

APPENDIX D

~~DRAFT~~ Final ENVIRONMENTAL ANALYSIS

PREPARED FOR THE PROPOSED

AMENDMENTS TO THE LOW CARBON FUEL STANDARD AND THE ALTERNATIVE DIESEL FUELS REGULATION

Air Resources Board
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Date of Release: ~~March~~ September 617, 2018

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PREFACE

A Draft Environmental Analysis (EA) for the Proposed Amendments to the Low Carbon Fuel Standard (LCFS) and Alternative Diesel Fuel (ADF) Regulations (Proposed Amendments) was released on March 9, 2018 for a 45-day public review and comment period that concluded on April 23, 2018. Revisions to the Proposed Amendments after the EA comment period warranted additional public review during 15-day comment periods. Two such 15-day public reviews occurred, first starting on June 20, 2018 and closing on July 5, 2018 and then starting on August 13, 2018 and closing on September 30, 2018. A total of 292 comment letters were received on the Proposed Amendments during all public comment periods, 20 of which addressed the Draft EA.

This Final EA consists of a modified version of the Draft EA. To facilitate identifying changes to the Draft EA, other than in this Preface (which has been added to this Final EA to explain the changes between the Draft and Final EA), modified text is presented with ~~strike-through~~ for deletions and underline for additions. The modifications to the Draft EA are minor clarifications that do not provide significant new information. The Final EA contains revisions to the Draft EA to accommodate proposed changes in the regulation made as part of the first 15-day public review. Changes in the regulations addressed in the first 15-day public review that result in Draft EA revisions consist of modifications to:

- Amendments to the Alternative Diesel Fuels Regulation; and
- Zero-Emission Vehicle (ZEV) Pathways

No changes to the regulations that require any changes to the Draft EA were proposed for the second 15-day public review, so no further revisions in the Draft EA are needed.

The following provides an overview of CEQA recirculation requirements, changes to the Draft EA, and CARB's rationale for not recirculating the EA.

Requirements for Recirculation of the Draft EA

Recirculation is required when "significant new information" is added to the Draft EA, such that, in the absence of recirculation, the public would be deprived "of a meaningful opportunity to comment upon a substantial adverse environment effect or a feasible way to mitigate or avoid such an effect" (CEQA Guidelines Section 15088.5[a]). As stated in CEQA Guidelines Section 15088.5(a), "significant new information" requiring recirculation includes:

- (1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
- (2) A substantial increase in the severity of an environmental impact, unless mitigation measures are adopted that reduce the impact to a level of insignificance.

- (3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.
- (4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

The following discussion addresses the potential for changes to the Draft EA to result in new significant environmental impacts or a substantial increase in the severity of an environmental impact. No feasible project alternatives or mitigation measures were recommended during the review periods. The EA provides a thorough analysis of the Proposed Amendments' environmental effects, and satisfies all applicable requirements of CARB's Certified Regulatory Program and CEQA.

Amendments to the Alternative Diesel Fuels Regulation

The modification to the proposed amendment to the ADF Regulation bifurcates sunset provisions for on- and off-road sectors separately, to reflect the differences in the level of anticipated future adoption of new technology diesel engines (NTDE) in the on- and off-road sectors. Revisions to the EA that address this amendment to the regulation are provided on page 32 of the Final EA, as follows.

F. Description of Amendments to the Alternative Diesel Fuels Regulation

The current ADF regulation sunsets in-use requirements for both on- and off-road biodiesel blends up to 20 percent biodiesel (B20) when the vehicle miles travelled (VMT) by on-road new technology diesel engine (NTDE)¹ heavy-duty vehicles in California reaches 90 percent of total VMT by the California on-road heavy-duty diesel vehicle fleet. ~~However, the~~ current ADF regulation sunset provision does not account for adoption of NTDEs in the off-road sector, which is occurring at a slower rate than in the on-road sector.

As part of the program review of in-use biodiesel requirements described in section 2293.6(a)(6) of the ADF regulation (California Code of Regulations, title 13) and in response to court direction that CARB further analyzed potential biodiesel NOx impacts, staff re-examined the on-road and off-road emissions analysis. Based on additional off-road data and the analysis included in the draft supplemental disclosure discussion in Appendix G to the Staff Report, staff determined that implementation of the current sunset provision could ~~fail to prevent possible future NOx increases resulting from biodiesel use increases~~

¹ The use of biodiesel in ~~older newer~~ diesel engines not equipped with selective catalytic reduction (SCR) results in ~~an no~~ increase in NOx emissions relative to use of conventional diesel. Diesel engines with SCR are referred to as New Technology Diesel Engines (NTDE); engines without SCR are referred to as non-NTDEs.

~~attributable to the LCFS~~ result in potential NO_x increases. More information on the data and analysis is available in Appendix G.

The proposed amendment includes bifurcated sunset provisions for on- and off-road sectors, separately, to reflect the differences in the level of anticipated future adoption of NTDEs in the on- and off-road sectors. The on-road in-use requirements are proposed to sunset when the heavy-duty on-road diesel fleet is 90 percent NTDE by vehicle miles traveled. For the off-road sector, in-use requirements will sunset when the hours of operation of heavy-duty off-road diesel NTDEs are 90 percent of the total hours of operation of all heavy-duty off-road diesel engines in California.

Staff performed additional air quality analysis to evaluate the NO_x emissions impacts of bifurcating the ADF regulation sunset provisions into on-road and off-road provisions. The method for this additional air quality analysis is based on the NO_x emissions analysis for biodiesel and renewable diesel (biomass-based diesel) in the Draft EA. The additional analysis indicates that the sunset of in-use requirements for the on-road sector would still likely occur in 2023, and the sunset of in-use requirements for the off-road sector would likely not occur until 2030 or later. This proposed amendment would mitigate potential future NO_x emissions increases due to biomass-based diesel use attributed to the LCFS. The proposed amendment would not result in changes to PM emissions, because changes to biodiesel in-use requirements (e.g., whether or not NO_x mitigant additives are required in biodiesel) do not impact PM emissions associated with biomass-based diesel use.

This modification would not result in new significant environmental impacts or impacts of greater severity than disclosed in the Draft EA. Thus, changes to the amendments to the Alternative Diesel Fuels Regulation, as part of the Proposed Amendments, would not require recirculation of the Draft EA.

ZEV Fueling Infrastructure Pathways for EA

Governor Brown signed Executive Order B-48-18 (EO B-48-18) on January 26, 2018, to boost the use of ZEVs, electric vehicle charging infrastructure, and hydrogen refueling infrastructure in California. EO B-48-18 calls for a new Statewide target of 250,000 vehicle charging stations (including 10,000 direct current (DC) fast charging) stations and 200 hydrogen refueling stations by 2025 to provide service to a fleet of 5 million ZEVs by 2030. This action builds on past efforts to boost ZEVs, including: legislation signed last year and in 2014 and 2013; adopting the 2016 Zero-Emission Vehicle Plan and the Advanced Clean Cars program; hosting a Zero-Emission Vehicle Summit; launching a multi-state ZEV Action Plan; co-founding the International ZEV Alliance; and issuing Executive Order B-16-12 in 2012 to help bring 1.5 million zero-emission vehicles to California by 2025.

Executive Order B-48-18 includes the following list of actions, which may be used to reach Statewide targets:

- Update the 2016 Zero-Emission Vehicle Action plan to help expand private investment in zero-emission vehicle infrastructure, particularly in low income and disadvantaged communities.
- Recommend actions that boost zero-emission vehicle infrastructure to strengthen the economy and create jobs in the State of California.
- Recommend ways to expand zero-emission vehicle infrastructure through the Low Carbon Fuel Standard Program.
- Support and recommend policies and actions that make it easier for people to install electric vehicle chargers in their homes and businesses.
- Ensure electric vehicle charging and hydrogen fueling are affordable and more accessible to all drivers.

To be consistent with EO B-48-18, the first 15-day changes included a new pathway to generate LCFS credits: Zero-Emission Vehicle Fueling Infrastructure Pathways. Pages 30-31 of the EA has been modified as follows:

9. Zero-Emission Vehicle Fueling Infrastructure Pathways

Staff is proposing to credit zero-emission vehicle (ZEV) fueling infrastructure on the basis of the fueling station capacity for both hydrogen refueling infrastructure and DC fast charging infrastructure. The proposal is responsive to the Governor's Executive Order 8-48-18, direction in Board Resolution 18-17, and stakeholder comments. The proposal is also consistent with the Scoping Plan and Mobile Source Strategy, which emphasize the importance of ZEVs in meeting the State's GHG and criteria pollutant emission targets. Like other aspects of the LCFS program, this amendment is intended to support development of ZEV infrastructure and is designed to sunset after an initial period of enhanced support for ZEV infrastructure build-out. The maximum quantity of infrastructure credits issued will be capped at 2.5 percent of overall program deficits for each category (2.5 percent for the hydrogen station provision and 2.5 percent for the fast charging provisions, for a maximum of 5 percent of total deficits across both).

It is described again under Section 2.G.3.c.ii, as follows (new text shown as underline):

c. Additional Infrastructure Needs

i. Summary

In general, infrastructure already exists to support increased shipments of feedstock crops and fuels via rail and ocean-going vessels. New processing plants for cellulosic ethanol, renewable diesel, biodiesel, biodiesel additives, alternative jet fuel, and biomethane could also 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. Construction and operation of additional hydrogen stations, CNG/LNG and EV charging stations could also be developed to meet future demands and in response to the hydrogen and DCFC infrastructure provisions.

Reducing GHG emissions at refineries could result in the installation of solar or wind electricity generation systems; use of lower-CI process energy such as biomethane, renewable propane, and renewable coke, to displace fossil fuel; and equipment electrification (i.e. substitution of high carbon fossil energy input with lower carbon electricity).

ii. Compliance Responses

Because credits could be generated using 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 the production of alternative fuels and under the innovative crude and refinery investment provisions could include the development and construction of CCS projects. As discussed below in section 2.E.3.d, CCS is a process whereby CO₂ 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 geologic formations, such as depleted oil and gas fields, or deep saline aquifers. Captured CO₂ may be used for CI credits under the Proposed Amendments, including when used for EOR projects.

These projects could include the modification of existing or new industrial facilities to capture CO₂ 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 CO₂ into a geologic formation for sequestration. The transport distances and pipeline construction requirements for the captured CO₂ would vary depending on the locations of specific industrial sources of the captured CO₂ and proposed underground formations, recognizing, however, that pipeline cost could reasonably limit the distance of CO₂ transport.

Potential compliance responses to the Proposed Amendments (both generally and as specifically associated with credits for ZEV infrastructure) consist of construction and operation of new hydrogen refueling and new

DC fast charging infrastructures, and an increase in the adoption rate of zero emission vehicles.

The Draft EA provides an analysis of construction and operation of additional hydrogen stations and electric vehicle (EV) charging stations, as discussed in Section 2.G.2.G, “Additional Infrastructure Needs,” Section 2.H, “Summary of Compliance Responses,” and throughout Chapter 4 (e.g., see the first paragraph under Impact B.1.a: Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics).

The Draft EA included compliance responses that included EV charging stations and hydrogen refueling stations in Section 2.G.4.c, “Additional Infrastructure Needs” and Section 2.H, “Summary of Compliance Responses.” The environmental impacts of the construction and operation of these compliance responses are described throughout Chapter 4 (e.g., see the first paragraph under Impact B.1.a: Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics). Thus, there would not be a new significant environmental impact related to crediting of ZEV fueling infrastructure pathways, as such impacts have already been analyzed and disclosed at the level of detail ascertainable at this early regulatory development stage.

The infrastructure provision is not a mandate, as a result the number and location of stations and chargers that would be constructed as a direct result of LCFS crediting for ZEV infrastructure is not reasonably foreseeable. However, these would be more likely to occur within footprints of existing facilities, or in areas with existing zoning that would permit the development and operation of fueling stations. In addition to the potential generation of LCFS credits, many factors and considerations influence the decision of when and where to build new ZEV infrastructure, including:

- State grant funding, including AB 8 grant funding
- Funding from case settlements
- Funding from public and investor owned utilities
- Location and access to customers/potential customers
- Rental and site acquisition costs
- Local jurisdictions’ (cities, counties) plan designations, zoning, support and permitting restrictions
- ZEV rollout projections
- Financing availability
- Fuel availability
- Electrical grid constraints and need for upgrades
- Average utilization rate for nearby stations/chargers
- Whether the facility would see regular fleet use at a charging/fueling station (e.g. parcel carriers)

The scope of analysis in the EA is intended to help focus public review and comments on the Proposed Amendments, and ultimately to inform the Board of the environmental benefits and adverse impacts of the proposed action prior to Board action. The 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 addresses a broad market-based regulatory program necessitating a general level of detail; however, the EA makes a good-faith 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 speculation.

As discussed above, the decision to construct and operate ZEV fueling infrastructure would be based on many factors, one of which is the ability to generate LCFS credits, including the new infrastructure credits. Additionally, the decision to locate new stations would depend on many other factors beyond CARB's jurisdiction, such as city or county land use plan and zoning designations, local government support or permitting restrictions, whether the grid requires substantial upgrades to support high power stations. Thus, attempting to determine the ultimate number and precise locations of new ZEV fueling infrastructure projects directly related to the proposed LCFS crediting incentives is not feasible. The Final EA continues to provide an appropriately broad level of environmental impact analysis. It would be speculative to determine whether new crediting procedures would cause a substantial increase in the severity of environmental impacts described in the Draft EA.

Therefore, recirculation of the Draft EA is not necessary, because there are no new significant environmental impacts or impacts of greater severity than previously disclosed.

1. INTRODUCTION AND BACKGROUND

A. Introduction

This Draft Final Environmental Analysis (Draft Final EA) is Appendix D of the California Air Resources Board (CARB or Board) staff report that is presented to the Board for consideration of the proposed Regulatory Amendments to the Low Carbon Fuel Standard (Proposed Amendments), i.e., the proposed project under the California Environmental Quality Act (CEQA). The Project Description section of this Draft Final EA presents a summary of the Proposed Amendments, i.e., the proposed project under CEQA. A detailed description of the Proposed Amendments is contained in the “Staff Report: Initial Statement of Reasons for the Proposed Regulatory Amendments to the Low Carbon Fuel Standard,” (Staff Report or ISOR) date of release March 6, 2018, which is hereby incorporated by reference and available at <https://www.arb.ca.gov/regact/regact18.htm> <https://www.arb.ca.gov/regact/2018/lcfs18/lcfs18.htm>. A summary of pertinent text of the regulation is provided in Chapter 2, Project Description, of the Draft Final EA.

This Draft Final EA is intended to disclose potential environmental impacts and identify potential mitigation specific to the Proposed Amendments. The Proposed Amendments are designed to improve California’s long-term ability to support the consumption of increasingly lower-carbon intensity (CI) fuels and to improve the program’s overall effectiveness. In some cases, as described in Chapter 4 of the Draft Final EA, potentially significant environmental effects may occur because of compliance actions taken in response to the Proposed Amendments. Mitigation measures are described in this Draft Final EA that could be expected to reduce potentially significant impacts to less-than-significant levels, for individual projects, if agencies with discretionary authority adopt the mitigation measures. The Draft Final 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 or may not be implemented by other parties) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

B. Background on Low Carbon Fuel Standard Regulation and Alternative Diesel Fuel Regulations

The Low Carbon Fuel Standard (LCFS), established pursuant to Executive Order S-01-07, calls for a reduction in the CI of transportation fuels sold for use in California 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.

On April 23, 2009, 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 2015, the Board re-adopted the LCFS to comply with a court order arising from a challenge to the original adoption and began implementation on January 1, 2016.

The Board also adopted the Alternative Diesel Fuels (ADF) regulation in 2015, clarifying an approval process for alternative diesel fuels. The ADF regulation also imposed requirements designed to prevent certain biodiesels from causing any significant new emissions. Since the implementation of LCFS, the use of low carbon fuels in California has been increasing. Before LCFS, the only alternative fuels with market share were natural gas and ethanol. Between 2011 and 2016, renewable diesel, biodiesel, and renewable natural gas use has increased each year (CARB LCFS Dashboard Figure 2). Since 2011, biodiesel use has grown over ten times—from 12 million to 163 million gallons per year; renewable diesel has increased from less than 2 million to 250 million gallons per year; and renewable natural gas use in vehicles has increased from 2 million to 87 million diesel gallon equivalent per year. In fact, in 2016, biomethane, that is, natural gas from sources such as landfills or digesters, made up over 60 percent of all gaseous fuels used in California vehicles. Through ongoing innovation, fuel producers are achieving reductions in the carbon intensities of their fuel pathways. For example, corn ethanol producers in California have begun producing cellulosic ethanol by converting the residual corn kernel fiber using "bolt-on" additions to their existing facilities. "Bolt-on" facilities would include an additional piece of equipment to the existing framework and; therefore, upgrading the processes without having to do any major reconfigurations. Moreover, new projects with the potential to generate credits are being explored at biofuel production facilities, waste management operations (e.g., landfills, livestock manure and wastewater treatment plants), crude production fields (e.g., solar-generated electricity and steam), and petroleum refineries (e.g., refinery efficiency improvement projects, production of renewable hydrogen and co-processing of renewable feedstocks). For instance, one project is generating credits for producing crude oil using solar-generated electricity under the innovative crude oil provision (CARB Approved Innovative Crude Oil Applications), and a major solar steam facility in California has been announced (GlassPoint – Belridge Solar). Providers of electricity and hydrogen for battery electric and fuel cell vehicles are also increasing participation in the program. For example, fixed guideway systems are currently generating credits

and utilities are offering zero-emission vehicle (ZEV) rebates using LCFS credit revenue (CARB LCFS Utility Rebate Programs).

In 2016, the California legislature adopted Senate Bill (SB) 32, which builds on the progress of AB 32 by codifying a statewide target to reduce GHG emissions 40 percent below 1990 levels by 2030. California's 2017 Climate Change Scoping Plan (Scoping Plan) sets out the State's path to achieve this target through continuation of existing measures implemented under AB 32 and through the development of new strategies. The Scoping Plan proposes developing more stringent LCFS targets as one of the primary measures for achieving the State's GHG 2030 target.

CARB staff proposes that, in 2018, the Board approve a suite of amendments to the LCFS, which would improve California's long-term ability to support the consumption of increasingly lower-CI fuels and improve the program's overall effectiveness. The Proposed Amendments are described in greater detail in Chapter 2, Project Description.

C. Prior Environmental Analysis

The 2015 Environmental Analysis (2015 EA) published in the 2015 ISOR for the re-adoption of the LCFS provided a single coordinated programmatic environmental analysis of an illustrative, reasonably foreseeable compliance scenario that could result from implementation of the re-adoption of the LCFS regulation and adoption of the ADF regulation. The analysis stated that implementation of the regulations could result in beneficial impacts to the GHG sector through substantial reductions in emissions from transportation fuels in California from 2016 through 2020 and beyond, long-term beneficial impacts to air quality through reductions in criteria air pollutants, and beneficial impacts to energy demand. Staff estimated a cumulative reduction in GHG emissions of about 35 million metric tons of carbon dioxide equivalent (MMTCO_{2e}) from transportation fuels used in California from 2016 through 2020. Staff anticipated that implementation of the LCFS would also reduce criteria pollutant emissions from the 2020 projected vehicle fleet, predominately attributable to reductions in diesel use. These emissions reductions include the reduced tailpipe emissions of fine particulate matter (PM_{2.5}) associated with the replacement of conventional diesel with substitute fuels despite possible 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.

As part of the analysis, CARB evaluated the potential physical changes to the environment resulting from a reasonable foreseeable compliance scenario. Staff expected that implementation of LCFS could provide incentives for various projects, including: processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. The 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); shifting agricultural crops; and installation of energy management systems at refineries. In addition, LCFS credits could be generated through

development of carbon capture and sequestration (CCS) facilities (upon subsequent Board adoption of a quantification methodology not included as part of the 2015 rulemaking) and operation of expanded fixed guideway systems.

In the 2015 EA, staff analyzed potential impacts to the various resource areas. Table 1-1 below summarizes these potential impacts.

**Table 1-1
Summary of Potential Environmental Impacts from the 2015 Environmental Analysis**

| Resource Area Impact | Significance |
|---|---|
| Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics | Potentially Significant and Unavoidable |
| Conversion of Agricultural and Forest Resources Related to New Facilities | Potentially Significant and Unavoidable |
| Agricultural and Forest Resource Impacts Related to Feedstock Cultivation | Potentially Significant and Unavoidable |
| Short-Term Construction-Related Air Quality Impacts | Potentially Significant and Unavoidable |
| Long-Term Operation Air Quality Emission | Beneficial |
| Short-Term Construction-Related and Long-Term Operational Impacts from Odors | Less Than Significant |
| Short-Term Construction-Related and Long-Term Impacts on Biological Resources Related to New Facilities | Potentially Significant and Unavoidable |
| Effects of Biological Resources Associated with Land Use Changes | Potentially Significant and Unavoidable |
| Short-Term Construction-Related Impacts on Cultural Resources | Potentially Significant and Unavoidable |
| Short Term Construction-Related Impacts on Energy Demand | Less Than Significant |
| Long-Term Operational Impacts on Energy Demand | Beneficial |
| Short-Term Construction-Related and Long-Term Operational Effects on Geology and Soil Related to New Facilities | Potentially Significant and Unavoidable |
| Long-Term Operational Impacts Associated with Carbon Capture and Sequestration Projects | Potentially Significant and Unavoidable |
| Long-Term Operational Impacts to Geology and Soil Associated with Land Use Changes | Potentially Significant and Unavoidable |
| Short-Term Construction- and Long-Term Operational Related Greenhouse Gas Impacts | Beneficial |
| Short-Term Construction-Related Hazard Impacts | Potentially Significant and Unavoidable |

| Resource Area Impact | Significance |
|--|---|
| Long-Term Increased Transport, Use, and Disposal of Hazardous Materials | Less Than Significant |
| Long-Term Operational Hazards Related to Carbon Capture and Sequestration | Potentially Significant and Unavoidable |
| Short-Term Construction-Related and Long-Term Operational Hydrologic Resource Impacts | Potentially Significant and Unavoidable |
| Long-Term Effects on Hydrology and Water Quality Related to Changes in Land Use | Potentially Significant and Unavoidable |
| Long-Term Impacts on Hydrology and Water Quality Related to Carbon Capture and Sequestration Projects | Potentially Significant and Unavoidable |
| Short-Term Construction-Related Impacts Related to New or Modified Facilities | Potentially Significant and Unavoidable |
| Long-Term Operational Impacts Related to Feedstock Production | Potentially Significant and Unavoidable |
| Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Mineral Resources | Less Than Significant |
| Short-Term Construction-Related Noise Impacts | Potentially Significant and Unavoidable |
| Long-Term Operational Noise Impacts | Less Than Significant |
| Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Population, Employment, and Housing | Less Than Significant |
| Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Public Services | Less Than Significant |
| Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Recreation | Less Than Significant |
| Short-Term Construction-Related Impacts on Traffic and Transportation | Potentially Significant and Unavoidable |
| Long-Term Operational Impacts on Traffic and Transportation | Potentially Significant and Unavoidable |
| Increased Demand for Water, Wastewater, Electricity, and Gas Services | Potentially Significant and Unavoidable |

Pursuant to an October 18, 2017 writ of mandate arising out of CEQA litigation associated with the 2009 adoption of the original version of the LCFS, CARB set aside its 2015 approval of the parts of the final 2015 EA addressing nitrogen oxide (NOx) emissions from biodiesel in resolution 17-48. Also, pursuant to that writ of mandate, CARB has developed a draft disclosure document included as Appendix G to the Staff Report, and finalized as the Final Supplemental Disclosure Discussion of Oxides of Nitrogen Potentially Caused by the Low Carbon Fuel Standard Regulation (hereafter referred to as the Final NOx Disclosure Document), to address whether the LCFS as a

whole² "is likely to have" caused an increase in NOx emissions in the past and whether the is likely to cause an increase in NOx emissions in the future.

