biodiesel use in California would continue at or near existing levels – or even increase – in the absence of an LCFS regulation. For additional information, please see Chapter 6 of the ADF Staff Report.

Impact 3.c: Short-Term Construction-Related and Long-Term Operational Impacts from Odors

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of CCS facilities and operation of expanded fixed-guideway systems.

Although it is reasonably foreseeable that construction activities could occur, there is uncertainty as to the exact location of any new facilities or modification of existing facilities. Typically, such facilities would be located in industrial or rural areas with appropriate zoning to accommodate these specific activities. Short-term construction activities could generate short-term odors associated with operation of diesel equipment; however, such activities would be short-term in nature and would not be expected to adversely affect long-term air quality.

Implementation of the proposed LCFS and ADF regulations would encourage the collection of natural gas from dairies, landfills, and wastewater treatment plants. Generally, odor is considered a perceived nuisance and an environmental impact. Factors that would affect odor impacts include the design of collection facilities and exposure duration. Natural gas collection systems at landfills would involve wells for extraction of landfill methane produced from decomposing waste, and wastewater treatment plants would modify existing digesters in enclosed operations. Wastewater treatment plants also typically maintain odor control systems to address fugitive

emissions at existing facilities. However, manure management at dairies typically involves flushing and/or scraping manure into onsite storage ponds or stockpiles. Manure in these storage ponds and stockpiles naturally undergo decomposition, and as a result, odorous compounds (e.g., ammonia and hydrogen sulfide) are released into the environment. However, the implementation of new digester facilities at existing livestock operations would result in the manure being placed into the digester rather than into onsite storage ponds or stockpiles. This would limit open air degradation (resulting in the breakdown of volatile organic compounds through anaerobic processes that would occur in the closed system) and would result in more control over the exhaust emissions.

Thus, short-term construction-related odor impacts and long-term operational odor impacts associated with the LCFS and ADF regulations would be **less than significant**.

4. Biological Resources

Impact 4.a: Short-Term Construction-Related and Long-Term Impacts on Biological Resources Related to New Facilities

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. The proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of CCS facilities and operation of expanded fixed guideway systems.

Although it is reasonably foreseeable that construction activities could occur for these types of activities, there is uncertainty as to the exact location of any new facilities or modification made to existing facilities. Any construction undertaken could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways.

The biological resources that could be affected by the construction and operation of new or modified manufacturing plants or renewable energy projects would depend on the specific location of any necessary construction and its environmental setting. Adverse impacts

could include modifications to existing habitat; including removal, degradation, and fragmentation of riparian systems, wetlands, or other sensitive natural wildlife habitat and plant communities; interference with wildlife movement or wildlife nursery sites; loss of special-status species; and/or conflicts with the provisions of adopted habitat conservation plans, natural community conservation plans, or other conservation plans or policies to protect natural resources.

Short-term construction-related impacts and long-term operational impacts to biological resources associated with the LCFS and ADF regulations would be potentially significant.

This impact on biological resources associated with the proposed LCFS and ADF regulations could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 4.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of biological resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to biological resources include:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance response to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the potentially significant impacts to biological resources. The definition of actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - Retain a qualified biologist to prepare a biological inventory of site resources prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Construction and operational planning will require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.
    - Retain a qualified biologist to prepare a wetland survey of onsite resources. This survey shall be used to establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 3030(d) of the Clean Water Act and is administered by the U.S. Army Corps of Engineers.
    - Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices.
    - Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring, as needed, to address project activities that could cause an active nest to fail.
    - Prepare site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board.

- Prepare spill prevention and emergency response plans, and hazardous waste disposal plans as appropriate to protect against the inadvertent release of potentially toxic materials.
- Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with “no net loss” requirements.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction- related and long-term operational impacts to biological resources associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable.**

Impact 4.b: Effects on Biological Resources Associated with Land Use Changes

Implementation of the proposed LCFS and ADF regulations would likely result in an increased demand for agricultural feedstocks, including sugarcane, sorghum, and soy. In some cases, this increase can be accomplished through the use of marginal lands (i.e., lands unsuitable for food crops), or through the increased production of feedstocks on existing agricultural lands (e.g., through the use of genetically modified crops designed for fuels). However, cultivation of biofuels on land currently used for food production could result in the conversion of additional existing forest, grassland, or other non-agricultural land to food-related agricultural uses. In addition, the use of distillers’ grains for ethanol, which is often used to feed livestock, could increase pressure to grow additional crops for cattle and other animal-based agriculture.

ARB estimates the indirect land use change effects of biofuel crop production using the Global Trade Analysis Project (GTAP) model, which is a computer model developed and supported by researchers at Purdue University. Within the GTAP’s scope, there are 111 world

regions, some of which consist of single countries, others of which are comprised of multiple neighboring countries. Each region contains data tables that describe every national economy in that region, as well as all significant intra- and inter-regional trade relationships. The data for this model are contributed and maintained by more than 6,000 local experts.

GTAP model analysis considers life cycle CI impacts related to potential or actual deforestation and conversion of other land use types. When a life cycle pathway is developed for a crop-based biofuel, an indirect land use change (iLUC) value is developed using the GTAP model for land that would be converted to agricultural production as a result of increased demand for that crop. The approach accounts for land conversions in all regions of the world based on available land and likelihood of land to be converted as demand for land goes up. The methodology attributes new land to come from forest lands, pastureland, and cropland. A fuel that is more likely to displace sensitive lands, such as forests, would have a higher iLUC value, making it less attractive for use in complying with the proposed LCFS regulation. However, while the models consider effects related to land use changes, they do not explicitly prohibit adverse effects on habitat or biodiversity, and there could still be substantial environmental impacts on biological resources.

Waste-derived biofuels would not require land conversion because they use waste biomass material from existing agricultural operations (i.e., no attendant deforestation) and are assigned “zero” iLUC values. Most gasoline contains up to 10 percent ethanol in the U.S. to meet oxygenation requirements. Instituting CI values for land use changes incents the production and use of renewable sources, such as waste-derived biofuels, and may decrease the potential for deforestation and other conversion of lands not currently in agricultural production. Thus, the proposed LCFS and ADF regulations would provide a disincentive for land use conversion, as these feedstocks would be less marketable due to increased CI values. As a result, the potential for land use conversion, and the related effects on biological species, would be decreased.

Depending on the type of crop, location, and need to convert lands, habitat destruction could occur, resulting in the loss of biodiversity. The location of new crop lands may affect conservation plans or disrupt important migratory routes. Indirect effects could occur as well, such as increased pesticide and nutrient use, the runoff of which could be detrimental to individual species. Because the proposed LCFS and ADF regulations would encourage the production of lower-CI value

crops, land conversion and adverse effects on biological species and their habitats could occur. This impact could be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 4.b: Implement Mitigation Measure 4.a

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts associated with land use conversion to biological resources associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable.**

5. Cultural Resources

Impact 5.a: Short-Term Construction-Related Impacts on Cultural Resources

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of CCS facilities and operation of expanded fixed guideway systems.

Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may

also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites 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. Historic buildings and structures may also be adversely affected by demolition-related activities. Such resources may occur individually, in groupings of modest size, or in districts. Because culturally sensitive resources can also be located in developed settings, historic, archeological, and paleontological resources, and places important to Native American communities, could also be adversely affected by construction of new facilities.

Short-term construction-related impacts on cultural resources associated with the proposed LCFS and ADF regulations would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 5.a

The Regulatory Setting in Attachment 1 includes, but is not limited to, applicable laws and regulations that provide protection of cultural resources. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to cultural resources include:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the

completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant cultural impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
    - 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 2010).

- 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 would 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 fossiliferous 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.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant short-term construction-related impact regarding cultural resources associated with the proposed LCFS and ADF regulations could be **potentially significant and unavoidable**.

6. Energy Demand

Impact 6.a: Short-Term Construction-Related Impacts on Energy Demand

Implementation of the proposed LCFS and ADF regulations is anticipated to incent various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. There is potential that innovative technology facilities, such as for drop-in renewable biofuels, and Fischer-Tropsch diesel could also be developed. Although it is reasonably foreseeable that activities associated with new or modified facilities could occur, there is uncertainty as to the exact location or character of any new facilities or modification of existing facilities.

Temporary increases in energy demand associated with new facilities would include fuels used during construction, and gas and electric demands. Typical earth-moving equipment that may be necessary for construction includes: graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. While energy would be required to complete construction for any new or modified facilities or infrastructure projects, it would be temporary and limited in magnitude such that a reasonable amount of energy would be expended.

Short-term construction-related impacts on energy demand, associated with the proposed LCFS and ADF regulations, would be **less than significant.**

Impact 6.b: Long-Term Operational Impacts on Energy Demand

In the long term, implementation of the proposed LCFS and ADF regulations is anticipated to result in an increase in production of low-carbon fuels (including ADFs) for California's market. This would be realized through operation of new processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Additionally, there is potential that innovative technology facilities, such as for drop-in renewable biofuels, and Fischer-Tropsch diesel could also be developed.

The relative mixtures of low-carbon fuels (including biofuel) used in vehicles are driven by the market. A fuel's CI value would incent other market-based factors, such as necessary infrastructure, feedstock availability, and compatibility with the vehicle fleet. The proposed LCFS and ADF regulations would not result in a change to fuel demand; rather, they would affect how fuels are blended and which fuels are used.

Determination of a fuel's energy demand and CI value is based on a "well-to-wheel" analysis, which includes production and processing, distribution, and vehicle operation. A Life Cycle Analysis Model called the Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET), developed by Argonne National Laboratory, has been used to calculate the energy use and greenhouse gas (GHG) emissions during the entire process. While the proposed LCFS and ADF regulations are designed to reduce the average CI of fuels, the CI of a fuel is not necessarily directly related to its ~~fuel~~ energy efficiency. This discrepancy between the energy demand versus CI value is shown for several examples of transportation fuels in Table 4-2. Note that energy demand represents the average well-to-wheel life cycle analysis, representing both well-to-tank (recovery to finished fuel) and tank-to-wheel (combustion of fuel in a vehicle).

Table 4-2: Well-to-Wheel Life Cycle Analysis of Transportation Fuels (Current LCFS Regulation)

Fuel Type	Feedstock	Energy Demand (Btu/MMBtu)	CI Value (gCO_2e/MJ)
California Reformulated Gasoline	CARBOB, corn ethanol	1,328,096	95.85 [1]
Ethanol	Corn (Dry Mill, Mid-West)	2,657,651	68.60 (95.66 including the iLUC)
	Brazilian Sugar Cane	2,249,563	46.0 (73.40 including iLUC)

Table 4-2: Well-to-Wheel Life Cycle Analysis of Transportation Fuels (Current LCFS Regulation)

Fuel Type	Feedstock	Energy Demand (Btu/MMBtu)	CI Value (gCO_2e/MJ)
	Cellulosic (Farmed Trees by Fermentation)	2,514,116	24.4
	Cellulosic (Forest Waste)	2,163,490	22.2
	Sorghum (Dry Mill, Mid-West)	2,527,881	55.81 (85.81 – 96.24 including iLUC)
California Ultra Low Sulfur Diesel	Diesel	1,273,919	98.03
Biodiesel	Soybean	1,301,413	21.25 (83.25 including iLUC)
	Canola Oil	1,341,680	31.99 (62.99 including ILUC)
	Used Cooking Oil	1,267,006	15.84
Renewable Diesel	Tallow	1, 628,670	39.33
	Soybean	1, 272,961	20.16 (82.16 including iLUC)
Compressed Natural Gas	North American Natural Gas Fields	1,113,153	68.0
	Landfills	183,840	11.26
	Dairy Digester	197,047	13.45

Notes: [1] assumes 80 percent mid-west and 20 percent California Corn Ethanol, including 30 gCO_2/MJ for indirect land use change
Btu/MMBtu= the amount of energy necessary in British thermal units (Btus) to produce one million Btu; CARBOB= California Reformulated Gasoline Blendstocks for Oxygenate Blending; CI=carbon intensity; FAME=Fatty Acid Methyl Ester process; iLUC= indirect land use change
Source: Detailed California-Modified GREET Pathway for Transportation Fuels are available at http://www.arb.ca.gov/fuels/lcfs/workgroups/workgroups.htm#pathways

As shown above, the amount of energy used to produce different types of low-carbon fuels from various feedstocks, and the associated CI values, can vary widely. For instance, there is a lower well-to-wheel energy demand for Brazilian sugarcane ethanol compared to cellulosic ethanol from farmed trees; however, the latter has a much lower CI value.

As described in Chapter 2, Section G (Projected Compliance Response Scenario), the California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB) blending sources and ADF source types are anticipated to be altered with implementation of the proposed LCFS and ADF regulations. For example, ethanol would likely shift away from corn ethanol, and toward sugarcane, cellulosic, sorghum, and molasses ethanols. In contrast, both renewable and

nonrenewable sources of natural gas would be anticipated, with the mixture favoring the more energy-intensive (nonrenewable) supplies. Thus, the relative change in energy requirements, from the entirety of the California fuels market, is dependent on economic and market demands. Furthermore, the proposed LCFS and ADF regulations are driven by CI values and not energy intensity of a given fuel pathway. Because these regulations are designed to allow for new pathways to be developed, it would be speculative to assume a substantial increase or decrease in energy demand related to adoption of the proposed LCFS and ADF regulations.

The proposed LCFS regulation includes the option to generate LCFS credits through opting in to the LCFS program. These credits sources would reduce GHG emissions through various methods, including cogeneration systems, combined heat and power, operation of fixed guideway systems, and high-efficiency motors. These options would provide a co-benefit of reduced energy demand in order to obtain credits (e.g., public transportation reduces the demand for private vehicle use).

While implementation of the proposed LCFS and ADF regulations is likely to result in a net decrease in energy demand when considered in terms of the California fuel market, there could be site-specific increases in energy demand related to electricity and natural gas consumption in new or modified facilities. Increases in energy demand could result from operating new processing plants, during development of innovative technologies, and as shifts in the location and quantity of fuel needed for shipment of fuels (e.g., train depot or shipping ports fueling stations).

While the issue of energy demand associated with implementation of the proposed LCFS and ADF regulations is complicated, Appendix F of the CEQA Guidelines considers the wise and efficient use of energy to include:

1. Decreasing overall per capita energy consumption;
2. Decreasing reliance on fossil fuel such as coal, natural gas, and oil; and
3. Increasing reliance on renewable energy sources.

Implementation of the proposed LCFS and ADF regulations would decrease per capita energy consumption, because the overall fuel mixture would trend toward less energy-intensive sources to reduce CI

values. In addition, these regulations have the potential to reduce California's reliance on fossil fuels, and increase the amount of renewable energy supplies because lower-CI valued fuels would be incented. Thus, the anticipated reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations would reduce overall energy demand, and would be considered a **beneficial** long-term operational impact.

7. Geology and Soils

Impact 7.a: Short-Term Construction-Related and Long-Term Operational Effects on Geology and Soil Related to New Facilities

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, CI credits could be generated through development of CCS facilities and operation of expanded fixed guideway systems.

Although it is reasonably foreseeable that construction and operational activities could occur, there is uncertainty as to the exact location of any new facilities or modification of existing facilities. Construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Additional disturbance could result from the increased mineral ore extraction activities which would provide raw materials to these manufacturing facilities and energy projects. These activities would have the potential to adversely affect soil and geologic resources in construction or mineral ore extraction areas.

New facilities could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil compaction, soil erosion, and loss of topsoil during construction. The level of susceptibility varies by location. However, the specific design details, siting locations, and soil compaction and erosion hazards for particular manufacturing facilities are not known at this time and would be analyzed on a site-specific basis at the project level.

Short-term construction-related and long-term operational impacts to geology and soils associated with the proposed LCFS and ADF regulations would be potentially significant.

The impacts to soil and geologic resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, State, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 7.a

The Regulatory Setting in Attachment 12 includes applicable laws and regulations that provide protection of geology and soils. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology and soils include:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts on soil erosion and the loss of topsoil. The definition of actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare a geotechnical investigation/study, which would 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, mineral resources, and the presence of hazardous materials.

- Proponents of new or modified facilities or infrastructure would provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents would 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.

- Disturbed areas outside of the permanent construction footprint would be stabilized or restored using techniques such as soil loosening, topsoil replacement, revegetation, and surface protection (i.e., mulching).

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction and long-term operational impacts to soil and geologic associated with the LCFS and ADF would be **potentially significant and unavoidable**.

Impact 7.b: Long-Term Operational Impacts Associated with Carbon Capture and Sequestration projects

The proposed LCFS and ADF regulations could encourage the implementation of CCS projects. Geological sequestration of CO_2 is a technology that injects and stores anthropogenic carbon dioxide (CO_2) produced by various industries and electric generation facilities in porous and permeable subsurface rock units, thereby preventing the

release of the CO_2 into the atmosphere where it may contribute to global warming. Few large-scale CO_2 geologic sequestration projects exist today and more research is needed to better understand the geologic constraints on subsurface rock storage capacities, the geologic and environmental hazards, and economic feasibility of CO_2 geologic sequestration.

Most seismic events result from the natural geologic processes reshaping the earth. However, human activities, such as primary or secondary oil recovery, solution mining, explosions, large impoundments of water, geothermal stimulation, or other fluid injection have also been demonstrated to increase the risk of seismic events by increasing subsurface pressure. When this happens, portions of the subsurface can be induced to move, potentially generating seismic events. While the specific long-term effects of potential CCS projects that are largely unknown, due to the uncertainty of locations or geologic settings, the increased risk of seismic events could still occur.

Therefore, long-term impacts to soil and geologic resources associated with the proposed LCFS and ADF regulations would be potentially significant.

The impacts to soil and geologic resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, State, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 7.b

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant geology and soils impacts.

Permits and/or agreements to reduce potential geology and soils impacts could include, but are not limited to, several classes of Underground Injection Control (UIC) permits administered pursuant to the Safe Drinking Water Act (SDWA) at the federal and State and levels. The U.S. Environmental Protection Agency (EPA) issues Class VI permits under these regulations, which apply to injections wells that are drilled for the sole purpose of CO_2 injection in an underground formation as part of a CCS project, without any other intended

purpose. The California Division of Oil, Gas and Geothermal Resources (DOGGR) issues Class II permits under regulatory authority granted by EPA pursuant to UIC regulations. Class II permits apply to injection wells created for the purpose of extracting oil and gas, including injection wells used for enhanced oil recovery (EOR) methods that could also be used for the purpose of CO_2 sequestration as part of a CCS project.

To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering studies, geologic study, and injection plans. Requirements for these permits are likely to include: isopach maps, cross sections, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. Because these permits would address inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach, this impact could be reduced.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction and long-term operational impacts to soil and geologic associated with CCS projects that could be incented under the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

Impact 7.c: Long-Term Operational Impacts to Geology and Soil Associated with Land Use Changes

The detrimental effects of agricultural practices on soil quality include erosion, desertification, salinization, compaction, and pollution. Loss of topsoil can increase erosion rates and affect water quality, which may be exacerbated through increased use of nutrients and pesticides.

Soil erosion from farming threatens the productivity of agricultural land and causes a number of problems elsewhere in the environment. An average of 10 times as much soil erodes from American agricultural fields as is replaced by natural soil formation processes. Because it takes up to 300 years for 1 inch of agricultural topsoil to form, soil that is lost is essentially irreplaceable (Trautmann and Porter, 2012). The amount of erosion varies considerably from one field to another, depending on soil type, slope of the field, drainage patterns, and crop management practices; and the effects of the erosion vary also. Areas

with deep organic loams are better able to sustain erosion without loss of productivity than are areas where topsoils are shallower.

Even when soil erosion is not excessive, intensive agriculture can impair soil quality by depleting the natural supplies of trace elements and organic matter. In natural ecosystems, soil fertility is maintained by the diverse contributions and recycling of nutrients by a wide range of plant and animal species. When this diversity is replaced by a single species grown year after year, some trace elements are depleted if not replaced by fertilization. The organic content of the soil also diminishes unless crop residues or other organic materials are supplied in sufficient quantities to replace that consumed over time.

Long-term operational impacts to geology and soil associated with the proposed LCFS and ADF regulations associated with changes in land use could change soil properties such as erosion potential, quality, and drainage capability. Because the location of future lands used to produce biofuels, and the extent to which these impacts would result, is unknown, this impact would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 7.c

The Regulatory Setting in Attachment 12 includes applicable laws and regulations that provide protection of geology and soils. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology and soils include:

- Use no-till agriculture to reduce soil erosion.
- Avoid harvesting in areas with steep slopes.

- Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure).
- Identify soil properties, engineering constraints, and facility design criteria.
- Develop a site grading and management plan to identify areas of disturbance, areas of cut and fill, slope during and after grading, existing vegetation, and measures to protect slope, drainages, and existing vegetation in the project area.
- Develop an erosion control plan to delineate measures to minimize soil loss and reduce sedimentation to protect water quality.
- Design runoff control features to minimize soil erosion.
- Construct drainage ditches only where necessary.
- Use appropriate structures at culvert outlets to prevent erosion.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts to soil and geologic associated with land use changes under the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

8. Greenhouse Gases

Impact 8.a: Short-Term Construction- and Long-term Operational Related Greenhouse Gas Impacts

Implementation of the proposed LCFS and ADF regulations is anticipated to incent various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. There is potential that innovative technology facilities, such as for drop-in renewable biofuels, and Fischer-Tropsch diesel could also be developed.

Although it is reasonably foreseeable that construction activities associated with new or modified facilities could occur, there is

uncertainty as to the exact location of any new facilities or the reconstruction or modification of existing facilities. Typical earth-moving equipment that may be necessary for this type of construction activities includes: graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. Specific, project-related construction activities would result in increased generation of GHG emissions associated with the use of heavy-duty off-road equipment, materials transport, and worker commutes for the duration of the construction phase. Therefore, construction-related GHG emissions are expected to be short-term and limited in amount.

Local agencies, such as air pollution control districts, are generally charged with determining acceptable thresholds of GHG emissions, measured in metric tons of carbon dioxide equivalent per year (MT CO_2e/year). Quantification of short-term construction-related GHG emissions is generally based on a combination of methods, including the use of exhaust emission rates from emissions models, such as OFFROAD 2007 and EMFAC 2011. These models require consideration of assumptions, including construction timelines and energy demands (e.g., fuel and electricity). However, a majority of local agencies (e.g., air pollution control districts) do not recommend or require the quantification of short-term construction-generated GHGs for typical construction projects because these only occur for a finite period of time (e.g., during periods of construction) that is typically much shorter than the operational phase. Thus, local agencies generally recommended that GHG analyses focus on operational phase emissions, as discussed below, unless the project is of a unique nature requiring atypical (e.g., large scale, long-term) activity levels (e.g., construction of a new dam or levee) for which quantification and consideration (e.g., amortization of construction emissions over the lifetime of the project) may be recommended.

When these short-term construction-related GHG emissions associated with construction activities undertaken in response to the proposed LCFS and ADF regulations are considered in relation to the overall long-term operational GHG benefits discussed below, they are not considered substantial.

Implementation of the proposed LCFS and ADF regulations is anticipated to result in environmental benefits that include an estimated reduction in GHG emissions of more than ~~60~~ 35 million metric tons of carbon dioxide equivalent (MMTCO_2e) from transportation fuels used in California from 2016 through 2020.

The proposed LCFS regulation includes annual CI compliance requirements that have been revised from the existing regulation. The required reduction in the CI of the transportation fuel pool would be expected to result in annual GHG emissions reductions as shown in Table 4-3. These estimates do not include a reduction to eliminate the double counting of the Zero Emission Vehicle mandate and the federal RFS program. As a result, implementation of the proposed regulations would result in a **beneficial** impact to GHG emissions.

Table 4-3: Projected LCFS GHG Emissions Reductions

	2016	2017	2018	2019	2020
$MMTCO_2e$	~~6.0~~6.8	~~8.8~~8.7	~~11.6~~11.4	~~16.2~~16.0	~~20.7~~20.4

9. Hazards and Hazardous Materials

Impact 9.a: Short-Term Construction-Related Hazard Impacts

Implementation of the proposed LCFS and ADF regulations is anticipated to incent various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. There is potential that innovative technology facilities, such as for drop-in renewable biofuels, and Fischer-Tropsch diesel could also be developed. Although it is reasonably foreseeable that activities associated with new or modified facilities could occur, there is uncertainty as to the exact location or character of any new facilities or modification of existing facilities.

These construction activities may require the transport, use, and disposal of hazardous materials. Construction activities generally use heavy-duty equipment requiring periodic refueling and lubricating fluids. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site as they are not designed for use on public roadways. Thus, such maintenance uses a service vehicle that mobilizes to the location of the construction equipment. It is during the transfer of fuel that the potential for an accidental release is most likely. Although precautions would 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 construction activities 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.

The short-term construction-related impact associated with the proposed LCFS and ADF regulations on hazards and hazardous materials would be potentially significant.

The impacts could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, State, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 9.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that apply to accident-related hazards and risk of upset. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid upset and accident-related impacts include:

- Proponents of new or modified facilities constructed as a compliance response would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant upset and accident-related hazard impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- 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 would 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.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction impacts regarding upset and accident-related hazards associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

Impact 9.b: Long-Term Increased Transport, Use, and Disposal of Hazardous Materials

Harmful substances can enter the environment in a number of ways throughout the entire cycle of fuel production, manufacturing, transportation, storage, distribution, and usage. Most commonly, they come out the tailpipes of vehicles as exhaust or unburned fuel. Fuel

vapors escape directly from automobile engines and gas tanks. They can also escape into the air during refueling, or when liquid fuel evaporates from a spill. Fuels can enter lakes and reservoirs through accidental spills or from motorized boats and personal watercraft. Fuels spilled on the ground or leaking from fuel storage tanks can contaminate groundwater. Substances in airborne engine exhaust settle directly onto water, soil and vegetation, or they can be washed down onto these surfaces when it rains. Also, fuel components are released into the environment during oil drilling, refining and transportation.

Gasoline and diesel fuels blends contain toxic substances that can enter the environment and cause adverse health effects in people. Some of these substances, such as benzene, toluene, and xylenes, are found in crude oil and occur naturally in fuels and their vapors. Other substances, such as 1,3-butadiene and formaldehyde, are formed in engines during combustion and are only present in exhaust. Other harmful pollutants found in engine exhaust include particulate matter (known more commonly as soot), NO_X, carbon monoxide, sulfur dioxide, and various hydrocarbons. Ozone, the major component of urban smog, is formed when nitrogen oxides react in sunlight with hydrocarbons.

People are exposed to gasoline and diesel exhaust when they drive or ride in a vehicle, jog or bike along roads, or park in a public garage. Motorists are further exposed to gasoline vapors when they fill up their vehicle's fuel tank. People who work in or live near freeways, refineries, chemical plants, loading and storage facilities or other places that handle crude oil and petroleum products may be exposed to higher levels of fuel components than the general public and face higher health risks.

Both liquid gasoline and motor vehicle exhaust contain chemicals that can cause cancer. Benzene, a fundamental component of gasoline and diesel fuel as well as vehicle exhaust, causes cancer in humans. Gasoline exhaust also contains cancer-causing 1,3-butadiene, formaldehyde, and acetaldehyde. Diesel exhaust contains several dozen toxic substances and scientific studies have shown that workers exposed to diesel exhaust are more likely to develop lung cancer. Long-term exposure to particles in diesel exhaust poses the highest cancer risk of any TAC (OEHHA 2007).

All internal combustion engine vehicles have the potential to release chemicals into the environment. These releases may occur as emissions to the air during fuel combustion, as well as through spills

and leaks during fueling and vehicle use. Low-carbon fuels and alternative diesels that would be imported into California would require storage. Underground storage tanks (USTs) can degrade over time, and could result in accidental release into the environment.

However, regulations limit the amount of fuel-related chemicals that may be released in the environment. EPA regulates diesel fuel under two programs: one under the Office of Pollution Prevention and Toxic Substances, which requires that all chemicals produced in the U.S. be registered under the Toxic Substances Control Act; the other is administered under the Transportation and Air Quality group as the Fuels and Fuel Additive program, which requires that all fuels sold for ground transportation purposes in the U.S. must be registered with the EPA and the volume produced reported on a quarterly basis. The California State Water Resources Control Board (SWRCB) regulates the storage of fuels in UST. The Office of the State Fire Marshal regulates diesel and biodiesel storage, dispensing, and vapor recovery. All diesel and biodiesel facilities must follow California building and fire code and adhere to the specific provisions regarding diesel and biodiesel.

Biofuel processing plants use various hazardous materials to create finished products. Each plant is responsible for determining if each waste stream is hazardous and managing it appropriately. Hazardous materials typically used at biofuel processing plants include the following.

a) Spent Filter Media

Spent filter media such as diatomaceous earth, filter aid, and socks can be ignitable. Spent filter media with high moisture content (from oil or biodiesel) can spontaneously combust. It is the responsibility of the facility to operate its plant in a manner that would not generate ignitable waste filter media. If the material is hazardous, the facility may manage the ignitable waste as a useful product and avoid Resource Conservation and Recovery Act (RCRA) regulation. Using the waste as a fuel is not a legitimate use under the regulations, unless the fuel is an actual product that results from the process. The facility may also dispose of the ignitable filter media as a hazardous waste at a permitted treatment, storage, or disposal facility. If the waste filter media is not hazardous, the facility may manage it as a solid waste.

b) Waste Glycerin

Waste glycerin can be ignitable or corrosive, or both. In addition, glycerin has a very high biochemical oxygen demand. While this does not make it a hazardous waste, it does present a threat to streams and lakes if disposed upon the land. This could also disrupt the wastewater treatment system's biological process into which the waste glycerin is disposed.

c) Spent or Unused Catalyst

Catalysts (and catalyst neutralizers) used in biodiesel production are acidic or caustic, thus the waste is potentially corrosive. Any spent catalyst (or other waste material) with a pH greater than or equal to 12.5, or less than or equal to 2, is a hazardous waste. Like waste methanol, waste catalyst is not subject to RCRA if it is returned to the process in a closed-loop system, but it would be a hazardous waste outside a closed-loop system until it was returned to the process.

d) Wastewater

Wastewater disposed under the authority of a valid Clean Water Act (CWA) permit is not regulated under RCRA. However, if wastewater contains a listed hazardous waste or exhibits a hazardous characteristic, it must be managed as a hazardous waste until treated or disposed in the CWA-permitted process. Biodiesel wastewater could be hazardous if it has high or low pH from catalyst disposed in the wastewater, contains high concentrations of methanol that would make it ignitable, or contains other listed or characteristic wastes.

e) Spent or Unwanted Laboratory Chemicals

A variety of chemicals are used in laboratories. If these chemicals are listed as a hazardous waste or fail the Toxicity Characteristic Leaching Procedure (TCLP) toxicity levels at 40 CFR Section 261.24, they are a hazardous waste when disposed. Some unused chemicals destined for disposal may be listed under 40 CFR Section 261.33 and thus "acute hazardous wastes." When calculating monthly waste generation rates, one kilogram of P-listed wastes generated during a month would make the facility a large quantity generator, and subject to permitting as discussed in Attachment 1.

Additive chemicals would need to be introduced into biodiesel blends to control oxidation, corrosion, foaming, cold temperature flow properties, biodegradation, water separation, and NO_X formation. There are several classes of additives, and some perform multiple functions when blended in fuel. The broad classes of additives include:

- Foam inhibitor - Generally a silicone-based compound that is essentially insoluble in fuel and affects bubble rupture (foam bubble destruction) in the fuel.
- Antioxidant - Chemical compounds that are either phenolic or aminic based that prevent peroxide formation in fuel during long term or high temperature storage.
- Lubricity Improver - A polar compound generally derived from fatty acids that provide protection against metal to metal wear within a fuel system. These can be esters, fatty acids, or amines for the most part.
- Corrosion Inhibitor - This additive prevents corrosion of fuel system components, mainly exposed reactive metal surfaces such as non-coated steel.
- Deposit Control Additive - This additive is either a detergent or dispersant additive that helps remove deposits that may form during high temperature exposure of fuel to the fuel system. These deposits generally form on or near the injector tip or spray holes.
- Conductivity Improver - Fuels that are hydroprocessed generally do not contain components that conduct static charge from the bulk fuel to the walls of storage tanks. Accumulated charge can cause static discharge and either damage equipment or cause fires.
- Water Separation Additive - Promotes separation of water from fuel. Low Temperature Flow Improver - Improved low temperature performance of fuel by modifying wax crystal structure of waxy components of fuel.
- Cetane improver (i.e., di-tert butyl peroxide) - Additive that raises cetane of fuel by modifying ignition properties of fuel.

- Biocide - Inhibits biological growth in fuel that is exposed to water.
- Additives would be needed for formulating diesel fuels to meet fit-for-purpose requirements. In addition to the provisions of providing energy for operating an engine, a fuel must also:
- Not foam when fueling;
- Not spark and/or cause fires or explosions when fueling;
- Be stable to long term storage;
- Not form deposits in the fuel injection system;
- Provide lubricity to moving parts within the fuel system; and
- Not form deposits in the injection components including the inside and outside of the fuel injector.

The proposed ADF regulation is being developed with consideration of recommendations provided in the Biodiesel Multimedia Evaluation report. This report has concluded that, in general, life cycle pollutant emissions from pure biodiesel are considerably lower than life cycle pollutant emissions from petroleum-derived fuels. In addition, additives that could be used in low-carbon fuels are likely to be similar to those used in existing fuels (i.e., ultra-low-sulfur diesel), and are, therefore, not anticipated to pose a substantially increased risk to the environment. Furthermore, as the biodiesel industry and market become more developed, additional evaluations will be prepared to address issues including:

- Investments to improve the knowledge base;
- Formulation of processes used to collect and manage new information;
- Formulation of processes to evaluate and communicate uncertainty; and
- Adjustment of the risk assessment process to mitigate the practical impacts of uncertainty on decision-making.

Ethanol is a volatile, flammable, colorless liquid and has a strong characteristic odor. It is easily ignited by heat, sparks, or flames.

Thus, if an accident were to occur during transport, hazardous consequences could result. While ethanol is currently transported for use in fuels, implementation of the proposed LCFS could alter the transportation patterns, reflecting different quantities or locations of sources.

Transport of hazardous materials, including gasoline, diesel, and biofuels are regulated under the Federal Department of Transportation (DOT), which requires the safe and reliable transportation of hazardous materials by all modes. DOT's Hazardous Materials Regulations govern the transportation of ethanol and other biofuels and blends by rail, air, motor carrier, and barge. In addition, 49 CFR part 172 lists and classifies those materials which the Department has designated as hazardous materials for purposes of transportation and prescribes the requirements for shipping papers, package marking, labeling, placarding, emergency response, training, and safety and applicable to the shipment and transportation of those hazardous materials. Requirements for carriage by rail, including operating, loading, and unloading requirements, along with detailed requirements for Class 3 (flammable liquid) materials are provided in 49 CFR Part 174.

Thus, regardless of the location of origin, transportation route, or end use, hazardous materials related to the proposed LCFS and ADF regulations are regulated through various programs, as described above. Thus, implementation of the proposed LCFS and ADF regulations are not anticipated to increase potential hazards and hazardous materials impacts associated with the transportation, use, and disposal of fuels. This impact would be **less than significant.**

Impact 9.c: Long-Term Operational Hazards Related to Carbon Capture and Sequestration

Geologic sequestration involves the injection of CO_2 thousands of feet underground where it is trapped within the pore spaces of solid rock. EPA requires that sequestration sites have confining subsurface zones, or layers of impermeable rock, to keep CO_2 from escaping into overlying geologic layers, ground water, or the surface (40 CFR 146.83(a)(2)). Under the geologic sequestration rule, EPA requires that potential geologic sequestration sites be thoroughly studied to protect the safety and security of the project. Geologic sequestration is not allowed where unsuitable subsurface conditions exist, and all underground injection projects must obtain permits to ensure the protection of underground drinking water sources or the surface. (40 CFR 146.82(a)(3)) (EPA 2010).

In some cases, enhanced oil recovery (EOR) has been proposed in conjunction with CCS projects in existing oil fields. Technologies to implement CCS/EOR projects are evolving. For instance, projects are currently underway to consider mobility control of the injected CO_2 using novel foams and gels (DOE 2014). In addition, use of industrial sources of CO_2, such as coal-based energy producers and fertilizer manufacturing plants, could contain impurities (i.e., injected agents may include other constituents, rather than only pure CO_2, that could become contaminants). Although operators would take steps to ensure the CO_2 and other pollutants remained sequestered, the risk would remain that some emissions could be released into the air, soil, aquifers, or surface waterways as a result of unidentified and/or poorly abandoned wells or other pathways (e.g., natural fractures).

Upon extraction of oil, there is a potential for accidental release during the transport of fuel. Although precautions would 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 (resulting in either a hazard event or contamination of soil, water, and/or air). Consequently, long-term operations 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.

The long-term operational impact associated with the proposed LCFS and ADF regulations on hazards and hazardous materials would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

Mitigation Measure 9.c

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regards to hazards and hazardous materials. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority

over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes.

Permits and/or agreements to reduce potential hazards and hazardous materials impacts could include, but are not limited to, Underground Injection Control (UIC) permits administered pursuant to the SDWA at the federal and State and levels. EPA issues Class VI permits under these regulations, which apply to injections wells that are drilled for the sole purpose of CO_2 injection in an underground formation as part of a CCS project, without any other intended purpose. DOGGR issues Class II permits under regulatory authority granted by EPA pursuant to UIC regulations. Class II permits apply to injection wells created for the purpose of extracting oil and gas, including injection wells used for EOR methods that could also be used for the purpose of CO_2 sequestration as part of a CCS project.

To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering studies, geologic study, and injection plans. Requirements for these permits are likely to include: isopach maps, cross sections, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. In addition, CEQA and/or other necessary regulatory processes would be completed to address and mitigate potential environmental effects. Because these actions would address inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, public outreach, and potential environment effects, this impact could be reduced.

Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant long-term operational impact regarding upset and accident-related hazards could be **potentially significant and unavoidable**.

10. Hydrology and Water Quality

Impact 10.a: Short-Term Construction-Related and Long-Term Operational Hydrologic Resource Impacts

The reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could result in the construction of various new facilities, such as new and/or modified facilities, to meet the demand of new fuel types. Although it is reasonably foreseeable that construction activities could occur, the location and extent of

construction activities related to new or modified facilities cannot be determined at this time.

Construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Specific construction projects would be required to comply with applicable erosion, water quality standards, and waste discharge requirements (e.g., NPDES, SWPPP). With respect to depleting groundwater supplies, impairing quality, and runoff issues, construction new facilities would not be anticipated to result in substantial demands due to the nature of associated activities.

Short-term construction-related and long-term operational impacts to hydrologic resources associated with the LCFS and ADF would be potentially significant.

Impacts to hydrologic resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, State, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 10.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regards to hydrology and water quality. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or mitigate hydrology and water quality-related impacts include the following:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements

(e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the potentially significant impacts associated with altering drainage patters, flooding, and inundation by seiche, tsunami, or mudflow. The definition of actions required to mitigate potentially significant hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.
  - Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project would prepare a stormwater drainage and flood control analysis and management plan. The plans would be prepared by a qualified professional and would summarize existing conditions and the effects of project improvements, and would include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and offsite improvements, features to protection downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features would be designed to protect existing downstream flow conditions that would result in new or increased severity of offsite flooding.
  - Establish drainage performance criteria for offsite 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 would design and construct new facilities to provide appropriate flood protection such that operations are not adversely affected by flooding and

inundation. These designs would be approved by the local or State land use agency. The project proponent would 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.

- As part of subsequent project-level planning and environmental review, the project proponent shall coordinate with the local groundwater management authority and prepare a detailed hydrogeological 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.

Mineral extraction and mining activities within the U.S. would be required to comply with the provisions of the Clean Water Act and the natural resource protection and land reclamation requirements of the appropriate State and federal land managers. The strongest protections for hydrologic resources are found in the Bureau of Land Management (BLM) and U.S. Forest Service mining permit conditions. All projects on federal lands would be required to provide disclose potential impacts as required by the National Environmental Policy Act. On BLM lands, all mining operations are subject to monitoring by the BLM to protect against unnecessary or undue degradation, and that all operators are responsible for fully reclaiming the area of their claim. Reclamation requires restoration of disturbed areas to stable, self-sustaining, and productive conditions which comply with the land-use plan for the area (EPA 1994). The U.S. Forest Service enforces similar mining reclamation standards for the land it manages. Reclamation requirements for mining operations on private lands vary from state to state. In some developing countries which supply mineral resources to the United States, environmental oversight and requirements for reclamation are effectively nonexistent (Vidal *et al.* 2013).

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to hydrology and water quality associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

Impact 10.b: Long-Term Effects on Hydrology and Water Quality Related to Changes in Land Use

As discussed in Chapter 2, Project Description, the proposed LCFS and ADF regulations and anticipated to alter the location and extent of fuel-based agricultural production. Ethanol supplies could shift somewhat from corn-based ethanol to cane, sorghum, cellulosic and molasses. The potential shift could affect agriculture-based ethanol pathways, resulting in a potential decrease in shipments of corn ethanol from within California and elsewhere in the United States and an increase in shipments of sugarcane and molasses ethanol from Brazil and Central America. Increased cultivation of fuel-based agriculture could displace land currently used for row crops, orchards, and grazing.

The U.S. has more than 330 million acres of agricultural land that produce an abundant supply of food and other products. American agriculture is noted worldwide for its high productivity, quality, and efficiency in delivering goods to the consumer. However, if improperly managed, activities from working farms and ranches can affect water quality. Agricultural nonpoint source (NPS) pollution affects water quality of rivers and lakes, wetlands, and contributes to contamination of estuaries and ground water. Agricultural activities that cause NPS pollution include poorly located or managed animal feeding operations; overgrazing; plowing too often or at the wrong time; and improper, excessive, or poorly timed application of pesticides, irrigation water, and fertilizer.

Pollutants that result from farming and ranching include sediment, nutrients, pathogens, pesticides, metals, and salts. Impacts from

agricultural activities on surface water and ground water can be minimized by using management practices that are adapted to local conditions. In addition, as described above under Impact 4.b Effects on Biological Resources Associated with Land Use Changes, GTAP analysis includes indirect effects of increased pesticide and nutrient use. Because the increased use of pesticides results in increased CI values, the proposed LCFS and ADF regulations could discourage increased chemical use for cultivation of agriculture-based fuels.

In general, farmers may employ best management practices (BMPs) to reduce runoff associated with agricultural practices. BMPs vary from state to state and among countries because “best” can be a highly subjective and site-specific label. For example, a practice may be considered best in one area (e.g., coastal plain) but inappropriate in another area (e.g., mountains). Criteria for determining what is best may include extent of pollution prevention or pollutant removal, ease of implementation, ease of maintenance and operation, durability, attractiveness to landowner (e.g., how willing would farmers be to implement the practice in a voluntary program?), cost, and cost-effectiveness. Regardless, implementation of the proposed LCFS and ADF regulations could result in adverse effects on water quality. Thus, this impact would be **potentially significant**.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 10.b: Implement Mitigation Measure 7.c

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of hydrology and water quality. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to hydrology and water quality:

- Use no-till agriculture to reduce soil erosion.

- Avoid harvesting in areas with steep slopes.
- Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure).
- Identify soil properties, engineering constraints, and facility design criteria.
- Develop a site grading and management plan to identify areas of disturbance, areas of cut and fill, slope during and after grading, existing vegetation, and measures to protect slope, drainages, and existing vegetation in the project area.
- Develop an erosion control plan to delineate measures to minimize soil loss and reduce sedimentation to protect water quality.
- Design runoff control features to minimize soil erosion.
- Construct drainage ditches only where necessary.
- Use appropriate structures at culvert outlets to prevent erosion.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction and long-term operational impacts to soil and geologic associated with land use changes under the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

Impact 10.c: Long-Term Impacts on Hydrology and Water Quality Related to Carbon Capture and Sequestration Projects.

Reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could result in implementation of CCS/EOR projects. Technologies to implement CCS/EOR projects are evolving. For instance, projects are currently underway to consider mobility control of the injected CO_2 using novel foams and gels (DOE 2014). In addition, use of industrial sources of CO_2, such as coal-based energy producers and fertilizer manufacturing plants, could contain impurities (i.e., injected agents may include other constituents,

rather than only pure CO_2, that could become contaminants). Although operators would take steps to ensure that pressure is maintained to trap sequestered CO_2 and other potential constituents, the risk would remain that some emissions could be released into the air, soil, aquifers, or surface waterways as a result of unidentified and/or poorly abandoned wells or other pathways (e.g., natural fractures).

The regulatory framework for CCS/EOR is also evolving. While the development of an environmentally protective, regulatory framework to address CCS/EOR project implementation in California is ongoing, specific requirements and limitations have not yet been fully established, so potential risks of contamination cannot be entirely dismissed.

Long-term operational impacts to hydrologic resources associated with CCS projects that could be incented under the proposed LCFS and ADF regulations would be potentially significant.

Operational impacts to hydrologic resources could be reduced to a less-than-significant level by mitigation that can and should be implemented by federal, State, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 10.c(1): Implement Mitigation Measure 10.a

Mitigation Measure 10.c(2)

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regards to hydrology and water quality. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes.

Permits and/or agreements to reduce potential hydrology and water quality impacts could include, but are not limited to, Underground Injection Control (UIC) permits administered pursuant to the SDWA at the federal and State and levels. EPA issues Class VI permits under these regulations, which apply to injections wells that are drilled for the sole purpose of CO_2 injection in an underground formation as part of a CCS project, without any other intended purpose. DOGGR issues

Class II permits under regulatory authority granted by EPA pursuant to UIC regulations. Class II permits apply to injection wells created for the purpose of extracting oil and gas, including injection wells used for EOR methods that could also be used for the purpose of CO_2 sequestration as part of a CCS project.

To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering studies, geologic study, and injection plans. Requirements for these permits are likely to include: isopach maps, cross sections, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. In addition, CEQA and/or other necessary regulatory processes would be completed to address and mitigate potential environmental effects. Because these actions would address inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, public outreach, and potential environment effects, this impact could be reduced to a less than significant level.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts to hydrologic resources associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

11. Land Use and Planning

Impact 11.a: Short-Term Construction-Related Impacts Related to New or Modified Facilities

Implementation of the proposed LCFS and ADF regulations could result in compliance responses requiring the short-term construction or modification of feedstock or fuel production, processing, or distribution facilities. Although it is reasonably foreseeable that these activities could occur, there is uncertainty as to the exact locations of these facilities. Within California, new facility construction or modification of

existing facilities would likely occur within the footprints of existing fuel production facilities or in areas with zoning that would permit the development of industrial or agricultural land uses. Whether or not these facilities would require temporary changes in land use that could divide established communities or conflict with applicable land use plans would be under the purview of local planning agencies. The development of facilities for fuel and feedstock processing could also occur outside California in areas with wide variation in policy approaches to land use planning.

In addition, short term agricultural land use changes could result in removal of existing vegetation, immediate loss of natural habitat and subsequent reduction in biodiversity (Bertzky et al. 2011), displacement of agricultural land used for food production, and immediate change to the physiological and hydrological configuration of the existing land due to grading.

Short-term construction-related impacts on land use and planning associated with implementation of the proposed LCFS and ADF regulations may not be consistent with existing and planned land uses. The environmental consequences of land use changes are considered in their respective sections of the EA.

Potential environmental impacts associated with land use change on agriculture and forestry, biology, geology and soils, and hydrology and their related mitigation measures are discussed in further detail under Impacts 2.a, 2.b, 4.a, 4.b, 8.b, and 10.a.

Impact 11.b: Long-Term Operational Impacts on Land Use Related to Feedstock Production

Implementation of the proposed LCFS and ADF regulations could result in compliance responses requiring the long-term operation of feedstock or fuel production, processing or distribution facilities, extended cultivation of biofuel crops, changes in agricultural land uses from one crop to another crop, and expansion of agricultural land onto neighboring undeveloped lands such as natural grasslands or forests.

Studies have shown that demands for biofuel crops can incur both direct and indirect land use changes at both the national and international level resulting in the displacement of existing agriculture or natural habitats (Searchinger et al. 2008, Edwards et al. 2010, Lapola et al. 2010). Direct and indirect land use change associated with the proposed LCFS and ADF regulations would depend on the types of feedstocks used, as determined, in large part, by market

forces along with total biofuel feedstock demand. Certain biofuel crops could require a combination of additional land, fertilizer, water, and agricultural management practices to produce the same volume of biofuel than other biofuel crops. For example, while sources vary, Brazilian sugarcane feedstocks have been shown to produce from 11 percent to 40 percent or more ethanol than U.S. based corn per unit of land (Tyner et al. 2011, Crago et al. 2010). According to research prepared for ARB, U.S. corn ethanol, U.S. soybean biodiesel, and Brazilian sugarcane ethanol require between 0.16 and 0.18 hectares (0.40 to 0.44 acres) of cropland to produce 1,000 gallons of their respective biofuels (Tyner et al. 2011). The same research also estimated that future global demands on these three major biofuels feedstocks would result in the conversion of approximately 2.13, 0.14, and 0.47 million hectares, respectively, into new cropland from forest and pasture land. Although reflecting the impact of global demand, Table 4-4 demonstrates the relative magnitude of land use change on cropland, forestland, and pasture land between marginal increases in production of selected biofuels.

Table 4-4: Land Cover Changes due to Expansion of U.S. Corn Ethanol, U.S. Soybean Biodiesel, and Sugarcane Ethanol in Brazil in One Year

		U.S. Corn Ethanol	U.S. Soybean Biodiesel	Brazilian Sugarcane Ethanol	Net change in land for the three Biofuel Feedstocks
Response to Global Demand	Cropland (ha)	2,126,261	143,189	471,693	2,741,143
	Forest land (ha)	-290,637	2,179	-96,897	-385,355
	Pasture land (ha)	-1,835,267	-145,369	-374,589	-2,355,225
	Assumed annual Increase in Production (billion gallons)	11.59	0.812	3	-
Marginal Effects	New Cropland per 1000 gallons (ha/1000 gallons)	0.18	0.18	0.16	-
	Change in Forest land per 1000 gallons (ha/1000 gallons)	0.025	n.s.c	0.03	-
	Change in Pasture land per 1000 gallons (ha/1000 gallons)	0.158	0.18	0.13	-

Notes: n.s.c. – no significant change, "-" not applicable or no information. ha = hectares
Source: Tyner et al. 2011

While the above-estimated annual land uses changes by feedstock are based on responses to global demands, the marginal land use change by feedstock are important considerations in terms of the contribution of potential feedstock demands from the California market only. The proposed LCFS regulation is designed to incent fuel pathways with lower CI values, which already account for land use change related GHG emissions. However, non-GHG impacts such as decreased biodiversity and impacts on water resources are not accounted for in the CI value of fuels, even as the metric incorporates carbon losses from deforested and other converted lands. Carbon storage of existing land uses does not sufficiently measure an area's level of biodiversity or sensitivity to land disturbance. Removal of natural undeveloped lands could lead to irreversible non-GHG impacts, such as loss of species populations, or impacts with a payback ("grow back") period of up to a few hundred years (Lapola et al. 2010). Due to the market-driven nature of the future biofuel mix, an increased demand for low-CI fuels could possibly incur higher non-GHG land use change impacts than a higher-CI fuel, especially if the low CI fuel feedstocks are sourced from an area with a sensitive ecosystem or geology. However, compliance responses, such as increased use of cellulosic ethanol, would generally use materials from fuel reduction practices, thus not requiring a substantial change in land use associated with feedstock production. Impacts associated with long-term land use and planning are wide-reaching, affecting nearly all resource impact areas, especially when considering indirect land use changes.

With respect to effects related to only land use and planning, the long-term conversion of lands required to meet the upstream demands for fuels to meet the proposed LCFS and ADF regulations could also conflict with local conservation plans or zoning policies. The increased demand could result in continued occurrences of direct land use change due to the expansion of agricultural lands and continued occurrences of indirect expansion of displaced agricultural lands. This could then result in an intensification of adverse effects associated with the conversion or modification of natural land or existing agriculture such as impacts on sensitive species populations; soil carbon content; annual carbon sequestration losses, depending on the land use; long-term erosion effects; adverse effects on local or regional water resources; and long-term water quality deterioration associated with intensified fertilizer use, pesticide or herbicide run-off. The environmental consequences of land use changes are considered in their respective sections of the EA.

Long-term environmental impacts associated with land use change and related mitigation measures are discussed in further detail under Impacts 2.a, 2.b, 4.a, 4.b, 7.c, 8.b, 8.b, and 10.a.

12. Mineral Resources

Impact 12.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Mineral Resources

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, biomass, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, CI credits could be generated through development of CCS facilities and fixed-guideway systems.

Although it is reasonably foreseeable that construction activities could occur, the location and extent construction activities related to new or modified manufacturing facilities cannot be determined at this time. However, new facilities would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered these issues. As a result, construction and operation of new facilities for low-carbon fuel projects would not affect the availability of a known mineral resource or recovery site.

Thus, short-term construction-related and operational mineral resources impacts associated with the LCFS and ADF would **be less than significant.**

13. Noise

Impact 13.a: Short-Term Construction-Related Noise Impacts

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, biomass, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition,

CI credits could be generated through development of CCS facilities and fixed-guideway systems.

Construction noise levels that could result from reasonably foreseeable compliance responses would fluctuate depending on the particular type, number, size, 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 onsite 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). Construction 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 this project type it is expected that the primary sources of noise would include backhoes, bulldozers, and excavators. Noise emission levels from typical types of construction equipment can range from approximately 74 to 94 A-weighted decibels (dBA) at 50 feet.

Based on this information and accounting for typical usage factors of individual pieces of equipment and activity types, onsite 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, if deemed necessary. 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 ground-borne noise and vibration, depending on the specific construction equipment used and activities involved. Ground-borne noise and vibration levels caused by various types of construction equipment and activities (e.g., bulldozers, blasting) range from 58 – 109 vibration decibels (VdB) and from 0.003 – 0.089 in/sec peak particle velocity (PPV) at 25 feet. Similar to the above discussion, although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of ground borne vibration and noise would include bulldozers and trucks. According to the Federal Transit Administration (FTA), levels associated with the use of a large bulldozer and trucks are 0.089 and 0.076 in/sec PPV (87 and 86 VdB) at 25 feet, respectively. With respect to the prevention of structural damage, construction-related activities would not exceed recommended levels (e.g., 0.2 in/sec PPV). However, based on FTA's recommended procedure for applying a propagation adjustment to these reference levels, bulldozing and truck activities could exceed recommended levels with respect to the prevention of human disturbance (e.g., 80 VdB) within 275 feet.

Thus, implementation of reasonably foreseeable compliance responses could result in the generation of short-term construction noise in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels.

Short-term construction-related impacts on noise associated with the proposed LCFS and ADF regulations would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 13.a

The Regulatory Setting in Attachment 12 includes, but is not limited to, applicable laws and regulations that pertain to noise. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that could be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize noise include:

- Proponents of new or modified facilities constructed under the reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant noise impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Ensure noise-generating 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, 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 would 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 or shielded.
- Properly maintain mufflers, brakes and all loose items on construction- and operation-related-related vehicles to minimize noise and address operational safety issues. 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.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant short-term construction-related impact regarding noise resulting from the construction of new facilities or reconstruction of existing facilities associated with the proposed LCFS and ADF regulations could be **potentially significant and unavoidable**.

Impact 13.b: Long-Term Operational Noise Impacts

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, biomass, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, CI credits could be generated through development of CCS facilities and fixed-guideway systems.

Implementation of the proposed LCFS and ADF regulations could result in changes to land use to collect or cultivate biofuel feedstock, as described above in Section 4.B.11. In general, these activities exist under current conditions. For example, any new farmland used for feedstock cultivation is likely to be adjacent to similar uses; and, forests are subject to periodic forest management activities, such as thinning, hazardous fuel removal, replanting, and timber harvest. These activities would generate noise on an inconsistent and infrequent basis, related to the availability of cellulosic materials or the harvest season, and would not be considered substantial.

New sources of noise associated with implementation of the proposed LCFS and ADF regulations could include operation of new facilities, such as ethanol processing plants, CCS operations, fixed guideways; and installation of new equipment associated with modification to

dairies, landfills, and wastewater treatment plants. However, development projects would likely occur within footprints of existing facilities, areas with zoning that would permit the development of manufacturing or industrial uses, or public lands where the appropriate State or federal agency has determined that such uses are allowable. Thus, implementation of any new regulations would not be anticipated to result in modifications near existing public (or public use) airports or private airstrips. No substantial increases in noises are anticipated.

Long-term operational noise impacts associated with the proposed LCFS and ADF regulations would be **less than significant**.

14. Population and Housing

Impact 14.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Population, Employment, and Housing

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, biomass, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, CI credits could be generated through development of CCS facilities and fixed-guideway systems.

Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, a substantial amount of construction worker migration would not be likely to occur, and a sufficient construction employment base would likely be available. Operation of these new facilities would not be expected require new additional housing or generate changes in land use that could conflict with adopted plans.

The implementation of the proposed LCFS and ADF regulations is not expected to lead to job losses or large-scale worker displacement. As cleaner, alternative fuels displace some petroleum-based fuels, jobs may shift from the petroleum industry to other sectors of California's economy, such as agriculture. The shift in consumer dollars from gasoline and diesel toward cleaner, more domestically-produced fuels would spur growth in well-paying jobs in the clean fuels industry.

Therefore, short-term construction- and long-term operational impacts on population growth, and displacement of housing or people associated with the LCFS and ADF would be **less than significant**.

15. Public Services

Impact 15.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Public Services

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, biomass, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, CI credits could be generated through development of CCS facilities and fixed-guideway systems.

Although it is reasonably foreseeable that activities associated with new or modified facilities could occur, there is uncertainty as to the exact location or character of any new facilities or modification of existing facilities. However, these would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of manufacturing or industrial uses. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Construction and operational activities would not require new additional housing to accommodate or generate changes in land use and, therefore, would not affect the provision of public services.

As a result, short-term construction- and long-term operational impacts, associated with the LCFS and ADF, on response time for fire protection, police protection, schools, parks, and other facilities would be **less than significant**.

16. Recreation

Impact 16.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Recreation

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of CCS facilities and operation of expanded fixed guideway systems.

These activities would likely occur within footprints of existing manufacturing facilities, or in areas with appropriate zoning. In addition, demand for these crews would be temporary (e.g., 6 – 12 months per project) and would not be anticipated to substantially increase regional population levels. Construction and operational activities associated with reasonably foreseeable compliance responses would not be anticipated to result in increased use of regional parks and other recreational facilities, such that existing neighborhood and regional parks or other recreational facilities would be substantially deteriorated. In addition, because construction crews would be temporary, and facilities would likely require few employees to run new or modified facilities, the demand for new (or expansion of) recreational-related facilities is not anticipated, and no substantial operational recreation impacts would be expected.

Therefore, short-term construction-related and long-term operational impacts on regional parks or other recreational facilities associated with the LCFS and ADF would be **less than significant**.

17. Transportation and Traffic

Impact 17.a: Short-Term Construction-Related Impacts on Traffic and Transportation

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester

facilities at dairies, modifications to crude production facilities (onsite solar, wind, biomass, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, LCFS credits could be generated through development of CCS facilities and operation of expanded fixed guideway systems.

Although detailed information about potential specific construction activities is not currently available, it would be anticipated to result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would vary depending on the particular type, number, and duration of usage for the varying equipment, and the phase of construction. 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 new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. This impact would be potentially significant.

This impact on transportation and traffic could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB.

Mitigation Measure 17.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regards to transportation. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize construction traffic impacts include:

- Proponents of new or modified facilities constructed would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen potentially significant impacts on traffic and transportation. The definition of actions required to mitigate potentially significant traffic impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

    - 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.

    - 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 meet the appropriate roadway 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.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for

individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding traffic resulting from the construction of new facilities or modification of existing facilities associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

Impact 17.b: Long-Term Operational Impacts on Traffic and Transportation

As shown in Table 2-3, demand for corn ethanol and sorghum corn ethanol could decrease through 2020. Ethanol supplies could primarily shift to cane ethanol, sorghum ethanol, cellulosic ethanol, and molasses ethanol. The potential shift could affect agriculture-based ethanol pathways, resulting in a potential decrease in shipments of corn ethanol from California and elsewhere and an increase in shipments of sugarcane and molasses ethanol to California from Brazil and Central America. In addition, processing plants and collection/cultivation of feedstock for cellulosic ethanol production could increase in the United States and Canada, which would be provided to California via rail.

An attempt to determine the exact times and quantities of different types of low-carbon and alternative diesel fuels would be speculative. The location of export and import is based upon numerous unknown factors including: weather patterns, demand, and other economic drivers. While changes to the existing trade patterns can be anticipated, as described above, the ability to ship and receive products is within the purview of relevant international ports, train depots, and the companies buying and selling products. It is therefore reasonable to assume that the existing infrastructure would be expanded to meet a growing need for imports of low carbon and alternative diesel fuel to and within California.

Upon entering the State, low-carbon and alternative diesel fuels would be transported to appropriate facilities (e.g., blending facilities, distribution centers). While the proposed LCFS and ADF regulations would not affect the quantities of fuels demanded, it could have a substantial effect on traffic patterns on local routes. These effects would

be dependent on feedstock demand and processing needs in a particular area. It is expected that ethanol shipments into California ports would not likely increase substantially in the very short term due to infrastructure restraints. Shipments of ethanol that cannot be accommodated through the Panama Canal might enter through a U.S. port other than those in California (e.g., Houston) and be delivered to California by rail. Therefore, while ethanol shipments by rail from locations within the U.S. may decrease, they are expected to be replaced by ethanol shipments delivered to out-of-state ports. These variations would affect the amount of traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the location of fuel-related deliveries, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. This impact would be potentially significant.

This impact on transportation and traffic could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB. That is, truck trips to blending and other processing facilities would continue at similar rates regardless of implementation of the proposed regulations.

Mitigation Measure 17.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regards to transportation. ARB does not have the authority to require implementation of mitigation related to changes to traffic patterns; these must be addressed by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Local agencies with project-approval authority would need to consider changes in traffic patterns in their relevant traffic management plans, regional transportation plans, or other relevant documents. Recognized practices that are routinely required to avoid and/or minimize operational traffic impacts include:

- Revisions to traffic signals
- Requirements to pay a fair share contribution to local traffic operation centers

- Coordination with Caltrans, or other relevant agencies, to broadcast real-time information on existing changeable message signs
- Consultation with local authorities to revise public transit system operations
- Consultation with local emergency service provides to ensure that operating conditions on local roadways and freeway facilities are maintained

Because the authority to determine operational impacts and require operational mitigation lies with land use and/or permitting agencies for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact regarding traffic resulting from changes to existing traffic patterns associated with the proposed LCFS and ADF regulations would be **potentially significant and unavoidable**.

18. Utilities and Service Systems

Impact 18.a: Increased demand for water, wastewater, electricity, and gas services

Implementation of the proposed LCFS and ADF regulations is anticipated to provide incentives for various construction projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Proposed regulations are also expected to incent minor expansions to existing operations, such as digester facilities at dairies, modifications to crude production facilities (onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. In addition, CI credits could be generated through development of CCS facilities and operation of expanded fixed guideway systems.

Reasonably foreseeable compliance responses associated with the LCFS and ADF could result in new demand for water, wastewater,

electricity, and gas services. Generally, facilities would be citied in areas with existing utility infrastructure—or areas where existing utility infrastructure is easily assessable. New or modified utility installation, connections, and expansion would be subject to the requirements of the applicable utility providers. Changes in land use, associated with biofuel feedstock production are likely to change water demand to support new crop types, depending on the size, location, and existing uses. This could result in an increase or decrease in water demand, and would be subject to availability and regulatory requirements.

The areas in which new water demands, associated with the proposed regulation, may occur cannot currently be known because the regulations do not mandate specific locations for feedstock production. Water supplies within California and elsewhere are generally not predicable over long periods of time (e.g., decades), and change according to factors, such as rainfall, temperature, and snowpack, as well as land use and population changes. Planning for these changes and consideration of water allocations is on-going and subject to federal, state, and local regulations. Regardless, the proposed LCFS and ADF Regulations do not dictate the particular location of cultivation, or type, of feedstocks that may be used to produce biofuel. The ability to produce low carbon fuels and alternative diesel fuels would be subject to the availability of locally available resources, including water, and other physical and economic factors.

Any new or modified facilities would be required to comply with all applicable laws and regulations, including obtaining any required local or State land use approvals, prior to their development. In addition, part of the land use entitlement process for facilities proposed in California requires that projects comply with the requirements of CEQA and the CEQA Guidelines. Depending on the jurisdiction, facilities proposed in other states may also be subject to comparable federal, State, and/or local environmental review requirements which would assess whether adequate utilities and services (i.e., wastewater services, water supply services, solid waste facilities) 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 service demands would be considered; agencies would provide input on available service capacity and the potential need for service-related infrastructure including expansions to waste water treatment plants, new water supply entitlements and infrastructure, storm water infrastructure, and solid waste handling capacity (e.g., landfills). Residual environmental impacts would also be managed through this process.

Thus, long-term operational impacts on utilities and services systems, associated with the LCFS and ADF would be potentially significant.

This impact could be reduced to a less-than-significant level by mitigation that can and should be implemented by local lead agencies, but is beyond the authority of the ARB and not within its purview.

Mitigation Measure 18.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that relate to utilities and service systems. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize utility and service-related impacts include:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.

- Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen potentially significant impacts on utilities and service systems. The definition of actions required to mitigate potentially significant utility or service-related impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.

- Comply with local plans and policies regarding the provision of water supply, wastewater treatment, and storm water drainage utilities, and solid waste services.
- Where an onsite wastewater system is proposed, submit a permit application to the appropriate local jurisdiction.
- Where appropriate, prepare a 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 would be approved by the local water agency/purveyor prior to construction of the project.
- Comply with local plans and policies regarding the provision of wastewater treatment services.

Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.

Consequently, while impacts could be reduced to a less-than-significant level by land use and/or permitting agency conditions of approval, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the potentially significant impact to utilities and service systems resulting from the operation of new facilities associated with the LCFS and ADF would be **potentially significant and unavoidable**.

5. CUMULATIVE AND GROWTH-INDUCING IMPACTS

A. Approach to Cumulative Analysis

This section satisfies requirements of the California Environmental Quality Act (CEQA) to discuss how the project being analyzed would contribute to cumulative impacts. ARB's certified regulatory program (17 CCR 60000-60008) does not provide specific direction on a cumulative impacts analysis, and while ARB, by virtue of its certified program, is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the CEQA Guidelines, the Guidelines nevertheless contain useful information for preparation of a thorough and meaningful cumulative analysis. The CEQA Guidelines require a lead agency to discuss a cumulative impact if the project's incremental effect combined with the effects of other projects is "cumulatively considerable" (CEQA Guidelines 15130(a)). The discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone (CEQA Guidelines 15130). 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.

In considering cumulative impacts, an agency may choose from among two approaches: it can prepare a list of past, present, and probable future projects that will produce related or cumulative impacts, or it can rely on a summary of projections contained in an adopted planning document or an adopted or certified environmental document for the planning document (CEQA Guidelines 15130(b)). Further, the CEQA Guidelines state that the pertinent discussion of cumulative impacts contained in one or more previously certified environmental impact reports (EIRs) may be incorporated by reference pursuant to provisions for tiering and program EIRs, and that no future cumulative analysis is required when the lead agency determines the regional and area wide impacts have already been addressed in the prior certified EIR for that plan (CEQA Guidelines 15130).

For purposes of this analysis, ARB is relying on the summary of projections contained in the Environmental Analysis (EA) prepared for the 2014 First Update to the Climate Change Scoping Plan (Scoping Plan Update EA). The Scoping Plan Update EA provided a program level review of significant adverse impacts associated with the reasonably foreseeable compliance responses that appeared most likely to occur as a result of implementing the recommended actions identified in each of the nine sectors discussed in the Scoping Plan Update. The impact discussion includes, where relevant, construction-related effects, operational effects of new or modified facilities, and influences of the recommended actions on GHG and air pollutant

emissions. The Scoping Plan Update EA considered cumulative impacts of a full range of reasonably foreseeable compliance responses to all the recommendations in all nine sectors, including LCFS within the Transportation Sector, along with the expected background growth in California in its impacts conclusions for each resource topic area. That EA considered the cumulative effect of both other "closely related" past, present, and future reasonably foreseeable activities undertaken to reduce GHGs in response to statewide programs and policies, as well other activities with "related impacts" (CEQA Guidelines 15355(b); 15130(a)(1)).