D. Relationship of this Draft Environmental Analysis to Prior Environmental Analysis

The ~~Draft~~ Final EA analyzes the impacts associated with the Proposed Amendments. Although most of the types of compliance responses and associated impacts with the Proposed Amendments are already addressed in the previous 2015 EA, this ~~Draft~~ Final EA, for the purposes of CEQA, is a stand-alone environmental document, drawing information from the 2015 EA and representing it again herein, when needed. This analysis presentation approach, as opposed to tiering from the previous EA, was chosen for reasons discussed below.

The Proposed Amendments, in comparison to what was analyzed in the 2015 EA, extends and increases the CI reduction targets from a 10 percent reduction by 2030 to a 20 percent reduction by 2030 from 2010 fuel CI levels. This adjustment would not substantially change the types of compliance responses analyzed in the 2015 EA, as stated above, but may result in a greater intensity of known compliance responses, such as additional building construction or fuel processing operations beyond the level that was anticipated in the 2015 EA. Also, as described in Chapter 2 (Project Description), the Proposed Amendments could result in changes to the profile of eligible fuels addressed in the previous analysis and increase the likelihood of certain compliance responses (such as CCS) that were generally described in the 2015 EA, but not analyzed in the detail available at that ~~this~~ time. The Proposed Amendments could result in some difference in compliance responses from those included in the previous analysis (e.g., the use of renewable jet fuel that would not be available without the Proposed Amendments).

Additionally, although requirements for LCFS crediting for CCS were generally included under the 2015 version of the regulation, potential impacts from anticipated future CCS projects were analyzed at a high programmatic level at that time, because CCS projects were not able to receive LCFS credits under that version of the regulation, pending CARB approval of a quantification methodology. The Proposed Amendments propose to incorporate a Board-approved CCS quantification methodology into the LCFS in order to allow projects to receive LCFS credits associated with use of CCS in certain cases. Therefore, the ~~Draft~~ Final EA analyzes CCS in a greater level of detail than the 2015 EA.

² For purposes of the analysis in Appendix G of the Staff Report, as directed by the Court of Appeal in that particular case, the "LCFS project as a whole" includes the original LCFS (the LCFS regulation adopted in 2009 and amended in 2012), and the modified LCFS (the replacement LCFS regulation adopted in 2015).

Staff has determined that the Proposed Amendments constitute a “project” under CEQA. As discussed in Section E, the impacts associated with the compliance responses of the Proposed Amendments are analyzed relative to a baseline of existing conditions (i.e., 2016).³ The year 2016 was selected to represent existing conditions and serve as the CEQA baseline for the Proposed Amendments, because this is the most current modeling year for which complete fuel volume and LCFS credit and deficit data are available, which is needed to evaluate the Proposed Amendments. This period, therefore, represents the most recent full-year data available. The Notice of Preparation (NOP) for the Proposed Amendments was released in July, 2017. Because the 2016 data was the best available information describing physical environmental conditions as they existed at the time the NOP was published, selection of 2016 as the baseline year is consistent with provisions in the CEQA Guidelines (14 California Code of Regulations [CCR] Section 15125(a)). Additionally, the previous iterations of the LCFS and ADF regulations analyzed in the 2010 and 2015 EAs were allowed to be implemented statewide despite the legal challenges against the environmental analyses. Therefore, in consideration of environmental changes associated with the LCFS and ADF regulations since the release of the previous EAs, and the refinements in air quality impact analysis methodology since that time, 2016 serves as an appropriate baseline for CEQA compliance purposes in this ~~Draft~~ Final EA.

E. Environmental Review Process

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

CARB is the lead agency for the Proposed Amendments and has prepared this ~~Draft~~ Final 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 of the Natural Resources Agency as meeting the requirements of CEQA. CARB’s regulatory program was certified by the Secretary of the Natural Resources Agency in 1978 (Cal. Code Regs., tit.14, § 15251(d)). As required by CARB’s certified regulatory program, and the policy and substantive requirements of CEQA, CARB prepared this ~~Draft~~ Final 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 (Cal. Code Regs., tit.17, § 60005(a) and (b)). The resource areas from the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et. seq) Environmental Checklist

³ The Proposed Amendments represent substantial proposed changes to the LCFS Regulation. Therefore, CARB staff have determined it is most informative for the purposes of this document to compare the Proposed Amendments against the existing environmental conditions as they existed at the time environmental review for the Proposed Amendments began. Note that Appendix G to the Staff Report also contains analysis of both past and future potential NOx emissions associated with the LCFS as a whole relative to a 2007 baseline, as directed by court order.

(Appendix G of that document) were used as a framework for assessing potentially significant impacts.

CARB has determined that approval of the Proposed Amendments is a “project” as defined by CEQA. CEQA defines 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 (Cal. Code Regs., tit. 14, §15378(a)).” Although the policy aspects of the Proposed Amendments do not directly change the physical environment, indirect physical changes to the environment could result from reasonably foreseeable compliance responses taken in response to implementation actions identified in the Proposed Amendments.

2. 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, the ~~Draft~~ Final 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 ~~Draft~~ Final EA is intended to help focus public review and comments on the Proposed Amendments, 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 Amendments is based on the following assumptions:

1. This analysis addresses the potentially significant adverse environmental impacts resulting from implementing the Proposed Amendments compared to existing conditions, which include existing compliance with the LCFS at the 2016 regulatory standards.
2. The analysis of environmental impacts and determinations of significance are based on reasonably foreseeable compliance responses associated with the Proposed Amendments; compliance with the existing State and federal regulatory framework is considered part of the baseline of existing conditions.

3. The analysis in this ~~Draft~~ Final 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 Amendments is programmatic. Furthermore, industry decisions regarding the specific location and design of new facilities and other infrastructure undertaken in response to the regulations, including the Proposed Amendments, are speculative, and 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 Amendments would undergo required project level environmental review and compliance processes.
5. This ~~Draft~~ Final EA generally does not analyze site-specific impacts when the location of future facilities or other infrastructure is speculative. However, the ~~Draft~~ Final 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 Amendments. Chapter 5 provides a summary of potential cumulative impacts of the Proposed Amendments.

F. Organization of the ~~Draft~~ Final Environmental Analysis

The ~~Draft~~ Final EA is organized into the following chapters to assist the reader in obtaining information about the Proposed Amendments and its 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 Amendments, implementation assumptions, and reasonably foreseeable compliance responses taken in response to the proposed amendments.
- 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 Amendments.
- Chapter 4, Impact Analysis and Mitigation – identifies the potential environmental impacts associated with the Proposed Amendments and mitigation measures for each resource impact area.
- Chapter 5, Cumulative and Growth-Inducing Impacts – identifies the cumulative effects of implementing the proposed amendments against a backdrop of past, present, and reasonably foreseeable future projects.

- Chapter 6, Mandatory Findings of Significance – discusses whether the proposed amendments 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 amendments.
- Chapter 8, References – identifies sources of information used in this ~~Draft~~ Final EA.

G. Public Review Process for the Draft Final Environmental Analysis

At a public workshop on August 7, 2017, CARB staff described plans to prepare an EA of the Proposed Amendments, and invited public feedback on the scope of the analysis.

In accordance with CARB's certified regulatory program, and consistent with CARB's commitment to public review and input on regulatory actions, ~~this Draft EA was is~~ subject to a public review process through the posting of the Staff Report for the Proposed Amendments. The Staff Report, which ~~includes included this~~ Draft EA, ~~will be was~~ posted for a public review period that ~~begins began~~ on March 9, 2018 and ~~ends ended~~ on April 23, 2018. This period ~~complies complied~~ 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~~ a public hearing on the Proposed Amendments. At this hearing, ~~currently scheduled for on~~ April ~~26 or~~ 27, 2018, the Board ~~will did~~ not take any approval action on the proposal; the Board ~~may provide provided~~ direction to staff on modifications to make in the proposal prepared by staff. ~~Staff will address any changes in a notice that will be issued with modified regulatory language, along with supporting documentation, for one or more 15-day review and comment periods~~ Two 15 day changes were circulated for public review, for the time periods of June 20 through July 5, 2018 and August 13 through 30, 2018 (extended two days to accommodate an errata for the second 15-day changes, which was released on August 15, 2018). ~~At the conclusion of all review periods, staff will~~ Staff has compiled compile public comments and prepared responses, including for comments on the EA, and ~~prepare~~ has prepared the Final Regulation Order for the Proposed Amendments for the Board's consideration at a second public hearing ~~planned later in~~ on September 27, 2018. If the finalized regulation is adopted by the Board at that time, the Final Statement of Reasons (FSOR) for the Proposed Amendments will be prepared by staff and the completed regulatory package will be filed with the Office of Administrative Law. When the package is filed with the Office of Administrative Law, a Notice of Decision for the Proposed Amendments will be posted on CARB's website, filed with the Secretary of the Natural Resources Agency, and transmitted to the State Clearinghouse.

2. PROJECT DESCRIPTION

A. Introduction

The “project” for purposes of this ~~Draft~~ Final EA includes the proposed regulatory amendments to the Low Carbon Fuel Standard (Proposed Amendments), including the Carbon Capture and Sequestration (CCS) Protocol, and amendments to the Alternative Diesel Fuels (ADF) regulation. While the Proposed Amendments constitute the “project” for California Environmental Quality Act (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 amendments.

The first part of this chapter provides a background summary of the existing LCFS and ADF regulations. The second part of the chapter summarizes the Proposed Amendments, including establishing appropriate average carbon intensity (CI) requirements through 2030; changes to the fuels that are subject to the regulation; addition of third-party verification of fuel pathways and credit/deficit generation data; incorporation of the CCS Protocol, revisions to the ADF regulation, and other changes, updates, and improvements to existing provisions, models, and procedures. Additional details about the amendments are available in the Initial Statement of Reasons (ISOR). The third part of this chapter describes an illustrative, reasonably foreseeable compliance response scenario resulting from these proposed amendments. This information provides 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).

CEQA requires agencies to analyze the “whole of an action” when conducting CEQA analyses. (See CEQA Guidelines 15378.) CARB has included CCS-related aspects as part of the proposed project for CEQA purposes. Offering LCFS credits for fuel production and processing related CCS is one of many ways the LCFS regulation can incentivize CO₂ emissions reductions. As noted elsewhere in this EA, the CCS Protocol’s accounting requirements lay out a quantification to calculate the amount of GHG emissions reductions from a CCS project and permanence requirements to ensure that the project demonstrates permanent sequestration of injected CO₂. Therefore, given its incorporation into the LCFS regulation, and its role in reducing the carbon intensity of fuels, CARB has included CCS as part of the proposed project to ensure the EA fully analyzes all aspects of the proposed project.

For a description of how the Proposed Amendments are different from the current regulation as re-adopted in 2015, see Section II of the ISOR and the first and second 15-day comment period notices, as well as Chapter 1(D) above. For a description of the regulatory background driving the need for the Proposed Amendments, see Chapter III of the ISOR.

B. Background Information on the Low Carbon Fuel Standard and Alternative Diesel Fuels Regulations

1. Background on the Low Carbon Fuel Standard Regulation

The current LCFS regulation is designed to reduce the 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 regulation creates financial incentives for the development and use of fuels with lower CIs. Fuel reporting entities, 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 LCFS establishes two sets of performance standards that determine the treatment of each fuel used in California: 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 current LCFS regulation applies 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 importers of fuels, although the compliance obligations can be transferred to downstream owners of the fuel. Providers of certain low-CI fuels (e.g., 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 current 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 2020¹ (relative to 2010) | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 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 <https://www.arb.ca.gov/regact/2015/lcfs2015/lcfsfinalregorder.pdf>

Under the LCFS regulation, a fuel reporting entity is a California fuel producer, provider, or importer that must meet the annual compliance 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 generates deficits. Credits and deficits are determined on a quarterly basis. For a given annual compliance period, a fuel reporting entity’s compliance obligation is determined by adding up all the quarterly deficits assessed to that party. A regulated party’s annual compliance obligation is met when the regulated party demonstrates, via its annual report, that it possessed and has retired a number of credits that is equal to its compliance obligation. Credits are “tradeable”—a regulated party can purchase them from other program participants. 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. The credits are also “bankable” (i.e., surrendering credits that the fuel reporting entity already has accumulated in prior compliance periods is permissible). A fuel reporting entity 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 fuel reporting entity 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 fuel reporting entity’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 fuel reporting entities 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 fuel reporting entities. The provider of an exempt fuel opts in by registering as a fuel reporting entity and agreeing to be bound by LCFS compliance, recordkeeping, reporting, and other requirements.

The LCFS regulation also provides fuel reporting entities options to directly reduce the CI of conventional fuels and generate credits. The innovative crude provision promotes the development and implementation of innovative crude oil production methods that reduce GHG emissions. Allowable methods are CCS, solar steam generation, solar and wind electrical power generation, and solar heat generation. The Low-Complexity/Low-Energy-Use Refinery provision provides credits to small refineries. To incent GHG reductions at the refineries, the LCFS also established the Renewable Hydrogen Refinery Credit Pilot Program and the Refinery Investment Credit Pilot Program.

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, fuel reporting entities are required to review these submittals and submit an annual report verifying the validity of the four quarterly reports. The results are used to determine compliance with LCFS targets for that given year. The LCFS regulation requires fuel reporting entities to use the LRT to report fuel and credit transactions subject to the regulation.

2. Background on the Alternative Diesel Fuels Regulation

Complementary State and federal policies, such as the federal Renewable Fuel Standard (RFS) and LCFS, are incentivizing the rapid development of ADFs and driving increased demand in California for ADFs. ADFs include any fuel used in a compression ignition engine that is not petroleum-based, does not consist solely of hydrocarbons,

and is not subject to a specification under section 2290 of Title 13, CCR.⁴ Examples of ADFs include, but are not limited to, biodiesel, Fischer-Tropsch fuels, and emulsions of water in diesel fuel.

The purpose of the 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 CARB.

C. Objectives of the Proposed Amendments

The primary objectives of the Proposed Amendments are listed below:

1. improve California's long-term ability to support the consumption of increasingly lower-CI fuels and to improve the program's overall effectiveness;
2. strengthen the CI reduction targets through 2030 in-line with California's 2030 GHG reduction requirement enacted through Senate Bill (SB) 32 (Pavley, 2016);
3. reduce the CI of transportation fuels in the California market by at least 20 percent of its 2010 level by 2030;
4. provide greater diversification of the State's fuel portfolio;
5. provide reduced dependence on petroleum;
6. decrease the associated economic impacts of gasoline and diesel price spikes caused by volatile oil price changes;
7. provide greater innovation and development of cleaner fuels, and support for California's ongoing efforts to improve ambient air quality;
8. provide additional, cost-effective LCFS compliance options including clarification on the use of CCS and the introduction of credit for alternative jet fuel; and
9. mitigate potential NOx emissions increases relative to conventional diesel due to biodiesel use attributed to the LCFS.

⁴ Section 2290 of Title 13, CCR defines "alternative fuels," which include any fuel which is commonly or commercially known or sold as one of the following: M-100 fuel methanol, M-85 fuel methanol, E-100 fuel ethanol, E-85 fuel ethanol, compressed natural gas, liquefied petroleum gas, or hydrogen.

D. Description of the Amendments to the Low Carbon Fuel Standard

1. Establishing Appropriate Average Carbon Intensity Requirements Through 2030

The current LCFS targets a 10 percent reduction in average fuel CI by 2020 and maintains that target for all subsequent years. In 2016, the California legislature adopted SB 32, which builds on the progress of Assembly Bill (AB) 32 (2006) by codifying a statewide target to reduce GHG emissions by at least 40 percent below 1990 levels by 2030. Achieving the ~~Senate Bill~~ (SB) 32 GHG reduction goals will require the use of a portfolio of low carbon transportation fuels beyond the amount expected to result from the current compliance schedule. To assess possible compliance schedules through 2030, staff conducted an in-depth scenario analysis to account for potential effects of additional proposed changes the LCFS, such as the addition of alternative jet fuels, providing a protocol to facilitate crediting for CCS, and revisions to other credit provisions, which may affect the volumes and types of fuels used to comply with the standard. Staff developed modeling tools that take into account feedstock supply, fuel prices, fuel incentives, and capacity constraints to assess the technical and economic feasibility of bringing low carbon fuels to California. Staff used these modeling tools to assess fuel supply variability and sensitivity to LCFS credit price and other uncertain market effects on a year-by-year basis. Staff used these modeling results, together with stakeholder feedback and information obtained from market reports on alternative fuel technology development, to inform the proposed compliance schedule through 2030.

Table 2-2 provides the proposed CI reductions from 2019 through 2030 from a 2010 reference point. The proposed amendments will extend the LCFS targets to meet a 20 percent reduction in fuel CI from a 2010 reference point by 2030. The proposed amendments will also smooth the CI reduction schedule by linearly reducing the target by 1.25 percent annually from a 5 percent reduction in 2018 to the 20 percent target in 2030.

| | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-----------------------|-------|------|-------|------|--------|-------|--------|------|--------|-------|--------|------|
| Proposed CI Reduction | 6.25% | 7.5% | 8.75% | 10% | 11.25% | 12.5% | 13.75% | 15% | 16.25% | 17.5% | 18.75% | 20% |

2. Changes to Fuels Subject to the Regulation

Staff is proposing amendments that would broaden the list of fuels subject to the LCFS regulation and alter the opt-in and/or exempt status of particular fuels.

a. Addition of Alternative Jet Fuel as Opt-In Credit Generating Fuels

Alternative jet fuels (AJFs) are “drop-in” fuels made from fossil or renewable sources, which can replace conventional jet fuels without the need to modify aircraft engines and existing fuel distribution infrastructure. When used at approved blending levels, staff expects AJFs to have the same performance characteristics as conventional jet fuel. Staff is proposing to allow low-CI pathways for AJF to generate credits as opt-in fuels under the LCFS. Conventional jet fuel, in contrast to gasoline and diesel, would not be subject to the LCFS regulation and would therefore not generate deficits. Like other liquid alternative fuels under the LCFS, the AJF producer or importer would be the first fuel reporting entity eligible to generate credits. Opt-in AJF pathways would be eligible to generate credits for the total volume loaded to planes in California, whether the destinations are in California or out of the state.

b. Removing the Opt-In Status for Fossil Compressed Natural Gas derived from North American Sources

In the current regulation, North American fossil CNG is an opt-in fuel because this fuel is presumed to have a CI that meets the standard in every year through 2020. As the CI standard continues to decline beyond 2020, however, staff anticipates some pathways for fossil CNG will have CI values that exceed the standard and become deficit-generating fuels. Therefore, staff is proposing to remove the opt-in status of fossil CNG, thereby requiring that regulated parties report all quantities of fossil CNG under the LCFS. Staff is also proposing in the 15-day modifications an exemption for small fossil CNG stations from LCFS requirements until the fuel becomes a deficit-generating fuel. Staff does not believe that this modification will change the consumption pattern of CNG in the State.

c. Removing the Opt-In Status for Hydrogen

Like North American CNG, hydrogen is an opt-in fuel under the current regulation because this fuel is presumed to have a CI that meets the compliance standard in every year through 2020 but this may not hold true through 2030. Staff is also proposing to change the opt-in status of hydrogen to allow CARB to use the LCFS reporting framework to monitor statewide compliance with the greenhouse gas emission and renewable energy resource requirements of California SB 1505 (Lowenthal 2006).

d. Removing the Exemption for Propane

Liquefied petroleum gas (LPG or “propane”), including renewable propane, is exempt from the current regulation, meaning its use as a transportation fuel generates neither credits nor deficits. Staff is proposing to remove this exemption for propane and consider it as both a gasoline and diesel substitute for credit and deficit accounting purposes. In the 15-day modifications, staff is also proposing an exemption for small

fossil propane stations from LCFS requirements until the fuel becomes a deficit-generating fuel. Staff does not believe that this modification will change the consumption pattern of propane in the State. The station owner for fossil propane and the producer or importer for renewable propane would be the first fuel reporting entity.

e. Allowing Alternative Fuels used in Military Tactical Vehicle and Aircraft to Opt-In

The LCFS currently exempts all fuels supplied for use in military tactical vehicles and support equipment from both credit and deficit generation. The Proposed Amendments would allow low carbon fuels used in military tactical vehicles and aircrafts to opt-in to the LCFS Program and be eligible to generate credits. Conventional high carbon fuels used in tactical vehicles would remain exempt from deficit generation.

f. Allowing Additional Electricity Applications

Staff is proposing changes that would clarify how several electricity transportation applications, such as electric cargo handling equipments, shore power for ocean going vehicles, electric transport refrigeration units, electric aircraft, and electric motorbikes, would be able to participate and generate earn credits in the program.

3. Addition of Third-Party Verification

CARB is proposing adding an independent verification program to support the accuracy of data reported to the LCFS. Verification would be performed by qualified and trained third-party verifiers that meet specifications for education and experience in GHG accounting.

Elements of verification as proposed in the regulation include: (1) annual site visits to ensure that all required sources and processes are included in the emissions estimates and that the data report is complete; (2) development of a plan for specific verification activities, including site visits and document reviews; (3) development of a sampling plan to conduct data checks on the reported data that considers source contributions with the highest emissions and greatest uncertainty; and (4) a verification opinion submitted to CARB and the reporting entity. Staff is proposing less frequent verification for alternative liquid-fuel production or fueling facilities that generate no more less than 6,000 credits per year and less than 6,000 deficits per year, to reduce the costs associated with verification for smaller projects.

4. Pathway Application and CI Determination

Staff is implementing an update to the current CA-GREET 2.0 model used for calculating life cycle CI values. The new model (CA-GREET 3.0) is based on the GREET1 2016 model developed by Argonne National Laboratory and released in October 2017, with modifications to incorporate California-specific technical information and to allow users to determine pathway-specific CI values. The CA-GREET model is

updated periodically to incorporate new data and improved calculation methodologies, and, as necessary, to reflect changes to the LCFS regulation. New technical data may reflect changes in fuel production parameters, feedstock-fuel properties, tailpipe emission factors, and other factors that impact pathway CI values.

Staff proposes to simplify the lexicon used to describe various pathway types by updating and simplifying the distinctions between Tier 1 and Tier 2 applications. ~~This~~ The proposed changes would allow for pathways with certain innovative practices to remain in the Tier 1 classification, and would remove the Lookup Table pathways from under the Tier 2 umbrella to a stand alone classification to clarify application requirements. Unique pathways that fall under the Tier 2 classification would no longer be subdivided into Methods 2A and 2B. Separately, a new designation for fully engineered planned facilities, called “Design-Based Pathways,” has been added to the Special Circumstances section.