The CEQA Guidelines state that a previously approved plan for the reduction of GHG emissions may be used in cumulative impacts analysis, that the pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference, and that in certain circumstances, no further cumulative impact analysis is required for a project that is consistent with a plan that has a certified EIR (CEQA Guidelines 15130(d)). Therefore, consistent with the CEQA Guidelines, ARB has determined that its cumulative analysis of the proposed LCFS and ADF regulations, which are designed to reduce annual emissions of GHGs and facilitate the introduction of alternative diesel fuels and were considered in and are consistent with the Scoping Plan EA, to rely on the cumulative analysis contained in the Scoping Plan Update EA, which is the statewide plan designed to reduce GHGs. The analysis of the Scoping Plan Update EA is hereby incorporated by reference. The portions of the Scoping Plan Update EA relevant to this discussion are also summarized in Section 5.C below within the respective resource area analyses.

The proposed LCFS and ADF regulations only apply to transportation fuels that are used in California, and impacts associated with combustion of fuels subject to the proposed regulations is largely limited to California. But a significant portion of the crude oil that is used to produce petroleum fuels consumed in California, and many of the alternative fuels consumed in California, are produced outside the State. Because of that, environmental impacts associated with the production and transportation of California transportation fuels occur both in California and outside the State, including in other states, other countries, and other continents. Therefore, this cumulative impact analysis has the same global geographic scope for fuel production and transportation cumulative impacts as the impact analysis in Chapter 4. Due to its wide geographic scope, this summary impact analysis is inherently general and programmatic in nature rather than site-or project-specific.

The analysis of cumulative impacts includes the following:

- A summary of the cumulative impacts found for each resource area in the Scoping Plan Update EA in May 2014.

- A discussion of the types of compliance responses associated with the proposed LCFS and ADF regulations, pertinent to each resource area. A significance conclusion that determines if the proposed LCFS and ADF regulations could result in a significant cumulative effect or a considerable contribution to an existing significant cumulative impact.

This approach to cumulative impacts analysis is "guided by the standards of practicality and reasonableness" (CEQA Guidelines 15130(b)) and serves the purpose of providing "a context for considering whether the incremental effects of the project at issue are considerable" when judged "against the backdrop of the environmental effects of other projects." (*CBE v. Cal. Res. Agency* (2002) 103 Cal.App.4th 98, 119).

B. Significance Determinations and Mitigation

Implementation of the proposed LCFS and ADF regulations was determined to potentially result in cumulatively considerable contributions to significant cumulative impacts to certain resource areas, as discussed below. While suggested mitigation is provided for each potentially cumulatively considerable impact, the mitigation needs to be implemented by other agencies. Where impacts cannot be feasibly mitigated, the EA recognizes the impact as significant and unavoidable. The Board will need to adopt Findings and a Statement of Overriding Considerations for any significant and unavoidable environmental effects of the project as part of the approval process.

C. Cumulative Impacts by Resource Area

1. Aesthetics

The Scoping Plan Update EA found that implementation of the recommended actions within the various sectors discussed in the Plan, which included the recommendation for the LCFS under the Transportation Sector, could result in a significant cumulative impact to aesthetic resources. As discussed in the Scoping Plan Update EA, there is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction and operation of these facilities (although likely to occur in areas zoned or used for manufacturing or industrial purposes), could conceivably introduce or increase the presence of artificial elements (e.g., heavy-duty equipment, removal of existing vegetation, buildings) in areas of scenic importance, such as visibility from a State scenic highways. The visual impact of such development would depend on several variables, including the type and size of facilities, distance and angle of view, visual absorption and placement in the landscape. In addition, facility

operation may introduce substantial sources of glare, exhaust plumes, and nighttime glare from lighting for safety and security purposes. Implementation of mitigation measures would not reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the recommended actions in the Scoping Plan Update could result in a significant cumulative aesthetics-related impact.

The proposed LCFS and ADF regulations' contribution to this significant impact would be cumulatively considerable, given the conclusion in Chapter 4 that the proposed regulations may themselves result in a significant adverse impact on aesthetic resources. Implementation of the project-level mitigation identified in Mitigation Measure 1.a could effectively reduce the incremental contribution from the proposed LCFS and ADF regulations to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with ARB. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative impact** on aesthetic resources.

2. Agricultural and Forest Resources

The Scoping Plan Update EA found that implementation of the recommended actions within the various sectors discussed in the Plan, which included the recommendation for the LCFS under the Transportation Sector, could result in a significant cumulative impact to agricultural and forest resources. As discussed in the Scoping Plan Update EA, there is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction of new facilities could result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, Williamson Act conservation contracts, or forest land or timberland, resulting in the loss of these resources. Because ARB has no land use authority, mitigation is not within its purview 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. Land use impacts would be further addressed for individual projects through the local development review process. Mitigation measures were identified that could reduce these impacts that would applied through the development review process. However, because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for

individual projects, and because of the programmatic nature of this EA, impacts were determined to be potentially significant and unavoidable. Thus, the Scoping Plan Update, which includes LCFS, could result in a significant cumulative impact to agricultural and forest resources.

The proposed LCFS and ADF regulations' contribution to this significant impact would be cumulatively considerable, given the conclusion in Chapter 4 that the proposed regulations may themselves result in a significant adverse impact on agricultural and forest resources. Mitigation measures were identified that could reduce these impacts that would be applied through the development review process. However, because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and because of the programmatic nature of this EA, impacts were determined to be potentially significant and unavoidable. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative impact** on agricultural and forest resources.

3. Air Quality

The Scoping Plan Update EA found that implementation of the recommended actions within the various sectors discussed in the Plan, which included the recommendation for the LCFS under the Transportation Sector, could result in a significant cumulative impact to air quality. As discussed in the Scoping Plan Update EA, reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could result in an increase in criteria air pollutants and toxic air contaminants, as well as generate unpleasant odors that could affect sensitive receptors. These would be generated by the use of heavy-duty construction equipment on a short-term basis, as well as longer-term operational impacts associated with biomass, anaerobic digestion and composting facilities; and LCFS. Therefore, the Scoping Plan Update could generate emission levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected ambient air quality standard violation, result in a cumulatively considerable net increase in non-attainment areas, or expose sensitive receptors to substantial pollutant concentrations or odors. However, all projects would be required to comply with all applicable laws and regulations, including obtaining any required local or State land use approvals, prior to their implementation. Part of the land use entitlement process for facilities proposed in California requires that projects comply with CEQA and other applicable local requirements (e.g., local air district

rules and regulations). This environmental review process would assess whether project implementation would result in short-term construction and long-term operational air quality impacts.

ARB identified mitigation measures that could reduce these impacts with the intention that the mitigations be applied through the development review process. However, because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and because of the programmatic nature of this EA, impacts were determined to be potentially significant and unavoidable. Thus, the Scoping Plan Update, which included LCFS, could result in a cumulative impact to air quality.

Reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could result in a short-term increase in criteria air pollutants and toxic air contaminants in proximity to where fuel production or handling facilities are constructed or modified, as well as generate unpleasant odors that could affect sensitive receptors. These would be generated by the use of heavy-duty construction equipment on a short-term basis. Therefore, the proposed LCFS and ADF could generate emission levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected ambient air quality standard violation, result in a cumulatively considerable net increase in non-attainment areas, or expose sensitive receptors to substantial pollutant concentrations or odors. However, all projects would be required to comply with all applicable laws and regulations, including obtaining any required local or State land use approvals, prior to their implementation. Part of the land use entitlement process in California requires that projects comply with CEQA and other applicable local requirements (e.g., local air district rules and regulations). This environmental review process would assess whether project implementation would result in short-term construction-related air quality impacts.

Implementation of mitigation measures could potentially reduce construction-related air quality impacts; however, because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant impacts.

Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that construction-related air quality impacts resulting from the development of new facilities or modification of existing facilities could be potentially significant and unavoidable. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a short-term significant cumulative** air quality impact.

Biodiesel and renewable diesel fuels have been found to reduce PM emissions relative to conventional diesel. Renewable diesel has been found to decrease NO_X relative to conventional diesel; however, biodiesel has been found to increase NO_X emissions in some cases, depending on feedstock and type of engine used. The following discussion considers NO_X emissions associated with biodiesel, which has been incentivized under the existing LCFS Regulation beginning in 2009 and under federal programs described below.

In 2009, there were few NTDEs, no renewable diesel, and little biodiesel in California. Since 2009, multiple incentives have contributed to greater biodiesel use and associated NO_X emissions. In addition to implementation of the LCFS approved in 2009, biodiesel was incented by the federal 2007 Renewable Fuels Standard (RFS2) and tax credits, which ARB staff considers to have been more instrumental in bringing biodiesel to California because of their higher economic incentives. California generally gets its “fair share” of the national supply of fuels, (i.e., approximately 11 percent of U.S. supply). To date, California has not yet reached its fair share for biodiesel, but has received more than its fair share of renewable diesel.

Increased use of renewable diesel, compared to biodiesel, has led to decreases in NO_X. It is expected that supply and use of renewable diesel will continue to grow, which offsets some of the potential NO_X increases from biodiesel. This, combined with increased NTDE use, will cause biodiesel-related NO_X emissions in California to continue to decrease and ultimately return to 2009 levels by 2023. For further explanation, see Chapter 6 of the ADF Staff Report. Given the RFS, federal tax incentives, and the growth of alternative fuel technologies and markets, it is reasonable to assume that biodiesel use in California would continue at or near existing levels – or even increase – in the absence of an LCFS regulation.

As discussed under Impact 4.3, implementation of the proposed ADF regulation would mitigate any potentially significant NO_X emissions impacts resulting from increased use of biodiesel associated with the

proposed LCFS regulation. Thus, adoption of the proposed LCFS and ADF regulations would **not result in a cumulatively considerable contribution to a significant adverse impact to long-term air quality**.

~~Implementation of the proposed LCFS and ADF regulations would result in long-term operational impacts that would be beneficial; thus, **no cumulatively-considerable contribution to a significant adverse impact to long-term air quality** would occur.~~

Implementation of the proposed LCFS and ADF regulations would encourage the collection of natural gas from dairies, landfills, and wastewater treatment plants. Generally, odor is considered a perceived nuisance and an environmental impact. Factors that would affect odor impacts include the design of collection facilities and exposure duration. In general, odors associated with dairies, landfills, and wastewater treatment plants are part of the existing conditions baseline, and are likely to be reduced through the use of a closed system (e.g., digester facilities). In addition, odor impacts are site-specific and the gaseous compounds released during operations would be distributed into the atmosphere in a way that would not allow for combined effects.

Thus, implementation of the proposed LCFS and ADF regulations **would not result in a cumulatively considerable contribution to a significant cumulative odor impact**.

4. Biological Resources

Implementation of reasonably foreseeable compliance responses associated with recommended actions in the Scoping Plan Update could require construction and operational activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. These activities would have the potential to adversely affect biological resources (e.g., species, habitat) that may reside or be present in those areas. Because there are biological species that occur, or even thrive, in developed settings, resources could also be adversely affected by construction and operations within disturbed areas at existing manufacturing facilities or at other sites in areas with zoning that would permit the development of manufacturing or industrial uses.

The biological resources that could be affected by construction and operation associated with implementation of new regulations and/or incentive measures under the Scoping Plan Update would depend on the specific location of any necessary construction and its environmental setting. Harmful impacts could include modifications to existing habitat; including removal, degradation, and fragmentation of riparian systems, wetlands, or other sensitive natural wildlife habitat and plan communities; interference with wildlife movement or wildlife nursery sites; loss of special-status species; and/or conflicts with the provisions of adopted habitat conservation plans, natural community conservation plans, or other conservation plans or policies to protect natural resources. Implementation of mitigation measures would not reduce these impacts to a less-than-significant level. Thus, the Scoping Plan Update, which includes LCFS, could result in a significant cumulative impact on biological resources.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could also require construction and operational activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction might result in disturbance of undeveloped areas through such activities as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. In addition, cultivation of biofuels could result in the conversion of additional existing forest, grassland or other non-agricultural land to food-related agricultural uses. These activities would have the potential to adversely affect biological resources (e.g., species, habitat) that may reside or be present in those areas. Because there are biological species that occur, or even thrive, in developed settings, resources could also be adversely affected by construction and operations within disturbed areas at existing manufacturing facilities or at other sites in areas with zoning that would permit the development of manufacturing or industrial uses.

The biological resources that could be affected by construction and operation associated with implementation of new regulations and/or incentive measures, would depend on the specific location of any necessary construction and its environmental setting. Harmful impacts could include modifications to existing habitat; including removal, degradation, and fragmentation of riparian systems, wetlands, or other sensitive natural wildlife habitat and plan communities; interference with wildlife movement or wildlife nursery sites; loss of special-status species; and/or conflicts with the provisions of adopted habitat

conservation plans, natural community conservation plans, or other conservation plans or policies to protect natural resources.

Implementation of mitigation measures would reduce these environmental effects. However because the authority to determine activity-level impacts and require activity-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address site-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant impacts.

Consequently, this EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that construction-related and long-term operational impacts on biological resources could be potentially significant and unavoidable. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative impact** on biological resources.

5. Cultural Resources

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites 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. Historic buildings and structures may also be adversely affected by demolition-related activities. Such resources may occur individually, in groupings of modest size, or in districts. Because culturally sensitive resources can also be located in developed settings, historic, archeological, and paleontological resources, and places important to Native American communities, could also be

adversely affected by construction of new facilities. Implementation of mitigation measures could reduce these impacts, however because the authority to determine specific project-level impacts and mitigation is outside the purview of ARB, any mitigation identified would not reduce these impacts to a less-than-significant level. Thus, the Scoping Plan Update, which includes LCFS, could result in a significant cumulative impact on cultural resources.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could also require construction activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites 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. Historic buildings and structures may also be adversely affected by demolition-related activities. Such resources may occur individually, in groupings of modest size, or in districts. Because culturally sensitive resources can also be located in developed settings, historic, archeological, and paleontological resources, and places important to Native American communities, could also be adversely affected by construction of new facilities. Implementation of mitigation measures could reduce these impacts, however because the authority to determine specific project-level impacts and mitigation is outside the purview of ARB, any mitigation identified would not reduce these impacts to a less-than-significant level. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative impact** on cultural resources.

6. Energy Demand

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operational activities associated with

new or modified facilities or infrastructure. Temporary increases in energy demand associated with new facilities would include fuels used during construction, and gas and electric operational demands. Typical earth-moving equipment that may be necessary for construction includes: graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. While energy would be required to complete construction for any new or modified facilities or infrastructure projects, it would be temporary and limited in magnitude and would not result in sustained increases in demand that would adversely affect energy supplies. Therefore, the Scoping Plan Update would not result in a cumulative impact relative to construction-related energy demand.

However, long-term operational energy demand impacts associated with the recommended actions under the Scoping Plan Update, which includes LCFS, would be primarily beneficial, and thus no cumulative impact on long-term operational energy demand would occur.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could also require construction and operational activities associated with new or modified facilities or infrastructure. Temporary increases in energy demand associated with new facilities would include fuels used during construction, and gas and electric operational demands. Typical earth-moving equipment that may be necessary for construction includes: graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. While energy would be required to complete construction for any new or modified facilities or infrastructure projects, it would be temporary and limited in magnitude and would not result in sustained increases in demand that would adversely affect energy supplies. Therefore, the proposed LCFS and ADF regulations **would not result in a cumulatively considerable contribution to a cumulative impact** relative to construction-related energy demand.

In the long term, the mix of lower carbon transportation fuels used in California is driven by the market, primarily through a fuel's carbon intensity (CI) value. A fuel's CI value would incentivize other market-based factors, such as necessary infrastructure, feedstock availability, and compatibility with the vehicle fleet. The proposed LCFS and ADF regulations would not result in a change to fuel demand; rather, they would affect how fuels are blended. In addition, implementation of the proposed LCFS and ADF regulations would trend toward less energy-intensive sources of fuels, increase the use of renewable energy supplies, and decrease reliance on fossil fuels. Thus, long-term

operational energy demand impacts associated with the proposed LCFS and ADF regulations would be primarily **beneficial**, and **no contributions to a cumulative impact on long-term operational energy demand would occur**.

7. Geology and Soils

Implementation of the reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operational activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction and operation could be located in a variety of relatively high-risk geologic and soil conditions that are considered to be potentially hazardous. For instance, the seismic conditions at the site of a new facility may have high to extremely high seismic-related fault rupture and ground shaking potential associated with earthquake activity. New facilities could also be subject to seismic-related ground failure, including liquefaction and landslides. Construction and operational activities could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil erosion. 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. Construction and operation could also occur in locations that would expose facilities and structures to expansive soil conditions. Development of new facilities could be 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, seismic hazards, and geologic, slope, and soil conditions for any particular facilities that could occur as a result of reasonably foreseeable compliance responses are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of this analysis, development of these facilities could expose people and structures to relatively high levels of risk associated with strong seismic ground shaking, including liquefaction and landslides, and instability. These geologic, seismic, and soil-related conditions could result in damage to structures, related utility lines, and access roads, blocking access and posing safety hazards to people.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting

agency for individual projects, and since the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Thus, the Scoping Plan Update, which includes LCFS, could result in a significant cumulative impact on geology and soils.

Implementation of the reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could also require construction and operational activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction and operation activities could be located in a variety of relatively high-risk geologic and soil conditions that are considered to be potentially hazardous. For instance, the seismic conditions at the site of a new facility may have high to extremely high seismic-related fault rupture and ground shaking potential associated with earthquake activity. New facilities could also be subject to seismic-related ground failure, including liquefaction and landslides. Construction and operational activities could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil erosion. 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. Construction and operation could also occur in locations that would expose facilities and structures to expansive soil conditions. Development of new facilities could be 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. Furthermore, land use changes could affect soil quality in site-specific locations.

The specific design details, siting locations, seismic hazards, and geologic, slope, and soil conditions for any particular facilities that could occur as a result of reasonably foreseeable compliance responses are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of this analysis, development of these facilities could expose people and structures to relatively high levels of risk associated with strong seismic ground shaking, including liquefaction and landslides, and instability. These geologic, seismic, and soil-related conditions could result in damage to structures, related utility lines, and access roads, blocking access and posing safety hazards to people.

Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and since the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative impact** on geology and soils.

8. Greenhouse Gases

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction activities associated with new or modified facilities or infrastructure. Specific, project-related construction activities could result in increased generation of short-term GHG emissions in limited amounts associated with the use of heavy-duty off-road equipment, materials transport, and worker commutes. As described in Chapter 4, a majority of local agencies (e.g., air pollution control districts) do not recommend or require the quantification of short-term construction-generated GHGs for typical construction projects because these only occur for a finite period of time (e.g., during periods of construction) that is typically much shorter than the operational phase, and agencies generally recommended that GHG analyses focus on operational phase emissions, unless the project is of a unique nature requiring atypical (e.g., large scale, long-term) activity levels (e.g., construction of a new dam or levee) for which quantification and consideration (e.g., amortization of construction emissions over the lifetime of the project) may be recommended. Thus, short-term construction related GHG emissions impacts associated with reasonably-foreseeable compliance responses for the recommended actions in the Scoping Plan Update are considered less than significant when considered in comparison to the overall GHG reduction associated with implementation of the Scoping Plan Update.

The long-term operational impacts to GHG emissions from the recommended actions are primarily beneficial, consistent with the goals and objectives of the Scoping Plan Update to reduce emissions to achieve 2020 and post-2020 emission reduction goals.

Thus, the Scoping Plan Update would not result in a significant cumulative GHG emissions impact.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could require construction activities associated with new or modified facilities or infrastructure. Specific, project-related construction activities could result in increased generation of short-term GHG emissions in limited amounts associated with the use of heavy-duty off-road equipment, materials transport, and worker commutes. As described in Chapter 4, a majority of local agencies (e.g., air pollution control districts) do not recommend or require the quantification of short-term construction-generated GHGs for typical construction projects because these only occur for a finite period of time (e.g., during periods of construction) that is typically much shorter than the operational phase, and agencies generally recommended that GHG analyses focus on operational phase emissions, unless the project is of a unique nature requiring atypical (e.g., large scale, long-term) activity levels (e.g., construction of a new dam or levee) for which quantification and consideration (e.g., amortization of construction emissions over the lifetime of the project) may be recommended. Thus, short-term construction related GHG emissions impacts associated with reasonably-foreseeable compliance responses to the proposed LCFS and ADF regulations are considered less than significant when considered in comparison to the overall GHG reduction associated with implementation of the proposed LCFS and ADF regulations. Thus, the proposed LCFS and ADF regulations **would not result in a ~~cumulatively considerable contribution to a~~ significant cumulative impact** on GHG emissions.

9. Hazards and Hazardous Materials

Reasonably foreseeable compliance responses to the recommended actions in the Scoping Plan Update could include construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact locations where construction and operations of new facilities or the modification of existing facilities would occur.

Construction activities may require the transport, use, and disposal of hazardous materials. Construction activities generally use heavy-duty equipment requiring periodic refueling and lubricating. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site. However, the transport, use, and disposal of hazardous materials would be required to comply with all applicable federal, State and local laws (see Attachment 2 of this EA). In addition, although there is uncertainty as to the exact locations where new facilities could be constructed or where existing facilities could be reconstructed, these would likely occur within footprints of existing manufacturing facilities, or in areas with zoning that would

permit the development of manufacturing or industrial uses. As a result, construction-related impacts associated with hazards and hazardous materials would be less than significant.

In addition, because potential facilities would likely occur within footprints of existing manufacturing facilities, the Scoping Plan Update would not be expected to result in locating new facilities near schools, public (or public use) airports, private airstrips, or wildlands; or on sites included on a list of hazardous materials sites or impair implementation of or physically interfere with an adopted emergency response or evacuation plan. In addition, as noted above, the handling of hazards materials would be required to comply with all applicable federal, State and local laws. As a result, operational impacts associated with hazards and hazardous materials would be less than significant.

Therefore, the Scoping Plan Update would not result in cumulative hazards or hazardous materials impacts.

Reasonably foreseeable compliance responses to the proposed LCFS and ADF regulations could include construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact locations where construction and operations of new facilities or the modification of existing facilities would occur.

These construction activities may require the transport, use, and disposal of hazardous materials. Construction activities generally use heavy-duty equipment requiring periodic refueling and lubricating fluids. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site as they are not designed for use on public roadways. Thus, such maintenance uses a service vehicle that mobilizes to the location of the construction equipment. It is during the transfer of fuel that the potential for an accidental release is most likely. Although precautions would 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 construction activities 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. The short-term construction-related impact associated with the proposed LCFS and ADF regulations on hazards and hazardous materials would be potentially significant. The impacts could be reduced to a less-than-significant level by mitigation that can and should be implemented by

federal, State, and local lead agencies, but is beyond the authority of the ARB and not within its purview.

While project-specific construction-related hazards and hazardous materials impacts from the proposed LCFS and ADF could occur, they would be site-specific and would not combine with other projects under the Scoping Plan Update. Therefore, short-term construction activities **would not result in a cumulatively considerable contribution to a significant cumulative impact** related to hazards and hazardous materials.

In addition, because potential facilities would likely occur within footprints of existing manufacturing facilities, the proposed LCFS and ADF regulations would not be expected to result in locating new facilities near schools, public (or public use) airports, private airstrips, or wildlands; or on sites included on a list of hazardous materials sites or impair implementation of or physically interfere with an adopted emergency response or evacuation plan. In addition, as noted above, the handling of hazards materials would be required to comply with all applicable federal, State and local laws. As a result, operational impacts associated with the proposed LCFS and ADF regulations **would not result in a cumulatively considerable contribution to a significant cumulative hazards and hazardous materials impact**.

10. Hydrology and Water Quality

Construction activities and long-term operations associated with reasonably foreseeable compliance responses to the recommended actions in the Scoping Plan Update could be located in a variety of conditions with regards to altering drainage patterns, flooding, and inundation by seiche, tsunami, or mudflow. The level of susceptibility varies by location. The specific design details, siting locations, and associated hydrology and water quality issues are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of CEQA disclosure, these potential hydrology and water quality-related impacts could be significant. Implementation of mitigation measures to reduce these impacts would not reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the Scoping Plan Update could result in a significant cumulative impact to hydrology and water quality.

Short-term construction activities and long-term operations associated with reasonably foreseeable compliance responses to the proposed

LCFS and ADF regulations could be located in a variety of conditions with regards to altering drainage patterns, flooding, and inundation by seiche, tsunami, or mudflow. Effects could be related to installation of new facilities or through the conversion of non-agricultural lands to agricultural uses. The level of susceptibility varies by location. The specific design details, siting locations, and associated hydrology and water quality issues are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of CEQA disclosure, these potential short-term and long-term hydrology and water quality-related impacts could be significant. Implementation of mitigation measures to reduce these impacts would not reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative impact** to hydrology and water quality.

11. Land Use and Planning

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require both construction and long-term operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. However, facilities would likely occur within the footprints of existing manufacturing facilities, or in areas with zoning that would permit the development these facilities. Thus, implementation of the recommended actions would not be anticipated to divide an established community or conflict with a land use or conservation plan. Therefore, the Scoping Plan Update would not result in a significant cumulative land use planning-related impact.

Implementation of the proposed LCFS and ADF regulations could result in compliance responses requiring the short-term construction or modification of feedstock or fuel production, processing or distribution facilities. Although it is reasonably foreseeable that these activities could occur, there is uncertainty as to the exact locations of these facilities. Within California, new facility construction or modification of existing facilities would likely occur within the footprints of existing fuel production facilities or in areas with zoning that would permit the development of industrial or agricultural land uses. Whether or not these facilities would require temporary changes in land use that could divide established communities or conflict with applicable land use plans would be under the purview of local planning agencies. Outside

of California, compliance responses could result in the development of facilities for fuel and feedstock processing in areas with wide variation in policy approaches to land use planning. Conversion of land may not be consistent with existing and planned land uses in the respective locations of biofuel cultivation.

Issues related to land use planning consistency can result in effects on the environment associated with agriculture and forestry, biology, geology and soils, and hydrology. Cumulative impacts associated with the topic areas are described within this chapter in Sections 2, 4, 8, and 10.

12. Mineral Resources

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require both the construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. New facilities would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered these issues, and thus impacts to the availability of a known mineral resource or recovery site would be less than significant.

In addition, some of the recommended actions and associated compliance responses could require the extraction of minerals (i.e., lithium or platinum) used to manufacture fuel cell and battery technologies. However, implementation of these measures would not substantially deplete the supply of lithium or platinum and both are currently used in auto manufacturing processes. Therefore, the Scoping Plan Update would not result in a significant cumulative impact to mineral resources.

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the proposed LCFS and ADF regulations could require both the construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. New facilities would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered these issues, and thus impacts to the availability of a known mineral resource or recovery site would be less than significant. Furthermore, compliance responses associated with the proposed LCFS and ADF regulations would not include extraction of minerals used to manufacture fuel cell and battery cell technologies. Therefore,

the proposed LCFS and ADF regulations **would not result in a cumulatively considerable contribution to a significant cumulative impact** to mineral resources.

13. Noise

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operation of new or modified facilities or infrastructure. These activities could result in the generation of short-term construction noise in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels, which would be potentially significant. Operational noise impacts would not typically be expected due to the fact that typical compliance response activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. However, operational effects of equipment constructed as a result of implementation of recommended actions associated with the Energy Sector and Green Buildings could result in potentially significant impacts. Implementation of mitigation measures could reduce potential construction-related or operational noise impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the Scoping Plan Update could result in a significant cumulative construction-related and operational noise impacts.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could require construction and operation of new or modified facilities or infrastructure. These activities could result in the generation of short-term construction noise in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels, which would be potentially significant. Implementation of mitigation measures could reduce potential construction-related impacts to a less-than-significant level; however, the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, if construction sites would be located within close proximity to each other, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative construction-related noise impact**.

Long-term operational activities associated with the proposed LCFS and ADF regulations would result in less than significant impacts, and **would not result in a cumulatively considerable contribution to a significant cumulative impact** on operational noise**.**

14. Population and Housing

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of such facilities. Construction of these facilities activities would require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, a substantial amount of construction worker migration would not be likely to occur, and a sufficient construction employment base would likely be available. Construction activities would not require new additional housing or generate changes in land use. Therefore, the Scoping Plan Update would not result in a significant cumulative impact related to population and housing growth.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could require construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of such facilities. Construction of these facilities activities would require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, a substantial amount of construction worker migration would not be likely to occur, and a sufficient construction employment base would likely be available. Construction activities would not require new additional housing or generate changes in land use. The implementation of the proposed LCFS and ADF regulations is not expected to lead to job losses or large-scale worker displacement. As cleaner, alternative fuels displace some petroleum-based fuels, jobs may shift from the petroleum industry to other sectors of California's economy, such as agriculture. The shift in consumer dollars from gasoline and diesel toward cleaner, more domestically-produced fuels would spur growth in well-paying jobs in the clean fuels industry.

Therefore, the proposed LCFS and ADF regulations **would not result in a cumulatively considerable contribution to a significant cumulative impact** related to population and housing growth.

15. Public Services

Reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could include construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Construction activities would not require new additional housing to accommodate or generate changes in land use and, therefore, would not affect the provision of public services. Therefore, the Scoping Plan Update would not result in a significant cumulative impact related to public services.

Reasonably foreseeable compliance responses associated the proposed LCFS and ADF regulations could include construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Construction activities would not require new additional housing to accommodate or generate changes in land use and, therefore, would not affect the provision of public services. Therefore, the proposed LCFS and ADF regulations **would not result in a cumulatively considerable contribution to a significant cumulative impact** related to public services.

16. Recreation

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operations of new or modified facilities or infrastructure. There is uncertainty as to the exact locations of potential new or modified facilities. These activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit their development. In addition, demand for construction of these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Thus, construction activities associated with reasonably foreseeable compliance responses would not be anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur. In addition, the demand for new (or expansion of) recreational-related facilities would not occur as a result of construction activities. Therefore, the Scoping Plan Update would not result in a significant cumulative impact related to recreational facilities.

As described in Chapter 4, implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could require construction and operations of new or modified facilities or infrastructure. There is uncertainty as to the exact locations of potential new or modified facilities. These activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit their development. In addition, demand for construction of these crews would be temporary (e.g., 6 – 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Thus, construction activities associated with reasonably foreseeable compliance responses would not be anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur. In addition, the demand for new (or expansion of) recreational-related facilities would not occur as a result of construction activities. Therefore, the proposed LCFS and ADF regulations **would not result in a cumulatively considerable contribution to a significant cumulative impact** related to recreational facilities.

17. Transportation and Traffic

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operations of new or modified facilities or infrastructure. Although detailed information about potential specific construction activities is not currently available, some of the potential compliance responses could result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would vary depending on the particular type, number, and duration of usage for the varying equipment, and the phase of construction. 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 new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips.

Implementation of mitigation measures could reduce short-term construction related impacts to a less-than-significant level, but because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, the impacts are considered potentially significant and unavoidable. Thus, the Scoping Plan Update could result in a cumulative short-term transportation and traffic-related impact.

Implementation of the reasonably foreseeable compliance responses under the Scoping Plan Update would not, however, result in cumulative impacts associated with long-term operational changes in traffic patterns or vehicle trips, or conflict with existing circulation plans.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could require construction and operations of new or modified facilities or infrastructure. Although detailed information about potential specific construction activities is not currently available, some of the potential compliance responses could result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would vary depending on the particular type, number, and duration of usage for the varying equipment, and the phase of construction. In addition,

demand for different types of feedstocks and processing needs could affect the existing traffic patterns. These variations would affect the amount of traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. Implementation of mitigation measures could reduce short-term construction related impacts and long-term operational impacts to a less-than-significant level, but because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, the impacts are considered potentially significant and unavoidable. Thus, if projects are located in close proximity such that traffic patterns would be affected by one of more construction project, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a short-term cumulative transportation and traffic-related impact**.

Implementation of the reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could also result in substantial long-term operational changes in traffic patterns or vehicle trips, or conflict with existing circulation plans. However, this impact is specific to implementation of the proposed LCFS and ADF regulations and would not combine with other projects under the Scoping Plan Update. Therefore, the proposed LCFS and ADF regulations **would not result in a cumulative contribution to a long-term significant cumulative impact** on transportation and traffic.

18. Utility Service Systems

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan Update could require construction and operations of new or modified facilities or infrastructure. Newly constructed or modified facilities could generate substantial increases in the demand for water supply, wastewater treatment, storm water drainage, and solid waste services in their local areas. Any new or modified facilities would be required to comply with all applicable laws and regulations, including obtaining any required local or State land use approvals, prior to their development. Part of the land use entitlement process for facilities proposed in California requires that each of these projects comply with the requirements of CEQA and the CEQA Guidelines. Depending on the

jurisdiction, facilities proposed in other states may also be subject to comparable federal, state, and/or local environmental review requirements which would assess whether adequate utilities and services (i.e., wastewater services, water supply services, solid waste facilities) would be available and whether the project would result in the need to expand or construct new facilities to serve the project.

The specific location and type of construction needs is not known and would be dependent upon a variety of market factors that are not within the control of ARB including: economic costs, product demands, environmental constraints, and other market constraints. Thus, the specific impacts from construction on utility and service systems cannot be identified with any certainty, and individual compliance responses could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impacts to a less-than-significant level.

Implementation of mitigation measures would not reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the Scoping Plan Update could result in a significant cumulative impact with respect to utilities and service systems.

Implementation of reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations could also require construction and operations of new or modified facilities or infrastructure. Newly constructed or modified facilities could generate substantial increases in the demand for water supply, wastewater treatment, storm water drainage, and solid waste services in their local areas. Any new or modified facilities would be required to comply with all applicable laws and regulations, including obtaining any required local or State land use approvals, prior to their development. Part of the land use entitlement process for facilities proposed in California requires that projects comply with the requirements of CEQA and the CEQA Guidelines. Depending on the jurisdiction, facilities proposed in other states may also be subject to comparable federal, state, and/or local environmental review requirements which would assess whether adequate utilities and services (i.e., wastewater services, water supply services, solid waste facilities) would be available and whether the project would result in the need to expand or construct new facilities to serve the project.

As discussed above, the specific impacts from construction on utility and service systems cannot be identified with any certainty, and

individual compliance responses could potentially result in significant environmental impacts for which it is unknown whether mitigation would be available to reduce the impacts to a less-than-significant level. Thus, the proposed LCFS and ADF regulations **could result in a cumulatively considerable contribution to a significant cumulative impact** with respect to utilities and service systems.

D. Growth-Inducing Impacts

As described above, a project would be considered growth-inducing if it removes an obstacle to growth, includes construction of new housing, or establishes major new employment opportunities. The reasonably foreseeable compliance responses associated with the proposed LCFS and ADF regulations would not result in new utility or services systems and would not include construction of new housing.

The proposed action intends to encourage the development of new, innovative fuel pathways to reduce the average CI value of California's transportation fuels market. As described in Section 4.B.14, this would change the development and use of transportation fuels, rather than the establishment of substantially new employment opportunities. Improvements to energy resources through actions such as reducing dependence on fossil fuels and increasing use of renewable resources is generally a State- and Country-wide goal (e.g., the Federal Renewable Fuels Standard, the 2007 Energy Independence and Security Act, and Appendix F of the CEQA Guidelines). The proposed LCFS and ADF regulations are a method to achieve these and other goals, rather than a program that will induce a major shift in the job market.

Thus, the proposed regulations would encourage economic activity associated with emerging technologies and research and development related to methods that could reduce the CI values of fuels used in California. Given that several existing regulations are aimed toward goals that would reduce the environmental effects associated with fuels, such as reduced energy use and air emissions, the proposed regulations would contribute to these trends rather than acting as the sole driving force.

6. MANDATORY FINDINGS OF SIGNIFICANCE

Consistent with the requirements of the California Environmental Quality Act (CEQA) Guidelines section 15065 and section 18 of the Environmental Checklist, this Environmental Analysis (EA) addresses the mandatory findings of significance for the proposed Low Carbon Fuel Standard (LCFS) and Alternative Diesel Fuel (ADF) regulations.

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 the CEQA Guidelines section 15065(a), 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 impact on the environment, which is defined in the CEQA Guidelines section 15382 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 impacts and issue areas, the precise nature, location and magnitude of impacts would be highly variable, and would depend on a range of reasonably foreseeable compliance responses that could occur with implementation of the proposed LCFS and ADF regulations. Location, extent, and a variety of other site-specific factors are not known at this time but would be addressed by environmental reviews to be conducted by local or regional agencies with regulatory authority at the project-specific level.

This EA, in its entirety, addresses and discloses potential environmental impacts associated with the recommended actions with the proposed regulations, including direct, indirect, and cumulative impacts in the following resource areas:

- Aesthetics
- Agriculture and Forest Resources

- Air Quality
- Biological Resources
- Cultural Resources
- Energy Demand
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems

As described in Chapter 4, this EA discloses potential environmental impacts, the level of significance prior to mitigation, proposed mitigation measures, and the level of significance after the incorporation of mitigation measures.

a) Impacts on Species

Under the CEQA Guidelines section 15065(a)(1), a lead agency shall find that a project may have a significant impact 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 4 of this EA addresses impacts that could occur to biological resources, including the reduction

of fish or wildlife habitat, the reduction of fish or wildlife populations, and the reduction or restriction of the range of special-status species.

b) Impacts on Historical Resources

The CEQA Guidelines section 15065(a)(1) states that a lead agency shall find that a project may have a significant impact 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. The CEQA Guidelines 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. The CEQA Guidelines section 15064.5 establishes standards for determining the significance of impacts to historical resources and archaeological sites that are a historical resource. Chapter 4 of this EA addresses impacts that could occur related to California history and prehistory, historic resources, archaeological resources, and paleontological resources.

2. Does the project have impacts that are individually limited, but cumulatively considerable?

As required by the CEQA Guidelines section 15065, a lead agency shall find that a project may have a significant impact on the environment where there is substantial evidence that the project has potential environmental impacts that are individually limited, but cumulatively considerable. As defined in the CEQA Guidelines section 15065(a)(3), 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 5, “Cumulative and Growth-Inducing Impacts,” in this EA.

3. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

Consistent with the CEQA Guidelines section 15065(a)(4), a lead agency shall find that a project may have a significant impact on the environment where there is substantial evidence that the project has the potential to cause substantial adverse impacts 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 significantly affected. This factor relates to adverse changes to the environment of human beings generally, and not to impacts 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 (short-term), 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 4 of this EA.

7. ALTERNATIVES ANALYSIS

This section satisfies California Environmental Quality Act (CEQA) Guidelines Section 15126.6, which addresses requirements related to alternatives to the proposed project. The following discussion provides an overview of the steps taken to develop alternatives to the proposed action (i.e., adoption of both the proposed Low Carbon Fuel Standard [LCFS] regulation and proposed Alternative Diesel Fuels [ADF] regulation), the project objectives associated with the proposed action, and an analysis of the alternatives' environmental effects and ability to meet the project objectives.

A. Approach to Alternatives Analysis

The California Air Resources Board's (ARB) certified regulatory program (17 CCR 60000-60008) requires that where a contemplated action may have a significant effect on the environment, a staff report shall be prepared in a manner consistent with the environmental protection purposes of ARB's regulatory program and with the goals and policies of CEQA. Among other things, the staff report must address feasible alternatives to the proposed action that would substantially reduce any significant adverse impact identified.

The certified regulatory program provides general guidance that any action or proposal for which significant adverse environmental impacts have been identified during the review process shall not be approved or adopted as proposed if there are feasible mitigation measures or feasible alternatives available that would substantially reduce such adverse impact. For purposes of this section, "feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors, and consistent with the Board's legislatively mandated responsibilities and duties (17 CCR 60006).

While ARB, by virtue of its certified program, is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the CEQA Guidelines, the Guidelines nevertheless provide useful information for preparation of a thorough and meaningful alternatives analysis. CEQA Guidelines section 15126.6(a) speaks to 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 different approaches to or variations of the project would reduce or eliminate significant project impacts, within the basic framework of the objectives, a principle that is consistent with ARB's regulatory requirements.

The range of alternatives is governed by the "rule of reason," which requires evaluation of only those alternatives "necessary to permit a reasoned choice" (14 CCR 15126.6(f)). Further, an agency "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (14 CCR 15126.6 (f)(3)). The analysis should focus on alternatives that are feasible 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.

B. Project Objectives

The objective of the proposed LCFS regulation is to reduce the carbon intensity (CI) of transportation fuels in the California market by at least 10 percent of its 2010 level by 2020. The lower CI is expected to reduce greenhouse gas (GHG) emissions from the state's transportation sector by about 35 million metric tons (MMT) during 2016-2020 and achieve other important benefits as well, including greater diversification of the state's fuel portfolio, a reduced dependence on petroleum and a decrease in the associated economic impacts of gasoline and diesel price spikes caused by volatile oil price changes, greater innovation and development of cleaner fuels, and support for California's ongoing efforts to improve ambient air quality. The reductions in CI by 2020 are expected to account for almost 20 percent of the total GHG emission reductions needed to meet the AB 32 mandate of reducing California's GHG emissions to 1990 levels by 2020 and are also expected to set the stage for greater changes in the state's transportation fuel portfolio in subsequent years.

The primary objective of the proposed ADF regulation is to establish a comprehensive legal path to bring new or emerging diesel fuel substitutes to the commercial market in California as efficiently as possible while preserving or enhancing public health, the environment, and the emissions benefits of the state's existing motor vehicle diesel regulations. The proposed ADF regulation also establishes specific rules governing the use of biodiesel fuel to ensure its use will meet the program goals of protecting public health and the environment.

C. Description of Alternatives

A detailed description of each alternative is presented below. The analysis that follows the descriptions of the alternatives includes a discussion of the degree to which each alternative meets the basic project objectives, and the degree to which each alternative avoids potentially significant impacts identified in Chapter 4.

CEQA requires that a No Project Alternative be considered (CEQA Guidelines Section 16126.6(e)). The purpose of describing and analyzing a no project alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. Because the proposed action consists of two separate decisions, this analysis considers two No Project Alternatives: No ADF approval and No LCFS approval. These alternatives are described below, followed by ~~two action alternatives:~~ the Gasoline-Only Compliance Curve Alternative ~~and No Trading Case Alternative~~.

1. No Project: No Proposed Alternative Diesel Fuels Regulation Approval

Typically, when a project is the revision of an existing regulatory program, the No Project Alternative is considered to be the continuation of the existing regulatory program (CEQA Guidelines 15126.6[e][3][A]). However, as described in Chapter 1, Introduction, the proposed ~~action~~ ADF regulation is intended to satisfy the mandate of the State of California Court of Appeal, Fifth Appellate District (Court) decision in the case *POET, LLC versus California Air Resources Board* (2013) 218 Cal.App.4th 681 (POET vs. ARB). The Court held that the LCFS would remain in operation and that ARB can continue to implement and enforce the existing regulatory standards at 2013 levels while it takes steps to address CEQA and Administrative Procedure Act (APA) issues associated with the original adoption of the LCFS regulation. ARB is required to assess whether nitrogen oxides (NO_X) emissions associated with biodiesel is a significant adverse impact of the LCFS under CEQA, and if so, consider mitigation measures to reduce that impact. The proposed ADF regulation addresses this impact and includes mitigation through blending requirements, as required (see Chapter 2, Project Description). However, it is important to note that the projected use of new technology diesel engines (NTDE) would largely reduce NO_X impacts regardless of this mitigation. ~~Thus,~~ But in the circumstance that the No Project Alternative is adopted for ADF, existing LCFS regulations would likely be set aside under the *POET* decision, and CI reduction standards for fuels would no longer exist.

If the existing LCFS was set aside, and the proposed ADF regulation was not adopted, existing regulations for fuels, including Cap-and-Trade, Advanced Clean Cars, the Federal Renewable Fuel Standard 2, ARB's Pavley Regulations, and EPA's Corporate Average Fuel Economy (CAFE) Standards would drive GHG emissions reduction in the State (see Attachment 1 for a description of the CAFE standards). However, without incentives to reduce the CI value of fuels in

California, feedstocks and fuels would likely be different than under the proposed regulations. That is, the market driver would be based on cost rather than the associated life cycle GHG emissions and a reduction in the CI value of California fuels is not likely to decrease substantially.

Market prices of different feedstocks for ethanol production, alternative diesels, and the general fuel portfolio ~~in~~in California depend on both supply-side and demand-side factors, and policies of relevant governments. While prices fluctuate based upon various factors, such as weather patterns and oil prices, generally the cost of importing sugarcane ethanol from Brazil is greater than transporting products from within the United States (Crago et al. 2010).

Without implementation of LCFS and the related shift in the types of feedstocks used for ethanol and biodiesel, there would be no incentives to reduce CI values of fuels, diversify the State's fuel portfolio, development of commercialization pathways for alternative diesel fuels, or specification set to reduce NO_X emissions from biodiesel. Thus, the basic project objectives would not be met.

Given the assumption that compliance responses associated with the proposed regulations would not occur, California's fuel portfolio is not likely to change substantially such that average CI values of fuels are reduced. Thus, potentially significant impacts related to compliance responses that could result in changes in shipment patterns, land use changes, additional infrastructure, and methods used to obtain CI credits would not be driven by LCFS and ADF. However, beneficial impacts related to GHG emissions and air quality would not be realized, and would be considered significant.

2. Re-Adoption of a Low Carbon Fuel Standard Regulation without Updates, and Adoption of the Proposed Alternative Diesel Fuel Regulation

The Board could re-adopt the existing 2012 LCFS without any of the revisions that are currently included in the -proposed LCFS, as well as proceed with adoption of the proposed ADF regulation. The features of the proposed LCFS regulation that would not be included as part of the LCFS re-adoption under this alternative include the following.

a) Energy Economy Ratios

The LCFS regulation included Energy Economy Ratio (EER) values in the original Initial Statement of Reasons (ISOR) in

March 2009, and several EER values were updated when amendments to the regulation were adopted in 2012. Since that time, new fuel economy data have become available for some alternative-fueled vehicles. Not revising the EER values to reflect the most current energy efficiency data available for vehicles currently operating in California would result in the LCFS regulation being out-of-date on emerging vehicle technologies. Staff is proposing to update the EER value for heavy-duty electric buses.

b) Regulated Party Revisions

Under the existing LCFS regulation, a regulated party is defined as a person who ultimately ends up with the CI obligation for the fuels introduced into the California market. Upstream fuel producers and distributors would not be considered regulated parties and therefore could not generate and maintain LCFS credits or report their fuel sales in the LCFS Reporting Tool (LRT).

c) Reporting Requirements

Because regulated parties are already using the LRT to report, a “no action” alternative to this proposed change would not have a substantial effect compared to existing conditions; however, designating the LRT as the mandated reporting form minimizes potential confusion regarding future LCFS reporting.

d) Method 2A/2B Certification

Under the existing LCFS regulation, fuel production facilities and fuel providers must apply for a Method 2A/2B fuel pathway to receive a CI value either lower than what is in the look-up tables (2A) or is not in the look-up tables (2B). Under the proposed LCFS regulation, use of staff resources would be more efficient by converting this 2A/2B process into two tiers: Tier 1 for first-generation fuels (e.g., sugar-and starch-based ethanols, fossil CNG and LNG, soy biodiesel, etc.), which will have CI values determined with a simplified calculator; and Tier 2 for next-generation fuels (e.g., cellulosic ethanol) or Tier 1 fuels that use innovative processes, which will have CI values determined through a more rigorous Method 2 process. To maintain the existing regulatory approach would forfeit the opportunity for greater staff efficiency and productivity.

e) Credit Trading

The proposed LCFS regulation includes a new section to provide more detail on how credits and deficits will be tracked, and to specify the process to be used to acquire, bank, transfer and retire credits. In addition, a provision would allow a regulated party to acquire credits in the first quarter of a year to meet a compliance obligation in the previous year, as long as those credits were generated in a previous year. This proposal further seeks to establish requirements relating to the public release of information concerning the generation of deficits and the generation, use, and transfer of credits. Under this alternative, ARB would not provide clarifications to the credit trading provisions, thereby inhibiting the CI credit market.

f) Opt-In/Opt-Out Procedure

The existing LCFS regulation allows electricity, hydrogen, CNG, LNG, and biogas providers to opt in to generate credits. It simply refers to a regulated party electing to generate LCFS credits for the exempted fuels but provides no specificity on how to opt-in or opt-out of the existing regulation. The proposed LCFS regulation includes additional language that details how a fuel provider could become a regulated party (opt-in) or later remove them from being a regulated party (opt-out). This alternative could thus deter regulated parties from entering into the CI credit system.

g) Regulated Parties for Electricity

The existing LCFS regulation includes language specifying the parties eligible to generate credits for residential electric vehicle (EV) charging, public EV charging, fleet EV charging, and workplace EV charging. Under the proposed LCFS regulation, staff is proposing to allow generation of credits for mass transit fixed guideway applications and electric forklifts

h) High Carbon-Intensity Crude Oil

The existing LCFS regulation recognizes that additional energy is required to produce some crude oils and, taking a full life cycle assessment (LCA) into consideration, calculates the CI deficit for such high carbon intensity crude oils (HCICOs) processed in California refineries. The proposed LCFS regulation would reevaluate emissions from the production and

transportation of HCICO processed in California refineries to ensure that the LCFS benefits are not diminished due to increases in GHG emissions from higher carbon intensity crude supplies.

i) Greenhouse Gas Emissions Reductions at Refineries

Under the existing LCFS, refineries would not be allowed to generate GHG reduction credits for investments at the refineries. Each refinery that generates a Refinery Investment Credit would have the CI of its transportation fuel reviewed periodically to ensure that the calculated difference has remained the same. Changes in the CI could result in an increase, decrease, or elimination of the credit in future years.

j) Modification of Compliance Curves for Gasoline and Diesel Standards

Under the existing LCFS regulation, existing compliance curves for gasoline and diesel would remain the same. As a result, modification of compliance curves under the proposed LCFS regulation would not consider updated research related to the effect of petroleum prices on the production of biofuels and fuels available for California's market.

k) Refinery-Specific Crude Oil Incremental Deficit Accounting

Under the existing LCFS regulation, refinery-specific crude oil incremental deficit accounting provisions would not be approved. The proposed LCFS regulation would allow low-complexity/low-energy-use refineries to opt out of the California Average Crude Provision and instead have their crude oil incremental deficit calculated on a refinery-specific basis. The large, complex refineries would continue to operate under the California Average crude oil provision.

l) Fuel Pathways and Producer Facility Registration

The proposed LCFS regulation includes the creation of a two-tiered pathway process, intended to streamline and simplify fuel pathway certification and regulation functions. Conventionally produced first generation fuels—starch- and sugar-based ethanol, biodiesel, renewable diesel, natural gas, and electricity—would fall into tier one, while next generation fuels—cellulosic alcohols, biomethane, hydrogen, drop-in fuels, etc.—and innovatively produced first-generation fuels would fall into

tier two. Under the existing LCFS regulation, this two-tiered pathway process would not be implemented.

3. Gasoline-Only Compliance Curve Alternative

The Gasoline-Only Compliance Curve Alternative would remove the diesel standard from the proposed LCFS regulation so that it would achieve a 10 percent reduction in CI by 2020 from a 2010 baseline for gasoline and gasoline substitute fuels only. This alternative proposes no reduction in CI for diesel and diesel substitute fuels. This alternative is less stringent than the proposed regulation, as it would exempt nearly four billion gallons of transportation fuel from any CI-reduction requirements. Additionally, under this alternative, the proposed ADF regulation would not be adopted by the Board.

This Alternative is likely to result in similar types of environmental impacts as under the proposed LCFS regulation. In addition, because development of innovative fuels (in particular ADFs) would not be incented, the number of new facilities necessary to meet demand, and thus environmental impacts related to construction and operation of new facilities would be reduced.

Because the proposed ADF regulation would not be adopted and only gasoline would be included in the proposed LCFS regulation, project objectives related to ADFs would not be met. In addition, compared to the Proposed Action, this alternative would not result in the same diversification of California's fuel portfolio, decrease reliance on fossil-based fuels, and would not incent innovation and investment in low-carbon gasoline fuel technologies.

This alternative is not anticipated to achieve the CI reduction objectives because it would only achieve a ten percent reduction in the CI of a portion of transportation fuels and would not regulate ADFs. This alternative would result in decreased GHG emissions, but to a lesser extent than under the proposed regulations. Because the proposed ADF regulation would not be implemented, NO_X and fine particulate matter ($PM_{2.5}$) emissions from alternative diesels would be greater than anticipated under the proposed LCFS and ADF regulations.

4. Alternatives Considered but Rejected

Additional alternatives were considered during scoping of the proposed LCFS and ADF regulations. The CEQA Guidelines section 15126.6(c) includes three factors that may be used to eliminate alternatives from detailed consideration in an EIR: "i. failure to meet most of the basic

project objectives; ii. infeasibility, or iii. inability to avoid significant environmental impact." The LCFS Standardized Regulatory Impact Assessment (SRIA) and ADF SRIA provide all alternatives proposed through public outreach efforts (available at www.arb.ca.gov).

a) Original Benefits Case Alternative

This alternative proposes to maintain the cumulative GHG emission reduction benefits estimated for the existing LCFS regulations, such that the LCFS achieves a 10 percent reduction in the CI of transportation fuels by 2020 from a 2010 baseline. Compared with the existing LCFS regulation, the proposed LCFS regulation is anticipated to result in slightly lower GHG emission reduction benefits by 2020 due to the Court's decision to freeze the implementation of the LCFS at 2013 levels (a 1 percent reduction in CI) during the re-adoption process, and because the proposed LCFS standards are less stringent than the 2010 standards in 2016 – 2018. To recover the lost GHG emissions reductions benefits, this alternative proposes setting the standards in 2016 – 2018 at more stringent levels than either the 2010 LCFS and the proposed LCFS regulation. This alternative is more stringent than the proposed LCFS regulation because it is requires more stringent reductions in carbon intensity in 2016 – 2018.

While the Original Benefits Alternative results in additional GHG emission reduction benefits compared with the proposed regulation, it achieves these emissions reductions by increasing the stringency of the standards in the early years (2016 – 2017). The proposed LCFS regulation provides additional flexibility due to its "back-loaded" nature: more reductions are required in the later than in the early years. This schedule allows for relatively high credit generation in the early years, and affords time for the development of advanced lower-CI fuels to become more plentiful and less expensive, and for the vehicles that utilize those fuels to achieve greater market penetration. A back-loaded compliance schedule also provides time for additional infrastructure to be built and logistics put in place to bring the fuels to market. Compared with the proposed LCFS regulation, this alternative requires greater volumes of low-CI fuels to be consumed in California in the early years of the analysis, resulting in increased demand for low-CI fuels and LCFS credits. ARB determined that, while this alternative would satisfy the 10 percent CI reduction by 2020 goal, it would occur at a higher cost and through reduced regulatory flexibility. In

addition, this alternative does not meet the CEQA requirements of reducing at least one significant environmental impact because necessary compliance responses to meet goals would not be substantially different, though they could occur at a faster rate. As a result, this alternative is considered to not be feasible and is not considered further.

b) Growth Energy Alternative

The Growth Energy (GE) Alternative was submitted in response to ARB's solicitation for alternatives. GE's alternative proposal retains the same mitigation options as the proposed ADF regulation. The main differences between staff's preliminary ADF proposal and the GE alternative are listed below:

- GE proposes treating animal and non-animal based biodiesel the same, by setting the significance level for both at zero percent, compared to staff's preliminary ADF proposal which sets the significance level at B1 for non-animal biodiesel and B5 for animal biodiesel.

- GE proposes eliminating the provisions for exemptions based on the use of new technology diesel engines (NTDEs), compared to staff's preliminary ADF proposal which provides exemptions for biodiesel used in NTDEs.

- GE proposes eliminating the sunset provision of staff's preliminary ADF proposal, compared to the staff proposal which would likely end mitigation for biodiesel in 2024.

Under the GE alternative, animal and non-animal biodiesel would be treated equally. Thus, renewable diesel would be blended with both animal and non-animal biodiesel at a ratio of 2.75:1 to mitigate NO_X emissions. For mitigation using additives, both animal and non-animal biodiesel would need to have one percent additive for a B20 blend to be mitigated.

The GE alternative would require mitigation of more fuel than the proposed ADF regulation; regulated parties would incur more costs to mitigate non-animal and animal based biodiesel similarly and setting the significance level for both at one percent. The GE alternative may achieve marginally more emissions benefits if biodiesel were to be widely used as an additive under staff's preliminary ADF proposal. Although the GE alternative is simpler than staff's preliminary ADF proposal,

the GE alternative is unnecessarily strict; staff's analysis of the science does not find that there are NO_X increases with B5 animal biodiesel or biodiesel used in NTDEs, so requiring mitigation for these does not achieve any additional emissions benefit versus staff's preliminary ADF proposal. As a result, to meet an increased demand for ADF specification requirements, additional infrastructure may be needed, thereby not reducing any potentially significant environmental effects. As a result, this alternative is considered to not be feasible and is not considered further.

c) National Biodiesel Board Alternative

The National Biodiesel Board (NBB) submitted an alternative to the proposed ADF regulation in response to ARB's solicitation for alternatives. The main differences between the proposed ADF regulation and the NBB alternative are listed below:

- NBB proposes setting the significance level for biodiesel at B10 for all biodiesel feedstocks (rather than B5 for animal-based biodiesel, and B10 for plant-based biodiesel).

- NBB proposes establishing an effective blend level that accounts for the impact of new technology diesel engines, renewable diesel, and animal biodiesel, versus per gallon mitigation in the proposal.

- NBB proposes a three year phase in period for the regulation, versus no phase in period in the proposed ADF regulation. This yields a slightly higher per year cost of infrastructure due to shorter amortization period.

The NBB alternative would treat animal and non-animal based biodiesel the same by setting the significance level for both at 10 percent annually by volume. The NBB alternative includes a three-year phase-in period; accordingly there are no costs for biodiesel mitigation in the first three years. Under the NBB alternative, mitigation would not be necessary until the statewide biodiesel content is up to 10 percent. After the 10 percent threshold has been reached, any additional biodiesel would be mitigated in the same way as the proposed ADF regulation.

The NBB alternative achieves substantially less emissions benefits than the proposed ADF regulation, and does not meet the project objectives to specify mitigation to reduce NO_X impacts by deferring to a three-year phase-in period, rather than an immediate requirement. Thus, this alternative is not considered further.

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ATTACHMENT 1: ENVIRONMENTAL AND REGULATORY SETTING

1. AESTHETICS

A. Existing Conditions

1. United States

The U.S., by virtue of its size, setting, and topographic and climate variation, exhibits tremendous scenic diversity. The varied landscape ranges from coastal to desert and valley to mountain. Innumerable natural features and settings combine to produce scenic resources that are treasured by residents and visitors alike.

Aesthetic value can be affected by visibility, which is directly related to the presence of airborne particles. Visibility-reducing particles consist of suspended particulate matter, a complex mixture of tiny particles consisting of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. Particles vary greatly in shape, size, and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt (ARB 2009).

2. California

Similar to the U.S., the visual character of California varies greatly related to topography and climate. The foothills form a transitional landform from the valley floor to the higher Sierra Nevada, Cascade, and Coast Ranges. The valley floor is cut by two rivers that flow west out of the Sierra Nevada and east out of the Coast Ranges. Irrigated agriculture land is the primary landscape in the Sacramento and San Joaquin Valleys, and the foothill landscape has been altered by grazing, mining, reservoir development, and residential and commercial development. The visual character of the state also varies dramatically from the north, which is dominated by forest lands, and the south, which is primarily residential and commercial development.

B. Regulatory Setting

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

Table 1: Applicable Laws and Regulations for Aesthetic Resources

Applicable Regulations	Description
Federal	
Federal Land Policy and Management Act of 1976 (FLPMA)	FLPMA is the enabling legislation establishing the Bureau of Land Management's (BLM's) responsibilities for lands under its jurisdiction. Section 102 (a) of the

Table 1: Applicable Laws and Regulations for Aesthetic Resources	
Applicable Regulations	**Description**
	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 resources, and archeological values…" Section 103(c) identifies "scenic values" as one of the resources for which public land should be managed.
BLM 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.
Natural 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." (Title 36 Code of Federal Regulations CFR (CFR) Part 800.5)
National Scenic Byways Program	Title 23, Sec 162 outlines the National Scenic Byways Program. This program is used to recognize roads having outstanding scenic, historic, cultural, natural, recreational, and archaeological qualities through designation of road as: National Scenic Byways; All-American Roads; or America's Byways. Designation of the byways provides eligibility for Federal assistance for safety improvement, corridor management plans, recreation access, or other project that protect scenic, historical, recreational, cultural, natural, and archaeological resources.
State	
Ambient Air Quality Standard for Visibility-Reducing Particles	Extinction coefficient (measure of absorption of light in a medium) of 0.23 per kilometer — visibility of 10 miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent.
California Streets and Highway Code, Section 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 to requirements of the California Scenic Highway Program.

Table 1: Applicable Laws and Regulations for Aesthetic Resources	
Applicable Regulations	**Description**
Local	
County and City Controls	Most local planning guidelines to preserve and enhance the visual quality and aesthetic resources of urban and natural areas are established in the jurisdiction's general plan. The value attributed to a visual resource generally is based on the characteristics and distinctiveness of the resource and the number of persons who view it. Vistas of undisturbed natural areas, unique or unusual features forming an important or dominant portion of a viewshed, and distant vistas offering relief from less attractive nearby features are frequently considered to be scenic resources. In some instances, a case-by-case determination of scenic value may be needed, but often there is agreement within the relevant community about which features are valued as scenic resources. In addition to federal and State designations, counties and cities have their own scenic highway designations, which are intended to preserve and enhance existing scenic resources. Criteria for designation are commonly included in the conservation/open space element of the city or county general plan.

2. AGRICULTURAL AND FOREST RESOURCES

A. Existing Conditions

1. United States

The 2012 Census of Agriculture recorded 2,109,303 farms in the U.S. The top five states, based on the value of agricultural products sold and on their percentage of the total value are: California (10.8 percent), Iowa (7.8 percent), Texas (6.4 percent), Nebraska (5.8 percent) and Minnesota (5.4 percent). Most states have laws in place to support agriculture and protect agricultural land.

Corn and soybeans grown in the U.S. are used in fuel production. Ethanol is primarily produced with corn in the U.S., and the U.S. is the largest ethanol producer. In 2008, the U.S. produced 42.3 million liters of ethanol (Climate Change Solutions et al. 2009). An estimated 4.7 billion bushels of corn was used for ethanol in 2010 and 4.9 billion bushels in 2011 (U.S. EIA 2012).

The U.S. is also a large producer of biodiesel fuel, which is produced primarily from soybean oil, but is also produced from vegetable oils and animal fats. Between October 2010 and September 2011, total biodiesel feedstock was 5.4 billion pounds, of which 2.7 billion pounds were soybean oil (U.S. EIA 2012).

2. California

California produces nearly half of the nation's grown fruits, nuts, and vegetables and is the nation's leading dairy state. California's agricultural abundance includes more than 400 commodities, many of which are produced solely in California. (*Ibid*.) Fresno County is the nation's most productive agricultural county, with $4.9 billion (1.3 percent of the total U.S. value) sold in 2012. Of California's approximately 100 million acres of land, 43 million acres are used for agriculture (ARB 2010).

Although California remains the nation's top agricultural producer, it and other states have experienced significant farmland loss as a result of urbanization. The California Department of Food and Agriculture estimates that about 3.4 million acres of land in California's agricultural counties are now urbanized. Other causes of agricultural land loss include the removal of agriculture for environmental purposes (such as the creation or enlargement of wildlife refuges) and withdrawals due to water shortages (ARB 2010).

With regards to conventional biofuel production, California produces only ten percent of the corn consumed in the state, mainly by livestock (beef and poultry). Current corn ethanol plants operating in the state import grain from the Midwest. Similarly, the state produces negligible amounts of soybean. Oil seeds produced in the state, including sunflower and safflower, are sold exclusively for human consumption (California Council on Science and Technology 2013).

3. Midwest

The majority of corn grown for ethanol production is grown in the Midwest. Nebraska has the 2nd largest ethanol operating production in the U.S. producing 1.6 billion gallons of ethanol, which is 12 percent of the nation's capacity of 13.8 billion gallons. Iowa has the largest capacity for producing ethanol at 3.7 billion gallons which is 27 percent of the nation's capacity (Renewable Fuels Association and Nebraska Energy Office 2014).

4. Areas Outside of the United States

Brazil is the world leader in ethanol produced with sugarcane. About half of Brazil's sugar is used to manufacture ethanol, and in 2006, 205 million tons of sugar cane was used to make 18 billion liters of ethanol, of which 3.5 billion liters was exported. Sugarcane production for ethanol is projected to increase 45 percent by 2016, and ethanol exports are projected to reach 4.8 million liters by 2016 (Climate Change Solutions et al. 2009). Brazil also exports ethanol produced with molasses. Approximately 80 percent of the sugarcane factories in Brazil are integrated factories that have sugar manufacturing co-located with an ethanol distillery. These facilities can use molasses as a feedstock for ethanol in addition to raw sugarcane juice (Szwarc 2009 cited in Gopal and Kammen 2009). Sugarcane growing regions are primarily concentrated in the mid-south and northeast areas of Brazil, and expansion of sugarcane production has resulted in conversion of former pastureland to sugarcane cultivation. It is likely that Brazil conversion of land to sugarcane production will continue as the demand for ethanol grows. Brazil has large savannas that could be brought into production of sugarcane without risk of deforestation. In addition, Brazil's Ministry of Agriculture, Livestock and Food Supply estimates the scope for cropland conversion in Brazil at 119 million hectares, with 69 million hectares in savannas and 50 million hectares from pastureland conversion (USDA 2011).

In addition to Brazil, Guatemala also produces ethanol from sugarcane and is the largest producer of sugarcane ethanol in Central America. Guatemala currently has five sugarcane plants that have the combined capacity to produce 269 million liters of ethanol. Guatemala also has the potential to produce much greater quantities of ethanol in the future (USDA Foreign Agricultural Service 2013a). Sugarcane growing regions of Guatemala are concentrated along the southern coast (CENGICAÑA 2014).

The other large producers of molasses ethanol include Central America and Indonesia. Indonesia has not produced fuel grade ethanol since 2010 because of a number of economic inefficiencies; however, Indonesia produced 1,335 thousand metric tons of molasses in 2013 and has a high potential for producing molasses based ethanol in the future (USDA Foreign Agricultural Service 2013b). Production of molasses ethanol in Central America and Indonesia differs from Brazil in that the sugarcane plants are physically and geographically separated from the plants producing molasses ethanol and molasses is produced as a low-value commodity that would otherwise be sold to the livestock feed market (ARB 2014). After the sugarcane has been

crushed and the cane juice has been sent to sugar production, molasses, which is a by-product of sugar production, is trucked to an ethanol distillery for fermentation and distillation (ARB 2013). In Central America, sugarcane is primarily grown in Guatemala, but is also grown in Honduras, Panama, and Nicaragua (USDA Foreign Agricultural Service 2013a). In Indonesia, sugarcane is grown primarily on the outer islands of Sumatra, Kalimantan Sulawesi, and Papua (USDA Foreign Agricultural Service 2012).

B. Regulatory Setting

Table 2 below provides a general description of applicable laws and regulations that may pertain to agriculture and forest resources.