Staff is proposing that all parties contributing site-specific data to a fuel pathway application may either apply as “joint applicants” to the pathway, or designate a single entity as the pathway applicant. For joint applicants, all parties would apply jointly as applicants in the AFP but could submit site-specific data separately (i.e., to maintain confidentiality of operational data) in the AFP. When applying as a single entity, the application would be submitted by one party but include site-specific data from all parties involved. Staff proposes that joint applicants would be subject to all requirements for pathway application, attestations, validation, verification and recordkeeping, for the portion of the pathway for which they submit site-specific data. In addition, designating a single entity as the fuel pathway applicant would not relieve other entities from obligations related to the accuracy of submitted site-specific data.

To streamline the application, evaluation, and verification process for Tier 1 fuel pathways, staff developed new Simplified CI Calculators for each Tier 1 fuel type, which would replace the current Tier 1 Calculator and 24-month operational data summary submittal requirement.

Fuel pathway holders of Tier 1 and Tier 2 fuel pathways will submit an annual Fuel Pathway Report, which will include their certified CI calculator updated to include the most recent two calendar years of operational data. This annual report may also include any supplemental data or documentation that the applicant and CARB agreed upon during the pathway evaluation process ~~and listed in the pathway operating conditions issued at the time of certification.~~

Staff is also proposing several changes to the Lookup Table (Table 6 of the current LCFS regulation), including adding new Lookup Table pathways for North American Fossil CNG, fossil-based propane, renewable electricity, electric vehicle charging based on time of use (“smart charging”), and renewable hydrogen; and removing the existing biomethane pathways.

Staff is proposing amendments to clarify the current regulation's requirements for directly supplied renewable power used as process energy in the production of transportation fuel. Staff is proposing new options to add flexibility for accounting for renewable power supplied to distributed/small-scale uses of electricity where direct supply of renewable power through co-location may be more challenging. Staff is also proposing amendments to clarify the details of the existing "book and claim" system of tracking renewable natural gas (RNG), which applicants have been using under existing pathways in the LCFS. Staff is proposing clarifying distinctions between RNG used as a feedstock in fuel production and ~~contrasting feedstock~~ applications with RNG ~~burned~~ combusted as a source of process energy.

5. Amendments to Fuel Reporting

Staff is proposing amendments to the fuel reporting provisions to clarify some of the existing requirements and add new requirements to support other changes proposed in the regulation.

Staff is proposing to update the terminology used to classify different LCFS participants to help better clarify roles and responsibilities of different entities participating in the program. It is critical to ensure that LCFS participants are able to identify and fulfill their requirements under the regulation.

Staff is also clarifying the existing regulatory requirements related to all online systems responsible for LCFS data management and program implementation, which includes Alternative Fuels Portal (AFP) and the LCFS Reporting Tool and Credit Banking and Transfer System (LRT-CBTS) and the proposed new verification portal. Staff is proposing creating a new online portal to facilitate the proposed third-party verification.

The current regulation requires the fuel data reported in the LRT-CBTS to be reconciled among business partners before credits or deficits are generated for the reported fuel data. Staff is proposing to enhance the reconciliation process in the LRT-CBTS. These proposed enhancements will eliminate the need for third-party verification of some of the liquid fuel transactions reported downstream of the producers and importers, limiting the scope and cost of third-party verification requirements.

Staff is proposing several other updates to provide clarification of current reporting requirements or to align the reporting requirements with industry practices. These include: (1) providing registration and reporting requirements related to Fueling Supply Equipment (FSE) for natural gas fuels, electricity, hydrogen and propane; (2) updating existing Energy Economy Ratio (EER) for heavy-duty electric vehicles and adding new EER values to support proposal for including new electric transportation applications, alternative jet fuel, and propane; (3) updating reporting units for CNG and L-CNG; providing clarification for better accounting and tracking of pipeline injected renewable natural gas; (4) providing temperature correction requirements for reporting liquid fuels; ~~and~~ (5) providing requirements for reporting liquid fuel exports; (6) providing mass balancing requirements for fuel producing facilities processing multiple feedstocks

(7) establishing a three quarter period for the credit or deficit generator status to be transferred to another entity; (8) establishing the eligibility and a hierarchy for claiming incremental credits for charging at residential and non-residential charging; (10) adding cargo handling equipment and auxillary power for ocean going vessels at berth as new transportation applications using electricity; and (11) identifying the eligible reporting entity for electric transportation applications not specified in the regulation.

6. Enhancement to Credit Provisions

Staff is proposing to create a buffer account for LCFS credits, which could be used to mitigate the invalidation risk for credit buyers and will safeguard the environmental integrity of the program.

Staff is also proposing to allow clearing service providers to participate in the LCFS program to facilitate exchange based trading of LCFS credits. Exchange trading could add value to the program by helping create a structured futures market. It could result in additional compliance flexibility, reduced investment risk in low-carbon fuels, further standardized credit contracts, and better price discovery in the LCFS credit market.

Staff is also proposing several amendments to ensure accurate and timely reporting of credit transactions in the LRT-CBTS. The way credit activities are currently reported in the LRT-CBTS, sometimes it makes it difficult to capture all the relevant elements of the credit trade. Thus, staff is considering enhancing credit transaction reporting requirements in the LRT-CBTS to include credit transactions with zero credit price, forward trades, and multiple credit deliveries.

These changes will allow more accurate information on credit activity to be available in a timely manner which not only improves transparency of the credit market but also allows ARB to effectively monitor the market.

7. Crude Petroleum Provisions

As required by the LCFS regulation, CARB considers the following items on a 3-year cycle through proposed amendments to the LCFS regulation:

- revisions to the Oil Production Greenhouse Gas Emissions Estimator model;
- addition of crudes to the Carbon Intensity Lookup Table for Crude Oil Production and Transport (Table 8); and
- updates to all CI values in Table 8.

Staff is proposing several amendments, as a part of these Proposed Amendments, to the innovative crude provision, which provides credits to crude oil producers who implement innovative technologies during crude production such as solar steam generation, solar or wind electricity generation, or CCS. Uses of biomethane and biogas that are physically supplied to the crude oil production facilities are also proposed to be

recognized as part of 15-day modifications. Staff is also clarifying that the innovative crude provision applies not only for innovative projects implemented at oil fields, but also for projects that reduce emissions during transport of the crude to the refinery. The existing innovative crude portions of the rule provide credit calculations for solar steam produced at three steam quality ranges. Staff is proposing to add ~~two~~ three additional ranges: 45 to 55 percent, 85 to 95 percent, and greater than 95 percent. The inclusion of these additional ranges will more accurately represent enthalpy and emissions per barrel for some thermally enhanced oil recovery operations. Staff also proposes to expand the reporting requirements for solar/wind electricity and solar steam projects under the innovative crude provision. Finally, staff is proposing an amendment to allow third-party co-applicants on innovative crude projects (e.g., solar steam providers or solar/wind electricity providers) to opt-in and receive credit for innovative projects upon written agreement with the crude oil producer.

8. Refinery Credit Provisions

a. Refinery Investment Credit Pilot Program

Staff is proposing to move from refinery-wide GHG accounting to project-level GHG accounting. ~~Staff is proposing a minimum lifecycle GHG reduction of 1 percent compared to the pre-project on-site refinery level GHG emissions.~~ Staff has proposed to modify the eligibility threshold such that it only applies to process improvement projects. The threshold for process improvement projects is modified from a carbon intensity based threshold of 0.1 gCO₂e/MJ to a quantity based threshold 10,000 MT/year or one percent of pre-project emissions.

In addition to process improvement projects, ~~S~~staff is proposing that the following innovative activities/projects qualify for the program:

- CCS projects;
- renewable electricity use,
- substitution of fossil fuels with renewable fuels, and
- electrification.

Staff is proposing to increase the limit on the amount of credits generated from process improvement projects that can be used to meet an entity's annual compliance obligation to 10 percent. The 10 percent limit was chosen based on survey information submitted by stakeholders. Staff also proposes that the crediting period for process improvement projects be limited to 15 years. However, there are no restrictions on credit generation from innovative refinery investment projects.

b. Renewable Hydrogen Refinery Credit Pilot Program

Under the current rule's refinery renewable hydrogen provision, applicants receive credits based on GHG reductions by substituting renewable hydrogen for fossil hydrogen in refineries. One input to the method listed in the current regulation is the CI

requirement of fossil hydrogen from Table 6 of the regulation (with the pathway identifier HYGN003). This lookup table value includes downstream emissions from use of hydrogen directly as a vehicle fuel. Staff proposes to correct this oversight as it was never staff's intent to use the full pathway for this calculation due to differences in covered emissions.

Staff also proposes to allow a more direct comparison of the amount and CI of fossil versus renewable natural gas used as inputs in steam methane reformation (SMR) rather than requiring a calculation of the amount and CI of fossil versus renewable hydrogen produced by SMR.

For other renewable hydrogen production pathways in refineries, including solar electrolysis, staff is proposing to estimate carbon intensities of fossil and renewable hydrogen at the refinery by requiring applicants to submit fuel pathway applications for both fossil and renewable hydrogen pathways in accordance with current Section 95488 of the LCFS regulation.

Lastly, staff proposes to clarify that this program applies to both renewable hydrogen produced on-site at a refinery and hydrogen purchased and supplied to a refinery.

c. Low-Complexity/Low-Energy-Use Refinery Credit

This provision is related to refineries that require relatively low energy levels to produce fuels, or low-energy-use refining processes.

To align with the current efforts on verification in LCFS provision, staff is proposing to clarify that credits awarded under this provision will be deposited into the refiners account after verification of their energy use under the Mandatory Reporting Rule (MRR) and verification of California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB) and diesel volumes produced from crude oil are complete.

d. Incremental Deficit for Low-Complexity/Low-Energy-Use Refinery

Low-complexity/low-energy-use refineries had the option to elect to use a refinery-specific incremental deficit calculation by January 31, 2016. No refineries elected to use this provision and as a result, this provision has become defunct. Staff is proposing to eliminate this provision.

9. Zero-Emission Vehicle Fueling Infrastructure Pathways

Staff is proposing to credit zero-emission vehicle (ZEV) fueling infrastructure on the basis of the fueling station capacity for both hydrogen refueling infrastructure and DC fast charging infrastructure. The proposal is responsive to the Governor's Executive Order 8-48-18, direction in Board Resolution 18-17, and stakeholder comments. The proposal is also consistent with the Scoping Plan and Mobile Source Strategy, which emphasize the importance of ZEVs in meeting the State's GHG and criteria pollutant

emission targets. Like other aspects of the LCFS program, this amendment is intended to support development of ZEV infrastructure and is designed to sunset after an initial period of enhanced support for ZEV infrastructure build-out. The maximum quantity of infrastructure credits issued will be capped at 2.5 percent of overall program deficits for each category (2.5 percent for the hydrogen station provision and 2.5 percent for the fast charging provisions, for a maximum of 5 percent of total deficits across both).

10. Statewide Point-of-Purchase Rebate Program

Staff is also proposing to require an opt-in electrical distribution utility (EDU), or its designee, generating base credits for residential electric vehicle (EV) charging to participate in a statewide point of purchase rebate program funded exclusively by LCFS credit proceeds, if such a program is established. The Board directed the Executive Officer, in resolution 18-17, to explore opportunities to increase the magnitude of ZEV rebates funded by sale of LCFS credits through a statewide point of sale rebate program. Following that direction, staff proposes several changes that will require each opt-in EDU to contribute a minimum percentage of base credits for residential EV charging to the rebate program.

E. Carbon Capture and Sequestration (CCS) Protocol

CCS is a process whereby CO₂ emissions are captured from large industrial sources, such as fuel production plants, refineries, power plants, natural gas processing facilities, fertilizer plants, and hydrogen plants, and are then transported and injected into underground geologic formations, such as depleted oil and gas fields, or deep saline aquifers. Each CCS project is designed to prevent the captured CO₂ from being released into the atmosphere. In some cases, CO₂-enhanced oil recovery (CO₂-EOR) has been proposed in conjunction with CCS projects in existing oil fields. CO₂-EOR involves the injection of CO₂ into a geologic formation to mobilize oil that would have otherwise been unrecoverable with conventional methods and, under the right conditions, improve oil viscosity and flow rate.

Pursuant to the proposed CCS Protocol, if carbon capture occurs at the oil field as part of crude oil production (e.g., capture from steam generators, combined heat and power plants, and steam methane reformers at bitumen upgraders), the crude producer may be eligible to generate LCFS credits for the portion of crude refined in California. If carbon capture occurs at refineries, the refiner is eligible to generate refinery investment credits. If carbon capture occurs at a fuel production plant, such as an ethanol plant, the ethanol producer may be eligible to generate LCFS CCS credits through certification of a tier 2 fuel pathway. If carbon capture occurs directly from the atmosphere, the capture facility may be eligible for LCFS credits from direct air carbon capture.

CCS is a promising technology for reducing CO₂ emissions from large stationary sources. In the 2015 LCFS rulemaking, CARB explained that in the future, CCS projects might become eligible to generate LCFS credits upon the adoption of a Board-approved accounting protocol and relevant regulatory requirements that ensure sequestration

permanence. As a way of incentivizing CO₂ emissions reductions through CCS and ensuring permanence of captured and sequestered CO₂ emissions, staff developed the CCS Protocol as a part of the Proposed Amendments. The CCS Protocol's accounting requirements lay out a quantification to calculate the amount of GHG emissions reductions from a CCS project and permanence requirements to ensure that the project demonstrates permanent sequestration of injected CO₂.

The accounting requirements of the CCS Protocol focus on the following main areas: CCS project boundary; project emission accounting by reservoir types, ~~as well as data generation and reporting requirements.~~ The permanence requirements of the CCS Protocol establish the requirements to ensure that a project ~~would~~will result in permanent geologic CO₂ sequestration of CO₂. The permanence requirements focus primarily on the following areas: risk-based site analysis; ~~injection or production well construction and structural integrity;~~ operating requirements; and monitoring, reporting, and independent expert review of sequestration permanence.

F. Description of Amendments to the Alternative Diesel Fuels Regulation

The current ADF regulation sunsets in-use requirements for both on- and off-road biodiesel blends up to 20 percent biodiesel (B20) when the vehicle miles travelled (VMT) by on-road new technology diesel engine (NTDE)⁵ heavy-duty vehicles in California reaches 90 percent of total VMT by the California on-road heavy-duty diesel vehicle fleet. ~~However, the~~ current ADF regulation sunset provision does not account for adoption of NTDEs in the off-road sector, which is occurring at a slower rate than in the on-road sector.

As part of the program review of in-use biodiesel requirements described in section 2293.6(a)(6) of the ADF regulation (California Code of Regulations, title 13) and in response to court direction that CARB further analyze potential biodiesel NOx impacts, staff re-examined the on-road and off-road emissions analysis. Based on additional off-road data and the analysis included in the draft supplemental disclosure discussion in Appendix G to the Staff Report, staff determined that implementation of the current sunset provision could ~~fail to prevent possible future NOx increases resulting from biodiesel use increases attributable to the LCFS~~ result in potential NOx increases. More information on the data and analysis is available in Appendix G.

The proposed amendment includes bifurcated sunset provisions for on- and off-road sectors, separately, to reflect the differences in the level of anticipated future adoption of NTDEs in the on- and off-road sectors. The on-road in-use requirements are proposed to sunset when the heavy-duty on-road diesel fleet is 90 percent NTDE by vehicle miles

⁵ The use of biodiesel in ~~older newer~~ diesel engines not equipped with selective catalytic reduction (SCR) results in ~~an no~~ increase in NOx emissions relative to use of conventional diesel. Diesel engines with SCR are referred to as New Technology Diesel Engines (NTDE); engines without SCR are referred to as non-NTDEs.

traveled. For the off-road sector, in-use requirements will sunset when the hours of operation of heavy-duty off-road diesel NTDEs are 90 percent of the total hours of operation of all heavy-duty off-road diesel engines in California.

As a result of this amendment, the sunset of in-use requirements for the on-road sector would still likely occur in 2023, and the sunset of in-use requirements for the off-road sector would likely occur no earlier than 2030.

~~Through an amendment to the ADF regulation, CARB will~~This amendment would mitigate ~~any potential future NO_x emissions increases due to biomass-based diesel use attributed to the LCFS. This amendment will revise the sunset provision for the ADF regulation to indicate that the sunset of in-use requirements is based on penetration of NTDEs for both on- and off-road vehicles and equipment.~~

~~As a result of this amendment, the sunset of in-use requirements in the ADF regulation would likely occur no earlier than 2030. Implementation of this mitigation measure would reduce long-term operational NO_x impacts of LCFS-attributed biomass-based diesel use to a less-than-significant level.~~

The current ADF regulation also includes a limited producer/importer exemption. The exemption has not been used and the application deadline has passed. CARB ~~will~~proposes to amend the current ADF regulation to remove the limited producer/importer exemption, and all related language, as the cut-off date for applications has passed and no applications were received.

G. Description of Compliance Responses

The following provides an illustrative, reasonably foreseeable compliance response scenario to achieve a 20 percent reduction in average CI by 2030 under the Proposed Amendments, including the CCS Protocol and ADF regulation amendments. As discussed above, the LCFS is based on a system of credits and relies on a wide variety of possible compliance responses to achieve the proposed reductions in CI. Compliance would be based upon available fuel types and sources. The compliance scenario described in this section is based on assumptions that CARB staff has determined to be reasonably foreseeable considering existing fuel types and sources, recent fuel supply trends, and anticipated production and transportation capacities in coming years. Actual compliance responses in response to the Proposed Amendments 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. Innumerable variations in these compliance responses could be posited as possible outcomes of the Proposed Amendments, therefore, the scenarios presented by staff are referred to as “illustrative” rather than “predictive” or “forecasted.”

Staff conducted an in-depth scenario analysis that informed possible compliance schedules through 2030. Staff developed modeling tools that account for feedstock

supply, fuel prices, fuel incentives, and capacity constraints to assess the technical and economic feasibility of bringing low carbon fuels to California. Staff used these modeling tools to assess fuel supply variability and sensitivity to LCFS credit price and other uncertain market effects on a year-by-year basis. The compliance responses described here are based on a reasonable range of assumptions, the modeling results, stakeholder feedback, and information obtained from market reports on alternative fuel technology development and; therefore, provide a sound basis for evaluating the Proposed Amendment's reasonably foreseeable environmental impacts. Please note that the compliance responses may be described in more detail, as appropriate, in the specific impact discussions in Chapter 4 below.

The precise location and quantities of alternative fuels cannot be predicted with certainty because market interest may inform future feedstock supplies and production locations. However, for the purpose of this analysis, 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). Additionally, bolt-on cellulosic ethanol processes can be added to corn ethanol facilities to convert corn kernel fiber to ethanol.

Feedstock sources for diesel substitutes and AJF could include the following:

- used cooking oil (UCO) for renewable diesel, biodiesel, and AJF provided from sources throughout North America, Europe, and Southeast Asia;
- tallow for renewable diesel, biodiesel, and alternative jet fuel from sources throughout North America, Southeast Asia, Australia, New Zealand, and Brazil;
- 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 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 CARB's current understanding of known and expected fuel pathways, CARB has developed one projected compliance response scenario to reflect what may reasonably occur under the Proposed Amendments. 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 gCO₂e/MJ while ethanol produced from corn can have a CI of more than 80 gCO₂e/MJ, even when the cellulosic ethanol is shipped a longer distance.

CARB has developed a plausible scenario to quantify potential volumes and credits generated by low carbon alternative fuels and petroleum-based projects through 2030 (CARB LCFS Illustrative Compliance Scenario Calculator, ~~March 6~~August 15, 2018). This information is based upon reasonable assumptions and known fuel availability compiled by staff after consulting with stakeholders, including industry experts, and is intended to provide an illustrative reasonably foreseeable scenario that could meet compliance standards. Figures 2-1 and 2-2 contain plausible, illustrative quantities of alternative fuels and expected credit generation, respectively, through 2030 (see Appendix E of the ISOR for additional background information used to create this illustrative scenario).