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources

Applicable Regulations	Description
Federal	
Farmland Protection Policy Act (FPPA)	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.
National Forest Management Act (NFMA) of 1976	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. 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.
State	
The California Land Conservation Act, also known as the	The California Department of Conservation's (DOC's) Division of Land Resource Protection administers the Williamson Act program, which permits property tax adjustments for

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources	
Applicable Regulations	**Description**
Williamson Act (Government Code Section 51200)	landowners who contract with a city or county to keep their land in agricultural production or approved open space uses for at least 10 years. Lands covered by Williamson Act contracts are assessed on the basis of their agricultural value instead of their potential market value under nonagricultural uses. In return for the preferential tax rate, the landowner is required to contractually agree to not develop the land for a period of at least 10 years. Williamson Act contracts are renewed annually for 10 years unless a party to the contract files for nonrenewal. The filing of a non-renewal application by a landowner ends the automatic annual extension of a contract and starts a 9-year phase-out of the contract. During the phase-out period, the land remains restricted to agricultural and open-space uses, but property taxes gradually return to levels associated with the market value of the land. At the end of the 9-year non-renewal process, the contract expires and the owner's uses of the land are restricted only by applicable local zoning. The Williamson Act defines compatible use of contracted lands as any use determined by the county or city administering the agricultural preserve to be compatible with the agricultural, recreational, or open space use of land within the preserve and subject to contract (Government Code, Section 51202[e]). However, uses deemed compatible by a county or city government must be consistent with the principles of compatibility set forth in Government Code, Section 51238.1. Approximately 16 million acres of farmland (about 50 percent of the State's total farmland) are enrolled in the program.
California Farmland Conservancy Program (CFCP) (Public Resources Code [PRC] Section 10200)	The program 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.

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources	
Applicable Regulations	**Description**
Farmland Mapping and Monitoring Program (FMMP) (Government Code Section 65570, PRC Section 612)	Under the FMMP, the DOC assesses the location, quality, and quantity of agricultural lands and conversion of these lands over time. Agricultural designations include the categories of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up Land, and Other Land. FMMP uses the following definitions to describe farmland types. • Prime Farmland is defined by the DOC as "Land with the best combination of physical and chemical features able to sustain long term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for production of irrigated crops at some time during the past four years." • Farmland of Statewide Importance is defined by the DOC as "Land similar to Prime Farmland that has a good combination of physical and chemical characteristics for the production of agricultural crops. This land has minor shortcomings, such as greater slopes or less ability to store soil moisture than Prime Farmland. Land must have been used for production of irrigated crops at some time during the past four years." • Unique Farmland is defined by the DOC as "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 vineyard as found in some climatic zones in California."
State Lands Commission Significant Land Inventory	The State Lands Commission is responsible for managing lands owned by the State, including lands that the State has received from the federal government. These lands total more than 4 million acres and include tide and submerged lands, swamp and overflow lands, the beds of navigable waterways, and State School Lands. The State Lands Commission has a legal responsibility for, and a strong interest in, protecting the ecological and Public Trust values associated with the State's sovereign lands, including the use of these lands for habitat preservation, open space and recreation. Scoping Plan projects located within these lands would be subject to the State Lands Commission permitting process.
Local	
Open Space Element	State law requires each city and county to adopt a general plan containing at least seven mandatory elements including

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources	
Applicable Regulations	**Description**
	an open space element. The open space element identifies open space resources in the community and strategies for protection and preservation of these resources. Agricultural and forested lands are among the land use types identified as open space in general plans.
Zoning	The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different land uses and identifies which land uses (e.g., agriculture, residential, commercial, industrial) are allowed in the various zoning districts of the jurisdiction. Since 1971, state law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.

3. AIR QUALITY

A. Existing Conditions

Federal, State, and local governments all share responsibility for reducing air pollution. The California Air Resources Board (ARB) is California's lead air agency and controls emissions from mobile sources, fuels, and consumer products, as well as air toxics. ARB is responsible for developing measures to reduce greenhouse gas emissions. ARB also coordinates local and regional emission reduction measures and plans that meet federal and State air quality limits. At the federal level, the U.S. Environmental Protection Agency (EPA) has oversight of State programs. In addition, EPA alone establishes emission standards for certain mobile sources such as ships, trains, and airplanes.

1. Criteria Air Pollutants

Concentrations of emissions of criteria air pollutants are used to indicate the quality of the ambient air because these are the most prevalent air pollutants known to be deleterious to human health. A brief description of each CAP is provided below. Emission source types and health effects are summarized in Table 3.

Table 3: Sources and Health Effects of Criteria Air Pollutants			
Pollutant	**Sources**	**Acute[1] Health Effects**	**Chronic[2] Health Effects**
Ozone	Secondary pollutant resulting	Increased respiration and	Permeability of

Table 3: Sources and Health Effects of Criteria Air Pollutants			
Pollutant	**Sources**	**Acute[1] Health Effects**	**Chronic[2] Health Effects**
	from reaction of reactive organic gases (ROG) and oxides of nitrogen (NO_X) in presence of sunlight. ROG emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NO_X results from the combustion of fuels	pulmonary resistance; cough, pain, shortness of breath, lung inflammation	respiratory epithelia, possibility of permanent lung impairment
Carbon monoxide (CO)	Incomplete combustion of fuels; motor vehicle exhaust	Headache, dizziness, fatigue, nausea, vomiting, death	Permanent heart and brain damage
Nitrogen dioxide (NO_2)	Combustion devices; e.g., boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines	Coughing, difficulty breathing, vomiting, headache, eye irritation, chemical pneumonitis or pulmonary edema; breathing abnormalities, cough, cyanosis, chest pain, rapid heartbeat, death	Chronic bronchitis, decreased lung function
Sulfur dioxide (SO_2)	Coal and oil combustion, steel mills, refineries, and pulp and paper mills	Irritation of upper respiratory tract, increased asthma symptoms	Insufficient evidence linking SO_2 exposure to chronic health impacts
Respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$)	Fugitive dust, soot, smoke, mobile and stationary sources, construction, fires and natural windblown dust, and formation in The atmosphere by condensation and/or transformation of SO_2 and ROG	Breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, premature death	Alterations to the immune system, carcinogenesis
Lead	Metal processing	Reproductive/ developmental effects (fetuses and children)	Numerous effects including neurological, endocrine, and cardiovascular effects

[1] Acute" refers to effects of short-term exposures to criteria air pollutants, usually at

Table 3: Sources and Health Effects of Criteria Air Pollutants			
Pollutant	**Sources**	**Acute[1] Health Effects**	**Chronic[2] Health Effects**

relatively high concentrations.

[2] Chronic" refers to effects of long-term exposures to criteria air pollutants, even at relatively low concentrations.

Sources: EPA 2011.

2. Ozone

Ozone is a photochemical oxidant (a substance whose oxygen combines chemically with another substance in the presence of sunlight) and the primary component of smog. Ozone is not directly emitted into the air but is formed through complex chemical reactions between precursor emissions of reactive organic gases (ROG) and oxides of nitrogen (NO_X) in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that result from the combustion of fuels.

Emissions of the ozone precursors ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. During the last 20 years the maximum amount of ROG and NO_X over an 8-hour period decreased by 17 percent. However, most counties in California are in nonattainment for ozone.

3. Nitrogen Dioxide

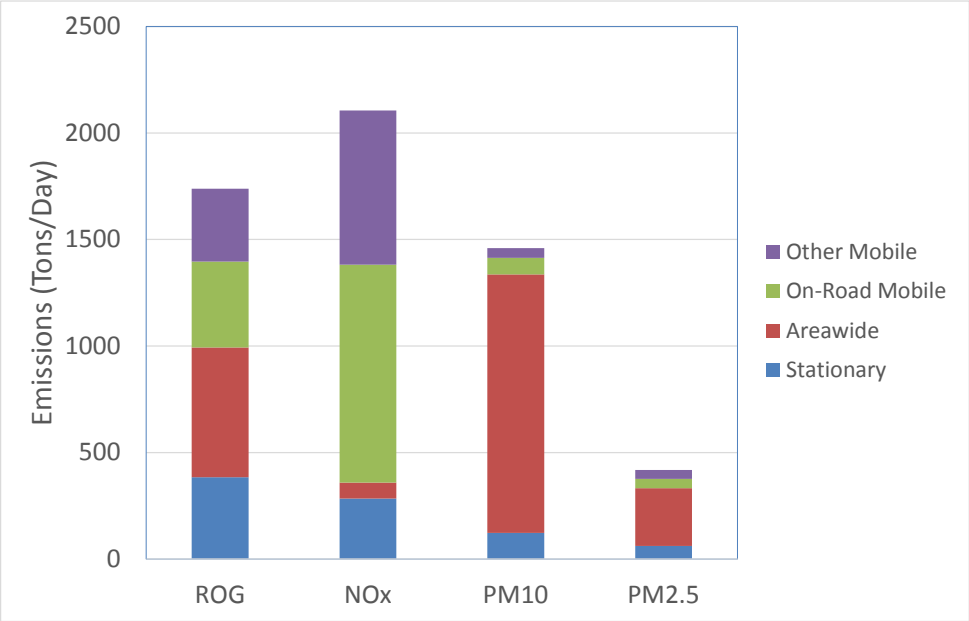
NO_2 is a brownish, highly-reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NO_X and are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local sources of NO_X emissions (EPA 2011).

4. Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction equipment, fires and natural windblown dust, and particulate matter formed in the atmosphere by reaction of gaseous precursors (ARB 2009). $PM_{2.5}$ includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. PM_{10} emissions in California are dominated by emissions from area sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and particles from residential fuel combustion. Direct emissions of PM_{10} have increased slightly in California over the last 20 years, and are projected to continue. $PM_{2.5}$ emissions have remained relatively steady over the last 20 years and are projected to increase slightly through 2020. Emissions of $PM_{2.5}$ are dominated by the same sources as emissions of PM_{10} (ARB 2009).

5. Emissions Inventory

Exhibit 1 summarizes emissions of CAPs within California for various source categories. According to California's emissions inventory, mobile sources are the largest contributor to the estimated annual average for air pollutant levels of ROG and NO_X accounting for approximately 43 percent and 83 percent, respectively, of the total emissions. Area wide sources account for approximately 83 percent and 65 percent of California's PM_{10} and $PM_{2.5}$ emissions, respectively (ARB 2013).



Source: ARB 2013
Exhibit 1 California 2012 Emissions Inventory

6. Toxic Air Contaminants

Concentrations of toxic air contaminants (TACs) are also used to indicate the quality of ambient air. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality* (ARB 2009), the majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most predominant being particulate-exhaust emissions from diesel-fueled engines (diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emissions control system is being used. Unlike some TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, ARB has made preliminary concentration estimates based on a PM exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several

studies to estimate concentrations of diesel PM. In addition to diesel PM, the TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, paradichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene.

Diesel PM poses the greatest health risk among these 10 TACs mentioned. Since 1990, the health risk associated with diesel PM has been in California has reduced by 52 percent. Overall, levels of most TACs, except paradichlorobenzene and formaldehyde, have decreased since 1990 (ARB 2009: Chapter 5).

7. Vulnerability to Climate Change

Climate scientists agree that global warming trends and other shifts in the climate system observed over the past century are almost certainly attributable to human activities and are proceeding at a rate that is unprecedented when compared with climate change that human society has lived through to date. Climate change is measured by examining recent shifts in the features (statistics, including extremes) that are associated with average weather, such as temperature, wind patterns, and precipitation, plus long-term trends in the great ice sheets, Arctic sea ice, and mean sea level. Since the development of the Scoping Plan, even stronger scientific evidence continues to mount that document that the climate is changing and that its impacts are widespread and occurring now. This evidence includes rising temperatures, shifting snow and rainfall patterns, and increased incidence of extreme weather events.

B. Regulatory Setting

Applicable laws and regulations associated with air quality are discussed in Table 4.

Table 4: Applicable Laws and Regulations for Air Quality

Regulation	Description
Federal	
Clean Air Act (CAA) (40 CFR)	CAA, which was last amended in 1990, requires the EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. CAA established two types of NAAQS: primary standards set limits to protect public health, including the health of “sensitive”

Table 4: Applicable Laws and Regulations for Air Quality	
Regulation	**Description**
	populations such as asthmatics, children, and the elderly; and 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 has set NAAQS for six principal pollutants, which are called "criteria" pollutants. Title III of the CAA directed the EPA to promulgate national emissions standards for Hazardous Air Pollutants. The CAA also required the EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.
SmartWay	SmartWay is an EPA program that reduces transportation-related emissions by creating incentives to improve supply chain fuel efficiency. It aims to increase the availability and market penetration of fuel efficient technologies and strategies that help freight companies save money while also reducing adverse environmental impacts.
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	
California Clean Air Act (CCAA) CCR (Titles 13 and 17)	ARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CCAA. The CCAA, which was adopted in 1988, required the ARB to establish California ambient air quality standards (CAAQS).
Waste Heat and Carbon Emissions Reduction Act	This Act is designed to encourage the development of new combined heat and power (CHP) systems in California with a generating capacity of not more than 20 megawatts. Section 2843 of the Act provides that the Energy Commission's guidelines require that CHP systems: be designed to reduce waste energy; have a minimum efficiency of 60 percent; have NO_X emissions of no more than 0.07 pounds per megawatt-hour; be sized to meet the eligible customer generation thermal load; operate continuously in a manner that meets the expected thermal load and optimizes the efficient use of waste heat; be cost effective, technologically feasible, and environmentally

Table 4: Applicable Laws and Regulations for Air Quality	
Regulation	**Description**
	beneficial.
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., AB 1807 and AB 2588).
Local	
Air Districts	Air Districts have primary responsibility for preparation, adoption, and implementation of mobile, stationary, and area emission control measures and for the preparation of the SIP and any amendments.

4. BIOLOGICAL RESOURCES

A. Existing Conditions

1. United States

The U.S. is comprised of many different biological provinces, or biomes, including tundras, coniferous forests, deciduous forests, grasslands, and deserts. Each biome provides a sanctuary to a diverse variety of biological species. Scientists have documented more than 200,000 species in the U.S. (The Nature Conservancy, 2002), representing more than 10 percent of the species worldwide.

2. California

California's diverse 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 U.S. and also has the greatest number of endemic species (i.e., species that occur only in the State).

Geographic and climatic forces have shaped the state's topography and soils. Glaciation, sedimentary and volcanic deposits, movement along fault zones, the uplift of subterranean rock and sediment layers, and gradual erosion have created unique topographical features and a mosaic of bedrock and soil types.

The state's geography and topography have created distinct local climates. North to south, the state extends for over 500 miles, bridging the temperate rainforests in the Pacific Northwest and the subtropical arid deserts of Mexico. Many parts of the state experience Mediterranean weather patterns, with cool, wet winters and hot, dry

summers. Along the northern coast there is abundant precipitation, and ocean air produces foggy, moist conditions. High mountains have cool conditions, with a deep winter snow pack. Desert conditions exist in the rain shadow of the mountain ranges.

The exceptional variation in landscape features, latitudinal range, geological substrates and soils, and climatic conditions supports alpine meadows, desert scrub, coastal wetlands, sandy beaches, dunes and bluffs, oak woodlands, diverse grasslands, moist redwood forests, spring-fed lakes, and freshwater streams, rivers, and marshes.

a) Plant Diversity

California leads the nation in numbers of native and endemic plant species. Its 5,047 native plant species represent 32 percent of all vascular plants in the U.S. Nearly one-third of the state's plant species are endemic, and California has been recognized as one of 34 global hotspots for plant diversity.

The state's native flora includes many unusual species. The giant sequoia, an ancient species that has survived from the Tertiary Age, is one of the most massive living organisms known. Coastal redwoods are the tallest trees in the world, reaching as high as 321 feet, taller than a 30-story building. A bristlecone pine in California's White Mountains, called Methuselah, at 4,767 years of age, has lived 1,000 years longer than any other known tree. California is home to the smallest flowering plant in existence, the pond-dwelling water-meal, less than one-tenth of an inch across. The state also supports nine species of carnivorous plants, including sundews, butterworts, and the California pitcher plant. Numerous species have adapted to grow on serpentine soils that are low in calcium, high in magnesium, and full of chromium, nickel, and other metals toxic to other plant species. Closed-cone conifer species, such as pygmy cypress and some chaparral plants, need hot fires to complete their life cycles.

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. 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.

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 (CDFG 2007).

b) Wildlife Diversity

California'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 U.S.); 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 are endemic to California.

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. Other community types may be especially important to a particular species or species group. For example, California's rocky offshore islands typically support a limited number of species but are nonetheless important habitat for those species that depend on them for nesting; the islands host some of the largest breeding colonies of seabirds in the U.S. In addition, California is part of the Pacific Flyway, an avian migratory pathway that stretches along the Pacific Coast from Mexico north to Alaska and into Siberia, Russia (CDFG 2007).

3. Areas Outside of the United States

Brazil is one of the most biodiverse countries in the world, accounting for 20 percent of the worlds biodiversity. Brazil has more than 103,800 animal species and between 43,000 and 49,000 plant species. The country is divided into six biomes: Amazon, Pantanal, Cerrado, Caatinga, Atlantic, and Pampa (Secretariat for Social Communication 2012).

Central America is only 0.1 percent of the world's landmass, but accounts for 7 percent of the world's biodiversity. The southern countries (Costa Rica and Panama) are the most biodiverse, followed by the northern countries (Guatemala and Belize), and then the central countries (Honduras, Nicaragua and El Salvador) (The Nature Conservancy 2014). Indonesia's archipelago comprises approximately 17,000 islands that include seven major biogeographic regions. Indonesia is also a biodiverse country, possessing 10 percent of the world's flowering species (estimated 25,000 flowering plants). Approximately 12 percent of the world's mammals occur in Indonesia, ranking it second, after Brazil, at the global level (Convention on Biological Diversity 2014).

B. Regulatory Setting

Applicable laws and regulations associated with biological resources are discussed in Table 5.

Table 5: Applicable Laws and Regulations for Biological Resources

Applicable Law	Description
Federal	
Federal Endangered Species Act (ESA)	Designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat. Two sections of the ESA address take of threatened and endangered species. Section 7 covers actions that would result in take of a federally-listed species and have a federal discretionary action. Section 10 regulates actions that would result in take of threatened or endangered species and a non-federal agency is the lead agency for the action. Section 10 of the ESA requires preparation of a habitat conservation plan (HCP). More than 430 HCPs have been approved nation-wide (USFWS 2005).
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.

Table 5: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
Clean Water Act (CWA)	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.
EPA Section 404 (b)(1) Guidelines	Requires USACE to analyze alternatives in a sequential approach such that USACE must first consider avoidance and minimization of impacts to the extent practicable to determine whether a proposed discharge can be authorized.
California Desert Conservation Area Plan (CDCA)	Comprises one of two national conservation areas established by Congress in 1976. FLPMA outlines how 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.

Table 5: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
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 U.S. Fish and Wildlife Service (USFWS) that shall promote the conservation of migratory bird populations.
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	Establishes special status species policy on BLM land for plant and animal species and the habitats on which they depend. The policy refers to species designated by the BLM State Director as sensitive.
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 include, but are not limited to, the Desert Tortoise Recovery Plan, Flat-tailed Horned Lizard Rangewide Management Strategy; Amargosa Vole Recovery Plan; and Recovery Plan for Upland Species of the San Joaquin Valley.
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
Natural Community Conservation Planning (NCCP) Act 1991	The primary objective of the NCCP program is to conserve natural communities at the ecosystem level while accommodating compatible land use. An NCCP identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. There are currently 23 NCCPs that have been adopted or are in progress in California (CDFW 2014).
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

Table 5: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
	maintain these standards.
Wetlands Preservation (Keene-Nejedly California Wetlands Preservation Act) (PRC, 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 (PRC, Section 5093.30 et seq.)	Establishes a California wilderness preservation system that consists 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.
Fully Protected Species (Fish and Game Code Sections 3511,4700, 5050, and 5515)	Identifies several amphibian, reptile, fish, bird, and mammal species that are Fully Protected. The California Department of Fish and Wildlife (CDFW) cannot issue a take permit for these species, except for take related to scientific research.
California Environmental Quality Act (CEQA Guidelines 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

Table 5: Applicable Laws and Regulations for Biological Resources	
Applicable Law	**Description**
	Native Plant Society (CNPS) and some animals on the CDFW's Special Animals List.
Oak Woodlands (California PRC 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 CDFW 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.
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.
Local	
Various City and County General Plans	General plans typically designate areas for land uses, 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.

5. CULTURAL RESOURCES

A. Existing Conditions

1. United States

Cultural resources include archaeological sites of prehistoric or historic origin, built or architectural resources older than 50 years, traditional or ethnographic resources, and fossil deposits of paleontological importance. America has a cultural heritage that dates back to some 25,000-60,000 years ago, when the first known inhabitants of the land that would eventually become the U.S. crossed the Bering land bridge into Alaska.

All areas within the U.S. have the potential for yielding as yet undiscovered archaeological and paleontological resources and undocumented human remains not interred in cemeteries or marked formal burials. These resources have the potential to contribute to our knowledge of the fossil record or local, regional, or national prehistory or history.

Archaeological resources include both prehistoric and historic remains of human activity. Built environment resources include an array of historic buildings, structures, and objects serving as a physical connection to America's past. Traditional or ethnographic cultural resources may include Native American sacred sites and traditional resources of any ethnic community that are important for maintaining the cultural traditions of any group. "Historical resources" is a term with defined statutory meaning and includes any prehistoric or historic archaeological site, district, built environment resource, or traditional cultural resource recognized as historically or culturally significant (PRC Section 21084.1; CEQA Guidelines Section 15064.5(a)). Paleontological resources, including mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains, are more than 5,000 years old and occur mainly in Pleistocene or older sedimentary rock units.

2. California

a) Prehistoric Overview

California was occupied by different prehistoric cultures dating to at least 12,000 to 13,000 years ago. Evidence for the

presence of humans during the Paleoindian Period prior to about 8,000 years ago is relatively sparse and scattered throughout the State; most surface finds of fluted Clovis or Folsom projectile points or archaeological sites left by these highly mobile hunter-gatherers are associated with Pleistocene lakeshores, the Channel Islands, or the central and southern California coast (Rondeau et al. 2007). Archaeological evidence from two of the Northern Channel Islands located off the coast from Santa Barbara indicates the islands were colonized by Paleoindian peoples at least 12,000 years ago, likely via seaworthy boats (Erlandson et al. 2007). By 10,000 years ago, inhabitants of this coastal area were using fishhooks, weaving cordage and basketry, hunting marine mammals and sea birds, and producing ornamental shell beads for exchange with people living in the interior of the State (Erlandson et al. 2007). This is the best record of early maritime activity in the Americas, and combined with the fluted points, indicates California was colonized by both land and sea during the Paleoindian period (Jones and Klar 2007).

With climate changes between 10,000 and 7,000 years ago at the end of the Pleistocene and into the early Holocene, Lower Archaic peoples adjusted to the drying of pluvial lakes, rise in sea level, and substantial alterations in vegetation communities. Approximately 6,000 years ago, vegetation communities similar to those of the present were established in the majority of the state, while the changes in sea level also affected the availability of estuarine resources (Jones and Klar 2007). The archaeological record indicates subsistence patterns during the Lower Archaic and subsequent Middle Archaic Period shifted to an increased emphasis on plant resources, as evidenced by an abundance of milling implements in archaeological sites dating between 8,000 and 3,000 years ago.

Approximately 3,000 years ago, during the Upper Archaic and Late Prehistoric Periods, the complexity of the prehistoric archaeological record reflects increases in specialized adaptations to locally available resources such as acorns and salmon, in permanently occupied settlements, and in the expansion of regional populations and trade networks (Moratto 1984; Chartkoff and Chartkoff 1984; Jones and Klar 2007). During the Upper Archaic, marine shell beads and obsidian continue to be the hallmark of long-distance trade and exchange networks developed during the preceding period (Hughes and Milliken 2007). Large shell midden/mounds at coastal and

inland sites in central and southern California, for example, attest to the regular reuse of these locales over hundreds of years or more from the Upper Archaic into the Late Prehistoric period. In the San Francisco Bay region alone, over 500 shell mounds were documented in the early 1900s (Moratto 1984).

Changes in the technology used to pursue and process resources are some of the hallmarks of the Late Prehistoric period. These include an increase in the prevalence of mortars and pestles, a diversification in types of watercraft and fishhooks, and the earliest record for the bow and arrow in the State that occurs in both the Mojave Desert and northeast California nearly 2,000 years ago (Jones and Klar 2007). The period also witnessed the beginning of ceramic manufacture in the southeast desert region, southwest Great Basin, and parts of the Central Valley.

During the Late Prehistoric period, the development of social stratification and craft specialization accompanied the increase in sedentism, as indicated by the variety of artifacts, including bone tools, coiled and twined basketry, obsidian tools, marine shell beads, personal ornaments, pipes, and rattles, by the use of clamshell disk beads and strings of dentalium shell as a form of currency, and by variation in burial types and associated grave goods (Moratto 1984; Chartkoff and Chartkoff 1984; Jones and Klar 2007). Pictographs, painted designs that are likely less than 1,000 years old, and other non-portable rock art created during this period likely had a religious or ceremonial function (Gilreath 2007). Osteological evidence points to intergroup conflict and warfare in some regions during this period (Jones and Klar 2007), and there also appears to have been a decline or disruption in the long-distance trade of obsidian and shell beads approximately 1,200 years ago in parts of the State (Hughes and Milliken 2007).

b) Ethnographic Overview

At the time of European contact, California was the home of approximately 310,000 indigenous peoples with a complex of cultures distinguished by linguistic affiliation and territorial boundaries (Kroeber 1925, Cook 1978, Heizer 1978, Ortiz 1983, d'Azevedo 1986). At least 70 distinct native Californian cultural groups, with even more subgroups, inhabited the vast lands within the State. The groups and subgroups spoke between 74

and 90 languages, plus a large number of dialects (Shipley 1978: p. 80, University of California at Berkeley 2009-2010).

In general, these mainly sedentary, complex hunter-gatherer groups of indigenous Californians shared similar subsistence practices (hunting, fishing, and collecting plant foods), settlement patterns, technology, material culture, social organization, and religious beliefs (Kroeber 1925, Heizer 1978, Ortiz 1983, d'Azevedo 1986). Permanent villages were situated along the coast, interior waterways, and near lakes and wetlands. Population density among these groups varied, depending mainly on availability and dependability of local resources, with the highest density of people in the northwest coast and Santa Barbara Channel areas and the least in the State's desert region (Cook 1976). Networks of foot trails were used to connect groups to hunting or plant gathering areas, rock quarries, springs or other water sources, villages, ceremonial places, or distant trade networks (Heizer 1978).

The social organization of California's native peoples varied throughout the State, with villages or political units generally organized under a headman who was also the head of a lineage or extended family or achieved the position through wealth (Bean 1978). For some groups, the headman also functioned as the religious ceremonial leader. Influenced by their Northwest Coast neighbors, the differential wealth and power of individuals was the basis of social stratification and prestige between elites and commoners for the Chilula, Hupa, Karok, Tolowa, Wiyot, and Yurok in the northwest corner of the State. Socially complex groups were also located along the southern California coast where differential wealth resulted in hierarchical classes and hereditary village chiefs among the Chumash, Gabrielino, Juaneño, and Luiseño (Bean and Smith 1978, Arnold and Graesch 2004).

At the time of Spanish contact, religious practices among native Californian groups varied, but ethnographers have recognized several major religious systems (Bean and Vane 1978: pp. 662-669). Many of the groups in the north-central part of the State practiced the *Kuksu* cult, primarily a ceremonial and dance organization, with a powerful shaman as the leader. Log drums, flutes, rattles, and whistles accompanied the elaborate ceremonial dances. The World Renewal cult in the northwestern corner of the State extended as far north as Alaska, entailed a variety of annual rites to prevent natural

disasters, maintain natural resources and individual health, and were funded by the wealthy class. The *Toloache* cult was widespread in central and southern California and involved the use of narcotic plant (commonly known as datura or jimsonweed) materials to facilitate the acquisition of power. On the southern coast among Takic-speaking groups, the basis of Gabrielino, Juaneño, and Luiseño religious life was the *Chinigchinich* cult, which appeared to have developed from the Toloache cult. Chinigchinich, the last of a series of heroic mythological figures, gave instruction on laws and institutions, taught people how to dance, and later withdrew into heaven where he rewarded the faithful and punished those who disobeyed his laws. The Chinigchinich religion seems to have been relatively new when the Spanish arrived, and could have been influenced by Christianity.

Trade and exchange networks were a significant part of the economy and social organization among California's Native American groups (Heizer 1978). Obsidian, steatite, beads, acorns, baskets, animal skins, and dried fish were among the variety of traded commodities. Inland groups supplied obsidian from sources along the Sierra Nevada Mountains, in Napa Valley, and in the northeast corner of the State. Coastal groups supplied marine shell beads, ornaments, and marine mammal skins. In addition to trading specific items, clamshell disk beads made from two clam species available on the Pacific coast were widely used as a form of currency (Kroeber 1922). In northwestern California, groups used strings of dentalium shell as currency.

The effect of Spanish settlement and missionization in California marks the beginning of a devastating disruption of native culture and life ways, with forced population movements, loss of land and territory (including traditional hunting and gathering locales), enslavement, and decline in population numbers from disease, malnutrition, starvation, and violence during the historic period (Castillo 1978). In the 1830s, foreign disease epidemics swept through the densely populated Central Valley, adjacent foothills, and North Coast Ranges decimating indigenous population numbers (Cook 1978). By 1850, with their lands, resources and way of life being overrun by the steady influx of non-native people during the Gold Rush, California's native population was reduced to about 100,000; by 1900, there were only 20,000 or less than seven percent of the pre-contact number. Existing reservations were created in California by the federal

government beginning in 1858 but encompass only a fraction of native lands.

In 2004, the Native American population in California was estimated at over 383,000 (OPR 2005). Although acknowledged as non-federally recognized California Native American tribes on the contact list maintained by the Native American Heritage Commission (NAHC), many groups continue to await federal tribal status recognition. As of 2005, there were 109 federally recognized tribes within the state, along with dozens of non-federally recognized tribes. Members of these tribes have specific cultural beliefs and traditions with unique connections to areas of California that are their ancestral homelands.

c) Historic Overview

Post-contact history for the State is generally divided into the Spanish period (1769–1822), Mexican period (1822–1848), and American period (1848–present). The establishment of Fort Ross by Alaska-based Russian traders also influenced post-contact history for a short period (1809–1841) in the region north of San Francisco Bay. Although there were brief visits along the Pacific coast by European explorers (Spanish, Russian, and British) between 1529 and 1769 of the territory claimed by Spain, the expeditions did not journey inland.

i) Spanish Period (1769–1822)

Spain's colonization of California began in 1769 with the overland expeditions from San Diego to San Francisco Bay by Lt. Colonel Gaspar de Portolá, and the establishment of a mission and settlement at San Diego. Between 1769 and 1823, the Spanish and the Franciscan Order established a series of 21 missions paralleling the coast along El Camino Real between San Diego and Sonoma (Rolle 1969). Between 1769 and 1782, Spain built four presidios (San Diego, Monterey, San Francisco, and Santa Barbara) to protect the missions, and by 1871 had established two additional pueblos at Los Angeles and San José.

Under Spanish law, large tracts of land, including cattle ranches and farms, fell under the jurisdiction of the missions. Native Americans were removed from their

traditional lands, converted to Christianity, concentrated at the missions, and used as labor on the mission farms and ranches (Castillo 1978). Since the mission friars had civil as well as religious authority over their converts, they held title to lands in trust for indigenous groups. The lands were to be repatriated once the native peoples learned Spanish laws and culture.

ii) Russian Period (1809–1841)

In 1809, Alaska-based Russians started exploring the northern California coast with the goal of hunting otter and seal and feeding their Alaskan colonies. The first Russian settlement was established in 1811–1812 by the Russian–American Fur Company to protect the lucrative marine fur trade and to grow produce for their Alaskan colonies. In 1841, as a result of the decline in local sea otter population and the failure of their agricultural colony, combined with a change in international politics, the Russians withdrew from California (Schuyler 1978).

iii) Mexican Period (1822–1848)

Following independence from Spain in 1822, the economy during the Mexican period depended on the extensive rancho system, carved from the former Franciscan missions and at least 500 land grants awarded in the State's interior to Mexican citizens (Beck and Haase 1974; Staniford 1975). Captain John Sutter, who became a Mexican citizen, received the two largest land grants in the Sacramento Valley. In 1839, Sutter founded the trading and agricultural empire named New Helvetia that was headquartered at Sutter's Fort, near the confluence of the Sacramento and American Rivers in today's City of Sacramento (Hoover et al. 2002).

Following adoption of the Secularization Act of 1833, the Mexican government privatized most Franciscan lands, including holdings of their California missions. Although secularization schemes had called for redistribution of lands to Native American neophytes who were responsible for construction of the mission empire, the vast mission lands and livestock holdings were instead redistributed by the Mexican government through several hundred land grants to private, non-indigenous ranchers

(Castillo 1978, Hoover et al. 2002). Most Native American converts returned to traditional lands that had not yet been colonized or found work with the large cattle ranchos being carved out of the mission lands.

iv) American Period (1848–present)

In 1848, shortly after California became a territory of the U.S. with the signing of the Treaty of Guadalupe Hidalgo ending Mexican rule, gold was discovered on the American River at Sutter's Mill in Coloma. The resulting Gold Rush era influenced the history of the State, the nation, and the world. Thousands of people flocked to the gold fields in the Mother Lode region that stretches along the western foothills of the Sierra Nevada Mountains, and to the areas where gold was also discovered in other parts of the State, such as the Klamath and Trinity River basins (Caltrans 2008). In 1850, California became the 31st state, largely as a result of the Gold Rush.

d) Paleontological Setting

California's fossil record is exceptionally prolific with abundant specimens representing a diverse range of marine, lacustrine, and terrestrial organisms recovered from Precambrian rocks as old as 1 billion years to as recent as 6,000 year-old Holocene deposits (refer to geologic timescale in Table 6). These fossils provide key data for charting the course of the evolution or extinction of a variety of life on the planet, both locally and internationally. Paleontological specimens also provide key evidence for interpreting paleoenvironmental conditions, sequences and timing of sedimentary deposition, and other critical components of the earth's geologic history. Fossils are considered our most significant link to the biological prehistory of the earth (Jefferson 2004).

Table 6: Divisions of Geologic Time

Era	Period	Time in Millions of Years Ago (approximately)	Epoch
Cenozoic	Quaternary	< 0.01	Holocene
		2.6	Pleistocene
	Tertiary	5.3	Pliocene

Table 6: Divisions of Geologic Time			
Era	**Period**	**Time in Millions of Years Ago (approximately)**	**Epoch**
		23	Miocene
		34	Oligocene
		56	Eocene
		65	Paleocene
Mesozoic	Cretaceous	145	
	Jurassic	200	
	Triassic	251	
Paleozoic	Permian	299	
	Carboniferous	359	
	Devonian	416	
	Silurian	444	
	Ordovician	488	
	Cambrian	542	
Precambrian		2,500	
Source: USGS Geologic Names Committee 2010			

Because the majority of the State was underwater until the Tertiary period, marine fossils older than 65 million years are not common and are exposed mainly in the mountains along the border with Nevada and the Klamath Mountains, and Jurassic shales, sandstones, and limestones are exposed along the edges of the Central Valley, portions of the Coast, Transverse, and Peninsular Ranges, and the Mojave and Colorado Deserts. Some of the oldest fossils in the State, extinct marine vertebrates called conodonts, have been identified at Anza-Borrego Desert SP in Ordovician sediments dating to circa 450 million years ago. Limestone outcrops of Pennsylvanian and Permian in the Providence Mountains SRA contain a variety of marine life, including brachiopods, fusulinids, crinoids, that lived some 300 to 250 million years ago.

Fossils from the Jurassic sedimentary layers in San Joaquin, San Luis Obispo, and Stanislaus counties include ammonites, bivalves, echinoderms and marine reptiles, all of which were common in the coastal waters. Gymnosperms (seed-bearing plants) such as cycads, conifers, and ginkgoes are preserved in terrestrial sediments from this period, evidence that the Jurassic

climate was warm and moderately wet. In the great Central Valley, marine rocks record the position of the Cretaceous shoreline as the eroded ancestral Sierra Nevada sediments were deposited east of the rising Coast Ranges and became the rock layers of the Sacramento and San Joaquin valleys. These Cretaceous sedimentary deposits have yielded abundant fossilized remains of plants, bivalves, ammonites, and marine reptiles (Paleontology Portal 2003).

Along coastal southern California where steep coastal mountains plunged into the warm Pacific Ocean an abundance of fossil marine invertebrates, such as ammonites, nautilus, tropical snails and sea stars, have been found in today's coastal and near-coastal deposits from the Cretaceous Period. A rare armored dinosaur fossil dated to about 75 million years ago during the Cretaceous was discovered in San Diego County during a highway project. It is the most complete dinosaur skeleton ever found in California (San Diego Natural History Museum 2010). The lack of fossil remains of the majority of earth's large vertebrates, particularly terrestrial, marine, and flying reptiles (dinosaurs, ichthyosaurs, mosasaurs, pleisosaurs, and pterosaurs), as well as many species of terrestrial plants, after the end of the Cretaceous and the start of the Tertiary periods 65 million years ago (the K-T boundary) attests to their abrupt extinction.

B. Regulatory Setting

Applicable laws and regulations associated with cultural resources are discussed in Table 7.

Table 7: Applicable Laws and Regulations for Cultural Resources

Applicable Regulation	Description
Federal	
NHPA of 1966	The NHPA 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

Table 7: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
	listing, in the NRHP.
National Environmental Policy Act (NEPA) of 1969	NEPA 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 major federal actions significantly affecting environmental quality, federal agencies must prepare, and make available for public comment, an environmental impact statement.
Archaeological Resources Protection Act of 1979 (NRPA)(16 USC 470aa-470II)	NRPA 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.
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (PL 101–601)	NAGPRA 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.
Advisory Council Regulation, Protection of Historic Properties (SHPO) (36 CFR 800)	Establishes procedures for compliance with Section 106 of the NHPA. 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	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.

Table 7: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
Places (NRHP) (36 CFR 60)	
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).
American Indian Religious Freedom Act of 1978	The American Indian Religious Freedom Act pledges to protect and preserve the traditional religious rights of American Indians, Aleuts, Eskimos, and Native Hawaiians. Before the act was passed, certain federal laws interfered with the traditional religious practices of many American Indians. The Act establishes a national policy that traditional Native American practices and beliefs, sites (and right of access to those sites), and the use of sacred objects shall be protected and preserved.
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 FHA, FTA, and 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	
California Health and Safety Code Section and California PRC, Section	Disturbance of human remains without the authority of law is a felony (California Health and Safety Code, Section 7052). According to State law (California Health and Safety Code, Section 7050.5, California PRC, Section 5097.98), if human remains are discovered or recognized in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected

Table 7: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
	to overlie adjacent human remains until 1) the coroner of the county has been informed and has determined that no investigation of the cause of death is required; 2) and if the remains are of Native American origin, and if the descendants from the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of with appropriate dignity the human remains and any associated grave goods as provided in PRC Section 5097.98; or the Native American Heritage Commission was unable to identify a descendent or the descendent failed to make a recommendation within 24 hours after being notified by the Commission. According to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the Native American Heritage Commission, who has jurisdiction over Native American remains (California Health and Safety Code, 7052.5c; PRC, Section 5097.98).
California Environmental Quality Act (Guidelines Section 15380)	CEQA requires that public agencies financing or approving public or private projects must assess the effects of the project on cultural resources. Furthermore, it requires that, if a project results in significant impacts on important cultural resources, alternative plans or mitigation measures must be considered; only significant cultural resources, however, need to be addressed. Thus, prior to the development of mitigation measures, the importance of cultural resources must be determined.
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 PRC). Therefore, local county and municipal policies, procedures, and zoning ordinances must be considered in the context of project-specific undertakings. Cultural resources are generally discussed in either the open

Table 7: Applicable Laws and Regulations for Cultural Resources	
Applicable Regulation	**Description**
	space element or the conservation element of the general plan. Many local municipalities include cultural resources preservation elements in their general plans that include some mechanism pertaining to cultural resources in those communities. In general, the sections pertaining to archaeological and historical properties are put in place to afford the cultural resources a measure of local protection. The policies outlined in the individual general plans should be consulted prior to any undertaking or project.
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 requiring permits (California Public Utilities Commission [CPUC], BLM) to complete archaeological investigations and employ the Secretary of Interior's Professional Qualification Standards and Guidelines (36 CFR 61).

6. ENERGY DEMAND

A. Existing Conditions

1. United States

The major energy sources consumed in the U.S. are petroleum (oil), natural gas, coal, nuclear, and renewable energy. The major users are residential and commercial buildings, industry, transportation, and electric power generators. The pattern of fuel use varies widely by sector. For example, oil provides 93 percent of the energy used for transportation, but only about 1 percent of the energy used to generate electric power (U.S. EIA 2013a).

2. California

Excluding Federal offshore areas, California ranks third in the Nation in crude oil production in 2014. California ranks third in the Nation in conventional hydroelectric generation, second in net electricity generation from other renewable energy resources, and first as a producer of electricity from geothermal energy (in 2012). In 2012, California, left with one remaining nuclear power plant after the San Onofre Nuclear Generating Station was permanently shut down in

2012, ranked fourteenth in net electricity generation from nuclear power plants and eighth in nuclear net summer capacity. Average site electricity consumption in California homes is among the lowest in the nation (6.9 megawatt hours per year), according to the Energy Information Administration's (EIA's) Residential Energy Consumption Survey last conducted in 2009. In 2012, California's per capita energy consumption ranked 49th in the Nation, due in part to its mild climate and energy efficiency programs (U.S. EIA 2013b).

In 2013, California's in-state electricity generation sources consisted of: 44.3 percent natural gas, 18.8 percent renewable sources, 8.8 percent nuclear, 7.8 percent large hydropower, and 7.8 percent from coal. Approximately 63 percent of total electricity generation was from in-state sources, with the remaining electricity coming from out-of-state imports from the Pacific Northwest (12 percent) and the Southwest (21 percent) (CEC 2014a).

In 2012, Californians consumed 274,449 gigawatt hours (GWh) of electricity and 12,897 million therms of natural gas, primarily in the commercial, residential, and industrial sectors. A California Energy Commission (CEC) staff forecast of future energy demand shows that electricity consumption will grow by between 0.79 and 1.56 percent per year between 2014 and 2024; and natural gas consumption is expected to reach up to 12,801 million therms by 2024 for an annual average growth rate of up to 0.02 percent (CEC 2014b).

The CEC is the State's primary energy policy and planning agency. Created by the Legislature in 1974, and located in Sacramento, six basic responsibilities guide the CEC as it sets state energy policy: forecasting future energy needs; promoting energy efficiency and conservation by setting the State's appliance and building efficiency standards; supporting public interest energy research that advances energy science and technology through research, development and demonstration programs; developing renewable energy resources and alternative renewable energy technologies for buildings, industry and transportation; licensing thermal power plants 50 megawatts or larger; and planning for and directing state response to energy emergencies.

The CPUC also plays a key role in regulating investor-owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies. The CPUC regulates investor-owned electric and natural gas utilities operating in California, including Pacific Gas and Electric Company, Southern California Edison, San Diego Gas and Electric Company, and Southern California Gas Company.

B. Regulatory Setting

Applicable laws and regulations associated with energy resources are discussed in Table 8.

Table 8: Applicable Laws and Regulations for Energy Resources	
Regulation	**Description**
Federal	
Energy Policy and Conservation Act	The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration, which is part of the U.S. Department of Transportation (USDOT), is responsible for establishing additional vehicle standards and for revising existing standards. From 1986 to 2012, fuel economy standards for passenger vehicles remained nearly stagnant at between 20.7 mpg for trucks and 27.5 mpg for light duty cars. In 2010, EPA adopted new passenger vehicle standards starting with the 2012 model year that incorporates GHG emissions standards on a vehicle-footprint basis and to accommodate the efficiencies of electric and other alternatively fueled vehicles. Additional standards for models years through 2025 were adopted in 2012. Translating the GHG standards to miles per gallon equivalents, the projected fuel economy standard for new passenger cars and light trucks combined would increase from 30.1 to 54.5 between 2012 and 2025 model years. Until 2010, heavy-duty vehicles (i.e., vehicles and trucks over 8,500 pounds gross vehicle weight) were not subject to fuel economy standards. In 2011, NHTSA and EPA released fuel economy standards for medium and heavy-duty vehicles (over 8,500 pounds gross vehicle weight) for 2014 through 2018 model years. Fuel economy standards for these vehicles vary by vehicle profession and include explicit mpg goals as well as percent reduction targets. Stricter fuel economy standards for medium and heavy-duty vehicles are expected in 2015. Compliance with federal fuel economy standards is determined on the basis of each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, administered by the EPA, was created to determine vehicle

Table 8: Applicable Laws and Regulations for Energy Resources	
Regulation	**Description**
	manufacturers' compliance with the fuel economy standards. The EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, the USDOT is authorized to assess penalties for noncompliance.
Energy Policy Act (EPAct) of 1992	EPAct was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.
Energy Policy Act of 2005	The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.
State	
Warren-Alquist State Energy Resources Conservation and Development Act of 1974	The Warren-Alquist Act is the legislation that created and gives statutory authority to the CEC (formally called the State Energy Resources Conservation and Development Commission).
Integrated Energy Policy Reports (SB 1389)	Senate Bill 1389 (Bowen, Chapter 568, Statutes of 2002) requires the CEC to prepare a biennial integrated energy policy report that contains an assessment of major energy trends and issues facing the State's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the State's economy; and protect public health and safety (PRC Section 25301[a]). The CEC prepares

Table 8: Applicable Laws and Regulations for Energy Resources	
Regulation	**Description**
	these assessments and associated policy recommendations every 2 years, with updates in alternate years, as part of the Integrated Energy Policy Report (IEPR). Preparation of the IEPR involves close collaboration with federal, state, and local agencies and a wide variety of stakeholders in an extensive public process to identify critical energy issues and develop strategies to address those issues (CEC 2012).
California Long-Term Energy Efficiency Strategic Plan	On September 18, 2008, the CPUC adopted California's first Long Term Energy Efficiency Strategic Plan, presenting a single roadmap to achieve maximum energy savings across all major groups and sectors in California. This comprehensive plan for 2009 to 2020 is the State's first integrated framework of goals and strategies for saving energy, covering government, utility, and private sector actions, and holds energy efficiency to its role as the highest priority resource in meeting California's energy needs. The plan was updated in January 2011 to include a lighting chapter.
California Building Energy Efficiency Standards (24 CCR Part 6)	California's Building Energy Efficiency Standards conserve electricity and natural gas in new building construction and are administered by the CEC. Local governments enforce the standards through local building permitting and inspections. The CEC has updated these standards on a periodic basis. The new 2013 Building Energy Efficiency Standards, which take effect on January 1, 2014, are approximately 25 percent more efficient than previous standards for residential construction and 30 percent more efficient for nonresidential construction.
Comprehensive Energy Efficiency Plan for Existing Buildings (AB 758)	Assembly Bill 758 (Skinner, Chapter 470, Statutes 2009) requires the CEC, in collaboration with the CPUC and stakeholders, to develop a comprehensive program to achieve greater energy efficiency in the State's existing buildings.
California Renewable Energy Portfolio Standard (RPS) (SB X1-2)	In 2011, Governor Brown signed SB X1-2, which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 33 percent of their electricity supply (portfolio) from renewable sources by 2020. The CPUC and the CEC jointly implement the Statewide RPS program through rulemakings and monitoring the activities of electric energy utilities in the state.
California Qualifying Facility and Combined Heat and Power Program	In December 2010, the CPUC approved California's Qualifying Facility and Combined Heat and Power Program Settlement, which established a CHP framework for the State's investor-owned utilities. The settlement established a near-term target of 3,000 megawatts (MW) of CHP for entities under the

Table 8: Applicable Laws and Regulations for Energy Resources	
Regulation	**Description**
Settlement	jurisdiction of the CPUC, although this target includes not just new CHP, but capacity from renewal of contracts due to expire in the next 3 years. The CPUC has also adopted a settlement agreement that includes reforms to the Rule 21 interconnection process to provide a clear, predictable path to interconnection of distributed generation while maintaining the safety and reliability of the grid (CEC 2012).
California Strategy to Reduce Petroleum Dependence (AB 2076)	Assembly Bill 2076 (Chapter 936, Statutes of 2000) requires the CEC and the ARB to develop and submit to the Legislature a strategy to reduce petroleum dependence in California. The statute requires the strategy to include goals for reducing the rate of growth in the demand for petroleum fuels. In addition, the strategy is required to include recommendations to increase transportation energy efficiency as well as the use of non-petroleum fuels and advanced transportation technologies including alternative fuel vehicles, hybrid vehicles, and high-fuel efficiency vehicles. The strategy, *Reducing California's Petroleum Dependence*, was adopted by the CEC and ARB in 2003. The strategy recommends that California reduce inroad gasoline and diesel fuel demand to 15 percent below 2003 demand levels by 2020 and maintain that level for the foreseeable future; the Governor and Legislature work to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks, and sport utility vehicles; and increase the use of nonpetroleum fuels to 20 percent of on-road fuel consumption by 2020 and 30 percent by 2030.
Alternative and Renewable Fuel and Vehicle Technology Program	Assembly Bill 118 (Statues of 2007) created the CEC's Alternative and Renewable Fuel and Vehicle Technology Program. The statute, subsequently amended by Assembly Bill 109 (Statues of 2008), authorizes the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the State's climate change policies.
Alternative Fuels Plan	Assembly Bill 1007 requires the CEC to prepare a state plan to increase the use of alternative fuels in California. Any environmental document prepared for a strategic growth plan, regional blueprint general plan metropolitan planning or transportation plan should include an evaluation of alternative fuels for emissions or criteria pollutants, TACs, GHGs, water pollutants, and other harmful substances, and their impacts on petroleum consumption, and set goals for increased alternative fuel use in the state for the next decades, and recommend

Table 8: Applicable Laws and Regulations for Energy Resources	
Regulation	**Description**
	policies to ensure the alternative fuel goals are attained, including standards on transportation fuels and vehicle and policy mechanisms to ensure vehicles operating on alternative fuels use those fuels to the maximum extent feasible.
Bioenergy Action Plan (Executive Order S-06-06)	Executive Order #S-06-06 establishes targets for the use and production of biofuels and biopower and directs state agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. This executive order establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The Executive Order also calls for the state to meet a target for use of biomass electricity.
Governor's Low Carbon Fuel Standard (Executive Order S-01-07)	Executive Order #S-01-07 establishes a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 through establishment of the LCFS. The executive order requires LCFS to be incorporated into the State Alternative Fuels Plan required by AB 1007 and is one of the proposed discrete early action GHG reduction measures identified by CARB pursuant to AB 32. In January, 2010, the Office of Administrative Law approved the LCFS regulation.
Local	
City/County General Plans	Many cities and counties have general plan elements and policies that specifically address energy use and conservation. Those energy conservation measures outlined in the various county and city general plans contain goals, objectives, and policies aimed at reducing energy consumption. Proponents of specific projects would be required to consult the applicable general plans and design the projects consistent with the guidelines of those general plans in which the projects are located.

7. GEOLOGY AND SOILS

A. Existing Conditions

1. United States

The U.S. has a diverse, complex, and seismically active geology that includes a vast array of landforms. Soils are as diverse as America's

geology, and are described and characterized individually and collectively with other soils, and their various compatible uses in soil surveys published by the U.S. Department of Agriculture (USDA). Soils are fundamental and largely non-renewable resources that are the basis for high-level sustained yields of agricultural commodities, forest products, and provide support to the wide variety of ecological communities throughout the state.

The geology of the U.S. is very complex and can be divided into roughly five physiographic provinces: the American cordillera, the Canadian shield, the stable platform, the coastal plain, and the Appalachian orogenic belt. In Alaska, the geology is typical of the cordillera, whereas in Hawaii the major islands consist of Neogene volcanic erupted over a hotspot.

2. California

The state's topography is highly varied and includes 1,340 miles of seacoast, as well as high mountains, inland flat valleys, and deserts. Elevations in California range from 282 feet below sea level in Death Valley to 14,494 feet at the peak of Mount Whitney. The mean elevation of California is approximately 2,900 feet. The climate of California is as highly varied as its topography. Depending on elevation, proximity to the coast, and altitude, climate types include temperate oceanic, highland, sub-arctic, Mediterranean, steppe, and desert (USGS 1995). The average annual precipitation across all California climate types is approximately 23 inches and approximately 75 percent of the state's annual precipitation falls between November and March, primarily in the form of rain, with the exception of high mountain elevations (DWR 2003). Average annual precipitation ranges from more than 100 inches in the mountainous areas within the Smith River in Del Norte County to less than 2 inches in Death Valley, illustrating the extreme differences in precipitation levels within the State (Mount 1995). Overall, northern California is wetter than southern California with the majority of the State's annual precipitation occurring in the northern coastal region.

a) Geology

Plate tectonics and climate have played major roles in forming California's dramatic landscape. California is located on the active western boundary of the North American continental plate in contact with the oceanic Pacific Plate and the Gorda Plate north of the Mendocino Triple Junction. The dynamic interactions between these three plates and California's climate

are responsible for the unique topographic characteristics of California, including rugged mountain ranges, long and wide flat valleys, and dramatic coastlines (Harden 1997). Tectonics and climate also have a large effect on the occurrence natural environmental hazards, such as earthquakes, landslides, and volcanic formations.

b) Landslides

Landsliding or mass wasting is a common erosional process in California and has played an integral part in shaping the State's landscape. Typically, landslides occur in mountainous regions of the State, but they can also occur in areas of low relief, including coastal bluffs, along river and stream banks, and inland desert areas. Landsliding is the gravity-driven downhill mass movement of soil, rock, or both and can vary considerably in size, style and rate of movement, and type depending on the climate of a region, the steepness of slopes, rock type and soil depth, and moisture regime (Harden 1997).

c) Earthquakes

Earthquakes are a common and unpredictable occurrence in California. The tectonic development of California began millions of years ago by a shift in plate tectonics that converted the passive margin of the North American plate into an active margin of compressional and translational tectonic regimes. This shift in plate tectonics continues to make California one of the most geomorphically diverse, active, and picturesque locations in the U.S. While some areas of California are more prone to earthquakes, such as northern, central, and southern coastal areas of California, all areas of California are prone to the effects of ground shaking due to earthquakes. While scientists have made substantial progress in mapping earthquake faults where earthquakes are likely to occur, and predicting the potential magnitude of an earthquake in any particular region, they have been unable to precisely predict where or when an earthquake will occur and what its magnitude will be.

d) Tsunamis

Coastal communities around the circum Pacific have long been prone to the destructive effects of tsunamis. Tsunamis are a series of long-period, high-magnitude ocean waves that are

created when an outside force displaces large volumes of water. Throughout time, major subduction zone earthquakes in both the Northern and Southern Hemispheres have moved the Earth's crust at the ocean bottom sending vast amounts of waters into motion and spreading tsunami waves throughout the Pacific Ocean.

Tsunamis can also occur from subareal and submarine landslides that displace large volumes of water. Subaeral landslide-generated tsunamis can be caused by seismically generated landslides, rock falls, rock avalanches, and eruption or collapse of island or coastal volcanoes. Submarine landslide-generated tsunamis are typically caused by major earthquakes or coastal volcanic activity. In contrast to a seismically generated tsunami, seismic seiches are standing waves that are caused by seismic waves traveling through a closed (lake) or semi-enclosed (bay) body of water. Due to the long-period seismic waves that originate after an earthquake, seiches can be observed several thousand miles away from the origin of the earthquakes. Small bodies of water, including lakes and ponds, are especially vulnerable to seismic seiches.

e) Volcanoes

A volcano is an opening in the Earth's crust through which magma escapes to the surface where it is extruded as lava. Volcanism may be spectacular, involving great fountains of molten rock, or tremendous explosions that are caused by the build-up of gases within the volcano (Ritchie and Gates 2001). Some of the most active volcanic areas in California are located within the Cascade Range - a volcanic chain that is a result of compressional tectonics along the Cascadia subduction zone.

f) Active Faults

A fault is defined as a fracture or zone of closely associated fractures along rocks that on one side have been displaced with respect to those on the other side. Most faults are the result of repeated displacement that may have taken place suddenly or by slow creep. A fault is distinguished from fractures or shears caused by landsliding or other gravity-induced surficial failures. A fault zone is a zone of related faults that commonly are braided and subparallel, but may be branching and divergent. A fault zone has significant width (with respect to the scale of the

fault being considered, portrayed, or investigated), ranging from a few feet to several miles (Bryant and Hart 2007).

In the State of California earthquake faults have been designated as being active through a process that has been described by the 1972 Alquist-Priolo Earthquake Fault Zoning Act. An active fault is defined by the State as one that has "had surface displacement within Holocene time (about the last 11,000 years)." This definition does not, of course, mean that faults lacking evidence for surface displacement within Holocene time are necessarily inactive. A fault may be presumed to be inactive based on satisfactory geologic evidence; however, the evidence necessary to prove inactivity sometimes is difficult to obtain and locally may not exist.

B. Regulatory Setting

Applicable laws and regulations associated with geology and soils are discussed in Table 9.

Table 9: Applicable Laws and Regulations for Geology and Soils

Regulation	Description
Federal	
Safe Drinking Water Act - Federal Underground Injection Control Class VI Program for Carbon Dioxide Geology Sequestration Wells	Under the Safe Drinking Water Act (SDWA), the Federal Underground Injection Control (UIC) Class VI Program for Carbon Dioxide Geologic Sequestration Wells requires states and owners or operators to submit all permit applications to the appropriate EPA Region for a Class VI permit to be issued. These requirements, also known as the Class VI rule, are designed to protect underground sources of drinking water. The Class VI rule builds on existing UIC Program requirements, with extensive tailored requirements that address carbon dioxide injection for long-term storage to ensure that wells used for geologic sequestration are appropriately sited, constructed, tested, monitored, funded, and closed. The rule also affords owners or operators injection depth flexibility to address injection in various geologic settings in the U.S. in which geologic sequestration may occur, including very deep formations and oil and gas fields that are transitioned for use as carbon dioxide storage sites.

Table 9: Applicable Laws and Regulations for Geology and Soils	
Regulation	**Description**
Safe Drinking Water Act - Federal Underground Injection Control Class II Program for Oil and Gas Related Injection Wells	The Class II Program for Oil and Gas Related Injection Wells requires states to meet EPA's minimum requirements for UIC programs including strict construction and conversion standards and regular testing and inspection. Enhanced oil and gas recovery wells may either be issued permits or be authorized by rule. Disposal wells are issued permits.
CWA	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.
Earthquake Hazards Reduction Act and National Earthquake Hazards Reduction Program Act	This Act established the National Earthquake Hazards Reduction Program to reduce the risks to life and property from future earthquakes. This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act by refining the description of agency responsibilities, program goals and objectives.
State	
Seismic Hazards Mapping Act, PRC Section 2690–2699.	The Seismic Hazards Mapping Act (the Act) of 1990 (PRC, Chapter 7.8, Division 2) directs the California DOC, Division of Mines and Geology (now called California Geological Survey [CGS]) 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

Table 9: Applicable Laws and Regulations for Geology and Soils	
Regulation	**Description**
	development projects within seismic hazard zones.
Alquist-Priolo Earthquake Fault Zoning Act	California's Alquist-Priolo Act (PRC 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act and renamed in 1994, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zones). It also defines criteria for identifying active faults, giving legal weight to terms such as "active," and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones. Under the Alquist-Priolo Act, faults are zoned, and construction along or across them is strictly regulated if they are "sufficiently active" and "well-defined." A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for the purposes of the act as within the last 11,000 years). A fault is considered well-defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment.
California Division of Oil, Gas, and Geothermal Resources (DOGGR), PRC Section 3106.	PRC 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 DOGGR regulates drilling, production, injection, and gas storage operations in accordance with 14 CCR 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 PRC Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.
California Building Standards Code (CBSC) (24 CCR)	California's minimum standards for structural design and construction are given in the CBSC (24 CCR). The CBSC is based on the Uniform Building Code (International Code Council 1997), which is used widely throughout U.S. (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for

Table 9: Applicable Laws and Regulations for Geology and Soils	
Regulation	**Description**
	various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.
Local	
Geotechnical Investigation	Local jurisdictions typically regulate construction activities through a process that may require the preparation of a site-specific geotechnical investigation. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate construction design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and the previous history of excavation and fill placement. Proponents of specific projects that require design of earthworks and foundations for proposed structures will need to prepare geotechnical investigations on the physical properties of soil and rock at the site prior to project design.
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of Best Management Practices similar to those contained in a SWPPP.
City/County General Plans	Most city and county general plans include an element that covers geology and soil resources within that jurisdiction.

8. GREENHOUSE GASES

A. Existing Conditions

1. United States and California

a) Existing Climate

Climate is the accumulation of daily and seasonal weather events over a long period of time, whereas weather is defined as the condition of the atmosphere at any particular time and

place (Ahrens 2003). Like its topography, California's climate is varied and tends toward extremes. Generally there are two seasons in California: 1) a long, dry summer, with low humidity and cool evenings and 2) a mild, rainy winter, except in the high mountains, where four seasons prevail and snow lasts from November to April. The one climatic constant for the state is summer drought.

California has four main climatic regions. Mild summers and winters prevail in central coastal areas, where temperatures are more equable than virtually anywhere else in the U.S. For example, differences between average summer and winter temperatures between San Francisco and Monterey for example are seldom more than 10°F (6°C). During the summer there are heavy fogs in San Francisco and all along the coast. Mountainous regions are characterized by milder summers and colder winters, with markedly low temperatures at high elevations. The Central Valley has hot summers and cool winters, while the Imperial Valley and eastern deserts are marked by very hot, dry summers, with temperatures frequently exceeding 100°F (38°C).

Average annual temperatures for the state range from 47°F (8°C) in the Sierra Nevada to 73°F (23°C) in the Imperial Valley. The highest temperature ever recorded in the U.S. was 134°F (57°C), registered in Death Valley on 10 July 1913. Death Valley has the hottest average summer temperature in the Western Hemisphere, at 98°F (37°C). The state's lowest temperature was -45°F (-43°C), recorded on 20 January 1937 at Boca, near the Nevada border.

Among the major population centers, Los Angeles has an average annual temperature of 63°F (17°C), with an average January minimum of 48°F (9°C) and an average July maximum of 75°F (24°C). San Francisco has an annual average of 57°F (14°C), with a January average minimum of 42°F (6°C) and a July average maximum of 72°F (22°C). The annual average in San Diego is 64°F (18°C), the January average minimum 49°F (9°C), and the July average maximum 76°F (24°C). Sacramento's annual average temperature is 61°F (16°C), with January minimums averaging 38°F (3°C) and July maximums of 93°F (34°C).

Annual precipitation varies from only 2 in (5 cm) in the Imperial Valley to 68 in (173 cm) at Blue Canyon, near Lake Tahoe. San

Francisco had an average annual precipitation (1971–2000) of 20 in (51 cm), Sacramento 17.9 in (45.5 cm), Los Angeles 13.2 in (33.5 cm), and San Diego 10.8 in (27.4 cm). The largest one-month snowfall ever recorded in the U.S., 390 in (991 cm), fell in Alpine County in January 1911. Snow averages between 300 and 400 in (760 to 1,020 cm) annually in the high elevations of the Sierra Nevada, but is rare in the Central Valley and coastal lowlands.

Sacramento has the greatest percentage (73 percent) of possible annual sunshine among the State's largest cities; Los Angeles has 72 percent and San Francisco 71 percent. San Francisco is the windiest, with an average annual wind speed of 11 mph (18 km/hr). Tropical rainstorms occur often in California during the winter.

b) Attributing Climate Change—The Physical Scientific Basis

Climate change is a long-term shift in the climate of a specific location, region or planet. The shift is measured by changes in features associated with average weather, such as temperature, wind patterns, and precipitation. According to the Intergovernmental Panel on Climate Change (IPCC), a scientific body established by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP), available scientific evidence supports the conclusion that most of the increased average global temperatures since the mid-20th century is very likely due to human-induced increases in greenhouse gas (GHG) concentrations. GHGs, which are emitted from both natural and anthropogenic sources, include water vapor, carbon dioxide, methane, nitrous oxide, halocarbons, and ozone. These gases play a role in the "greenhouse effect" that helps regulate the temperature of the earth.

The current post-industrial warming trend differs alarmingly from past changes in the Earth's climate because GHG emissions are higher and warming is occurring faster than at any other time on record within the past 650,000 years. Historical long-term as well as decadal and inter-annual fluctuations in the Earth's climate resulted from natural processes such as plate tectonics, the Earth's rotational orbit in space, solar radiation variability, and volcanism. The current trend derives from an added factor: human activities, which have greatly intensified the natural greenhouse effect, causing global warming. GHG

emissions from human activities that contribute to climate change include the burning of fossil fuels (such as coal, oil and natural gas), cutting down trees (deforestation) and developing land (land-use changes). The burning of fossil fuels emits GHGs into the atmosphere, while deforestation and land-use changes remove trees and other kinds of vegetation that store ("sequester") carbon dioxide. Emissions of GHGs due to human activities have increased globally since pre-industrial times, with an increase of 70 percent between 1970 and 2004 (IPCC 2007).

A growing recognition of the wide-ranging impacts of climate change has fueled efforts over the past several years to reduce GHG emissions. In 1997, the Kyoto Protocol set legally binding emissions targets for industrialized countries, and created innovative mechanisms to assist these countries in meeting these targets. The Kyoto Protocol took effect in 2004, after 55 parties to the Convention had ratified it (The UN Climate Change Convention and the Kyoto Protocol). Six major GHGs have been the focus of efforts to reduce emissions and are included in AB 32: carbon dioxide (CO_2), methane, nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). They are regulated under the Kyoto Protocol. Nitrogen trifluoride (NF_3) was later added to the list of important GHGs to reduce and codified in California statute.

The "global warming potential" (GWP) metric is used to convert all GHGs into "CO_2-equivalent" (CO_2e) units. Importantly, metrics such as GWP have been used as an exchange rate in multi-gas emissions policies and frameworks. Each gas's GWP is defined relative to CO_2. For example, N_2O's GWP is 310, meaning a unit mass of N_2O warms the atmosphere 310 times more than a unit mass of CO_2. SF_6 and PFCs have extremely long atmospheric lifetimes, resulting in their essentially irreversible accumulation in the atmosphere once emitted. However, in terms of quantity of emissions, CO_2 dominates world and U.S. GHG emissions.

Because the major GHGs have longer lives, they build up in the atmosphere so that past, present and future emissions ultimately contribute to total atmospheric concentrations. Thus, while reducing emissions of conventional air pollutants decreases their concentrations in the atmosphere in a relatively short time, atmospheric concentrations of the major GHGs can only be gradually reduced over years and decades. More

specifically, the rate of emission of CO_2 currently greatly exceeds its rate of removal, and the slow and incomplete removal implies that small to moderate reductions in its emissions would not result in stabilization of CO_2 concentrations, but rather would only reduce the rate of its growth in coming decades. Many of the same activities that emit conventional air pollutants also emit GHGs (e.g., the burning of fossil fuels to produce electricity, heat or drive engines and the burning of biomass). Some conventional air pollutants also have greenhouse effects; for example, soot/black carbon and tropospheric ozone (see Short-Lived Climate Pollutants below).

c) Attributing Climate Change—Greenhouse Gas Emission Sources

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial and agricultural sectors. In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation. Anthropogenic emissions of CO_2 are byproducts of fossil fuel combustion. Methane, a potent GHG, resulting primarily from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions), is largely associated with fugitive emissions from oil and gas operations, natural gas transmission, agricultural practices, and landfills. N_2O is also largely attributable to agricultural practices nitrogen-based fertilizers) and soil management. CO_2 sinks, or reservoirs, include vegetation, soils, and the ocean, which absorb CO_2 through sequestration and dissolution, respectively, two of the most common processes of CO_2 sequestration.

CO_2 equivalent (CO_2e) is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect (i.e., GWP). The GWP is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, “Calculation References,” of the General Reporting Protocol of the California Climate Action Registry (CCAR 2009), 1 ton of methane has the same contribution to the greenhouse effect as approximately 34 tons of CO_2 (IPCC 2013). Therefore, methane is a much more potent GHG than CO_2. Expressing emissions in CO_2e takes the

contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

The California GHG inventory compiles statewide anthropogenic GHG emissions and sinks. It includes estimates for CO_2, methane, N_2O, SF_6, NF_3, HFCs, and PFCs. The current inventory covers years 2000 to 2011 (available at http://www.arb.ca.gov/cc/inventory/data/data.htm).