Figure 2-1: Alternative Fuel Volumes in the Proposed Amendments Scenario

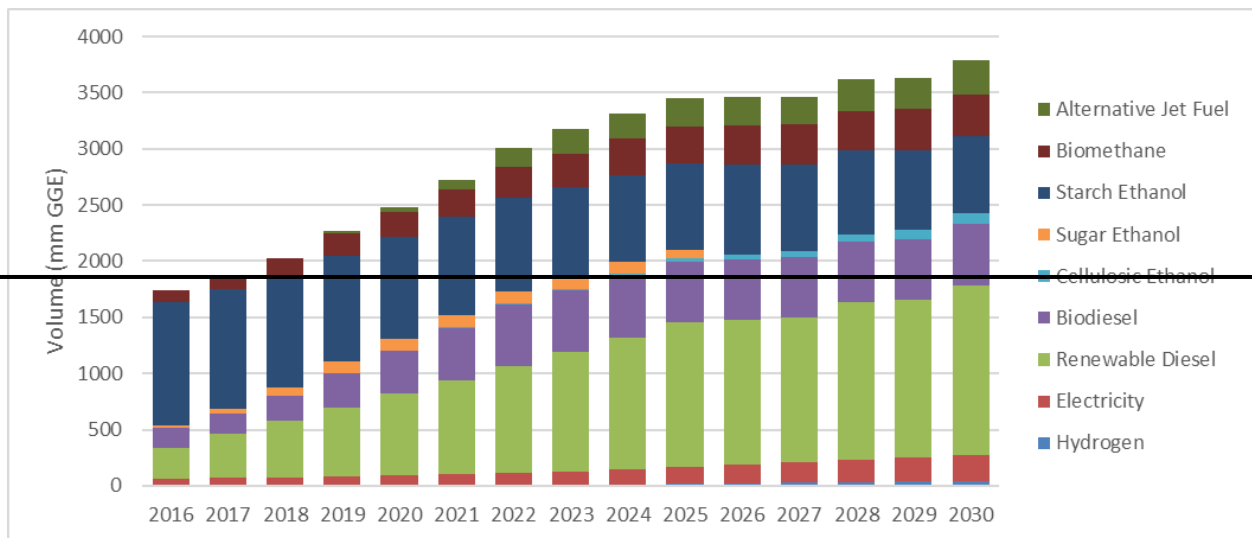
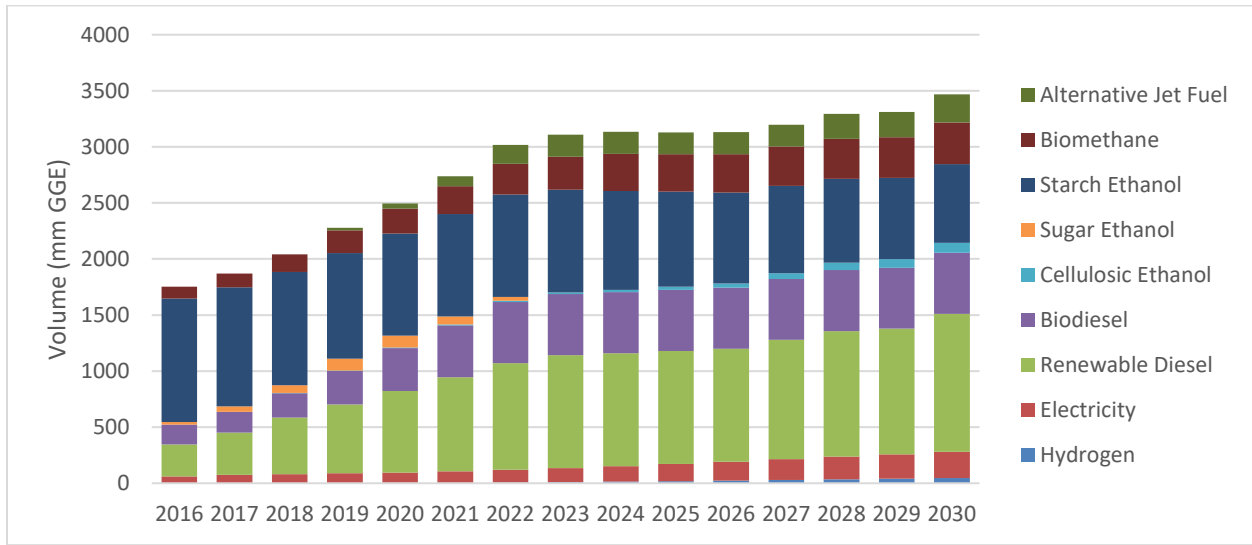
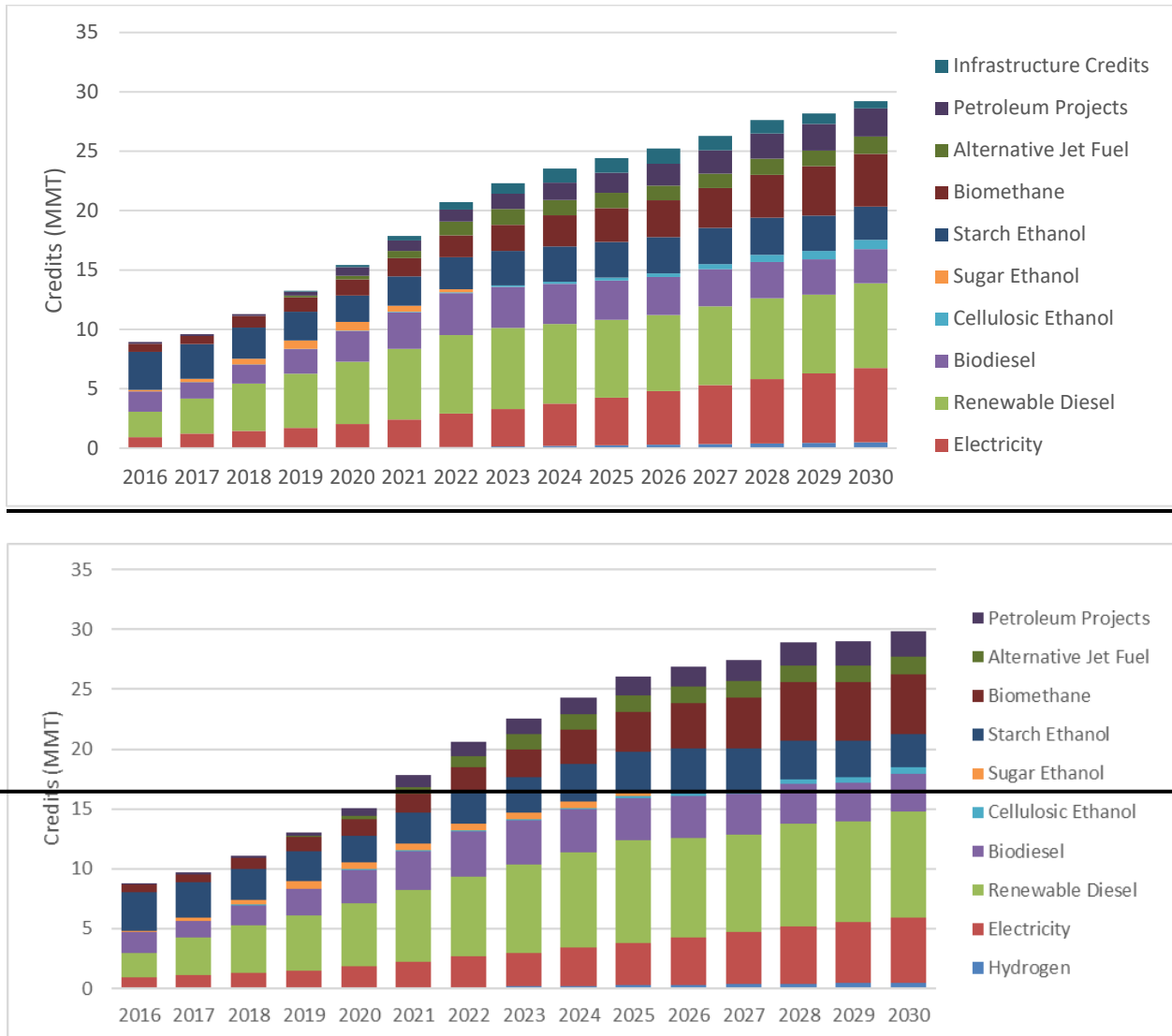


Figure 2-2: Credits Generated in the Proposed Amendments Scenario



1. Reasonably Foreseeable Types and Feedstock Sources of Low-Carbon Fuels

The following 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 CI requirements through 2030. In some cases, the fuels and feedstocks are already being supplied to California under the current LCFS regulation and other regulations and would be expected to continue under the Proposed Amendments. Other reasonably foreseeable compliance responses that could occur because of implementation of the Proposed Amendments are also described.

a. Agriculture-Based Ethanol Production

i. Summary

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. CO₂ released when ethanol is used in vehicles is offset by the CO₂ 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. Fuel 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); and
- molasses ethanol (from Brazil, Central America, and Indonesia);

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments 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 feedstocks into ethanol. Co-generation of heat and electricity and carbon capture and sequestration systems could also be constructed in association with ethanol production.

b. Renewable Diesel, Biodiesel, and Alternative Jet Fuel

i. Summary

Renewable diesel and biodiesel are derived from the same types of non-petroleum renewable resources, including plant 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 (e.g. sodium hydroxide, potassium hydroxide, or sodium methoxide) are combined with oils and fats to produce methyl esters and glycerol. The fatty acid methyl esters (FAME) are used as biofuel. Renewable diesel is produced through hydrotreating, a process that involves hydrogenating triglycerides in fats and oils to make them resemble molecules found in conventional diesel and replaces sulfur,

oxygen, and nitrogen with hydrogen. Renewable diesel is often produced in larger refineries, while biodiesel is typically produced in smaller 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. Renewable diesel and biodiesel may both be produced from various non-petroleum renewable sources. Soybeans, canola, 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.

AJFs are “drop-in” fuels made from fossil or renewable sources, which can replace conventional jet fuels without the need to modify aircraft engines and existing fuel distribution infrastructure. AJFs are expected to primarily be derived from the same renewable sources as renewable diesel and biodiesel. AJF and renewable diesel are often produced at the same facility.

ii. Compliance Responses

Potential compliance responses to the proposed amendments, including the amendment to the ADF 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, renewable diesel and biodiesel additives. Potential compliance responses to the Proposed Amendments to include AJF as an opt-in credit generating fuel may include construction and operation of new facilities to produce AJF; and collection and distribution of feedstocks to supply these facilities. Production plants may be stand-alone or co-located at petroleum refineries. This increased investment may increase the production of both AJF and renewable diesel as both alternative fuels are produced at the same facilities and from the same feedstocks. Also, increased use of AJF may potentially reduce criteria pollutant emissions during taxi, takeoffs, and landings, which may result in positive health impacts, especially near airports.

c. **Compressed Natural Gas and Liquefied Natural Gas from both Fossil and Renewable Sources**

i. Summary

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. Fuel 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.

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 is most frequently produced from the following biogas sources:

- landfills;
- dairies;
- food processing companies; and
- waste water treatment plants.

Landfills provide a source of natural gas that may be used to comply with the LCFS. In 2010, CARB 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.

Natural gas is also collected at large dairies; a pathway has been prepared for this fuel under the current LCFS. Such pathways incent the installation of a biogas control system for manure management on dairy cattle and swine farms and the use of the captured biomethane as a vehicle fuel.

Wastewater treatment plants provide a promising complementary opportunity to help divert a portion of organic wastes from landfills and create useful byproducts, such as electricity and biofuels. It is anticipated that some of California's existing, and potentially new, wastewater treatment plants that operate anaerobic digesters may install additional equipment to collect, store, and co-digest regionally-sourced organic wastes (e.g. food, cooking grease by products, and agricultural produce waste), and install other equipment and infrastructure to use capture biogas for beneficial purposes. Captured biogas could potentially be used for on or off-site electricity generation, or cleaned and compressed for use as a natural gas pipeline supplement or as a vehicle fuel. The use of digester biogas for these purposes would potentially result in the

installation and operation of a variety of equipment and infrastructure at wastewater treatment plants.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments 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 CO₂) would be purified to pipeline quality biomethane, or be made available on-site 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 near the processing facility. 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.

d. Cellulosic Ethanol

i. Summary

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.

“Bolt-on” facilities are another way to produce cellulosic ethanol. These units produce cellulosic ethanol from the fiber of the corn kernel and are added to or co-located with existing corn ethanol biorefineries. Bolt-on configurations minimize capital expenditures by maximizing the utility of existing plant and unit operation assets—most notably using existing fermentation and distillation assets to convert cellulosic sugars to cellulosic ethanol. Additionally, shared supply chains and distribution channels helps lower the investment risk.

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);
- cellulosic ethanol from crop residues (including from Central Valley of California and the Midwest); and
- cellulosic ethanol from conversion of corn kernel fiber at conventional corn ethanol facilities.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include construction of bolt-on cellulosic processing units at conventional ethanol facilities, as well as construction of stand-alone 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.

e. Hydrogen

i. Summary

Hydrogen can be produced from diverse, domestic resources. Currently, most hydrogen is produced from fossil fuels, specifically natural gas. Electricity from the grid or from renewable sources, such as wind, solar, geothermal, or biomass, is also currently used to produce hydrogen.

Fossil fuels can be reformed to release hydrogen from their hydrocarbon molecules and are the source of most of the hydrogen currently produced. Combining these processes with CCS will reduce the CO₂ emissions. Natural gas reforming is an advanced and mature hydrogen production process that builds upon the existing natural gas infrastructure.

Biomass can be converted to hydrogen and other byproducts through a number of methods. Because growing biomass removes CO₂ from the atmosphere, the net carbon emissions of these methods can be low. Solar energy can directly or indirectly provide the energy to produce hydrogen. Wind-generated electricity can power water electrolysis to produce hydrogen, which could be used to fuel vehicles, or stored and then used in fuel cells to generate electricity during times of the day when the wind resource is low. Electricity can be used to split water into hydrogen and oxygen. This technology is well developed and available commercially, and systems that can efficiently use renewable power are being developed.

Hydrogen is distributed through three methods: pipeline, high-pressure tube trailers, and liquefied hydrogen tanks.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include the modification of natural gas and biogas facilities to produce hydrogen, as well as the development and construction of CCS at hydrogen production facilities or solar/wind electricity electrolysis projects. This could include construction of new infrastructure such as pipelines in various locations to enable the transport of hydrogen.

f. Propane

i. Summary

Propane (also known as Liquefied Petroleum Gas) is produced from liquid components recovered during natural gas processing. These components include ethane, methane, propane, butane, and heavier hydrocarbons. Propane, butane, and other gases are also produced during crude oil refining. Propane is shipped from its point of production to bulk distribution terminals via pipeline, railroad, barge, truck, or tanker ship. Propane marketers fill trucks at the terminals and distribute propane to retail fuel sites.

Renewable propane is chemically indistinct from traditional propane, and can, therefore, be used by all existing propane-powered vehicles without the need for modification. It can be made a variety of ways, including as a by-product of renewable diesel and renewable jet fuel production from renewable sources, making it a lower carbon alternative to conventional propane and petroleum products.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include a reduction in the use of fossil propane if it generates deficits or an increase in the use of fossil propane if it generates credits. Staff also anticipate the inclusion of renewable propane as an opt-in fuel may lead to its increased use as a transportation fuel in California. This may involve changes in the method of transportation of propane to retail fuel sites.

g. Electricity

i. Summary

Most of the electricity consumed in California is generated by natural gas, nuclear energy and from renewable sources of energy, including hydropower, biomass, wind, geothermal, and solar power.

Plug-in hybrid electric vehicles (PHEVs) and all-EVs, while operating in all-electric mode, do not produce tailpipe emissions. However, there may be emissions associated with electricity production, primarily from combustion of fossil fuels and biomass. Over time these production emissions will decline as California progresses to meeting the 50 percent renewable electricity requirements in SB 350, or potentially more swiftly if EV

load is encouraged to be served using renewable sources including solar and wind by the Proposed Amendments.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include an increase in the use of electricity as a transportation fuel. This may result in an increase in the production of electricity and potentially associated emissions from electricity production. The Proposed Amendments include new text to more strongly encourage EVs to source zero emitting electricity such as solar and wind.

2. Potential Use of Innovative Technologies

The Proposed Amendments provide a method to create new fuel pathways. Examples of new, innovative pathways include: zero emission electricity to electric or hydrogen vehicles, drop-in renewable biofuels from sustainable feedstocks including alternative jet fuels, and carbon capture and sequestration from conventional fuel producers. Section 95489 of the LCFS regulation also includes the ability for oil producers or refiners to earn credits based on (1) using crude oil produced in an innovative manner, (2) making qualifying, emissions-reducing improvements at refineries, and (3) producing renewable hydrogen for refineries. These technologies are described below.

a. Drop-In Renewable Biofuels

i. Summary

Drop-in biofuels are fuels substantially similar to gasoline, diesel, or AJFs. 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;
- pyrolysis or liquefaction of biomass to bio-oil with hydroprocessing; and
- fischer-Tropsch process.

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 (CO) 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.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments 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.

b. Innovative Methods for Crude Oil Production

i. Summary

Solar-generated steam may also be used for EOR, a process known as thermally enhanced oil recovery (TEOR). Steam is injected into fields containing heavy crude oil to lower the viscosity of the crude and allow it to be pumped to the surface. In most TEOR fields, the steam is produced using steam generators or combined heat at power plants. If the steam is instead produced using solar generation technologies or using biomethane or biogas, the crude oil producer is eligible to generate LCFS credits for the portion of crude refined in California. Solar and wind generated electricity used to power crude oil production equipment is also eligible to generate LCFS credits. Finally, carbon capture from steam generators and cogeneration plants at oil fields is eligible for innovative crude production method credit.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include the development and construction of CCS, solar steam generation, ~~or~~ solar/wind electricity generation projects. These projects could include the modification of existing or new industrial facilities to capture CO₂ emissions, produce steam generated by solar energy, or produce electricity generated by solar or wind 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 CO₂ or steam or the transport of biomethane or biogas. The transport distances and pipeline construction requirements for the captured CO₂, biomethane or biogas, or steam would vary considerably, depending on the locations of specific industrial sources of the captured CO₂, biomethane or biogas, or solar-generated steam. Compliance responses for inclusion of biomethane or biogas as an innovative method for crude production are expected to be similar to the production and use of biomethane as a transportation fuel as discussed above in subsection 1.c.

c. Refinery Investment Projects

i. Summary

The purpose of the Refinery Investment Credit Pilot Program (RICPP) is to encourage reductions in GHG emissions from major process improvements, fuel switching, and CCS. On or off site solar generation projects, flare modifications, and renewable steam generation are eligible for credit generation. Staff is also proposing to include on-site CCS projects as eligible projects for the RICPP. GHG reductions from CCS would be included as part of post-project GHG emissions. The projects would have to conform to CCS Protocol.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include the development and construction of CCS at refineries, solar heat/steam generation, replacing emitting equipment with lower carbon electrical load, and renewable steam generation at existing or new industrial facilities.

d. Renewable Hydrogen for Refineries

i. Summary

Refiners produce most hydrogen through steam methane reformation (SMR). Renewable hydrogen is produced when renewable natural gas is substituted for fossil natural gas as feedstock to the SMR unit. Renewable hydrogen can also be produced by electrolysis of water. Use of electricity from renewable sources such as solar or wind results in the production of renewable hydrogen.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include the development and construction of solar electrolysis at refineries or the substitution of renewable natural gas for fossil gas in SMR units.

3. Potential Changes in Land Use, Shipment Patterns, and Infrastructure

In consideration of the potential for increased use of alternative fuels in California, CARB has developed estimates of potential changes in land use, shipment patterns, and infrastructure needs that could occur because of the Proposed Amendments. These changes are summarized below.

a. Land Use Changes

i. Summary

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.

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).

ii. Compliance Responses

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 Amendments, 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 Amendments will be scattered around several continents, given the global nature of transportation fuels markets. The Proposed Amendments 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 the Proposed Amendments could contribute to increased direct and indirect land use change to accommodate new croplands, but the likelihood of this is at least partially mitigated by the LUC scores added to crop-derived pathways.

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).

b. Changes to Fuel-Associated Shipment Patterns

i. Summary

As shown in Figure 2-1, demand in California for starch ethanol (e.g., corn ethanol and sorghum corn ethanol) could decrease through 2030, due to both demand reduction for gasoline because of efficiency standards and electric vehicle use as well as a shift somewhat toward lower-CI ethanols such as cane/molasses ethanol and cellulosic ethanol. The potential shift could affect agriculture-based ethanol pathways, resulting in a potential decrease in shipments of corn ethanol to California 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 and domestic demand for ethanol produced in Brazil and other sugarcane regions. 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 may 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.

ii. Compliance Responses

Through 2030, increased levels of diesel substitutes such as biodiesel and renewable diesel would be needed to meet the anticipated demand (see Figure 2-1). This is likely to result in increased imports from Asia, Europe, and North America to California.

d. Additional Infrastructure Needs

iii. Summary

In general, infrastructure already exists to support increased shipments of feedstock crops and fuels via rail and ocean-going vessels. New processing plants for cellulosic ethanol, renewable diesel, biodiesel, biodiesel additives, alternative jet fuel, and biomethane could also 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. Construction and

operation of additional hydrogen stations, CNG/LNG and EV charging stations could also be developed to meet future demands and in response to the hydrogen and DCFC infrastructure provisions.

Reducing GHG emissions at refineries could result in the installation of solar or wind electricity generation systems; use of lower-CI process energy such as biomethane, renewable propane, and renewable coke, to displace fossil fuel; and equipment electrification (i.e. substitution of high carbon fossil energy input with lower carbon electricity).

iv. Compliance Responses

Because credits could be generated using 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 the production of alternative fuels and under the innovative crude and refinery investment provisions could include the development and construction of CCS projects. As discussed below in section 2.E.3.d, CCS is a process whereby CO₂ 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 geologic formations, such as depleted oil and gas fields, or deep saline aquifers. Captured CO₂ may be used for CI credits under the Proposed Amendments, including when used for EOR projects.

These projects could include the modification of existing or new industrial facilities to capture CO₂ 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 CO₂ into a geologic formation for sequestration. The transport distances and pipeline construction requirements for the captured CO₂ would vary depending on the locations of specific industrial sources of the captured CO₂ and proposed underground formations, recognizing, however, that pipeline cost could reasonably limit the distance of CO₂ transport.

Potential compliance responses to the Proposed Amendments (both generally and as specifically associated with credits for ZEV infrastructure) consist of construction and operation of new hydrogen refueling and new DC fast charging infrastructures, and an increase in the adoption rate of zero emission vehicles.

e. Carbon Capture and Sequestration at Alternative Fuel Production Facilities, Oil Fields, or Refineries

i. Summary

CCS is a process whereby CO₂ 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 geologic formations, such as depleted oil and gas fields or deep saline aquifers. In California, underground injection projects must be permitted by U.S. EPA or the California Division of Oil, Gas and Geothermal Resources (DOGGR). U.S. EPA issues Class VI Underground Injection Control (UIC) permits, which apply to injection wells that are drilled for the sole purpose of CO₂ 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 constructed for the purpose of injecting fluids produced during oil and gas production, such as brines, and include injection wells used in ~~tertiary, or~~ EOR methods that could ~~also~~ be used for the purpose of CO₂ sequestration as part of a CCS project

Each CCS project is designed to prevent the captured CO₂ from being released into the atmosphere. In some cases, EOR has been proposed in conjunction with CCS projects in existing oil fields. EOR involves the injection of gaseous CO₂ into a geologic formation to mobilize oil that would have otherwise been unrecoverable with conventional methods and, under the right conditions, improve oil viscosity and flow rate. If carbon capture occurs at the oil field as part of crude oil production (e.g. capture from steam generators, combined heat and power plants, and steam methane reformers at bitumen upgraders), the crude producer may be eligible to generate LCFS credits for the portion of crude refined in California. Each CCS project, including those projects related to CO₂-EOR, must meet the requirements of the CCS Protocol if the operators of the project wish to qualify to generate credits related to CCS GHG emissions reductions under the LCFS. The CCS Protocol is designed to provide confidence that all injected CO₂ is accounted for, and to ensure that the captured CO₂ is safely and permanently stored deep underground. Criteria required by the CCS Protocol for projects to be eligible to generate credits under the LCFS include, but are not limited to: (1) a quantification methodology to determine the volume of CO₂ sequestered, (2) a risk assessment, (3) minimum site selection requirements (e.g., a minimum depth requirement), (4) rigorous well construction requirements, (5) monitoring and verification requirements, and (6) disclosure of CO₂ storage sites for future land development and management. Additionally, the CCS Protocol requires CCS projects comply with all federal or local laws and regulations, including those that ensure water resources are protected from contamination.

ii. Compliance Responses

Potential compliance responses to the Proposed Amendments could include the development and construction of CCS projects. These projects could include the modification of existing or new industrial facilities to capture CO₂ emissions; along with construction of new infrastructure such as pipelines, wells, and other surface facilities in various locations to enable the transport and injection of CO₂. The transport distances and pipeline construction requirements for the captured CO₂ would vary considerably, depending on the locations of specific industrial sources of the captured CO₂. The CCS Protocol, which includes a quantification methodology that accounts for all emitted and sequestered CO₂, ensures that there is a net GHG emissions decrease (i.e., a GHG emissions benefit) for all CCS projects, including CCS projects associated with production of conventional fuels.

H. Summary of Compliance Responses

Reasonably foreseeable compliance responses associated with the Proposed Amendments include the following which could result in changes to the existing physical environment: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; modification to existing or new industrial facilities to capture CO₂ emissions; construction of new infrastructure such as pipelines, wells and other surface facilities; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

Certain specific amendments included in the proposed amendments would not result in compliance responses that change the physical environment or result in adverse environmental effects. These include the addition of third-party verification, pathway application and CI determination, fuel amount reporting improvements, exchange trading, enhancement to credit transaction reporting and removal of the limited producer/importer exemption in the current ADF regulation. This set of amendments

deal with modification or updates to already existing programs and processes and would not result in additional physical changes to the environment beyond what would already occur under the current LCFS and ADF regulations. Therefore, these certain specific proposed amendments would have no impact on any of the environmental resource areas analyzed in this ~~Draft~~ Final EA and will not be discussed further.

3. ENVIRONMENTAL AND REGULATORY SETTING

The California Environmental Quality Act (CEQA) Guidelines require an environmental impact report (EIR) to include an environmental setting section which discusses the current environmental conditions in the vicinity of the project. This environmental setting normally constitutes the baseline physical conditions against which an impact is compared to determine whether it is significant (Cal. Code Regs., tit.14, § 15125). As discussed in Chapter 1 of this Draft Environmental Analysis (EA), the California Air Resources Board (CARB or Board) has a CEQA certified regulatory program and prepares an environmental analysis in lieu of an EIR. This ~~Draft~~ Final EA is a functional equivalent to an EIR under CEQA; therefore, to comply with the policy objectives of CEQA, an environmental setting, and a regulatory setting with environmental laws and regulations relevant to the proposed Regulatory Amendments to the Low Carbon Fuel Standard (Proposed Amendments) have been included as Attachment 1 to this ~~Draft~~ Final EA.

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4. IMPACT ANALYSIS AND MITIGATION MEASURES

A. Approach to the Environmental Impacts Analysis and Mitigation Measures

This chapter contains an analysis of environmental impacts and mitigation measures associated with the Proposed Amendments to the Low Carbon Fuel Standard (Proposed Amendments). The California Environmental Quality Act (CEQA) states the baseline for determining the significance of environmental impacts is normally the existing conditions at the time the environmental review is initiated (Cal. Code Regs., tit. 14, § 15125(a)). Therefore, significance determinations reflected in this ~~Draft~~ Final EA Environmental Analysis (~~Draft~~ Final EA EA) are based on a comparison of the potential environmental consequences of the Proposed Amendments with the regulatory setting and physical conditions in 2016 (see Attachment 1). For determining whether the Proposed Amendments have a potential effect on the environment, the California Air Resources Board (CARB or Board) evaluated the potential physical changes to the environment resulting from the reasonably foreseeable compliance responses described in further detail in Chapter 2 of this ~~Draft~~ Final EA EA. A table summarizing all the potential impacts and proposed mitigation for each resource area discussed below is included at Attachment 2 to this document.

The reasonably foreseeable compliance responses associated with the Proposed Amendments 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; (2) the reasonably foreseeable compliance responses would result in generally similar environmental effects that can be mitigated in similar ways (Cal. Code Regs., tit. 14 § 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 ~~Draft~~ Final EA 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 law.

The analysis is based on reasonably foreseeable compliance responses that are based on a set of reasonable assumptions. While the compliance responses described in this ~~Draft~~ Final EA EA are not the only conceivable ones, they provide a credible basis for impact conclusions that is consistent with available evidence. The analysis also includes actions that could likely occur under a broad range of the potential scenarios. 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) because the specific location, extent, and design of potential new and/or modified facilities cannot be known at this time.

Senate Bill (SB) 1000, signed into law by Governor Brown on September 24, 2016, which took effect on January 1, 2017, serves to mitigate environmental justice-related impacts through the incorporation of general plan policies that would be applied

throughout a jurisdiction. As such, the provisions of SB 1000 would not be applicable to the analyses performed for this ~~Draft~~ Final EA; however, CARB recognizes environmental justice as a pervasive and significant issue within the State. Additionally, AB 617 requires CARB and air districts to take various measures to analyze and address criteria air pollutants and toxic air contaminants in communities affected by a high exposure burden. For additional information about environmental justice please see Chapter VII of the ISOR.

1. Significant Adverse Environmental Impacts and Mitigation Measures

The analysis of potentially significant adverse impacts 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. These reasonably foreseeable compliance responses are described in more detail in Chapter 2 of this ~~Draft~~ Final EA. The ~~Draft~~ Final EA analysis addresses broadly defined types of impacts or actions that may be taken by others in the future because of implementation of the Proposed Amendments.

This ~~Draft~~ Final 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 Amendments and environmentally sensitive resources or conditions that may be affected. This conservative approach tends to overstate environmental impacts considering these uncertainties and is intended to satisfy the good-faith, full-disclosure intention of CEQA. When specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts recognized as potentially significant in this ~~Draft~~ Final EA can later be avoided or reduced to a less-than-significant level.

The ~~Draft~~ Final EA contains a degree of uncertainty regarding implementation of mitigation for potentially significant impacts. The programmatic analysis in this ~~Draft~~ Final EA does not allow for a precise description of the details of project-specific mitigation because CARB cannot predict the location, design, or setting of specific compliance responses that may result, and does not have authority over implementation of specific infrastructure projects that may occur. 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 ~~Draft~~ Final EA. Consequently, this ~~Draft~~ Final EA takes the conservative approach in its post-mitigation significance conclusions (i.e., concluding 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 ~~Draft~~ Final EA on a case-by-case basis. It is expected that many individual development projects would be able to feasibly avoid or mitigate impacts to a less-than-significant level. If a potentially significant environmental effect

cannot be feasibly mitigated with certainty, this ~~Draft~~ Final EA identifies it as potentially significant and unavoidable.

Where applicable, consistent with CARB's certified regulatory program requirements (Cal. Code Regs., tit. 17, § 60005(b)), this ~~Draft~~ Final EA also acknowledges potential beneficial effects on the environment in each resource area that may result from implementation of the Proposed Amendments. Any beneficial impacts associated with the Proposed Amendments are included in the impact analysis for each resource area listed below.

B. Resource Area Impacts and Mitigation Measures of Proposed Low Carbon Fuel Standard Amendments

The following discussion provides a programmatic analysis of the reasonably foreseeable compliance responses that could result from implementation of the proposed amendments to the Low Carbon Fuel Standard (LCFS) and Alternative Diesel Fuel (ADF) regulations, described in Chapter 2 of this ~~Draft~~ Final 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 (Cal. Code Regs., tit. 14, § 15000 et. seq). These impact discussions are followed by the types of mitigation measures that could be required to reduce potentially significant environmental impacts.

1. Aesthetics

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, alternative jet fuel (AJF), and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and electric vehicle (EV) charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity

and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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, renewable gasoline, renewable diesel, AJF, and renewable propane facilities, are likely to involve regular silvicultural, forest thinning and harvest, plantation of short rotation forestry and oil crops, 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, solar farms, wind turbines, and pipelines) 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 Amendments could be potentially significant.

Potential aesthetic 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.1.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of aesthetic resources. CARB 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 be 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 Amendments would be **potentially significant and unavoidable**.

2. Agricultural and Forest Resources

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment

plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

Reasonably foreseeable compliance responses associated with the Proposed Amendments 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 Amendments. Because CARB

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 Amendments, 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 Amendments 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 CARB and not within its purview.

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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.2.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of agricultural and forest resources. CARB 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 CARB 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 off-site 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 be 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 Amendments would be **potentially significant and unavoidable**.

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

As discussed in Chapter 2, Project Description, the Proposed Amendments could alter the location and extent of fuel-based agricultural feedstock cultivation and production. Diesel and gasoline are expected to shift away from fossil fuel feedstocks to renewable feedstocks including starch, sugar, and oilseed crops, cellulosic materials, and wastes and residues such as tallow and used cooking oil. Ethanol supplies could shift away from corn-based ethanol toward other feedstocks, such as cane, sorghum, cellulosic, and molasses. Renewable diesel, AJF and renewable propane supplies can shift away from food-grade oil, such as soybean oil, toward other feedstocks, such as tallow, rapeseed oil, jatropha oil, and used cooking oil. These shifts could lead to increased demand for and cultivation of certain 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 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. When cultivated for low-carbon biofuel production, cellulosic feedstocks 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 and 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 would require speculation. 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 Amendments would provide market-based incentives that could lead to an increase in the production of certain agricultural feedstocks to produce 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.2.b: Implement Mitigation Measure B.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 Amendments would be **potentially significant and unavoidable**.

3. Air Quality

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for

feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

Proposed development of new or modified manufacturing facilities would be required to secure local or State land use 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 CARB 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 as required when 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 [PM₁₀] 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 could also result in short-term increases in CO, CO₂, hydrocarbons, PM, 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 construction-related emission levels because of the on-site equipment and ground-disturbing activities associated with grading, compacting, and excavation. Site preparation equipment and activities typically include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Although precise information regarding the location, quantity, and type of construction activities is not available at this time given the programmatic nature of this analysis, 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 according to the California Emissions Estimator model (South Coast Air Quality Management District 2017), which may exceed general mass emissions limits of a local or regional air quality management district depending on the location of the emissions. 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.

In sum, short-term construction-related air quality impacts associated with the Proposed Amendments would be potentially significant.

Potential short-term air quality 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.3.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of air quality. CARB 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 could still exceed local air district threshold levels of significance depending on the magnitude of construction activities, though this is not likely.

Consequently, while impacts should 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 Amendments would be **potentially significant and unavoidable**.

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

Table 4-1 below shows the total estimated NO_x and PM_{2.5} emissions from transportation related activities in California in the baseline year of 2016.⁶ This table includes emissions from crude oil production and petroleum refining, biofuel production, and mobile sources. A discussion of the sources of data and the methodology supporting these estimates can be found in ~~Chapter V of the staff report~~ Attachment H of the Second Notice of Public Availability of Modified Text.⁷

**Table 4-1
Estimated Total 2016 Emissions for Transportation (tons/year)⁸**

| Emission Source | NO_x | PM_{2.5} |
|-------------------------------|-----------------------|-------------------------|
| Refining and Crude Production | 10,631 | 2,960 |
| Biofuel Production | 29 | 22 |
| Mobile Sources | 411,659 | 21,347 |
| Total | 422,319 | 24,329 |

Relative to the 2016 baseline year, when the Proposed Amendments become effective in 2019, they are expected to result in an increase in the production and use of alternative fuels, an increase in the implementation of emission reduction projects at refineries and crude oil production facilities, and an increase in the implementation of technologies such as CCS to reduce emissions at production facilities. The potential air quality implications of the Proposed Amendments primarily involve emission changes

⁶ The Proposed Amendments represent substantial proposed changes to the LCFS Regulation. Therefore, CARB staff have determined it is most informative for the purposes of this document to compare the Proposed Amendments against the existing environmental conditions as they existed at the time environmental review for the Proposed Amendments began. Note that Appendix G to the Staff Report also contains analysis of both past and future potential NO_x emissions associated with the LCFS as a whole relative to a 2007 baseline, as directed by court order.

⁷ As briefly explained in ~~Chapter V of the ISOR~~ Attachment H to the Second Notice of Public Availability of Modified Text, the refining, crude, and mobile source estimates in this table are based on the CEPAM inventory tool, which is available to the public. The current public version uses the 2012 inventory (which as described above uses estimates based on 2012 data for vehicles, production, etc.) and then forecasts future emissions estimates based on “growth and control data”. This method generates the best available data regarding emissions in 2016.

⁸ Table 4-1 includes emissions from the following sources: petroleum refineries; crude oil production facilities; ethanol, biodiesel and renewable diesel facilities; on-road vehicles; and off-road mobile sources including trains, aircraft, harborcraft, ocean going vessels (within 3 miles of shore), construction equipment, and farm equipment.

from the increased transportation of feedstocks to the biofuel production facility, the increased production of biofuels, the increased transportation of biofuels to the blending terminal, and the increased combustion of biofuels (instead of fossil fuels) in vehicles and aircraft. Staff also analyzed the effects on emissions of petroleum-based projects, such as the implementation of refinery efficiency improvement projects and solar steam projects for crude oil production.

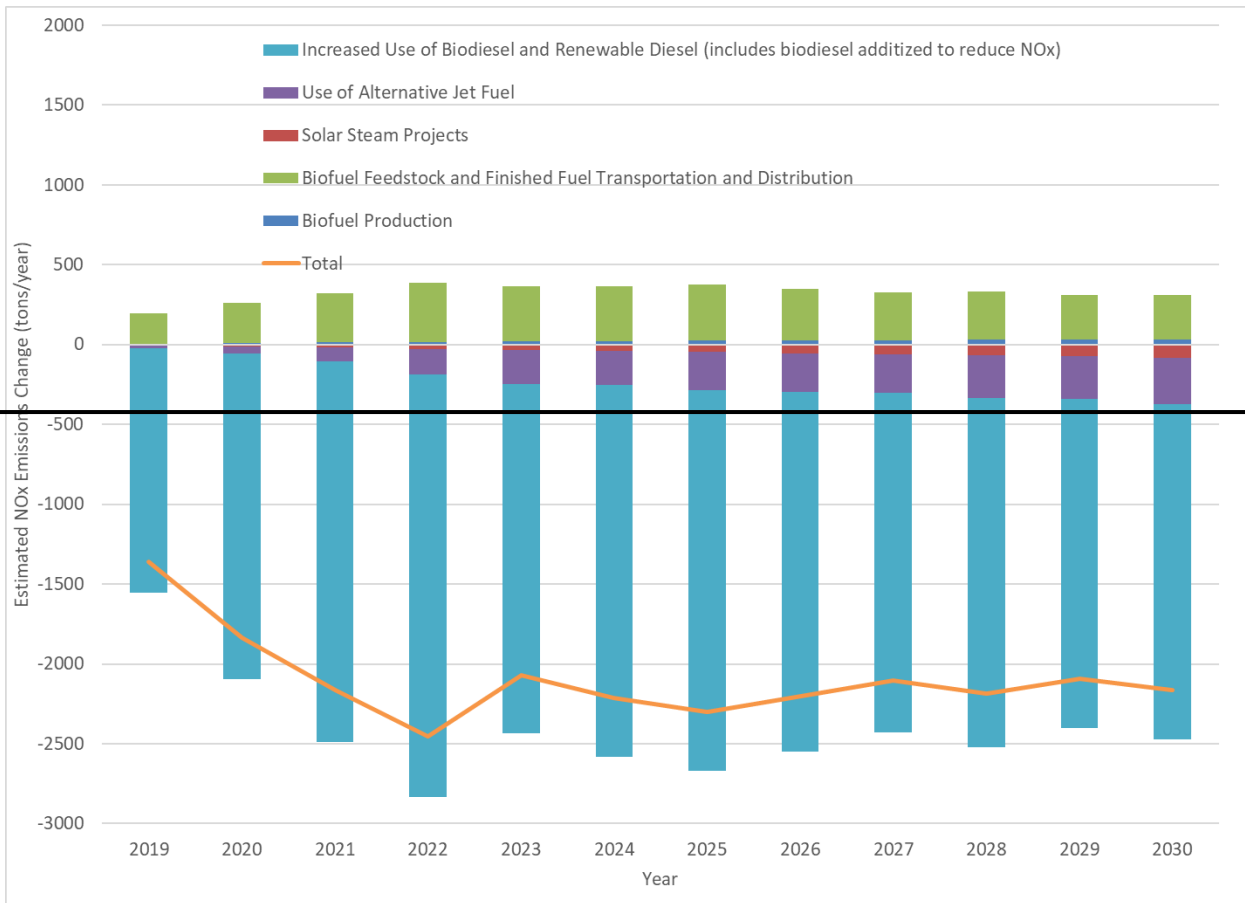
The Proposed Amendments would be expected to result in net improvements to California's air quality. The LCFS is one of many State and federal policies that will affect emissions from the transportation sector through 2030 and beyond. Given the magnitude of statewide transportation emissions, estimating the total transportation related emissions in each year and comparing to those of the 2016 baseline year would obscure the more limited contribution of the Proposed Amendments to the emission changes, which could be misleading. Therefore, staff focused on quantifying the emission changes (i.e. the "delta") that would be directly attributable to the LCFS and the Proposed Amendments. The net NO_x and PM_{2.5} emissions impact of the Proposed Amendments relative to the 2016 "existing conditions" baseline are presented in Figures 4-1 and 4-2, respectively (CARB LCFS Amendments Air Quality Calculations, August 15, 2018~~March 6, 2018~~). Staff focused on PM_{2.5} as opposed to PM₁₀ because PM_{2.5} is typically associated with fuel burning, industrial combustion processes, and vehicle emissions, while PM₁₀ is most commonly associated with road dust and construction activities.

As shown in Figures 4-1 and 4-2, respectively, the total NO_x and PM_{2.5} emissions are estimated to be lower in each year from 2019 through 2030 (the years during which the Proposed Amendments would be implemented).⁹ The annual NO_x and PM_{2.5} emission reductions represent less than one percent of total statewide and transportation-related emissions of NO_x and PM_{2.5}, and less than ~~one percent and two percent of total~~ statewide and transportation-related NO_x and PM_{2.5} emissions, respectively.

⁹ This EA does not analyze emissions increases or decreases in the years 2016 through 2018 because the Proposed Amendments are not implemented until 2019. Therefore, there would be no changes to compliance responses associated with the Proposed Amendments until 2019. As discussed elsewhere in this EA, this 2016 baseline has been selected because the 2016 data was the best available information describing physical environmental conditions as they existed at the time the notice of preparation was published, consistent with CEQA Guidelines 15125(a).

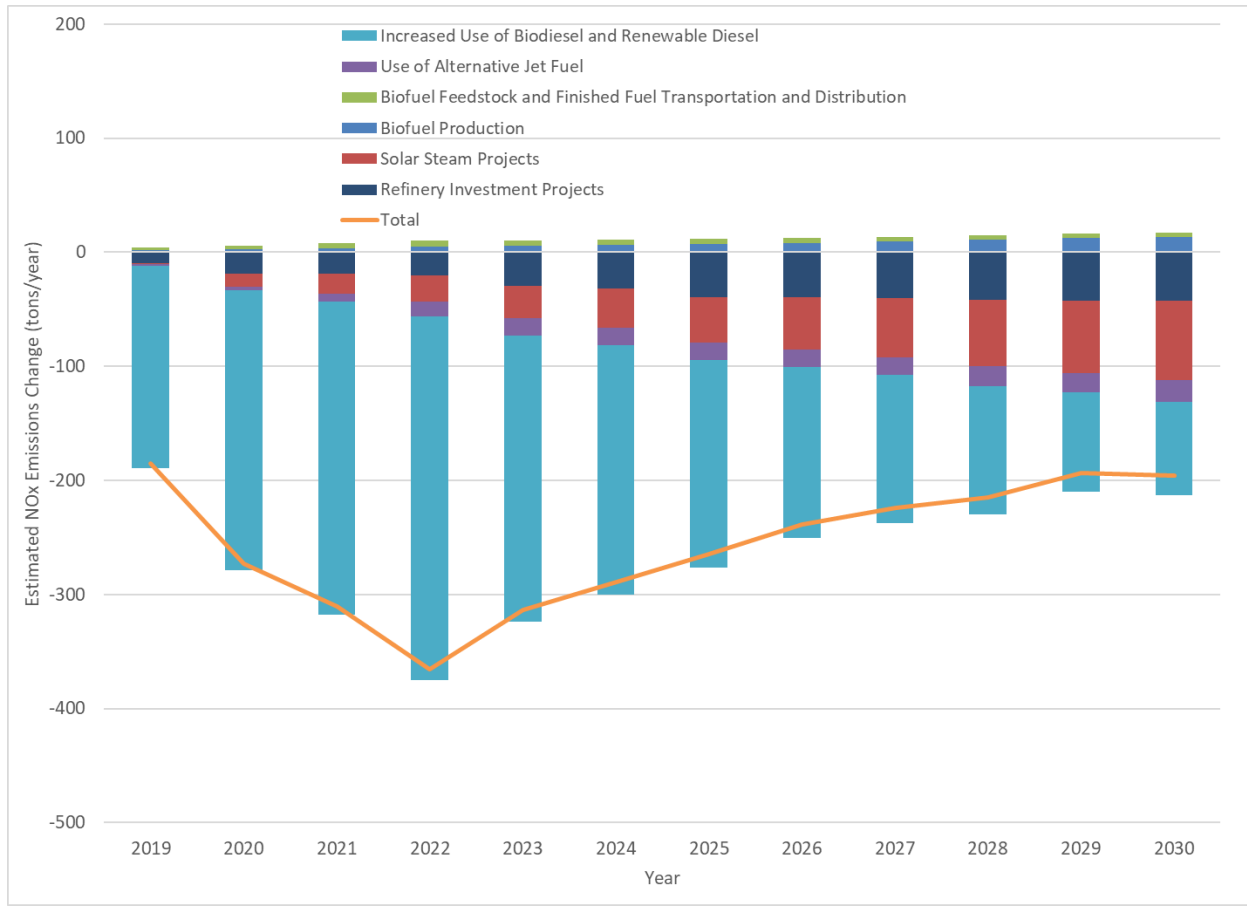
Figure 4-1: Estimated Statewide NOx Emissions Impact of the Proposed LCFS Amendments Relative to 2016 Baseline (tons/year)

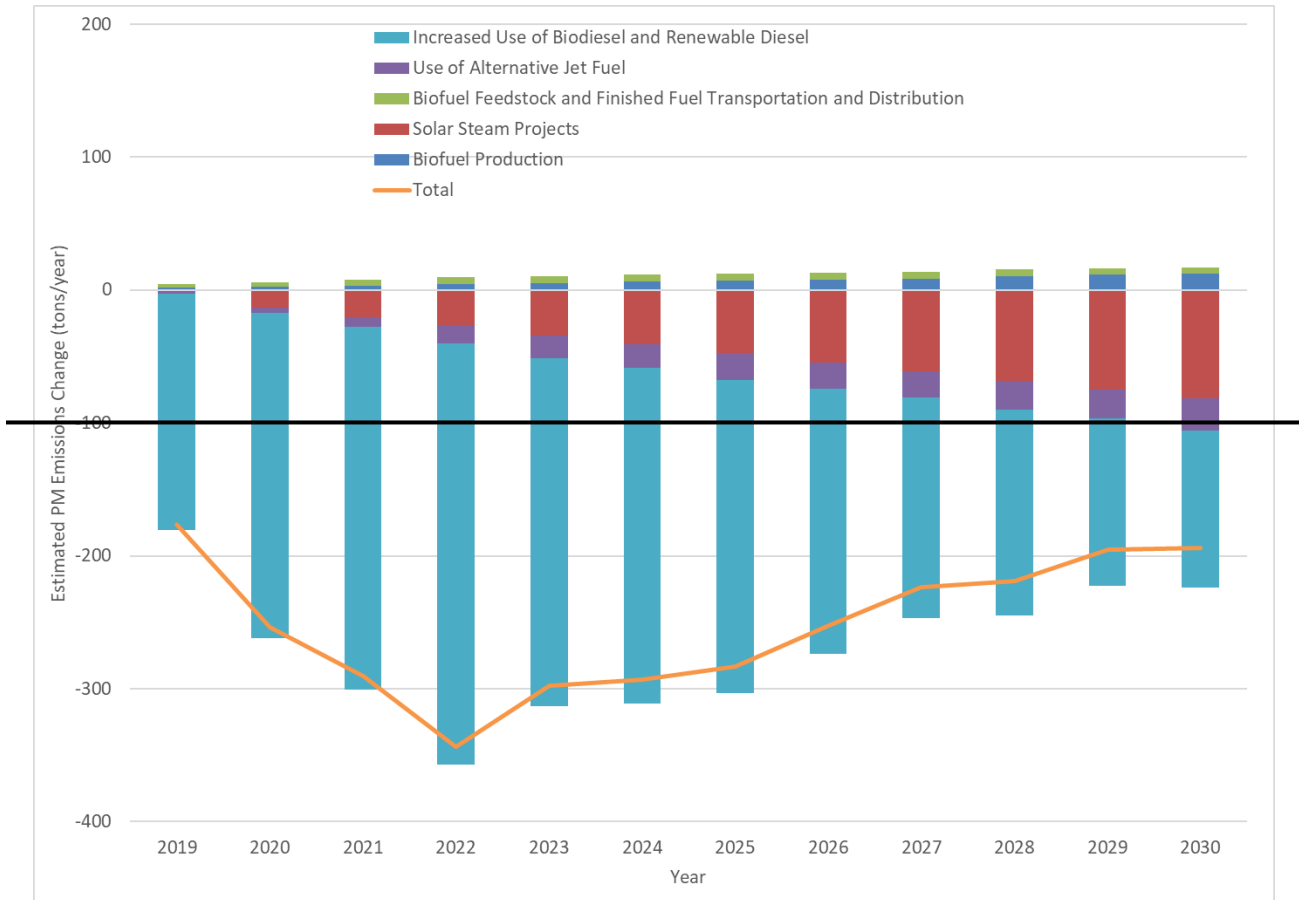




Note: Biofuel includes cellulosic ethanol, biodiesel, renewable diesel, alternative jet fuel, renewable propane, and dairy natural gas.