California's gross emissions of greenhouse gases decreased by 6 percent from 478.4 million metric tons of CO_2e ($MMTCO_2e$) in 2001 to 448.1 $MMTCO_2e$ in 2011, with a maximum of 489.2 $MMTCO_2e$ in 2004. During the same period, California's population grew by 9 percent from 34.5 to 37.6 million people. As a result, California's per capita GHG emissions have decreased over the last 11 years from 13.9 to 11.9 metric tons of CO_2e per person. In 2011, emissions continued to decrease for the transportation and electric power sectors. Emissions from all other sectors (e.g., industrial) remained relatively flat or increased slightly from 2010.

d) Short-Lived Climate Pollutants

Climate policy and research have mainly concentrated on long-term climate change and controlling the long-lived GHGs. However, there is growing recognition within the scientific community that efforts to address climate change should also focus on near-term actions to reduce climate-warming substances with much shorter atmospheric lifetimes. These non-CO_2 pollutants, known as "short-lived climate pollutants" (SLCP), include tropospheric ozone, methane, HFC, black carbon, and N_2O.

From a global perspective, SLCPs represent nearly 40 percent of the total climate pollutant emissions. In California, their contribution is smaller at around 30 percent. SLCPs have relatively short lifetimes in the atmosphere, but have significant GWP, which represent the ability to trap heat relative to CO_2. Since SLCPs remain in the atmosphere for periods of only a few days to a few decades, reducing their emissions results in immediate benefits. Thus, controlling sources of SLCPs is a critical climate strategy for reducing the near-term rate of global warming, particularly in regions most vulnerable to climate change.

California has established a strong track record with significant SLCP reductions as a co-benefit to its long-standing programs to clean up the air and protect public health. These include diesel engine controls, advanced clean cars, restrictions on burning, development of a refrigerant management program, and landfill controls. ARB is currently pursuing additional actions to further reduce SLCP emissions. These include targeting research on SLCP emissions from various sources to help the State identify specific cost-effective measures, and developing regulations where cost-effective techniques are clearer.

i) Tropospheric Ozone

Ozone is a highly reactive and unstable gas. Stratospheric ozone, a layer of ozone high up in the atmosphere, is beneficial and absorbs ultraviolet radiation. Tropospheric (ground-level) ozone is a major air and climate pollutant. Tropospheric ozone is the main component of smog and causes serious health effects such as asthma and lung disease. Tropospheric ozone also affects sensitive vegetation and ecosystems, including forests, parks, wildlife refuges and wilderness areas. Tropospheric ozone can act as a direct GHG and as an indirect controller of GHG lifetimes. As a strong oxidant, it affects the lifetimes and concentrations of atmospheric trace gases, including methane and HFCs.

Tropospheric ozone is not emitted directly into the air. It is created by photochemical reactions between NO_X and volatile organic compound (VOC) emissions from vehicles, industrial facilities, consumer products and many other sources.

Ozone has long been recognized as a significant local and regional air quality issue due to its impacts on human health and the environment. Federal clean air laws require areas with unhealthy levels of ozone to develop plans, known as State Implementation Plans (SIP). These plans include measures that describe how an area will attain federal ozone air quality standards. In addition to measures included in the SIP, the State has adopted several regulatory programs focused on controlling ozone forming compounds (NO_X and VOCs). These include the Low Emission Vehicle Programs, Off-Road Engine

Standards, On-Road Heavy-Duty Diesel Vehicles Regulation, and Consumer Products Regulations.

ii) Methane

Methane is a potent and short-lived GHG. It is the second most prevalent GHG emitted in the U.S. from human activities. In addition to its climate forcing properties, methane also has a number of indirect effects including its role in contributing to global background ozone. As air quality standards tighten, reducing background ozone becomes more critical.

Enteric fermentation, manure management, landfills, natural gas transmission (methane is a significant constituent of natural gas), and wastewater treatment are the State's largest anthropogenic methane-producing sources.

Methane concentrations have been increasing due to human activities related to fossil fuel extraction and distribution, agriculture, and waste handling. Methane emissions are also contributed by non-anthropogenic or "natural" sources such as wetlands, oceans, forests, fires, terrestrial arthropods (such as termites) and geological sources (such as submarine gas seepage, micro seepage over dry lands and geothermal seeps).

iii) Hydrofluorocarbons

HFCs are synthetic gases that are the fastest growing climate forcers in the U.S. as well as in many other countries. HFCs represent just three percent of all GHG emissions in California, but their warming effect is hundreds to thousands of times that of CO_2. HFCs are primarily produced for use as substitutes for ozone-depleting substances (ODS) in refrigeration, air conditioning, insulating foams, solvents, aerosol products, and fire protection.

iv) Black Carbon

Black carbon is a subset of PM emissions and consists of small dark particles that result from incomplete combustion of fossil fuels, bio-fuels, and biomass. It

contributes to climate change both directly by absorbing sunlight, and indirectly by depositing on snow and by interacting with clouds and affecting cloud formation.

Unlike other GHGs, black carbon has a very short atmospheric lifetime (an average of about a week), resulting in a strong correlation to regional emission sources. As a result, emission reductions have immediate benefits for climate and health.

The main sources of black carbon in California are wildfires, off-road vehicles (e.g., locomotives, marine vessels, tractors, excavators, dozers), on-road vehicles (e.g., cars, trucks, and buses), fireplaces, agricultural burning (burning agricultural waste), and prescribed burning (planned burns of forest or wildlands). California has been an international leader in reducing black carbon, with 90 percent control since the early 1960s and close to 95 percent control expected by 2020 due to existing programs that target reducing PM from diesel engines and burning activities.

Recent ARB estimates suggest that the annual black carbon emissions in California decreased about 70 percent between 1990 and 2010, in direct proportion to declining diesel PM emissions – a co-benefit of ARB's regulations on diesel engines. Other categories of diesel engines, such as off-road diesels (e.g., agricultural and construction equipment), building equipment and diesel generators, are also projected to have major declines in diesel PM emissions. Efforts to manage agricultural, forest, and range land management burning operations are expected to continue reducing black carbon emissions.

e) Adaptation to Climate Change

According to the IPCC, which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, global average temperature is expected to increase by 3–7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2007). Resource areas other than air quality and global average temperature could be indirectly affected by the accumulation of GHG emissions. For example, an increase in the global

average temperature is expected to result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state.

According to the CEC (2012), statewide average temperatures increased by about 1.7 degrees Fahrenheit from 1895 to 2011. Throughout the past century precipitation (i.e., rain and snow) has followed the expected pattern of a largely Mediterranean climate with wet winters and dry summers, and considerable variability from year to year. No consistent trend in the overall amount of precipitation has been detected, except that a larger proportion of total precipitation is falling as rain instead of snow. In addition, during the last 35 years, the Sierra Nevada range has witnessed both the wettest and the driest years on record of more than 100 years. While intermittent droughts have been a common feature of the State's climate, evidence from tree rings and other indicators reveal that over the past 1,500 years, California has experienced dry spells that persisted for several years or even decades (CEC 2012).

The effects of global climate change could lead to a variety of secondary effects to public health, water supply, energy supply, sea level, wildfire risks, and ecosystems. Recent data, climate projections, topographic, demographic, and land use information have led to the findings that:

- The state's electricity system is more vulnerable than was previously understood.
- The Sacramento-San Joaquin Delta is sinking, putting levees at growing risk.
- Wind and waves, in addition to faster rising seas, will worsen coastal flooding.
- Animals and plants need connected "migration corridors" to allow them to move to more suitable habitats to avoid serious impacts.
- Native freshwater fish are particularly threatened by climate change.

- Minority and low-income communities face the greatest risks from climate change.
- There are effective ways to prepare for and manage climate change risks, but local governments face many barriers to adapting to climate change; these can be addressed so that California can continue to prosper.

At the same time, the State has recognized the need to adapt to climate change impacts that can no longer be avoided. In 2014, the CA Natural Resources Agency released the Safeguarding California Plan, which serves as an update to the 2009 California Climate Adaptation Strategy. The many adaptation planning efforts underway in virtually every State agency, in regional and local communities such as Chula Vista, San Diego, Los Angeles, Santa Barbara, Santa Cruz, San Francisco, Hayward, Marin County, Sacramento, and others, as well as in private businesses suggest that CEOs, elected officials, planners, and resource managers understand the reality that California and the world is facing.

In fact, the latest climate science makes clear that State, national and global efforts to mitigate climate change must be accelerated to limit global warming to levels that do not endanger basic life-support systems and human well-being. Success in mitigation will keep climate change within the bounds that allow ecosystems and society to adapt without major disruptions. Further advances in integrated climate change science can inform California's and the world's climate choices and help ensure a resilient future (CEC 2012).

B. Regulatory Setting

Applicable laws and regulations specific to the reduction of GHG emissions are listed in Table 10 below. It should be noted that other laws and regulations described under Energy Demand in this Environmental Setting would also reduce GHG emissions.

Table 10: Applicable Laws and Regulations for Greenhouse Gases

Regulation	Description
Federal	
Mandatory Greenhouse Gas	On September 22, 2009, EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the U.S.

Table 10: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
Reporting Rule	In general, this national reporting requirement will provide EPA with accurate and timely GHG emissions data from facilities that emit 25,000 metric tons or more of CO_2 per year. This publically available data will allow the reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. Reporting is at the facility level, except that certain suppliers of fossil fuels and industrial greenhouse gases along with vehicle and engine manufacturers will report at the corporate level. An estimated 85 percent of the total U.S. GHG emissions, from approximately 10,000 facilities, are covered by this final rule.
National Program to Cut Greenhouse Gas Emissions and Improve Fuel Economy for Cars and Trucks	On September 15, 2009, EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) proposed a new national program that would reduce GHG emissions and improve fuel efficiency for all new cars and trucks sold in the EPA proposed the first-ever national GHG emissions standards under the CAA, and NHTSA proposed CAFE standards under the Energy Policy and Conservation Act. This proposed national program would allow automobile manufacturers to build a single light-duty national fleet that satisfies all requirements under both Federal programs and the standards of California and other states. The President requested that EPA and NHTSA, on behalf of the Department of Transportation, develop, through notice and comment rulemaking, a coordinated National Program under the CAA and the Energy Policy and Conservation Act (EPCA), as amended by the Energy Independence and Security Act (EISA), to reduce fuel consumption by and GHG emissions of light-duty vehicles for model years 2017-2025. EPA and NHTSA are developing the proposal based on extensive technical analyses, an examination of the factors required under the respective statutes and on discussions with individual motor vehicle manufacturers and other stakeholders. The National Program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles (light-duty vehicles) built in those model years (76 FR 48758). The first part of this program (i.e., 2012-2016) is implemented. The next part (i.e., 2017-2025) is currently in process for which ARB is proposed to accept compliance thereof as also being acceptable for California compliance, similar to what was done for the first part.

Table 10: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
Endangerment and Cause or Contribute Findings	On December 7, 2009, EPA adopted its Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CAA (Endangerment Finding). The Endangerment Finding is based on Section 202(a) of the CAA, which states that the Administrator (of EPA) should regulate and develop standards for "emission[s] of air pollution from any class of classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The rule addresses Section 202(a) in two distinct findings. The first addresses whether or not the concentrations of the six key GHGs (i.e., carbon dioxide [CO_2], methane, nitrous oxide [N_2O], hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF_6]) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and therefore the threat of climate change. The Administrator found that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the CAA. The evidence supporting this finding consists of human activity resulting in "high atmospheric levels" of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wild fires, droughts, sea level rise, and higher intensity storms) are a threat to the public health and welfare. Therefore, GHGs were found to endanger the public health and welfare of current and future generations. The Administrator also found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHGs fit within the CAA definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements but rather allow EPA to finalize the GHG standards proposed earlier in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation.
State	

Table 10: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
Executive Order S-3-05	Executive Order S-3-05, which was signed by former Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary will also submit biannual reports to the governor and state legislature describing: progress made toward reaching the emission targets; impacts of global warming on California's resources; and mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the Cal/EPA created the Climate Action Team (CAT) made up of members from various state agencies and commission. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.
Assembly Bill 32, the California Global Warming Solutions Act, Statutes of 2006	In September 2006, former Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from substantial stationary and mobile source categories. Requires ARB to produce a Scoping Plan by 1/1/2009 and at least every 5 years afterwards that details how the state will meet its GHG reduction targets. AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at

Table 10: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
	the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.
Assembly Bill 1493, Statutes of 2002	In September 2004, ARB approved regulations to reduce GHG emissions from new motor vehicles. The Board took this action pursuant to Chapter 200, Statutes of 2002 (AB 1493, Pavley) which directed the Board to adopt regulations that achieve the maximum feasible and cost effective reduction in greenhouse gas emissions from motor vehicles. The regulations, which took effect in 2006 following an opportunity for legislative review, apply to new passenger vehicles and light duty trucks beginning with the 2009 model year.
Executive Order S-1-07	Executive Order S-1-07, which was signed by former Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, at over 40 percent of statewide emissions. It establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10 percent by 2020. This order also directed ARB to determine if this LCFS could be adopted as a discrete early action measure after meeting the mandates in AB 32. ARB adopted the LCFS on April 23, 2009.
Senate Bill 1368, Statutes of 2006	SB 1368 is the companion bill of AB 32 and was signed by former Governor Schwarzenegger in September 2006. SB 1368 requires the CPUC to establish a GHG emission performance standard for baseload generation from investor owned utilities by February 1, 2007. The CEC must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the GHG emission rate from a baseload combined-cycle natural gas fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the CPUC and CEC.
Senate Bill 1078, Statutes of 2002, Senate Bill 107,	SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from

Table 10: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
Statutes of 2006, and SBx1 2	renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In 2010, SBx1 2 was chaptered, which expanded the State's Renewable Portfolio Standard to 33 percent renewable power by 2020.
Senate Bill 97, Statutes of 2007	As directed by SB 97, the Natural Resources Agency adopted Amendments to the CEQA Guidelines for GHG emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.
Senate Bill 375, Statutes of 2008	SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). ARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every 8 years, but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012. This bill also extends the minimum time period for the Regional Housing Needs Allocation (RNHA) cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of CEQA would incent qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."
Executive Order S-13-08	Sea level rise is a foreseeable indirect environmental impact associated with climate change, largely attributable to thermal expansion of the oceans and melting polar ice. As discussed above in the environmental setting (subheading "Adaptation to Climate Change"), sea level rise presents impacts to California

Table 10: Applicable Laws and Regulations for Greenhouse Gases	
Regulation	**Description**
	associated with coastal erosion, water supply, water quality, saline-sensitive species and habitat, land use compatibility, and flooding. Former Governor Arnold Schwarzenegger signed Executive Order S-13-08 on November 14, 2008. This executive order directed the California Natural Resources Agency (CNRA) to develop the 2009 California Climate Adaptation Strategy (CNRA 2009)), which summarizes the best known science on climate change impacts in seven distinct sectors—public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture, forest resources, and transportation and energy infrastructure—and provides recommendations on how to manage against those threats. This executive order also directed OPR, in cooperation with the CNRA, to provide land use planning guidance related to sea level rise and other climate change impacts by May 30, 2009, which is also provided in the 2009 California Climate Adaptation Strategy (CNRA 2009) and OPR continues to further refine land use planning guidance related to climate change impacts. Executive Order S-13-08 also directed CNRA to convene an independent panel to complete the first California Sea Level Rise Assessment Report. This report is to be completed no later than December 1, 2010. The report is intended to provide information on the following: • Relative sea level rise projections specific to California, taking into account issues such as coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge, and land subsidence rates; • The range of uncertainty in selected sea level rise projections; • A synthesis of existing information on projected sea level rise impacts to state infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems; and • Discussion of future research needs regarding sea level rise for California.

9. HAZARDS AND HAZARDOUS MATERIALS

A. Existing Conditions

1. United States

Hazardous materials are substances with physical properties that could pose a substantial present or future hazard to human health or the environment when improperly handled, disposed, or otherwise managed. Hazardous materials are grouped into four categories based on their properties: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), and reactive (causes explosions or generates toxic gases). A hazardous waste is any hazardous material that cannot be safely disposed in the trash or poured down sinks and storm drains. This includes items, such as fuels, industrial solvents and chemicals, process water, and spent materials (e.g., pozzolans, foams).

Naturally occurring hazardous materials in the U.S. include asbestos, radon, and mercury. Asbestos is a naturally occurring mineral composed of long, thin, fibrous crystals. Asbestos is found in 20 of the U.S. states and has been mined in 17 of these states, including the Appalachian region, California, and Oregon (Asbetos.net 2010). Mercury is a chemical element that comes from both natural sources 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. 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.

2. California

California Health and Safety Code (Section 25501) defines "hazardous materials" as any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. Hazardous materials are grouped into four categories based on their characteristics: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials) and reactive (causes explosions or generates toxic gases). A hazardous waste is any hazardous material that is finished with its intended use and is discarded. This may include items, such as spent fuels, industrial

solvents and chemicals, process water, and other spent materials (i.e., some types of batteries and fuel cells). California's hazardous waste regulations provides the following means to determine whether or not a waste is hazardous: (1) a list of criteria (toxic, ignitable, corrosive and reactive) that a waste may exhibit; (2) a list of those wastes that are subject to regulation; and (3) a list of chemical names and common names that are presumed to be hazardous in California. The California Hazardous Waste Control Law recognizes more than 780 hazardous chemicals and nearly 30 additional common materials that may be hazardous. Naturally occurring asbestos is also often found in a type of rock (serpentine) located in the California Coast Ranges and Sierra foothills.

B. Regulatory Setting

Applicable laws and regulations associated with hazards and hazardous materials are discussed in Table 11.

Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials

Regulations	Description
Federal	
CWA (40 CFR 112)	The 1972 amendments to the 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 U.S. Section 402 of the CWA specifically required EPA to develop and implement the NPDES program.
Safe Drinking Water Act (SDWA)	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.
Federal Hazardous Materials Regulations (FHMR) Title 49, Code of Federal Regulations, Parts 100-180	The regulations establish criteria for the safe transport of hazardous materials. Compliance is mandatory for intrastate and interstate transportation.
Toxic Substances	TSCA provides EPA with authority to require reporting,

Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
Control Act (TSCA) 15 U.S.C. Section 2601 et seq.	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. Section 6901 et seq. (40 CFR)	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. Federal regulations adopted by EPA are found in Title 40, Code of Federal Regulations (40 CFR).
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	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 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).
Emergency Planning and Community Right-to-Know Act	The 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

Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
(EPCRA) (42 USC Section 9601 et seq.)	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.
State	
Hazardous Materials Transportation California Vehicle Code Sections 31301-31309	Regulations pertaining to the safe transport of hazardous materials are in California Vehicle Code Sections 31301-31309. All motor carriers and drivers involved in transportation of hazardous materials must comply with the requirements contained in federal and state regulations, and must apply for and obtain a hazardous materials transportation license from the California Highway Patrol. A driver is required to obtain hazardous materials endorsement issued by the driver's country or state of domicile to operate any commercial vehicle carrying hazardous materials. The driver is required to display placards or markings while hauling hazardous waste, unless the driver is exempt from the endorsement requirements. A driver who is a California resident is required to obtain an endorsement from California Highway Patrol.
Hazardous Waste Control Law California Health & Safety Code, Division 20, Chapter 6.5, 22 CCR, Division 4.5	California requirements and statutory responsibilities in managing hazardous waste in California – this includes the generation, transportation, storage, treatment, recycling, and disposal of hazardous waste. The statute and regulation are implemented by Cal/EPA Department of Toxic Substances Control.
California Accidental Release Prevention (CalARP) Program 19 CCR Division 2, Chapter 4.5, Sections 2735-2785	The purpose of the CalARP program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right-to-know laws. This is accomplished by requiring businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop a Risk Management Plan (RMP). An RMP is a detailed engineering analysis of the potential accident factors present at a business and the mitigation measures that can be implemented to reduce this accident potential.
Hazardous Material Business Plan & Area Plan Program Health and Safety	The business and area plans program, relating to the handling and release or threatened release of hazardous materials, was established in California to protect the public health and safety and the environment. Basic information on the location, type,

Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
Code Sections 25500 – 25520 19 CCR, Division 2, Chapter 4, Article 3 & 4	quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidently released into the environment, is not now available to firefighters, health officials, planners, public safety officers, health care providers, regulatory agencies, and other interested persons. The information provided by business and area plans is necessary in order to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of hazardous materials into the workplace and environment. Certified Unified Program Agencies (CUPAs) use information collected from the Business Plan and CalARP programs to identify hazardous materials in their communities. This information provides the basis for the Area Plan and is used to determine the appropriate level of emergency planning necessary to respond to a release.
Unified Program Administration Health and Safety Code, Chapter 6.11, Sections 25404-25404.8 27 CCR, Division 1, Subdivision 4, Chapter 1, Sections 15100-15620	A CUPA, which is authorized by the Secretary of Cal/EPA to carry out several of the hazardous waste/hazardous materials regulatory programs administered by the State in a coordinated and consistent manner. The six hazardous waste and materials program elements covered by the CUPA include: 1) Hazardous Waste Generators 2) Underground Tanks 3) Above Ground Tanks 4) Accidental Release Program 5) Hazardous Material Release Response Plans & Spill Notification 6) Hazardous Materials Management Plans & Inventory Reporting The intent of the CUPA is to simplify the hazardous materials regulatory environment and provide a single point of contact for businesses to address inspection, permitting, billing, and enforcement issues.
Fuels and Fuel Additive Program (40 CFR 79)	EPA regulates diesel fuels under two programs; one is administered under the Office of Pollution Prevention and Toxic Substances (OPPTS) and the other is administered under the Transportation and Air Quality group. The OPPTS requires that all chemicals produced in the U.S. are registered with the Toxic Substances Control Act. The Transportation and Air Quality group requires that any fuels sold for ground transportation purposes must be registered with EPA and the volumes reported on a quarterly basis.

Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials	
Regulations	**Description**
Local	
Various Local Ordinances	Various ordinances and codes may be adopted at the local level to provide stricter requirements in the management of hazardous materials and waste activities within the jurisdiction.

10. HYDROLOGY AND WATER QUALITY

A. Existing Conditions

1. United States

The U.S. has a very diverse climate due to its wide range of geographic features. The climate is temperate in the majority of the U.S., subtropical in the southern region, tropical in Hawaii and in Florida, polar in Alaska, semi-arid in the Great Plains, arid in the Great Basin, and Mediterranean in California. Weather in the U.S. is influenced by the polar jet stream. The Great Basin and Columbia Plateau are arid and semi-arid, with annual precipitation averaging less than 15 inches. From July to September monsoons and thunderstorms affect the southwest and Great Basin region. The Cascades region is one of the snowiest places in the world, with some spots averaging over 600 inches of snow annually.

About 90 percent of public water systems in the U.S. obtain their water from groundwater. However, because systems served by groundwater tend to be much smaller than systems served by surface water, only 34 percent of Americans (101 million) are supplied with treated groundwater, while 66 percent (195 million) are supplied with surface water (EPA 2003).

2. California

a) Surface Waters

Surface waters occur as streams, lakes, ponds, coastal waters, lagoons, estuaries, floodplains, dry lakes, desert washes, wetlands and other collection sites. Water bodies modified or developed by man, including reservoirs and aqueducts, are also considered surface waters. Surface water resources are very diverse throughout the state, due to the high variance in tectonics, topography, geology/soils, climate, precipitation, and hydrologic conditions. Overall, California has the most diverse range of watershed conditions in the U.S., with varied climatic

regimes ranging from Mediterranean climates with temperate rainforests in the north coast region to desert climates containing dry desert washes and dry lakes in the southern central region.

The average annual runoff for the State is 71 million acre-feet (DWR 2003). The state has more than 60 major stream drainages and more than 1,000 smaller, but significant drainages that drain coastal mountains and inland mountainous areas. High snowpack levels and resultant spring snowmelt yield high surface runoff and peak discharge in the Sierra Nevada and Cascade Mountains that feed surface flows, fill reservoirs and recharge groundwater. Federal, state and local engineered water projects, aqueducts, canals, and reservoirs serve as the primary conduits of surface water sources to areas that have limited surface water resources. Most of the surface water storage is transported for agricultural, urban, and rural residential needs to the San Francisco Bay Area and to cities and areas extending to southern coastal California. Surface water is also transported to southern inland areas, including Owens Valley, Imperial Valley, and Central Valley areas.

b) Groundwater

The majority of runoff from snowmelt and rainfall flows down mountain streams into low gradient valleys and either percolates into the ground or is discharged to the sea. This percolating flow is stored in alluvial groundwater basins that cover approximately 40 percent of the geographic extent of the state (DWR 2003). Groundwater recharge occurs more readily in areas underlain by coarse sediments, primarily in mountain base alluvial fan settings. As a result, the majority of California's groundwater basins are located in broad alluvial valleys flanking mountain ranges, such as the Cascade Range, Coast Ranges, Transverse Ranges, and the Sierra Nevada.

There are 250 major groundwater basins that serve approximately 30 percent of California's urban, agricultural and industrial water needs, especially in southern portion of San Francisco Bay, the Central Valley, greater Los Angeles area, and inland desert areas where surface water is limited. On average, more than 15 million acre-feet of groundwater are extracted each year in the State, of which more than 50 percent is extracted from 36 groundwater basins in the Central Valley.

c) Water Quality

Land uses have a great effect on surface water and groundwater water quality in the State of California. Water quality degradation of surface waters occurs through nonpoint- and point- source discharges of pollutants. Nonpoint source pollution is defined as not having a discrete or discernible source and is generated from land runoff, precipitation, atmospheric deposition, seepage, and hydrologic modification (EPA 1993). Nonpoint-source pollution includes runoff containing pesticides, insecticides, and herbicides from agricultural areas and residential areas; acid drainage from inactive mines; bacteria and nutrients from septic systems and livestock; VOCs and toxic chemicals from urban runoff and industrial discharges; sediment from timber harvesting, poor road construction, improperly managed construction sites, and agricultural areas; and atmospheric deposition and hydromodification. In comparison, point-source pollution is generated from identifiable, confined, and discrete sources, such as a smokestack, sewer, pipe or culvert, or ditch. These pollutant sources are regulated by the EPA and SWRCB through RWQCB. Many of the pollutants discharged from point-sources are the same as for nonpoint-sources, including municipal (bacteria and nutrients), agricultural (pesticides, herbicides, and insecticides), and industrial pollutants (VOCs and other toxic effluent).

B. Regulatory Setting

Applicable laws and regulations associated with hydrology, water quality, and water supply are discussed in Table 12.

Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply

Regulation	Description
Federal	
National Flood Insurance Program (FEMA)	Designated floodplain mapping program, flooding and flood hazard reduction implementation, and federal subsidized flood insurance for residential and commercial property. Administered by the 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 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
CWA	Administered primarily by the EPA. Pertains to water quality standards, state responsibilities, and discharges of waste to waters of the U.S. 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 402	Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4) (MS4 Permit). Several of the cities and counties issue their own NPDES municipal stormwater permits for the regulations of stormwater discharges. These permits require that controls are implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, these permit holders have created Stormwater Management Plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects, applicants will be required to follow the guidance contained in the Stormwater Management Plans as defined by the permit holder in that location.
CWA Section 404	Permit system for dredging or filling activity in waters of the U.S., including wetlands, and administered by USACE.
National Toxics Rule and California Toxics Rule	Applicable receiving water quality criteria promulgated by EPA for priority toxic pollutants consisting generally of trace metals, synthetic organic compounds, and pesticides.

Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
State	
California Water Rights	The 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.
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 RWQCBs 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. RWQCBs issue waste discharge requirements 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, CDFW, and the Office of Environmental Health and Hazard Assessment.

Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
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.
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 percent 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)	NPDES permit for stormwater and non-storm discharges from construction activity that disturbs greater than 1 acre. The general construction permit requires the preparation of a SWPPP that identifies 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. While small amounts of construction-related dewatering are covered under the General Construction Permit, the RWQCB has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit applies to various categories of dewatering activities and may apply to some construction sites, if construction of specific projects required dewatering in greater quantities than that allowed by the General Construction Permit and discharged the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit.

Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
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. The general industrial permit requires the preparation of a SWPPP that identifies potential onsite pollutants, BMPs to be implemented, and inspection/monitoring.
Senate Bill 1168	This bill requires all groundwater basins designated as high- or medium-priority basins by DWR that are designated as basins subject to critical conditions of overdraft to be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2020, and requires all other groundwater basins designated as high- or medium-priority basins to be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2022. This bill would require a groundwater sustainability plan to be developed and implemented to meet the sustainability goal, established as prescribed, and would require the plan to include prescribed components.
Assembly Bill 1739	This bill establishes groundwater reporting requirements for a person extracting groundwater in an area within a basin that is not within the management area of a groundwater sustainability agency or a probationary basin. The bill requires the reports to be submitted to the SWRCB or, in certain areas, to an entity designated as a local agency by the SWRCB.
Senate Bill 1319	This bill allows the SWRCB to designate a groundwater basin as a probationary basin subject to sustainable groundwater management requirements. This bill also authorizes SWRCB to develop an interim management plan in consultation with the DWR under specified conditions.
Local	
Water Agencies	Water agencies enter into contracts or agreements with the federal and state governments to protect the water supply and to ensure the lands within the agency have a dependable supply of suitable quality water to meet present and future needs.
Floodplain Management	General plans guide county land use decisions, and require the identification of water resource protection goals, objectives, and

Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply	
Regulation	**Description**
	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 RWQCBs generally delegate permit authority to county health departments to regulate the construction and operation/maintenance of onsite sewage disposal systems (e.g., septic systems and leach fields, cesspools).

11. LAND USE AND PLANNING

A. Existing Conditions

1. United States

The manner in which physical landscapes are used or developed is commonly referred to as land use. Public agencies are the primary entities that determine the types of land use changes that can occur for specific purposes within their authority or jurisdiction. In most states, land uses decisions are made by local governments. In incorporated areas, land use decisions are typically made by the city. In unincorporated areas, land use decisions are typically made by the county. Sometimes state, regional or federal land management agencies also make land use decisions. Generally, state law establishes the framework for local planning procedures, which local governments follow in adopting their own set of land use policies and regulations in response to the unique issues they face.

2. California

In California, the State Planning and Zoning Law (California Government Code section 65000 et seq.) provides the primary legal framework that cities and counties must follow in land use planning and controls. Planned land uses are designated in the city or county general plan, which serves as the comprehensive master plan for the community. Also, city and county land use and other related resource policies are defined in the General Plan. The primary land use regulatory tool provided by the California Planning and Zoning Law is the zoning ordinance adopted by each city and county. Planning and Zoning Law requirements are discussed in the regulatory setting below.

When approving land use development, cities and counties must comply with CEQA, which requires that they consider the significant environmental impacts of their actions and the adoption of all feasible mitigation measures to substantially reduce significant impacts, in the event a project causes significant or potentially significant effects on the environment. In some cases, building permits may be ministerial, and therefore exempt from CEQA, but most land use development approval actions by cities and counties require CEQA compliance.

Land use decisions in California are also be governed by state agencies such as the California Coastal Commission, California State Lands Commission, California Department of Parks and Recreation, and others, where the state has land ownership or permitting authority with respect to natural resources or other state interests.

B. Regulatory Setting

Applicable laws and regulations associated with land use and planning are discussed in Table 13.

Table 13: Applicable Laws and Regulations for Land Use and Planning

Regulation	Description
Federal	
FLPMA	FLPMA is the principal law governing how the BLM manages public lands. FLPMA requires the BLM to manage public land resources for multiple use and sustained yield for both present and future generations. Under FLPMA, the BLM is authorized to grant right-of-ways for generation, transmission, and distribution of electrical energy. Although local agencies do not have jurisdiction over the federal lands managed by the BLM, under FLPMA and the BLM regulations at 43 CFR Part 1600, the BLM

Table 13: Applicable Laws and Regulations for Land Use and Planning	
Regulation	**Description**
	must coordinate its planning efforts with state and local planning initiatives. 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.
BLM Resource Management Plans	Established by FLPMA, Resource Management Plans 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 Resource Management Plans. Management direction is set forth in the Resource Management Plans 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.
National Forest Management Act (NFMA)	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. Goal 4 of the USFS'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.

Table 13: Applicable Laws and Regulations for Land Use and Planning	
Regulation	**Description**
State	
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.
Subdivision Map Act (Government Code section 66410 et seq.)	In general, land cannot be divided in California without local government approval. The primary goals of the Subdivision Map Act are: (a) to encourage orderly community development by providing for the regulation and control of the design and improvements of the subdivision with a proper consideration of its relation to adjoining areas; (b) to ensure that the areas within the subdivision that are dedicated for public purposes will be properly improved by the subdivider so that they will not become an undue burden on the community; and (c) to protect the public and individual transferees from fraud and exploitation. (61 Ops. Cal.Atty. Gen. 299, 301 [1978]; 77 Ops. Cal.Atty. Gen. 185 [1994]). Dividing land for sale, lease or financing is regulated by local ordinances based on the state Subdivision Map Act (Government Code section 66410 et seq.).
Local	
General Plans	The most comprehensive land use planning is provided by city and county general plans, which local governments are required by State law to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by state law or which the jurisdiction has chosen to include. Required topics are: land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address are public facilities, parks and recreation, community design, or growth management, among others. City and county general plans must

Table 13: Applicable Laws and Regulations for Land Use and Planning	
Regulation	**Description**
	be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas).
Specific and Community Plans	A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These more localized plans provide for focused guidance for developing a specific area, with development standards tailored to the area, as well as systematic implementation of the general plan. Specific and community plans are required to be consistent with the city or county's general plan.
Zoning	The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, state law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.

12. MINERAL RESOURCES

A. Existing Conditions

1. United States

Mineral resources are all the physical materials that are extracted from the earth for use. Modern society is dependent on a huge amount and variety of mineral resources. Mineral resources are classified as metallic or non-metallic. As measured by consumption, the most important metallic resources are iron aluminum, copper, zinc and lead. The most important nonmetallic resources include crushed stone, sand and gravel, cement, clays, salt and phosphate. Mineral reserves are known deposits of minerals that can be legally mined economically using existing technology.

2. California

The CGS classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act of 1975 and assists in the designation of land containing significant aggregate resources. Mineral Resources Zones (MRZs) 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.

California ranks as 7th in the U.S. for non-fuel mineral production, accounting for approximately 3.9 percent of the nation's total. In 2011, there were approximately 700 active mineral mines that produced: sand and gravel, boron, Portland cement, crushed stone, gold, masonry cement, clays, gemstones, gypsum, salt, silver, and other minerals (Clinkenbeard and Smith 2013).

B. Regulatory Setting

Applicable laws and regulations associated with mineral resources are discussed in Table 14.

Table 14: Applicable Laws and Regulations for Mineral Resources

Regulation	Description
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.
State	
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

Table 14: Applicable Laws and Regulations for Mineral Resources	
Regulation	**Description**
	authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using MRZs 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.
CBSC (24 CCR)	California's minimum standards for structural design and construction are given in the CBSC (24 CCR). The CBSC is based on the Uniform Building Code (International Code Council 1997), which is used widely throughout U.S. (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.
Local	
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of BMPs similar to those contained in a SWPPP.
City/County General Plans	Most city and county general plans have an element that addresses mineral resources within that jurisdiction.

13. NOISE

A. Existing Conditions

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. Common sources of environmental noise and noise levels are presented in Table 15.

Table 15: Typical Noise Levels

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet	100	--
Gas lawnmower at 3 feet	90	--
Diesel truck moving at 50 mph at 50 feet	80	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	60	
Quiet urban daytime	50	Large business office, Dishwasher in next room
Quiet urban nighttime	40	Theater, Large conference room (background)
Quiet suburban nighttime	30	Library, Bedroom at night, Concert hall (background)
Quiet rural nighttime	20	Broadcast/Recording Studio
	10	--
Threshold of Human Hearing	0	Threshold of Human Hearing

Notes: dB=A-weighted decibels; mph=miles per hour
Source: Caltrans 2009: p.2-21

1. Sound Properties

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 summed. 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 (i.e., transportation) such as automobiles, trucks, and airplanes and stationary sources (i.e., non-transportation) 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 (i.e., decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers. 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 (i.e., 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 (e.g., berms, hills, and dense vegetation) and human-made features (e.g., buildings and walls) may be used as noise barriers.

All buildings provide some exterior-to-interior noise reduction. A building constructed with a wood frame and a stucco or wood sheathing exterior typically provides a minimum exterior-to-interior noise reduction of 25 dB with its windows closed, whereas a building constructed of a steel or concrete frame, a curtain wall or masonry exterior wall, and fixed plate glass windows of one-quarter-inch thickness typically provides an exterior-to-interior noise reduction of 30–40 dB with its windows closed (Paul S. Veneklasen & Associates 1973, cited in Caltrans 2002: p. 7-37).

2. Common 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 in relation to the environment are defined below (Caltrans 2009).

Equivalent Noise Level (L_{eq}): The equivalent steady-state noise level in a stated period of time that would contain the same acoustic energy as the time-varying noise level during the same period (i.e., average noise level).

Maximum Noise Level (L_{max}): The highest instantaneous noise level during a specified time period.

Minimum Noise Level (L_{min}): The lowest instantaneous noise level during a specified time period.

Day-Night Noise Level (L_{dn}): The 24-hour L_{eq} with a 10-dB penalty applied during the noise-sensitive hours from 10 p.m. to 7 a.m., which are typically reserved for sleeping.

Community Noise Equivalent Level (CNEL): Similar to the L_{dn} described above with an additional 5-dB penalty applied during the noise-sensitive hours from 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.

3. 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 2007: p. 21). 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.

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss both may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (Caltrans 2009).

4. 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 (FTA 2006, 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. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006). This is based on a reference value of 1micro (μ) inch/second.

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006).

Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration is rarely perceptible. The range of interest is 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. Construction activities could generate groundborne vibrations that potentially pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2006).

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 16 describes the general human response to different levels of groundborne vibration-velocity levels.

Table 16: Human Response to Different Levels of Groundborne Noise and Vibration	
Vibration-Velocity Level	**Human Reaction**
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Notes: VdB = vibration decibels referenced to 1 μ inch/second and based on the root mean square (RMS) velocity amplitude.
Source: FTA 2006: p. 7-8

5. Sensitive Land Uses

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, schools, 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. These types of receptors 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.

B. Regulatory Setting

Applicable laws and regulations associated with noise are discussed in Table 17.

Table 17: Applicable Laws and Regulations for Noise	
Regulation	**Description**
Federal	
Federal Noise Control Act (1972) EPA (40 CFR 201-	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

Table 17: Applicable Laws and Regulations for Noise	
Regulation	**Description**
211)	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.
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.
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	FHWA standards, policies, and procedures 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,	This regulation established a standard for noise exposure in the

Table 17: Applicable Laws and Regulations for Noise	
Regulation	**Description**
Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration [OSHA])	workplace.
FTA Guidance	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	
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 or other alternative.
Section 5000 et seq. (21 CCR Division 2.5, Chapter 6), California Airport Noise Regulations promulgated in	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

Table 17: Applicable Laws and Regulations for Noise	
Regulation	**Description**
accordance with the State Aeronautics Act	speech, sleep, and community reaction.
24 CCR, Part 2	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 Ldn levels to 45 dBA in any habitable room.

14. EMPLOYMENT, POPULATION, AND HOUSING

A. Existing Conditions

1. United States

The employed civilian labor force, unemployment rates, employment opportunities, and population estimates and projections for cities, counties, and states are collected every 10 years by the US Census Bureau (Census). The estimated population in 2013 for the U.S., was approximately 316,128,839 and the estimated number of housing units was 132,802,859 (Census 2014). The estimated average number of persons per household in 2013 was 2.61 in the U.S. in 2013 (Census 2014). In 2013, the unemployment rate in the U.S. declined from 7.9 percent in January to 6.7 percent by December (DOF 2013).

2. California

a) Population

According to the Census data, the estimated population of California in 2013 was 38,332,521 (Census 2014). Since California became a state in 1850, the population has been increasing rapidly. Within the first 150 years of California's statehood, the population increased from fewer than 100,000 citizens to almost 34 million in 2000 (CSP 2005). It is expected that the population of California will reach and surpass the 50-million mark sometime between 2030 and 2040 if the current growth rates persist (CSP 2005).

b) Housing

As population within the state increases, housing distribution and household conditions are expected to evolve. Estimated housing units, households, and vacancy rates for the State of California in 2013 are shown below in Table 18. Data was derived from the 2010 Census (Census 2014).

Table 18: California Housing Profile	
Total Housing Units	13,680,081
Total households	12,577,498
Vacant housing units	1,102,583
Owner-occupied	7,035,371
Renter-occupied	15,691,211
Homeowner vacancy rate	2.1
Rental vacancy rate	6.3
	Source: DOF 2010

c) Employment

In 2013, the civilian labor force in California was approximately 18,550,000, and the unemployment rate decreased steadily decreased in 2013 from 9.5 percent in January to 8.3 percent in December (DOF 2013).

B. Regulatory Setting

See land use planning and housing-related regulations in Section 11.0, Land Use and Planning.

15. PUBLIC SERVICES

A. Existing Conditions

1. United States

EPA is charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. The EPA Criminal Investigation Division's primary mission is the enforcement of the U.S. environmental laws as well as any other federal law in accordance with the guidelines established by the Attorney General of the U.S. (18 U.S.C. 3063). These environmental

laws include those specifically related to air, water, and land resources. The USFS is an agency of the USDA that administers the nation's 155 national forests and 20 national grasslands, including fire protection and response services. Major divisions of the agency include the National Forest System, State and Private Forestry, and the Research and Development branch. The Fire and Aviation Management part of the USFS works to advance technologies in fire management and suppression, maintain and improve the extremely efficient mobilization and tracking systems in place, and reach out in support of federal, state, and international fire partners.

Education is primarily a state and local responsibility in the U.S. Communities, as well as public and private organizations, establish schools, develop curricula, and determine requirements for enrollment and graduation.

2. California

a) Law Enforcement

Enforcement of environmental laws in California is the responsibility of the Attorney General's Office and the CalEPA. The Attorney General represents the people of California in civil and criminal matters before trial courts, appellate courts and the supreme courts of California and the U.S. In regards to environmental issues, the Attorney General enforces laws that safeguard the environment and natural resources in the state. Recent actions by the Attorney General related to air quality and climate change issues include: legally defending the state's clean cars law against multiple challenges, filing numerous actions against the Bush Administration regarding regulation of global warming pollution, working with local governments to ensure that land use planning processes take account of global warming, promoting renewable energy and enhanced energy efficiency in California, and working with other state leaders and agencies to implement AB 32, the Global Warming Solutions Act of 2006 (DOJ 2011).

CalEPA was created in 1991 by Governor's Executive Order. CalEPA's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality. The CalEPA is comprised of various boards, departments and offices, including: ARB, Department of Pesticide Regulation, DTSC, Office of Environmental Health

Hazard Assessment, and SWRCB (including the nine RWQCBs).

California's environmental laws are enforced by state and local agencies, each charged with enforcing the laws governing a specific media such as air, water, hazardous waste, solid waste, and pesticides. Enforcement agencies for these media are as follows:

- Air: ARB (part of CalEPA) and Local Air Districts.
- Water: SWRCB (part of CalEPA), RWQCBs (part of CalEPA), local waste water officials, and the California Department of Public Health.
- Hazardous Waste: DTSC (part of CalEPA) and CUPA.
- Carcinogens/Reproductive Toxins: Prop. 65 through the Office of Environmental Health Hazard Assessment (part of CalEPA).
- Pesticides: Department of Pesticide Regulation (part of CalEPA) and County Agricultural Commissioners

Statewide law enforcement service is provided by the California Highway Patrol, which is responsible for protecting State resources and providing crime prevention services and traffic enforcement along the State's highways and byways.

Community law enforcement service is provided by local police and sheriff agencies (i.e., cities and counties, respectively) to prevent crime, respond to emergency incidents, and provide traffic enforcement on local roadways.

b) Fire Protection and Emergency Medical Response Services

State-level fire protection and emergency response service is provided by the California Department of Forestry and Fire Protection (CAL FIRE), primarily in rural areas of the State. 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 and urban fire protection service is provided by local fire districts and/or local agencies (e.g., fire departments of cities and counties). In addition to providing fire response services most fire agencies also provide emergency medical response services (i.e., ambulance services) within their service areas.

3. Schools

Statewide, the regulation of education for youth is provided by the 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. Locally, school districts are responsible for the management and development of elementary, middle, and high-school facilities.

B. Regulatory Setting

Applicable laws and regulations associated with public services are discussed in Table 19.

Table 19: Applicable Laws and Regulations for Public Services

Regulation	Description
Federal	**None applicable.**
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	
State Fire Responsibility Areas	Areas delineated by the 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.

16. RECREATION

A. Existing Conditions

1. United States

Recreational resources and facilities are provided and managed at federal, state, and local levels. The federal government manages a diverse array of recreational facilities and resources that include national parks and monuments, national forests and grasslands, wildlife refuges, wilderness areas, lakes and lands managed by different agencies in the federal government, wild and scenic rivers, and back country byways, national trials, and marine reserves and estuaries. Each federal agency's programs include recreation components.

2. California

California has more than 275 state beaches and parks, recreation areas, wildlife areas, historic parks, and museums, and has authority over fishing and hunting activities, habitat restoration and protection in the state. General plans for State parks, recreation areas, and beaches are publicly available. The California Outdoor Recreation Plan and associated research provide policy guidance to all public agencies – federal, state, local, and special districts that oversee outdoor recreation on lands, facilities and services throughout California. Agencies and departments that have involvement in recreational activities include Boating and Waterways, Fish and Wildlife, Tahoe Regional Planning Association, various conservancies, and others (California State Parks 2008).

Recreational lands and facilities are also managed by regional and local park and recreation agencies and open space districts. City and county general plans contain recreation elements that provide framework for planning agencies to consider when projects are developed and implemented.

B. Regulatory Setting

Applicable laws and regulations associated with recreation are discussed in Table 20.

Table 20: Applicable Laws and Regulations for Recreation

Regulation	Description
Federal	
FLPMA, 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the "multiple use" management, protection, development, and enhancement of public lands. Multiple use management, defined as "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people" with recreation identified as one of the resource values.
State	
	None applicable
Local	
General Plans	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.

17. TRANSPORTATION, TRAFFIC, AND SHIPPING

A. Existing Conditions

1. United States and California

Existing roadway systems in the U.S. and California generally consist 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 considerably (i.e., from hundreds to hundreds of thousands). 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 LOS F, 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 depending on the location. In addition to the roadway systems, circulation networks provide additional transportation opportunities and include mass transit, airports, and non-motorized travel (e.g., pedestrian and bicycle paths).

The majority of alternative fuels are not produced within the states that have the highest demand for these fuels. Therefore, shipping is a major factor in use and transport of alternative fuels. According to the USDA, 90 percent of ethanol is transported by train or truck. The remaining 10 percent is transported by barge or pipeline (U.S. Department of Energy 2013). Most ethanol produced in the U.S is transported from the production plants via train, and is most efficient when a train of approximately 100 cars (called a unit train) is transported to a single destination. There is currently only one pipeline that has successfully transported ethanol and it is from Tampa to Orlando. There are currently no pipelines dedicated to transport of ethanol in the U.S. Biodiesel fuel is transported similarly to ethanol. The majority of biodiesel fuel is transported via rail because most biodiesel plants are not located near pipelines (U.S. EIA 2012).

2. Areas Outside of United States

Ethanol and biodiesel imported from outside of the United State are primarily shipped in chemical tankers. Tankers are connected to shore-based storage tanks via pipeline. Pumping equipment is typically located near the tanker storage plants; however, chemical tankers typically have pumping equipment on board. Brazil is the leader in world trade for ethanol. Ethanol is shipped out of five ports in Brazil; however, the majority of ethanol is shipped out of the ports of Santos, Sao Sebastiao, and the terminal of Ilha D'Aqua. The International Maritime Organization develops the safety regulations for the transport of dangerous goods, and the International Code for the Construction and Equipment of Ships and provides an international standard for the safe carriage by sea of dangerous and noxious liquid chemicals in bulk (Climate Change Solutions et al. 2009).

B. Regulatory Setting

Applicable laws and regulations associated with transportation and traffic are discussed in Table 21.

Table 21: Applicable Laws and Regulations for Transportation and Traffic	
Regulation	**Description**
Federal	
40 CFR, Part 77 (FAA)	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.	Regulates the highway transport of hazardous materials.
VC Sections 13369; 15275 and 15278	Addresses 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.	Specifies limits for vehicle width, height, and length.
VC Section 35780	Requires permits for any load exceeding Caltrans weight, length, or width standards on public roadways.
California Streets and Highways Code Section 117, 660-672	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.	Regulate permits from Caltrans for any roadway encroachment from facilities that require construction, maintenance, or repairs on or across State highways and County roads.

18. UTILITIES AND SERVICE SYSTEMS

A. Existing Conditions

1. United States

The U.S. Bureau of Reclamation (USBR) is a federal agency and it is the largest wholesaler of water in the U.S. and the second largest producer of hydroelectric power (USBR 2011). The Federal Power Commission regulates both the interstate transmission of electricity and the sale of hydroelectric power at the wholesale level in the U.S., and the Federal Energy Regulatory Commission (FERC) has authority over intrastate as well as interstate natural gas production.

2. California

a) Water Supply and Distribution

The principal water supply facilities in California are operated by the USBR and DWR. 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 2011).

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 districts, irrigation 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 or state land use authority and seek approval for development of the groundwater well(s).

b) Wastewater Collection and Treatment

The SWRCB is the state agency responsible for the regulation of wastewater discharges to surface waters and groundwater

via land discharge. The SWRCB and nine RWQCBs are responsible for development and enforcement of water quality objectives and implementation plans that protect the beneficial uses of the federal and state waters (SWRCB 2013). The SWRCB also administers water rights in California. 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 onsite wastewater treatment system. These facilities would need to be approved by the local or state land use authority and the RWQCB.

c) Electricity and Natural Gas

The 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 utility. New development projects would need to coordinate with the local service provider to ensure adequate capacity is available to serve the development.

d) Solid Waste Collection and Disposal

Statewide, the California Department of Resources Recycling and Recovery (CalRecycle), which is a department of the 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 and, once approved by Cal Recycle, they can serve as the enforcement agency for landfills and recycling facilities with their jurisdictions.

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.

B. Regulatory Setting

Applicable laws and regulations associated with utilities are discussed in Table 22.

Table 22: Applicable Laws and Regulations for Utilities

Regulation	Description
Federal	
Federal Power Act of 1935	In the Federal Power Act of 1935 (49 Stat. 803), created the Federal Power Commission, an independent regulatory agency with authority over both the interstate transmission of electricity and the sale of hydroelectric power at the wholesale level. The act requires the commission to ensure that electricity rates are “reasonable, nondiscriminatory and just to the consumer.” The Federal Power Act of 1935 also amended the criteria that the commission must apply in deciding whether to license the construction and operation of new hydroelectric facilities.

Table 22: Applicable Laws and Regulations for Utilities	
Regulation	**Description**
Natural Gas Act of 1938	Together with the Federal Power Act of 1935, the Natural Gas Act of 1938 (NGA) (P.L. 75-688, 52 Stat. 821) was an essential piece of energy legislation in the first half of the 20th century. These statutes regulated interstate activities of the electric and natural gas industries, respectively. The acts are similarly structured and constitute the classic form of command-and-control regulation authorizing the federal government to enter into a regulatory compact with utilities. In short, the Natural Gas Act enabled federal regulators to set prices for gas sold in interstate commerce in exchange for exclusive rights to transport the gas.
Natural Gas Policy Act of 1978	The Natural Gas Policy Act of 1978 (NGPA) granted the FERC authority over intrastate as well as interstate natural gas production. The NGPA established price ceilings for wellhead first sales of gas that vary with the applicable gas category and gradually increase over time.
State	
Waste Heat and Carbon Emissions Reduction Act of 2007	The Waste Heat and Carbon Emissions Reduction Act of 2007 (AB 1613), placed requirements on the CPUC, the CEC, and local electric utilities to develop incentive programs and technical efficiency guidelines to encourage the installation of small CHP systems. The CEC approved efficiency and certification guidelines for eligible systems under AB 1613 in January 2010, and the CPUC approved standardized contracting and pricing provisions between CHP operators and the Investor Owned Utilities in November 2012.
Section 21151.9 of the PRC/ 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-dry, and multiple-dry years. The WSA is required to be approved by the water service agency before the project can be implemented.

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ATTACHMENT 2: SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Aesthetics		
Impact 1.a: Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics **Potentially Significant**	**Mitigation Measure 1.a** • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must certify that the environmental document was prepared in compliance with applicable regulations prior to approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. • The project proponent would color and finish the surfaces of all project structures and buildings visible to the public to: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The project proponent would submit a surface treatment plan to the lead agency for review and approval. • To the extent feasible, the sites selected for use as construction staging and laydown areas would be areas that are already disturbed and/or are in locations of low visual sensitivity. Where feasible, construction staging and laydown areas for equipment, personal vehicles, and material storage would be sited to take	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	advantage of natural screening opportunities provided by existing structures, topography, and/or vegetation. Temporary visual screens would be used where helpful, if existing landscape features did not screen views of the areas. • All construction, operation, and maintenance areas would be kept clean and tidy, including the re-vegetation of disturbed soil and storage of construction materials and equipment would be screened from view and/or are generally not visible to the public, where feasible. • Siting projects and their associated elements next to important scenic landscape features or in a setting for observation from State scenic highways, national historic sites, national trails, and cultural resources would be avoided to the greatest extent feasible. • The project proponent would contact the lead agency to discuss the documentation required in a lighting mitigation plan, submit to the lead agency a plan describing the measures that demonstrate compliance with lighting requirements, and notify the lead agency that the lighting has been completed and is ready for inspection.	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Agriculture Resources		
Impact 2.a: Conversion of Agricultural and Forest Resources Related to New Facilities **Potentially Significant**	**Mitigation Measure 2.a** • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance response to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant agricultural and forest land impacts may include the following actions. Because ARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels. Any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Avoidance of important agricultural and forest land, to the extent feasible. • The establishment and recording of a farmland or forest conservation easement to protect other land in the region. • The purchase of credits in an already-established, approved farmland mitigation bank.	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	• Contribution to county agricultural sustainability funds.	
Impact 2.b: Agricultural and Forest Resource Impacts Related to Feedstock Cultivation **Potentially Significant**	**Mitigation Measure 2.b: Implement Mitigation Measure 2.a** The authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant agricultural or forest land impacts	**Potentially Significant and Unavoidable**
Air Quality		
Impact 3.a: Short-Term Construction-Related Air Quality Impacts **Potentially Significant**	**Mitigation Measure 3.a** • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local jurisdiction with land use authority would determine that the environmental review process complied with CEQA and other applicable regulations, prior to project approval. • Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the construction-related air quality impacts of the project. • Project proponents would apply for, secure, and comply with all appropriate air quality permits for project construction from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to construction	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	mobilization. • Project proponents would comply with the federal Clean Air Act and the California Clean Air Act (e.g., New Source Review and Best Available Control Technology criteria if applicable). • Project proponents would comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure (e.g., construction-related fugitive PM dust regulations, indirect source review, and payment into offsite mitigation funds). • For projects located in PM nonattainment areas, prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.	
Impact 3.b: Long-Term Operational Air Quality Emissions **Beneficial**	No Mitigation Required	**Not Applicable**
Impact 3.c: Short-Term Construction-Related and Long-Term Operational Impacts from Odors **Less Than Significant**	No Mitigation Required	**Not Applicable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Biological Resources		
Impact 4.a: Short-Term Construction-Related and Long-Term Impacts on Biological Resources Related to New Facilities **Potentially Significant**	**Mitigation Measure 4.a** • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance response to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the potentially significant impacts to biological resources. The definition of actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. - Retain a qualified biologist to prepare a biological inventory of site resources prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Construction and operational planning will require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities. - Retain a qualified biologist to prepare a wetland survey of onsite resources. This survey shall be used to establish	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 3030(d) of the Clean Water Act and is administered by the U.S. Army Corps of Engineers. - Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices. - Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring, as needed, to address project activities that could cause an active nest to fail. - Prepare site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board. - Prepare spill prevention and emergency response plans, and hazardous waste disposal plans as appropriate to protect against the inadvertent release of potentially toxic materials. - Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with “no net loss” requirements.	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Impact 4.b: Effects of Biological Resources Associated with Land Use Changes **Potentially Significant**	**Mitigation Measure 4.b: Implement Mitigation Measure 4.a** Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant impacts.	**Potentially Significant and Unavoidable**
Cultural Resources		
Impact 5.a: Short-Term Construction-Related Impacts on Cultural Resources **Potentially Significant**	**Mitigation Measure 5.a** • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant cultural impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Retain the services of cultural resources specialists with training	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	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 2010).	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	• 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 would 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 fossiliferous 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;	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	- specimen preparation; - identification, cataloging, curation and storage; and - a final report of the findings and their significance.	
Energy Demand		
Impact 6.a: Short Term Construction-Related Impacts on Energy Demand **Less Than Significant**	No Mitigation Required	**Not Applicable**
Impact 6.b: Long-Term Operational Impacts on Energy Demand **Beneficial**	No Mitigation Required	**Not Applicable**
Geology, Soils and Minerals		
Impacts 7.a: Short-Term Construction-Related and Long-Term Operational Effects on Geology and Soil Related to New Facilities **Potentially Significant**	**Mitigation Measure 7.a** • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts on soil erosion and the loss of topsoil. The definition of actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare a geotechnical investigation/study, which would 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, mineral resources and the presence of hazardous materials. • Proponents of new or modified facilities or infrastructure would provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents would 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. • Disturbed areas outside of the permanent construction footprint would be stabilized or restored using techniques such as soil loosening, topsoil replacement, revegetation, and surface protection (i.e., mulching).	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Impact 7.b: Long-Term Operational Impacts Associated with Carbon Capture and Sequestration Projects **Potentially Significant**	**Mitigation Measure 7.b** Because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and the programmatic level of analysis associated with this EA does not attempt to address project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately by implemented to reduce potentially significant geology and soils impacts. Permits and/or agreements to reduce potential geology and soils impacts could include, but are not limited to, several classes of Underground Injection Control (UIC) permits administered pursuant to the Safe Drinking Water Act (SDWA) at the federal and State and levels. The U.S. Environmental Protection Agency (EPA) issues Class VI permits under these regulations, which apply to injections wells that are drilled for the sole purpose of CO_2 injection in an underground formation as part of a CCS project, without any other intended purpose. The California Division of Oil, Gas and Geothermal Resources (DOGGR) issues Class II permits under regulatory authority granted by EPA pursuant to UIC regulations. Class II permits apply to injection wells created for the purpose of extracting oil and gas, including injection wells used for enhanced oil recovery (EOR) methods that could also be used for the purpose of CO_2 sequestration as part of a CCS project. To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering studies, geologic study, and injection plans. Requirements for these permits are	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	likely to include: isopach maps, cross sections, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. Because these permits would address inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach, this impact could be reduced.	
Impact 7.c: Long-Term Operational Impacts to Geology and Soil Associated with Land Use Changes **Potentially Significant**	**Mitigation Measure 7.c** • Use no-till agriculture to reduce soil erosion. • Avoid harvesting in areas with steep slopes. • Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure). • Identify soil properties, engineering constraints, and facility design criteria. • Develop a site grading and management plan to identify areas of disturbance, areas of cut and fill, slope during and after grading, existing vegetation, and measures to protect slope, drainages, and existing vegetation in the project area. • Develop an erosion control plan to delineate measures to minimize soil loss and reduce sedimentation to protect water quality. • Design runoff control features to minimize soil erosion. • Construct drainage ditches only where necessary. • Use appropriate structures at culvert outlets to prevent erosion.	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Greenhouse Gas Emissions		
Impact 8.a: Short-Term Construction- and Long-term Operational Related Greenhouse Gas Impacts **Beneficial**	No Mitigation Required	**Not Applicable**
Hazards and Hazardous Materials		
Impact 9.a: Short-Term Construction-Related Hazard Impacts **Potentially Significant**	**Mitigation Measure 9.a** • Proponents of new or modified facilities constructed as a compliance response would coordinate with local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant upset and accident-related hazard impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Handling of potentially hazardous materials/wastes should be	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	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 would 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.	
Impact 9.b: Long-Term Increased Transport, Use, and Disposal of Hazardous Materials **Less Than Significant**	No Mitigation Required	**Not Applicable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Impact 9.c: Long-Term Operational Hazards Related to Carbon Capture and Sequestration **Potentially Significant**	**Mitigation Measure 9.c** The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regards to hazards and hazardous materials. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Permits and/or agreements to reduce potential hazards and hazardous materials impacts could include, but are not limited to, Underground Injection Control (UIC) permits administered pursuant to the SDWA at the federal and State and levels. EPA issues Class VI permits under these regulations, which apply to injections wells that are drilled for the sole purpose of CO_2 injection in an underground formation as part of a CCS project, without any other intended purpose. DOGGR issues Class II permits under regulatory authority granted by EPA pursuant to UIC regulations. Class II permits apply to injection wells created for the purpose of extracting oil and gas, including injection wells used for EOR methods that could also be used for the purpose of CO_2 sequestration as part of a CCS project. To obtain these permits, the project proponent would be required to	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	conduct various evaluations, such as engineering studies, geologic study, and injection plans. Requirements for these permits are likely to include: isopach maps, cross sections, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. In addition, CEQA and/or other necessary regulatory processes would be completed to address and mitigate potential environmental effects. Because these actions would address inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, public outreach, and potential environment effects, this impact could be reduced.	
Hydrology and Water Quality		
Impact 10.a: Short-Term Construction-Related and Long-Term Operational Hydrologic Resource Impacts **Potentially Significant**	**Mitigation Measure 10.a** • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses to new regulations would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation identified in the environmental document to reduce or substantially lessen the potentially significant impacts associated with altering drainage patters, flooding, and inundation by seiche, tsunami, or mudflow. The definition of actions required to mitigate potentially significant	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Under the oversight of the local lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project would prepare a stormwater drainage and flood control analysis and management plan. The plans would be prepared by a qualified professional and would summarize existing conditions and the effects of project improvements, and would include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and offsite improvements, features to protection downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features would be designed to protect existing downstream flow conditions that would result in new or increased severity of offsite flooding. • Establish drainage performance criteria for offsite 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 would design and construct new facilities	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs would be approved by the local or State land use agency. The project proponent would 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. • As part of subsequent project-level planning and environmental review, the project proponent shall coordinate with the local groundwater management authority and prepare a detailed hydrogeological 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.	
Impact 10.b: Long-Term Effects on Hydrology and Water Quality Related to Changes in Land Use **Potentially Significant**	**Mitigation Measure 10.b** • Use no-till agriculture to reduce soil erosion. • Avoid harvesting in areas with steep slopes. • Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	structure). • Identify soil properties, engineering constraints, and facility design criteria. • Develop a site grading and management plan to identify areas of disturbance, areas of cut and fill, slope during and after grading, existing vegetation, and measures to protect slope, drainages, and existing vegetation in the project area. • Develop an erosion control plan to delineate measures to minimize soil loss and reduce sedimentation to protect water quality. • Design runoff control features to minimize soil erosion. • Construct drainage ditches only where necessary. • Use appropriate structures at culvert outlets to prevent erosion.	
Impact 10.c: Long-Term Impacts on Hydrology and Water Quality Related to Carbon Capture and Sequestration Projects **Potentially Significant**	**Mitigation Measure 10.c(1): Implement Mitigation Measure 10.a** **Mitigation Measure 10.c(2)** The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regards to hydrology and water quality. ARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would qualify as a “project” under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	CEQA statutes. Permits and/or agreements to reduce potential hydrology and water quality impacts could include, but are not limited to, Underground Injection Control (UIC) permits administered pursuant to the SDWA at the federal and State and levels. EPA issues Class VI permits under these regulations, which apply to injections wells that are drilled for the sole purpose of CO_2 injection in an underground formation as part of a CCS project, without any other intended purpose. DOGGR issues Class II permits under regulatory authority granted by EPA pursuant to UIC regulations. Class II permits apply to injection wells created for the purpose of extracting oil and gas, including injection wells used for EOR methods that could also be used for the purpose of CO_2 sequestration as part of a CCS project. To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering studies, geologic study, and injection plans. Requirements for these permits are likely to include: isopach maps, cross sections, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones. In addition, CEQA and/or other necessary regulatory processes would be completed to address and mitigate potential environmental effects. Because these actions would address inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, public outreach, and potential environment effects, this impact could be reduced to a less than significant level.	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	Because the authority to determine project-level impacts and require project-level mitigation lies with the land use approval and/or permitting agency for individual projects, and that the programmatic analysis does not allow project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation ultimately implemented to reduce the potentially significant impacts.	
Land Use and Planning		
Impact 11.a: Short-Term Construction-Related Impacts Related to New or Modified Facilities **Potentially Significant**	See Mitigation Measures: 2.a, 2.b, 4.a, 4.b, 8.b, and 10.a	**Potentially Significant and Unavoidable**
Impact 11.b: Long-Term Operational Impacts Related to Feedstock Production **Potentially Significant**	See Mitigation Measures: 2.a, 2.b, 4.a, 4.b, 7.c, 8.a, 8.b, and 10.a	**Potentially Significant and Unavoidable**
Mineral Resources		
Impact 12.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Mineral Resources **Less Than Significant**	No Mitigation Required	**Not Applicable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Noise		
Impact 13.a: Short-Term Construction-Related Noise Impacts **Potentially Significant**	**Mitigation Measure 13.a** • Proponents of new or modified facilities constructed under the reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen the environmental impacts of the project. The definition of actions required to mitigate potentially significant noise impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Ensure noise-generating 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, 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.	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	• All construction equipment used would 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 or shielded. • Properly maintain mufflers, brakes and all loose items on construction- and operation-related-related vehicles to minimize noise and address operational safety issues. 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	

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	in normal work areas.	
Impact 13.b: Long-Term Operational Noise Impacts **Less Than Significant**	No Mitigation Required	**Not Applicable**
Population and Housing		
Impact 14.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Population, Employment, and Housing **Less Than Significant**	No Mitigation Required	**Not Applicable**
Public Services		
Impact 15.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Public Services **Less Than Significant**	No Mitigation Required	**Not Applicable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
Recreation		
Impact 16.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Recreation **Less Than Significant**	No Mitigation Required	**Not Applicable**
Transportation and Traffic		
Impact 17.a: Short-Term Construction-Related Impacts on Traffic and Transportation **Potentially Significant**	**Mitigation Measure 17.a** • Proponents of new or modified facilities constructed would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen potentially significant impacts on traffic and transportation. The definition of actions required to mitigate potentially significant traffic impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. - Minimize the number and length of access, internal, service	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	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. - 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 meet the appropriate roadway 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.	
Impact 17.b: Long-Term Operational Impacts on Traffic and Transportation **Potentially Significant**	**Mitigation Measure 17.b** • Revisions to traffic signals • Requirements to pay a fair share contribution to local traffic operation centers • Coordination with Caltrans, or other relevant agencies, to broadcast real-time information on existing changeable message signs	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	• Consultation with local authorities to revise public transit system operations • Consultation with local emergency service provides to ensure that operating conditions on local roadways and freeway facilities are maintained	
Utilities and Service Systems		
Impact 18.a: Increased Demand for Water, Wastewater, Electricity, and Gas Services **Potentially Significant**	**Mitigation Measure 18.a** • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body would certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development. • Based on the results of the environmental review, proponents would implement all mitigation identified in the environmental document to reduce or substantially lessen potentially significant impacts on utilities and service systems. The definition of actions required to mitigate potentially significant utility or service-related impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency. • Comply with local plans and policies regarding the provision of water supply, wastewater treatment, and storm water drainage utilities, and solid waste services.	**Potentially Significant and Unavoidable**

Attachment 2: Summary of Environmental Impacts and Mitigation Measures		
Resource Area Impact **Significance Before Mitigation**	**Potential Mitigation**	**Significance After Mitigation**
	• Where an onsite wastewater system is proposed, submit a permit application to the appropriate local jurisdiction. • Where appropriate, prepare a 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 would be approved by the local water agency/purveyor prior to construction of the project. • Comply with local plans and policies regarding the provision of wastewater treatment services.	