Figure 4-2: Estimated Statewide PM_{2.5} Emissions Impact of the Proposed LCFS Amendments Relative to 2016 Baseline (tons/year)

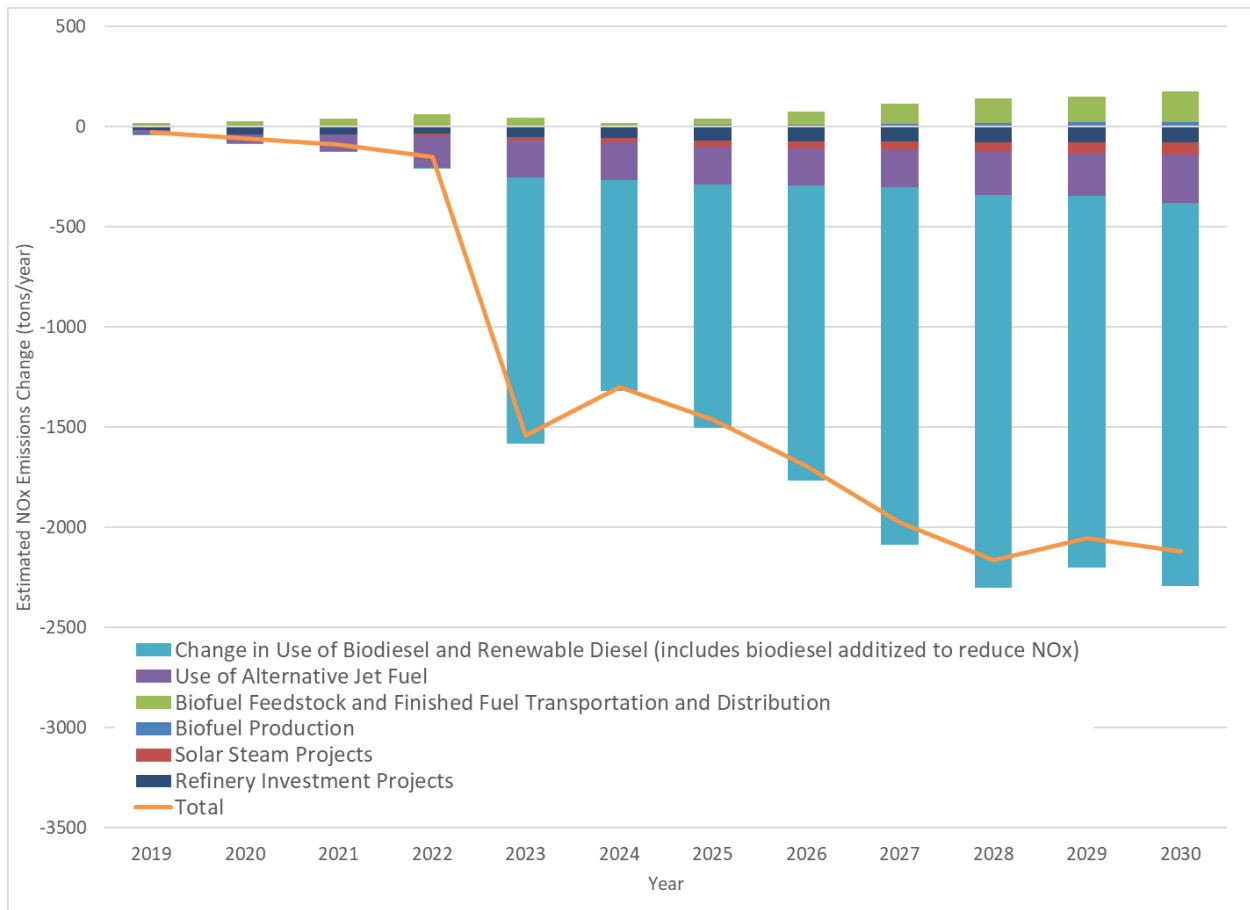




Note: Biofuel includes cellulosic ethanol, biodiesel, renewable diesel, alternative jet fuel, renewable propane, and dairy natural gas.

For purposes of full disclosure, staff performed the same analysis comparing the Proposed Amendments to the projected emissions impact of an LCFS program that remains at 10 percent CI reduction post 2020. This represents a comparison to a business-as-usual scenario that may occur without adoption of the Proposed Amendments, analysed in further detail as Alternative 1 in Chapter VII. More details on the business-as-usual scenario, including estimated volumes of alternative fuels and implementation of petroleum projects, are presented in Appendix E of the Staff Report. The net NO_x and PM_{2.5} emissions impact of the proposed amendments relative to the 10 percent LCFS scenario are presented in Figures 4-3 and 4-4, respectively. The total NO_x and PM_{2.5} emissions are estimated to be lower in each year from 2019 through 2030.

Figure 4-3: Estimated Statewide NOx Emissions Impact of the Proposed LCFS Amendments Relative to a 10 Percent LCFS Scenario (tons/year)



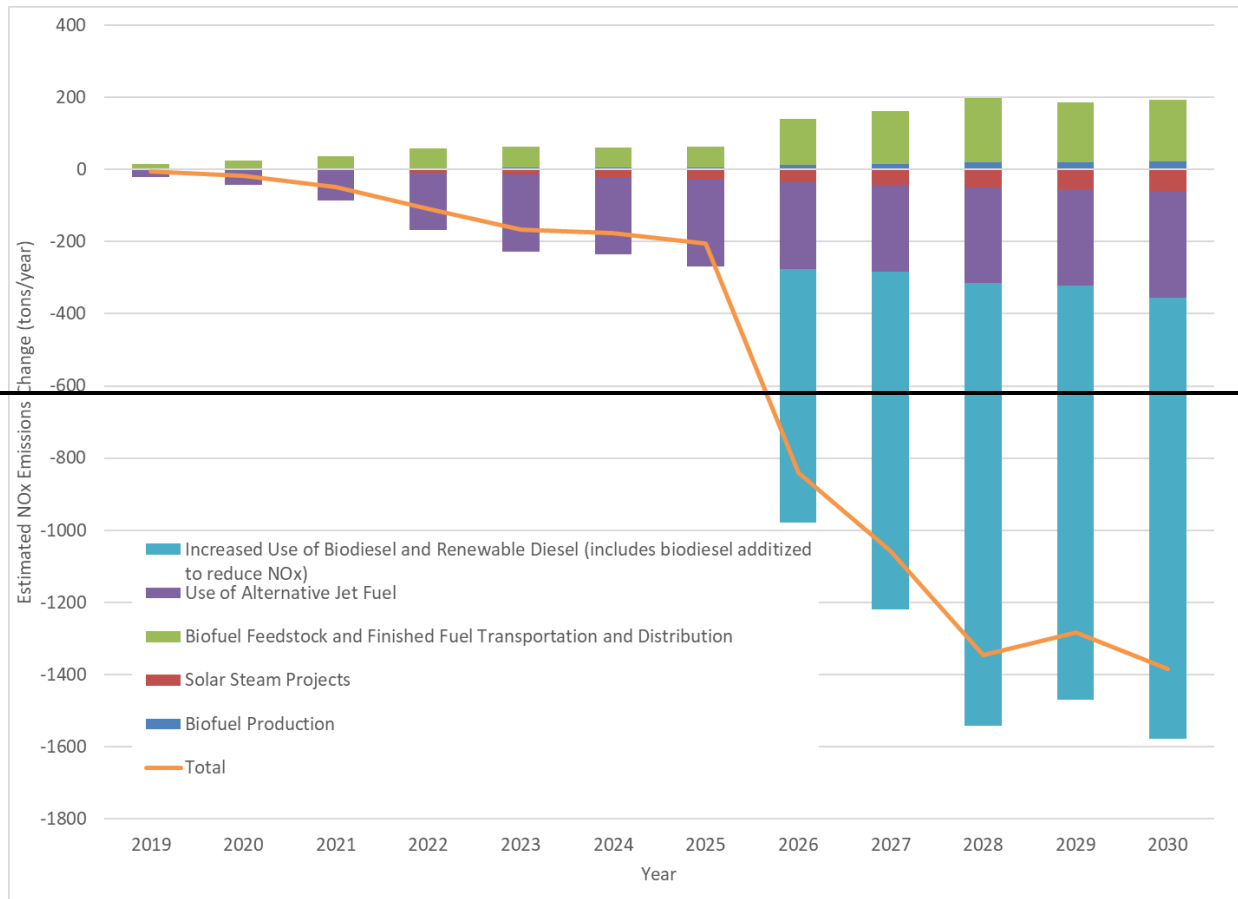
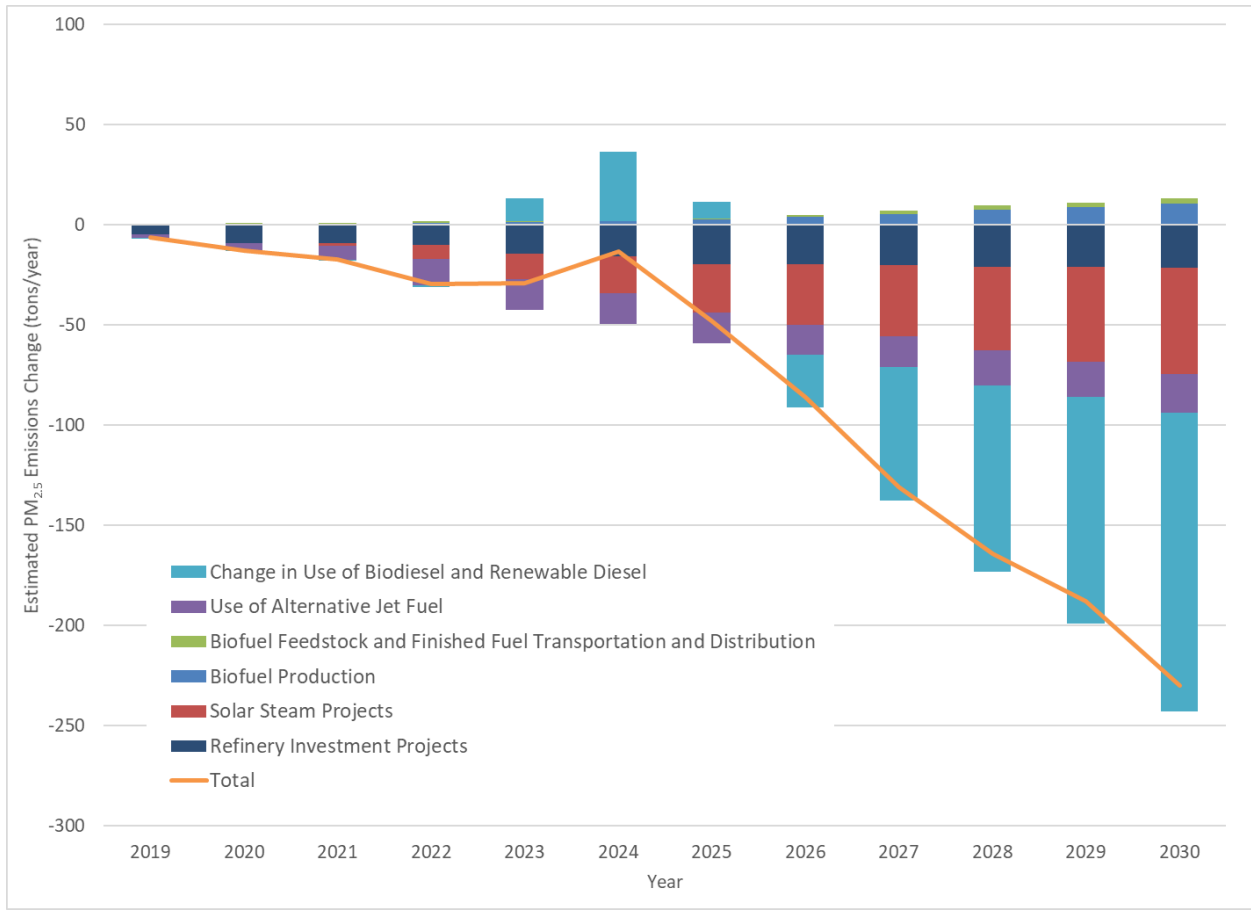
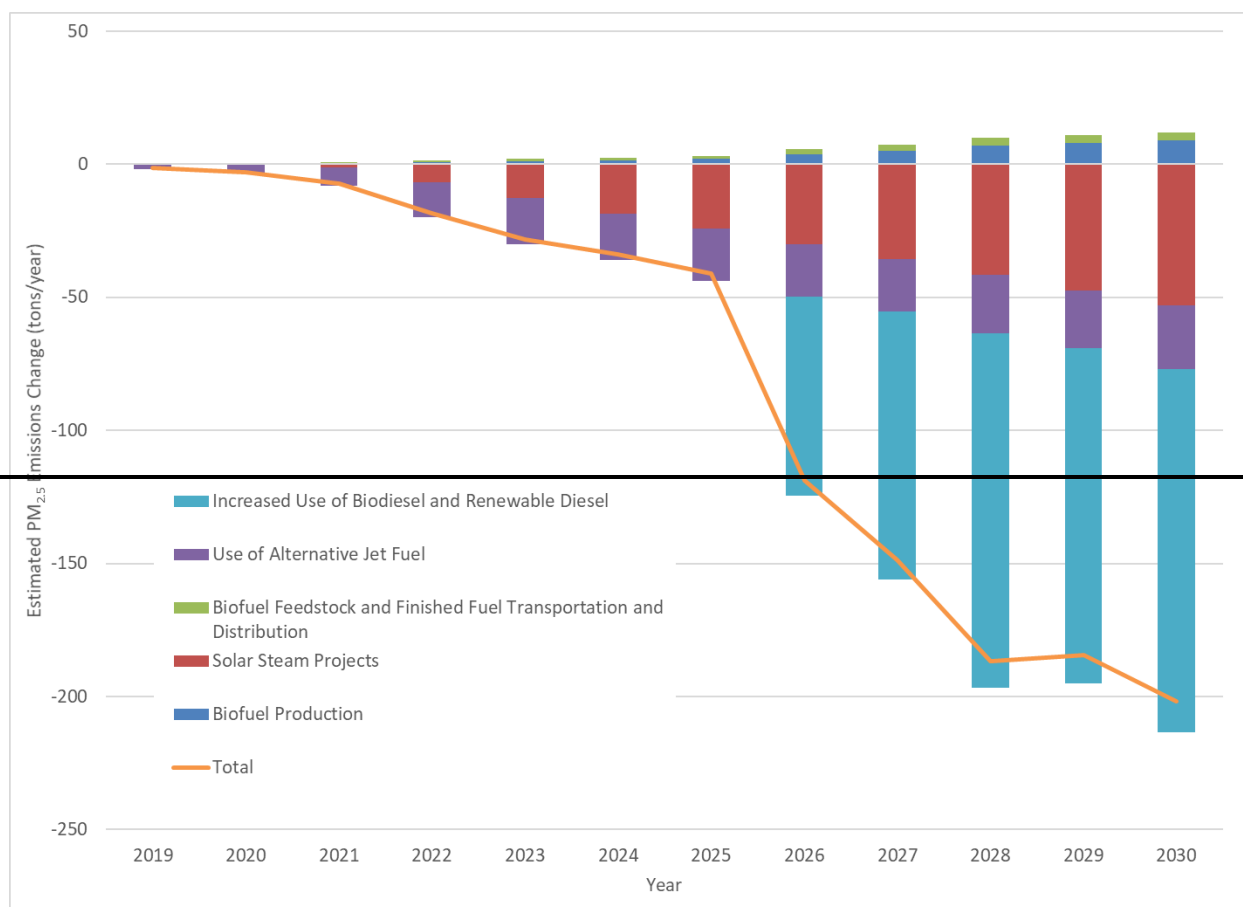


Figure 4-4: Estimated Statewide PM_{2.5} Emissions Impact of the Proposed LCFS Amendments Relative to a 10 Percent LCFS Scenario (tons/year)





The following subsections analyze in greater detail the potential for environmental changes due to specific compliance responses associated with the Proposed Amendments.

Increased Use of Biodiesel and Renewable Diesel: Adoption of the Proposed Amendments would be expected to increase the use of biodiesel and renewable diesel in lieu of conventional diesel, while mitigating tailpipe NOx emissions increases associated with biodiesel use in on-road applications through 2022 and in off-road applications for all years, including beyond 2022. In estimating the impacts of the Proposed Amendments on long-term operational NOx emissions related to biomass-based diesel use, staff used the same methodology for fuel volume and emissions attribution to the LCFS as that developed and used in Appendix G to the Staff Report. Staff included an “LCFS-attributed” value to satisfy the instructions in the previously-mentioned October 18, 2017 writ of mandate to determine the biodiesel and renewable diesel volumes and impacts that are attributable to the implementation of the LCFS regulation. Staff performed additional air quality analysis to evaluate the NOx emissions impacts of bifurcating the ADF regulation sunset provisions into on-road and off-road provisions, as described further below. The results of this analysis are reflected in Figures 4-1 through 4-4. LCFS-attributed values were then compared to baseline values, which in this case are properly set in 2016, as explained in Chapter 1(D).

Overall, biomass-based diesel use attributed to the LCFS would result in a potential decrease in NOx emissions relative to use of conventional diesel in all State- and federally-designated ozone non-attainment areas in 2019 through 2030. Biomass-based diesel use attributed to the LCFS would result in a PM emission decrease relative to use of conventional diesel in all years from 2019 through 2030. Overall, biodiesel and renewable diesel fuels have been found to reduce tailpipe PM emissions relative to conventional diesel. Renewable diesel has been found to decrease tailpipe NOx relative to conventional diesel; however, biodiesel has been found to increase NOx emissions in some cases, depending on feedstock and type of engine of used. The Alternative Diesel Fuel regulation was approved in 2015 requiring NOx mitigation additive use to address potential increased NOx emissions from biodiesel use. Pursuant to the ADF, multiple NOx mitigation methods have been certified by CARB to mitigate any additional NOx emissions from biodiesel use compared with the reference diesel. In the first Notice of Public Availability of Modified Text (June 20, 2018), staff proposed to bifurcate the sunset provisions for on- and off-road diesel engine applications. Under the modified proposal, the sunset is triggered separately for heavy-duty on-road diesel applications and heavy-duty off-road diesel applications when each reaches a threshold of 90 percent new technology diesel engines. Renewable diesel use also reduces NOx emissions compared to use of conventional diesel, and since both renewable diesel and biodiesel use displaces conventional diesel use, renewable diesel helps offset increased NOx emissions from biodiesel.

As indicated above, staff conducted additional air quality analysis to evaluate the NOx emissions impacts of bifurcating the ADF regulation sunset provisions into on-road and off-road provisions. The methodology for this additional air quality analysis is based on the NOx emissions analysis for biodiesel and renewable diesel (biomass-based diesel) in the draft environmental analysis.¹⁰ The revisions to the NOx emissions analysis methodology for biomass-based diesel in the draft environmental analysis are summarized in the next several paragraphs. The 15-day changes are not anticipated to result in changes to PM emissions.

Staff estimated the projected volumes of biodiesel and renewable diesel to be used by on-road and off-road mobile sources for each year. These volumes were estimated based on the total projected volumes of biodiesel and renewable diesel for each and the projected fractions of diesel fuel use by on-road mobile sources (from EMFAC2014) and

¹⁰ CARB. 2018. Appendix D: Draft Environmental Analysis. Public Hearing to Consider Proposed Amendments to the Low Carbon Fuel Standard Regulation and to the Regulation on Commercialization of Alternative Diesel Fuels, Staff Report: Initial Statement of Reasons.

off-road mobile sources (from OFFROAD2017-ORION),^{11,12,13,14} assuming the fractions of biodiesel and renewable diesel use by on-road and off-road sources are similar to the fractions of conventional diesel use by on-road and off-road sources.¹⁵

Staff estimated the potential changes in LCFS-attributed NOx emissions for biomass-based diesel use compared to conventional diesel use. Staff estimated emissions separately for on- and off-road application based on the estimated volumes of unmitigated biodiesel. For all applications, staff assumed that biodiesel blends below B5 are not mitigated for all years analyzed (i.e., 2018 – 2030).¹⁶

For on-road applications, staff assumed that biodiesel blends between five percent biodiesel (B5) and B20 used in non-NTDEs would be mitigated to the level of conventional diesel until the in-use requirements sunset for on-road applications.¹⁷ After that time, staff assumed that biodiesel blends from B5 to B20 in on-road applications would not be mitigated.¹⁸

For off-road applications, staff assumed that biodiesel blends between B5 and B20 used in non-NTDEs would be mitigated to the level of conventional diesel for all years analyzed.¹⁹

¹¹ CARB. 2018. EMFAC2014 Web Database, Version 1.0.7. Available at: <https://www.arb.ca.gov/emfac/2014/>. Accessed: May 25, 2018.

¹² CARB. 2018. OFFROAD2017-ORION Web Database, Version 1.0.1. Available at: <https://www.arb.ca.gov/orion/>. Accessed: May 25, 2018.

¹³ CARB. 2018. CEPAM: 2016 SIP - Standard Emission Tool. Available at: <https://www.arb.ca.gov/app/emsmv/fcemssumcat/fcemssumcat2016.php>. Accessed on May 25, 2018.

¹⁴ Fuel volumes in OFFROAD2017-ORION were adjusted based on the ratio of diesel-fueled NOx emissions for off-road mobile sources from OFFROAD2017-ORION to CEPAM to account for the omission of locomotive-passenger, locomotive class III/short-line, and agriculture over 25 hp from the OFFROAD2017-ORION emissions inventory.

¹⁵ CARB does not have detailed information or data regarding the amount of biodiesel and renewable diesel used in the on-road sector versus the off-road sector, but assume that biomass-based diesel is divided between the on- and off-road sectors similarly to conventional diesel.

¹⁶ The ADF regulation does not require NOx mitigation for biodiesel blends below B5. Due to the cost associated with NOx mitigation of biodiesel, it is unlikely that biodiesel blends below B5 would be NOx-mitigated. In the event that some biodiesel blends below B5 are mitigated, this assumption is conservative (i.e., maximizes biodiesel NOx emissions).

¹⁷ The ADF regulation requires NOx mitigation of biodiesel blends between B5 and B20 to the level of conventional diesel. Due to the cost associated with NOx mitigation of biodiesel blends, NOx mitigation of biodiesel blends for use in the on-road sector is unlikely to continue once the on-road sunset occurs. In the event that some on-road biodiesel continues to be NOx mitigated beyond the on-road sunset date, this assumption is conservative (i.e., maximizes the estimated potential biodiesel NOx emissions).

¹⁸ Ibid.

¹⁹ The proposed amendment to the ADF regulation requires NOx mitigation of biodiesel blends between B5 and B20 used in off-road applications to the level of conventional diesel until the off-road sunset occurs. Staff's analysis extended through 2030. Staff estimates that the off-road sunset will not occur until after 2030.

Increased Use of Other Air Quality Improving Low Carbon Fuels: Other air-quality improving low carbon fuels, including electricity, hydrogen, and natural gas in low NO_x engines, also produce air quality benefits. However, because other complementary regulations and incentive programs may be stronger drivers of increased use of these specific fuels than the LCFS, to be conservative staff is not attributing these benefits to the LCFS in this analysis.

Increased Feedstock and Finished Fuel Transportation and Distribution: The Proposed Amendments would be expected to result in an increase in production of low carbon fuels in California, thereby requiring increased transport of feedstock to biofuel production facilities and increased transport of finished biofuel to blending facilities. An increase in the import of biofuels would also be expected to occur as a result of the Proposed Amendments, requiring an increase in transport of these fuels to rail terminals and blending facilities in California. The increased consumption of biofuels in California would displace an equivalent volume of petroleum-based fuels resulting in a decrease in transport of these fuels to blending and distribution facilities. However, since petroleum fuels are commonly transported to these facilities via pipeline, the emissions benefit from the reduced transport of the petroleum fuels is expected to be minimal and has been conservatively omitted. There is a projected increase in both NO_x and PM_{2.5} emissions due to biomass and biofuel transportation and distribution because of the Proposed Amendments. However, these statewide emission increases, along with all other increases attributable to the Proposed Amendments, are much less than the statewide tailpipe emission benefits provided using biodiesel and renewable diesel. An updated discussion of the methodology used to determine the estimated emissions for transport of feedstocks and finished fuel can be found in Appendix Attachment F of the ISOR Second Notice of Public Availability of Modified Text. Given the mix of incentives and different regulatory regimes in different states, it is extremely difficult to draw firm conclusions regarding likely emissions beyond California's borders. Because fuel market participants make business decisions relating to where and how to transport their products based on complex and ever-shifting considerations including policy signals such as the LCFS and other similar programs in other jurisdictions, it would be extremely speculative to assess whether the LCFS could contribute to out of state transportation emissions increases. As discussed elsewhere in this EA, CARB also expects that out of state components would be subject to local environmental review requirements.

Increased Production of Biofuels and Implementation of ~~Solar Steam~~ Petroleum-Based Projects in California: The Proposed Amendments would result in an increase in production and/or expansion at California alternative fuel facilities, which would result in increased NO_x and PM_{2.5} emissions at these facilities. Increases in in-state production would be expected to occur from biodiesel, renewable diesel, alternative jet fuel, renewable propane, cellulosic ethanol, and dairy digester gas. Although no major change would be expected for in-state production of starch ethanol, CCS may be implemented at ethanol facilities, resulting in increased demand for electricity for CO₂ compression. The LCFS also provides opportunities to reduce the carbon intensity in conventional petroleum supply chains. One of these opportunities is to produce crude

oil using innovative methods, such as implementation of CCS, solar steam, and renewable electricity projects at oil fields. Another opportunity is to improve the efficiency of petroleum refineries and implement emission reduction projects including process electrification and use of renewable electricity. There is a projected decrease in both NO_x and PM_{2.5} emissions due to the large reduction in emissions from refinery process efficiency projects and from natural gas-fired steam generators as solar steam projects are implemented. The emission reductions from process efficiency projects at refineries are expected to primarily occur in the San Francisco Bay and South Coast air basins. The emission reductions from implementation of solar steam at oil fields are expected to primarily occur in the San Joaquin Valley air basin. Other air basins are expected to experience small net increases in emissions from alternative fuel production. However, these emission increases, along with all other statewide increases attributable to the Proposed Amendments, are much less than the tailpipe emission benefits provided using biodiesel and renewable diesel in California. An updated discussion of the methodology used to determine the estimated changes in emissions at alternative fuel production facilities and for solar steam generation can be found in Appendix Attachment F of the ISOR-Second Notice of Public Availability of Modified Text. Given the mix of incentives and different regulatory regimes outside of California, it would be extremely speculative to draw firm conclusions regarding potential emissions impacts due to increased production of biofuels and implementation of innovative crude oil projects beyond California's borders. As discussed elsewhere in this EA, CARB also expects that out of state components would be subject to local environmental review requirements.

Increased Use of Alternative Jet Fuel: The Proposed Amendments would result in an increased use of AJF at California airports, resulting in changes in emissions during taxi, takeoff, and landing operations. AJF has shown significant emission reductions in PM and SO_x, and slight or negligible reductions in NO_x relative to conventional jet fuel. So, the direct effect of the use of AJF itself would be positive for air quality. An updated discussion of the methodology used to determine the estimated changes in aviation emission from the use of AJF can be found in Appendix Attachment F of the ISOR Second Notice of Public Availability of Modified Text.

Some stakeholders have expressed concern about a possible indirect effect of support for AJF through the Proposed Amendments. Specifically, if supply of low carbon biomass feedstocks is limited, AJF production may compete with production and on-road use of biomass-based diesels. In such a case, some air quality benefits of using biomass-based diesels could be diverted from regions with heavy truck traffic to regions with airports. Staff believes this is unlikely and that a more likely outcome of the Proposed Amendments' inclusion of AJF is that more facilities would be built that co-produce both biomass-based diesel and AJF and that the total air quality benefit increases. Inclusion of AJF may lead to increased investment in facilities, as the airline industry is developing a strong record for partnering with alternative fuel producers through direct investment and off-take agreements (Hileman 2017), which assist in providing the certainty necessary to get these advanced biofuel facilities built.

Displacement of Fossil Propane with Renewable Propane: The Proposed Amendments would be expected to result in the displacement of fossil propane by renewable propane in propane-fueled vehicles in California. The displacement of fossil propane by renewable propane would not be expected to result in any changes to the tailpipe emissions from these existing vehicles. Tailpipe emissions from propane vehicles are comparable to those of gasoline and diesel vehicles with modern emission controls due to equivalent emissions regulation on engine technology (U.S. Department of Energy). However, the development of low NO_x propane engines may provide additional NO_x emission reduction benefits as compared to gasoline and diesel engines. If the adoption of propane vehicles and use of propane as a fuel increases over time, this may lead to additional reductions in NO_x. However, because other CARB regulations and incentive programs may be stronger drivers than the LCFS for adoption of alternative-fueled vehicles, staff is not attributing these potential benefits to the LCFS in this analysis.

Health Impacts Analysis: Improvements in California air quality under the Proposed Amendments are anticipated to result in health benefits for Californians. The Proposed Amendments would affect air quality through three main categories of emissions: 1) tailpipe emissions changes for on-road and off-road vehicles, 2) aircraft emissions changes at and near airports, and 3) changes in emissions at stationary sources from alternative fuel production, efficiency improvement projects at refineries, and steam production at oil fields (Marshall 2003).²⁰

Table 4-2 shows the estimated avoided mortality and morbidity incidence because of the Proposed Amendments scenario for 2019 through 2030 by California air basin. Values in parenthesis represent the 95 percent confidence intervals of the central estimate. The proposed amendments scenario is estimated to reduce overall emissions of PM_{2.5} and NO_x in all years and leads to a net statewide health benefit.

The majority of health benefits estimated in the proposed amendments scenario are concentrated in the South Coast and San Joaquin Valley air basins, with minor health benefits distributed among other regions. Because the LCFS does not specify the blend levels of alternative fuels used at different locations within the State and does not specify how or where the changing supplies of transportation fuels will be produced, the projections of the spatial distribution of emission reductions and associated health

²⁰ Emissions from alternative fuel production facilities and other stationary sources were multiplied by 0.2 to account for the difference in the way those emissions affect exposed populations compared to on-road vehicle emissions. Emissions from production facilities, which are released from tall stacks relatively distant from residential areas, are expected to result in lower impacts than emissions from motor vehicles at ground level, on roadways that run through residential neighborhoods. The factor of 0.2 was derived by comparing the intake fraction (IF) of the two sources. IF is the fraction of total emissions of air pollutant that is inhaled by a receptor population during a certain time period, and is estimated by combining air pollutant concentration enhancement and population distribution near the source. The current study estimates IF of PM_{2.5} from three major refineries located in Los Angeles County using the U.S. EPA approved AERMOD model. The IF for refineries is then compared against published estimates of the IF of on-road diesel vehicles in the South Coast Air Basin to obtain the ratio of 20 percent.

impacts from the proposed amendments are highly uncertain. This source of uncertainty is not accounted for in the 95 percent confidence intervals.

A more detailed discussion of the health impacts analysis is provided in ~~Chapter V of the staff report~~ Attachment H of the Second Notice of Public Availability of Modified Text.

**Table 4-2
Incremental (Relative to the 2016 Baseline) Regional and Statewide Avoided Mortality and Morbidity Incidences from 2019 to 2030 under the Proposed Amendments Scenario *²¹**

| Region | Avoided Premature Deaths | Avoided Hospitalizations | Avoided ER Visits |
|---------------------|--------------------------|--------------------------|-------------------|
| Great Basin Valleys | 0(0-0) | 0(0-0) | 0(0-0) |
| Lake County | 1(0-1) | 0(0-0) | 0(0-0) |
| Lake Tahoe | 0(0-0) | 0(0-0) | 0(0-0) |
| Mojave Desert | 5(4-7) | 1(0-2) | 2(2-3) |
| Mountain Counties | 1(1-1) | 0(0-0) | 0(0-0) |
| North Central Coast | 2(1-2) | 0(0-1) | 1(1-1) |
| North Coast | 1(1-1) | 0(0-0) | 0(0-0) |
| Northeast Plateau | 0(0-1) | 0(0-0) | 0(0-0) |
| Sacramento Valley | 24(18-29) | 4(0-8) | 9(6-12) |
| Salton Sea | 6(4-7) | 0(0-2) | 2(1-2) |
| San Diego County | 16(13-20) | 3(0-6) | 7(4-10) |
| San Francisco Bay | 46(37-56) | 8(1-19) | 19(13-28) |
| San Joaquin Valley | 76(60-93) | 10(1-23) | 32(20-43) |
| South Central Coast | 8(6-9) | 1(0-3) | 3(1-4) |
| South Coast | 128(100-156) | 18(2-43) | 55(35-76) |
| Statewide | 310(248-380) | 46(6-106) | 130(82-176) |

* Values in parenthesis represent the 95% confidence interval. Totals may not add due to rounding

²¹ The method used to quantify health benefits was used for CARB's on-road diesel regulations. Jet fuel emissions are treated the same as on-road diesel. This is an upper bound estimate. Fuel production emissions were discounted by a factor of 0.2 compared to diesel. In other words, PM emissions from this category were multiplied by 0.2. This factor is based on dispersion modeling work by Research Division, which suggests that the ratio of intake fractions of PM from refineries in Los Angeles to on-road diesel is approximately 1/5.

| Region | Avoided Premature Deaths | Avoided Hospitalizations | Avoided ER Visits |
|---------------------|--------------------------|--------------------------|-------------------|
| Great Basin Valleys | 0 (0-0) | 0 (0-0) | 0 (0-0) |
| Lake County | 1 (1-1) | 0 (0-0) | 0 (0-0) |
| Lake Tahoe | 0 (0-0) | 0 (0-0) | 0 (0-0) |
| Mojave Desert | 8 (6-10) | 1 (0-3) | 4 (2-5) |
| Mountain Counties | 1 (1-1) | 0 (0-0) | 0 (0-0) |
| North Central Coast | 2 (2-3) | 0 (0-1) | 1 (1-1) |
| North Coast | 1 (1-1) | 0 (0-0) | 0 (0-0) |
| Northeast Plateau | 0 (0-1) | 0 (0-0) | 0 (0-0) |
| Sacramento Valley | 26 (21-32) | 4 (1-9) | 10 (6-14) |
| Salton Sea | 8 (6-9) | 1 (0-3) | 2 (2-3) |
| San Diego County | 21 (17-26) | 4 (0-8) | 9 (6-13) |
| San Francisco Bay | 43 (34-53) | 8 (1-18) | 19 (12-26) |
| San Joaquin Valley | 86 (67-105) | 11 (1-25) | 36 (22-49) |
| South Central Coast | 8 (6-10) | 1 (0-3) | 3 (2-4) |
| South Coast | 141 (111-173) | 20 (3-47) | 61 (38-83) |
| Statewide | 348 (272-426) | 51 (6-118) | 146 (92-200) |

*Values in parenthesis represent the 95% confidence interval. Totals may not add due to rounding

Local Emissions Impacts: As discussed previously, the Proposed Amendments could result in the increased production of ethanol, biodiesel, renewable diesel and biomethane, as well as the use of CCS at biofuel and fossil fuel refineries. Viewed in isolation, this could lead to an potential localized increase in emissions of all criteria pollutants associated with feedstock transport to production facilities, production of biofuels, and transport of finished fuels to blending facilities. Any new biofuel production facilities would be required to follow all State and local emission standards to protect public health and the environment. Moreover, on a statewide basis, potential emission increases near production facilities are estimated to be very small relative to total statewide emission reductions from the use of biodiesel and renewable diesel, alternative jet fuel, refinery efficiency projects, and solar steam as shown in Figures 4-1 and 4-2. However, small emission increases may occur at a localized level near feedstock and finished fuel transportation routes and near production facilities. Emissions from these stationary sources would be monitored and controlled by local air districts to minimize the negative impacts from the increased production. Under State Implementation Plans (SIPs), states are required to provide comprehensive plans to attain the NAAQS set by the U.S. EPA. CARB reviews and approves local area districts and other agencies SIP elements and ensures they achieve the State’s criteria pollution targets. Additionally, AB 617 directs CARB to cooperate with local air districts to implement criteria pollutant reduction programs in high-exposure communities. AB 617 additionally requires CARB to establish and maintain a database of the best-available retrofit control technology for criteria pollutants. The programs, standards, and plans specified under the SIPs and AB 617 will most likely ensure that any increase in criteria pollutant emissions from increased activity due to the Proposed Amendments will be controlled to minimize the impacts on California residents, especially in areas with poor air quality.

Notwithstanding the efforts of CARB and local air districts discussed above to monitor and reduce criteria pollutant emissions, and despite estimated beneficial long-term

operational impacts statewide, localized increases in emissions because of the Proposed Amendments could occur near biofuel production facilities and routes for biofuel feedstock and finished fuel transportation. These potential local increases in emissions would be largely dependent on the extent and location of increased biofuel production. Because the LCFS is a market-based program and does not specify the specific sites at which alternative fuels are produced, both the extent of increased biofuel production and the location of potential new biofuel facilities cannot be known at this time.

CARB does not believe significant localized increases are likely, and as discussed above, CARB anticipates overall beneficial long-term operational impacts statewide. Nevertheless, in an abundance of caution and for the purposes of complete public disclosure, CARB concludes that long-term local air quality impacts associated with the Proposed Amendments could be **potentially significant and unavoidable**.

Mitigation Measure B.3.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of air quality. CARB does not have the authority to require implementation of mitigation related to operation of 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 and operated 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 operational-related air quality impacts of the project.
- Project proponents would apply for, secure, and comply with all appropriate air quality permits for project operation from the local agencies with air quality

- jurisdiction and from other applicable agencies, if appropriate, prior to commencement of project operation.
- 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., 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 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, operational emissions could still exceed local air district threshold levels of significance, though this is not likely.

Consequently, while CARB does not believe significant localized increases are likely and anticipates overall beneficial long-term operational impacts and if they were to exist impacts should 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-related air quality impacts resulting from the operation of new or modified facilities associated with the Proposed Amendments would be **potentially significant and unavoidable**.

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction

of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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.

With respect to long-term operational impacts associated with odors, implementation of the Proposed Amendments would encourage the collection of biomethane gas from dairies, landfills, and wastewater treatment plants. The release of methane gas from these sources are usually accompanied by odorous compounds (e.g., ammonia and hydrogen sulfide). 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. Methane 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 on-site storage ponds or stockpiles. Manure in these storage ponds and stockpiles naturally undergo decomposition, and as a result, odorous compounds 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 on-site storage ponds or stockpiles, potentially reducing odors that would otherwise occur without the new digester facilities. 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 Proposed Amendments would be **less than significant**.

4. Biological Resources

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 Proposed Amendments would be potentially significant.

Potential biological 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.4.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of biological resources. CARB 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 be 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 Amendments would be **potentially significant and unavoidable**.

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

Implementation of the Proposed Amendments may result in an increased demand for agricultural feedstocks, including sugarcane, sorghum, and soy. In some cases, this increase can be accomplished using 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.

CARB 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 because 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 Amendments. 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 Amendments 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 Amendments 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.

Potential biological 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.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 be 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 Amendments would be **potentially significant and unavoidable**.

5. Cultural Resources

Impact B.5.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Cultural Resources

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at

petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 the Proposed Amendments may result in an increase in production of low-carbon fuels from cellulosic materials such as forest thinnings. Adverse long-term operational impacts could include removal or degradation of forestland or other areas of cultural significance.

Short-term construction-related impacts and long-term operational impacts on cultural resources associated with the Proposed Amendments would be potentially significant.

Potential cultural 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.5.a

The Regulatory Setting in Attachment 1 includes, but is not limited to, applicable laws and regulations that provide protection of cultural resources. CARB 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 Amendments could be **potentially significant and unavoidable**.

6. Energy Demand

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 Amendments, would be **less than significant**.

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

In the long term, implementation of the Proposed Amendments 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 which will impact energy demand slightly. 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 Amendments would not result in a change to total

demand for energy services such as transportation; rather, they would affect how fuels are blended and which fuels are used to provide this service.

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 GHG emissions during the entire process. While the Proposed Amendments are designed to reduce the average CI of fuels, the CI of a fuel is not necessarily directly related to its fuel efficiency. 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).

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 C (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 Amendments. For example, sources of ethanol would likely shift away from corn, and toward sugarcane, cellulosic, sorghum, and molasses. 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 Amendments are driven by CI values and not energy intensity of a given fuel pathway.

The Proposed Amendments also include the option to generate LCFS credits for recognition of low carbon fuels used in public transit systems (light rail, buses, etc.). Expansion of compliance using these options may provide a co-benefit of reduced energy demand (e.g., public transportation reduces the energy demand from private vehicle use). Similarly, the economics of more efficient vehicles (including those using electric drive trains) are improved by the Proposed Amendments.

While implementation of the Proposed Amendments may result in a net decrease in energy demand when considered in terms of the California fuel market in certain cases, 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 Amendments 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 Amendments 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 Amendments would reduce overall energy demand, and would be considered a **beneficial** long-term operational impact.

7. Geology and Soils

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 Amendments would be potentially significant.

Potential soil and geologic 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.7.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of geology and soils. CARB 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 Proposed Amendments would be **potentially significant and unavoidable**.

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

The detrimental effects of agricultural and forestry practices on soil quality include erosion, desertification, salinization, compaction, deforestation, 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 many 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). Soil erosion from

intensive forestry practices and heavy machinery use can cause many problems in the forest environment. 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 topsoil is shallower.

Even when soil erosion is not excessive, intensive agriculture or removal of agricultural and forest residues 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 Amendments 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.

Potential soil and geologic 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.7.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of geology and soils. CARB 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.

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 to soil associated with land use changes.

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 Amendments would be **potentially significant and unavoidable**.

8. Greenhouse Gases

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms,

collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

It is reasonably foreseeable that construction activities associated with new or modified facilities could occur, resulting in short-term increases in GHG emissions. 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 (MTCO₂e/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 and Emission FACtor (EMFAC). These models require consideration of assumptions, including construction timelines and energy demands (e.g., fuel and electricity). However, most 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 Amendments are considered in relation to the overall long-term operational GHG benefits discussed below, they are not considered substantial.

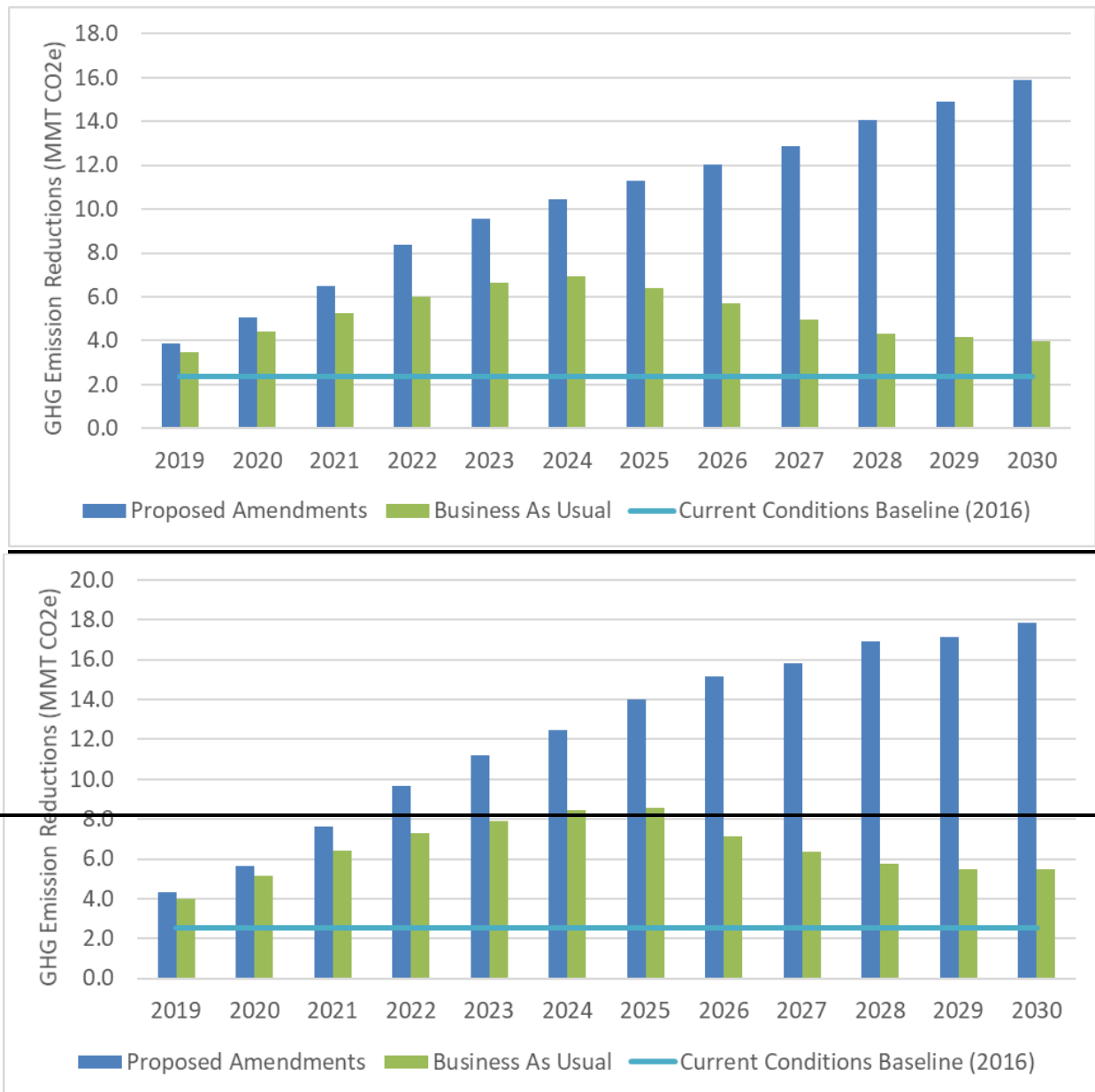
The Proposed Amendments include strengthening the CI reduction benchmarks through 2030 in-line with California's 2030 GHG reduction requirement enacted through SB 32. The required reduction in the CI of the transportation fuel pool is expected to result in

annual GHG emissions reductions as shown in Figure 4-5. It is important to note that because the LCFS calculates emission reductions on a full lifecycle basis, the GHG emission reductions occur both in California and out-of-state. These GHG reduction estimates include an adjustment to eliminate double counting of emission reductions that are attributed to other State and federal programs such as Advanced Clean Cars and the Renewable Fuel Standard as well as rebate programs for zero emission vehicles. Updated dDetails on the methodology staff used to attribute GHG emission reductions to the LCFS versus other programs are presented in Appendix Attachment F of the ISOR Second Notice of Public Availability of Modified Text.

Also shown for comparison are the annual GHG emission reductions attributable to the LCFS compared against the “existing conditions” baseline (i.e. year 2016), as well as a “business-as-usual” scenario. The business-as-usual scenario represents compliance with the current regulation in which the proposed amendments are not adopted and the current ten percent CI reduction target continues unchanged from 2020 through 2030. For this scenario, GHG emissions attributable to the LCFS decline after year 2025 as overall gasoline demand decreases and EV adoption increases. As overall gasoline demand decreases, total credits (i.e. GHG reductions) necessary for compliance with the fixed 10 percent reduction target also decline. In addition, the increase in EV adoption results in more credit generation by electricity. Because GHG emission reductions associated with charging EVs with grid electricity are not assumed to be attributable to the LCFS, the increase in credit generation by EVs results in a further decline in GHG emissions attributable to the LCFS for this scenario.

Cumulatively from 2019 through 2030, the proposed amendments provide an an additional 97447 MMT emission reductions as compared to the 2016 existing conditions baseline and an additional 6370 MMT emission reductions as compared to the business-as-usual scenario.

Figure 4-5: Estimated LCFS GHG Emission Reductions for 2019 to 2030 Attributable to the LCFS (MMT_{CO2e})



As a result, implementation of the Proposed Amendments would result in a **beneficial** impact to GHG emissions.

9. Hazards and Hazardous Materials

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 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 Amendments on hazards and hazardous materials would be potentially significant.

Potential hazard 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is

not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.9.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that apply to accident-related hazards and risk of upset. CARB 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 Amendments would be **potentially significant and unavoidable**.

Impact B.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, usage, and disposal. 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. Hazardous materials can also enter the environment during manufacturing and disposal of EV batteries.

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 PM (known more commonly as soot), NO_x, CO, sulfur dioxide, and various hydrocarbons. Ozone, the major component of urban smog, is formed when NO_x reacts 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 (Office of Environmental Health Hazard Assessment 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. The U.S. Environmental Protection Agency (U.S. 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 U.S. EPA and the volume produced reported on a quarterly basis. The California State Water Resources Control Board (SWRCB) regulates the storage of fuels in USTs. 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.

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 Amendments could alter the transportation patterns, reflecting different quantities or locations of sources.

Pyrolysis oil is a fuel intermediate produced by fast pyrolysis or co-processing of cellulosic biomass, which has high acidity, viscosity and corrosivity. Thus, if an accident were to occur during transport, blending and upgrading, hazardous consequences could result.

Transport of hazardous materials, including gasoline, diesel, hydrogen, 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 Amendments are regulated through various programs, as described above. Thus, implementation of the Proposed Amendments 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**.

10. Hydrology and Water Quality

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms,

collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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, Stormwater Pollution Prevention Plan [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 Proposed Amendments would be potentially significant.

Potential hydrologic 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.10.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to hydrology and water quality. CARB 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 patterns, 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 off-site 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 off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious areas; (b) maximizing permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the system design.
 - The project proponent 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 CWA 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 (USFS) mining permit conditions. All projects on federal lands would be required to disclose potential impacts as required by the National Environmental Policy Act (NEPA). 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 (U.S. EPA 1994). The USFS 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 U.S., 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 Amendments would be **potentially significant and unavoidable**.

Impact B.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 Amendments is 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. Increased cultivation of fuel-based agriculture could displace land currently used for row crops, orchards, and grazing. Planting energy crops and short rotation forestry on marginal land, and intensive forest harvest could both have long-term effects on hydrology.

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 Amendments 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 Amendments could result in adverse effects on water quality. Thus, this impact would be potentially significant.

Potential hydrologic 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 U.S. or abroad) with approval authority over the

particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.10.b: Implement Mitigation Measure B.10.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of hydrology and water quality. CARB 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 Amendments would be **potentially significant and unavoidable**.

11. Land Use and Planning

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 Amendments 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, hydrology, and others specifically their related mitigation measures are discussed in further detail under Impacts B.2.a, ~~2.b~~, B.4.a, ~~4.b~~, B.7.a, ~~8.b~~, B.10.a, and others as applicable.

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

Implementation of the Proposed Amendments 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 Amendments 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 CARB, 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 4-3 demonstrates the relative magnitude of land use change on cropland, forestland, and pasture land between marginal increases in production of selected biofuels.

| Table 4-3: 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 Amendments are 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 and renewable diesel, would generally use materials from waste 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 Amendments 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 Draft Final EA.

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

12. Mineral Resources

Impact B.12.a: Short-Term Construction-Related Impacts on Mineral Resources

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

Although it is reasonably foreseeable that construction activities could occur, the location and extent of construction activities related to new or modified facilities and infrastructure cannot be determined at this time. Construction associated with new or modified facilities would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered mineral resource issues. Although construction of new infrastructure could occur in areas outside the footprints of existing facilities, short-term construction impacts would only temporarily affect the availability of known mineral resources. As a result, construction 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 mineral resources impacts associated with the Proposed Amendments would be **less than significant**.

Impact B.12.b: Long-Term Operational-Related Impacts on Mineral Resources

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for

feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

Long-term operational compliance responses associated with the Proposed Amendments include increased mining and processing of rare materials used in solar panels, fuel cells, and EV batteries; increased mining and processing of metals used as catalysts to produce low carbon fuels. Depending on the magnitude of required materials, implementation of the Proposed Amendments could affect the availability of known minerals.

Long-term operational related mineral resources impacts associated with the Proposed Amendments would be significant.

Potential mineral 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.12.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of mineral resources. CARB 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 most likely 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 mineral resources include:

- Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Regulation 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 follow all applicable environmental regulations as part of approval of a project for development.
- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on mineral resources associated with the project.
- Actions required to mitigate potentially significant mineral resource 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 an investigation/study, which would include an evaluation of the development's impact on the availability of mineral resources valuable to the region and residents of the state or delineated on a local general plan, specific plan, or other land use plan.
 - Proponents of new or modified facilities or infrastructure would provide a complete site plan showing any overlapping areas between the proposed plan and locally-important mineral resources delineated on a local general plan, specific plan, or other land use plan. Proponents would avoid locating facilities that would result in the loss of availability of locally-important mineral resources, as much as possible.

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 Draft Final EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational-related impacts to mineral resources would be **potentially significant and unavoidable**.

13. Noise

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 construction-related noise levels because of the on-site equipment associated with grading, compacting, and excavation, which uses the noisiest types of construction equipment. Site preparation equipment and activities include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). 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, on-site construction could result in hourly average noise levels of 87 dBA equivalent sound level (L_{eq}) at 50 feet and maximum noise levels of 90 dBA maximum noise levels (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 Amendments would be potentially significant.

Potential noise 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.13.a

The Regulatory Setting in Attachment 1 includes, but is not limited to, applicable laws and regulations that pertain to noise. CARB 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 ~~Draft~~ Final EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the short-term construction-related impact regarding noise resulting from the construction of new facilities or reconstruction of existing facilities associated with the Proposed Amendments could be **potentially significant and unavoidable**.

Impact B.13.b: Long-Term Operational Noise Impacts

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

Implementation of the Proposed Amendments 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 existing 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. However, the intensity and frequency of these activities could increase to provide additional biomass in response to the Proposed Amendments, which would result in a substantial increase in ambient noise levels.

New sources of noise associated with implementation of the Proposed Amendments could include operation of new facilities, such as truck loading and unloading, biofuel processing plants, CCS operations, fixed guideways; dairy and wastewater treatment anaerobic digesters; installation of new equipment associated with modification to dairies, landfills, and wastewater treatment and oil and gas facilities. Digester and new equipment noise levels could exceed applicable noise standards and result in a substantial increase in ambient noise levels.

Long-term operational noise impacts associated with the Proposed Amendments would be potentially significant.

Potential noise 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 U.S. or abroad) with approval authority over the particular development

projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.13.b: Implement Mitigation Measure B.13.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 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 noise impacts associated with the Proposed Amendments would be **potentially significant and unavoidable**.

14. Population, Employment, and Housing

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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. Implementation of the Proposed Amendments could result in increased demand of biofuel feedstock, which would require farmers for agricultural activities, such as plantation and harvest of energy and oil crops, and workers for forest activities, such as forest thinning and timber harvest. 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 Amendments 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 Proposed Amendments would be **less than significant**.

15. Public Services

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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. Forest thinning and hazardous fuel removal could provide benefits to the public services as these activities reduce forest fire risks.

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

16. Recreation

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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 Proposed Amendments would be **less than significant**.

17. Transportation and Traffic

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

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms, collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects; construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

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.

Potential transportation 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.17.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to transportation. CARB 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 impact regarding traffic resulting from the construction of new facilities or modification of existing facilities associated with the Proposed Amendments would be **potentially significant and unavoidable**.

Impact B.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 U.S. 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 Amendments 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.

The implementation of the Proposed Amendments is expected to increase the production of cellulosic ethanol, renewable diesel, AJF and propane in California. Transportation of biomass feedstock such as cellulosic biomass, plant oils, used cooking oils and tallow could result in adverse impacts on transportation and traffic, including traffic congestion, pavement damage, and accidents. 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.

The implementation of the Proposed Amendments is expected to reduce the amount of crude oil imported to California ports by transoceanic tanks, pipelines, and rail. Distribution of gasoline and diesel from refineries to blending facilities are expected to decrease, but distribution of low carbon fuels such as renewable diesel and AJF would increase.

Potential transportation 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.17.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to transportation. CARB 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; and
- Consultation with local emergency service providers 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 Amendments would be **potentially significant and unavoidable**.

18. Utilities and Service Systems

Impact B.18.a: Increased Demand for Water, Wastewater, Electricity, and Gas Services

Reasonably foreseeable compliance responses associated with the Proposed Amendments include: modifications to cultivation volume and transport of feedstock; changes to location and types of feedstock; new or modified processing facilities for feedstock and finished fuel production; increased transportation of finished alternative fuels to blending terminals or retail fuel sites; construction and operation of new facilities to produce renewable diesel, gasoline, AJF, and propane; construction of new anaerobic facilities to digest manure from dairies, sewage from wastewater treatment plants, and organic waste diverted from landfills; construction of infrastructure to collect biogas and produce methane; construction of stand-alone and bolt-on cellulosic processing units for renewable fuels production; increase of tree cultivation at farms,

collection of yard waste, or removal of forest litter and agricultural residues; construction of electrolysis units and substitution of renewable natural gas for fossil gas in production of hydrogen; construction of solar and wind electricity generation projects construction and operation of additional hydrogen stations, CNG/LNG stations and EV charging stations; deployment and use of additional electric drivetrain, natural gas, and propane fueled vehicles; modifications to existing crude production facilities to accommodate solar and wind electricity, solar heat, and/or solar steam generation; electrification of equipment and installation of renewable electricity and battery storage systems at petroleum refineries and alternative fuel production facilities; land use changes and changes to fuel-associated shipment patterns.

Reasonably foreseeable compliance responses associated with the Proposed Amendments could result in new demand for water, wastewater, electricity, and gas services. Generally, facilities would be sited 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.

Any new or modified facilities, no matter their size and location would be required to seek 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 each of these projects undergo environmental review consistent with the requirements of CEQA and the CEQA Guidelines. It is assumed that facilities proposed in other states would be subject to comparable federal, State, and/or local environmental review requirements (e.g., CEQA) and that the environmental review process 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 calculated; 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). Resulting environmental impacts would also be determined through this process.

The implementation of the Proposed Amendments is expected to increase the production of renewable natural gas from dairy digesters. Operation of new dairy digesters could potentially need landfill servicing. Construction of new or expanded storm water drainage facilities could result from the development of off-site digesters. Anaerobic digesters constructed for the management of organic waste could create additional strains on utilities and service systems. The operation of digester systems at dairies, organic compost facilities, and wastewater treatment plants designed to export electricity or biogas for off-site use or consumption could potentially create impacts for

electric and gas utilities and their service systems. Thus, long-term operational impacts on utilities and services systems, associated with the Proposed Amendments would be potentially significant.

Potential utility 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure B.18.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that relate to utilities and service systems. CARB 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 on-site 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 impact to utilities and service systems resulting from the operation of new facilities associated with the Proposed Amendments would be **potentially significant and unavoidable**.

C. Resource Area Impacts and Mitigation Measures of Carbon Capture and Sequestration Protocol

The following discussion provides a programmatic analysis of the reasonably foreseeable compliance responses that could result from implementation of the CCS Protocol, described in Chapter 2 of this ~~Draft~~ Final 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 (Cal. Code Regs., tit. 14 § 15000 et. seq). These impact discussions are followed by the types of mitigation measures that could be required to reduce potentially significant environmental impacts.

1. Aesthetics

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although it is reasonably foreseeable that activities associated with modified or new facilities and infrastructure could occur, there is uncertainty as to the exact location or character of any modified or new facilities or infrastructure. Some of the reasonably foreseeable compliance responses could be accomplished with minimal ground-

disturbing activity. For example, facility retrofits and expansions to accommodate CCS would likely be located adjacent to, or within, existing industrial facilities 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. However, new infrastructure such as pipelines could extend beyond the boundaries of existing sites.

Projects that would require the use of biomass, such as the collection of forest materials or agricultural wastes for cellulosic ethanol facilities or biomass gasification 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, modification or construction of facilities associated with biomass feedstocks would not be expected to substantially alter existing aesthetic resources.

Development of new facilities and infrastructure, 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 and pipelines) 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 and infrastructure, 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.

Therefore, short-term construction-related impacts and long-term operational impacts on aesthetics associated with implementation of the proposed CCS Protocol 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, State, federal, or other land use or permitting agencies (either in the U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.1.a: Implement Mitigation Measure B.1.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 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 or modified facilities and infrastructure associated with the proposed CCS Protocol would be **potentially significant and unavoidable**.

2. Agricultural Resources

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol that could impact agricultural resources include the modification or construction of facilities or infrastructure that could result in the conversion of agricultural land. Although there is uncertainty as to the exact location or character of any new or modified facilities or infrastructure, there is substantial overlap between locations of basins with carbon sequestration potential and areas of designated farmland (California Geological Survey 2011, California Department of Conservation 2017). Therefore, there is potential for impacts to Prime Farmland, Unique Farmland, or Farmland of Statewide Importance and Williamson Act conservation contracts.

If facilities and infrastructure are proposed in response to the proposed CCS Protocol, 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 or transport pipeline were located on important farmland or property under a Williamson Act Contract, conversion of the agricultural land could occur. Therefore, impacts associated with implementation of the proposed CCS Protocol on agricultural and forest resources could be potentially significant.

Potential agricultural 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.2.a: Implement Mitigation Measure B.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 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 or modified facilities and infrastructure associated with reasonably foreseeable compliance responses to the proposed CCS Protocol would be **potentially significant and unavoidable**.

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

Implementation of the proposed CCS Protocol is anticipated to provide incentives for the modification of existing facilities and the construction of new facilities to capture CO₂ emissions, including low CI fuel production facilities (e.g., ethanol plants and biomass gasification plants) with carbon capture systems. If ethanol supplies 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.C.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 or biomass gasification, cellulosic feedstock would be 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 modification of existing facilities and construction of new facilities and infrastructure to include CCS 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 CCS Protocol would provide market-based incentives that could lead to an increase in the production of certain agricultural and forest 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 U.S. or abroad) with approval authority over particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.2.b: Implement Mitigation Measure B.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 CCS Protocol would be **potentially significant and unavoidable**.

3. Air Quality

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

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 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 CARB 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 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 PM dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., PM₁₀ and 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 could also result in short-term increases in ROG and NO_x. These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment. Health risks at sensitive receptors due

to TAC emissions would depend on the levels of emissions, the locations of sources relative to receptors and the extent of dispersion of TACs from sources to receptors.

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 the emissions. 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 CCS Protocol would be potentially significant.

Potential short-term air quality 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no general land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.3.a: Implement Mitigation Measure B.3.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 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 or modified facilities and infrastructure associated with the proposed CCS Protocol would be **potentially significant and unavoidable**.

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

CCS projects could contribute to additional criteria pollutant and air toxics emissions from activities related with CO₂ capture, compression, transport, and injection. The amount and scale of potential air pollutant emissions from CCS projects can vary widely, from reductions in emissions to large emissions increases based on the industrial process from which CO₂ is captured and the technology used to capture the CO₂. Because CCS generally requires substantial amounts of energy use, additional air pollutant emissions would be expected from the implementation of most types of CCS projects. A study by the European Environmental Agency has shown that increases in criteria and air toxics emissions are well correlated with the magnitude of the energy demands of the CCS process (European Environmental Agency 2011). Carbon capture tends to be by far the most energy intensive and expensive step in a CCS project. CCS projects involving processes that produce low purity CO₂ would require far greater energy demand than CCS projects involving high purity CO₂.²² Accordingly, the greater the CCS project's CO₂ purity, the lower the expected increases in criteria and air toxics emissions.

In the near term, most potential CCS projects would likely occur in processes that already produce high purity CO₂ streams, such as ethanol production and certain forms of steam methane reforming. These projects would not require a CO₂ capture step and would be expected to occur sooner due to their lower cost. Therefore, these near-term projects would likely cause minimal changes in criteria and toxics emissions as a result of CO₂ compression, transport, and injection. These projects would be subject to all applicable local air district permitting and environmental review requirements, and would not likely result in levels that exceed local air district thresholds.

However, CCS projects that produce low-purity CO₂ streams such as power plants, refineries, and oil and gas operations, would require a much higher energy demand, resulting in additional electricity and fuel use. These increases in fuel use could result in increases in criteria pollutant and air toxics emissions. Any new CCS project would be required to follow all State and local emission standards to protect public health and the environment. Moreover, on a statewide basis, potential emission increases from CCS projects are estimated to be very small relative to total statewide emission reductions

²² High purity CO₂ is CO₂ that only requires dehydration, ~98%. Low purity can be anywhere from as low as ~400ppm (atmospheric CO₂) to ~15% (industrial processes and coal power production)

from the use of biodiesel and renewable diesel, alternative jet fuel, and solar steam as shown in Figures 4-1 and 4-2. However, emission increases may occur at a localized level near CCS projects. Emissions from stationary sources would be monitored and controlled by local air districts to minimize the negative impacts from increased fuel use. Under SIPs, states are required to provide comprehensive plans to attain the NAAQS set by the U.S. EPA. CARB reviews and approves local area districts and other agencies SIP elements and ensures they achieve the State's criteria pollution targets. Additionally, AB 617 directs CARB to cooperate with local air districts to implement criteria pollutant reduction programs high-exposure communities. AB 617 additionally requires CARB to establish and maintain a database of the best-available retrofit control technology for criteria pollutants. The programs, standards, and plans specified under the SIPs and AB 617 will most likely ensure that any increase in criteria pollutant emissions from increased activity due to the Proposed Amendments will be controlled to minimize the impacts on California residents, especially in areas with poor air quality.

In addition, CO₂ capture technology associated with low-purity CO₂ streams would be primarily based on chemical adsorption using amine-based solvents such as monoethanolamine (MEA).²³ However, the amine-based solvents used in carbon capture systems would be recycled in a closed system, and emissions of amine-based solvents associated with these carbon capture systems would be minimal. Waste streams associated with CCS projects, such as spent carbon waste and filter waste, may need to be disposed of via incineration (Korre 2010), which could also cause additional air toxics emissions to the atmosphere.

There is also a remote possibility that a CO₂ leak from an injection well located near a residential area could result in displacement of oxygen in enclosed rooms with limited air exchange (e.g., basements), resulting in an acute impact (i.e., asphyxiation) if residents are present in the enclosed rooms. This would require CO₂ air concentrations approximately 75 times higher than ambient atmospheric CO₂ concentrations (i.e., an increase from 400 parts per million [ppm] to 30,000 ppm) (National Oceanic and Atmospheric Administration 2017, Occupational Safety and Hazard Administration 2017). However, this impact would be mitigated by the CCS Protocol, which would not credit projects with injection wells located in or near residential, commercial, or industrial areas where residents or workers could be exposed to CO₂ concentrations that could result in an acute impact. The CCS Protocol also requires CO₂ monitoring near injection wells during project operation and following closure of the injection wells, reducing the likelihood of leaks that could result in an acute impact. In addition, the CCS Protocol would require owners of properties where active or closed CO₂ injection wells are located to disclose the presence and locations of the injection wells to potential future owners of the property prior to the sale of the property. Responsibility for continued sequestration of CO₂ and air monitoring of injection wells would transfer to the new property owner under the CCS Protocol.

²³ Capture technologies such as pre-combustion capture, other solvents or sorbents, or entirely new power cycles, may have different emissions impacts but have not yet been demonstrated commercially.

Notwithstanding the efforts of CARB and local air districts discussed above to monitor and reduce criteria pollutant and air toxics emissions, localized increases in emissions because of the CCS Protocol could occur near CCS projects. These potential local increases in emissions would be largely dependent on the type(s) and locations of CCS projects in the State. Because the LCFS is a market-based program and does not regulate the types or locations at which CCS projects occur, both the types and locations of potential CCS projects cannot be known at this time.

Therefore, long-term local operational air quality impacts associated with the proposed CCS Protocol could be potentially significant and unavoidable.

Mitigation Measure C.3.b: Implement Mitigation Measure B.3.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 be implemented to reduce potentially significant impacts. With mitigation, operational emissions could still exceed local air district threshold levels of significance, though this is not likely.

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-related air quality impacts resulting from the development of new or modified facilities and infrastructure associated with the proposed CCS Protocol would be **potentially significant and unavoidable**.

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although it is reasonably foreseeable that construction activities could occur, there is uncertainty as to the exact location of any modified or new facilities and infrastructure. 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 CCS Protocol could result in the modification of existing industrial facilities or construction of new industrial facilities and infrastructure that use or generate chemicals that produce odors (e.g., ethanol plants and facility wastewater treatment plants). Generally, odor is considered a perceived nuisance and an environmental impact. Factors that would affect odor impacts include the design of facilities and exposure duration. Industrial facilities and wastewater treatment plants typically maintain odor control systems to address fugitive emissions at new or existing facilities. Thus, short-term construction-related odor impacts and long-term operational odor impacts associated with the proposed CCS Protocol would be **less than significant**.

4. Biological Resources

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although it is reasonably foreseeable that construction activities could occur for these types of activities, there is uncertainty as to the exact locations of any modified or new facilities and infrastructure. Any construction undertaken could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines and pipelines for CO₂ transport, boring of wells, erection of new buildings and structures, 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 facilities and infrastructure would depend on the specific construction and operational location(s) of these facilities and infrastructure and their environmental settings. 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.

As discussed in greater detail below under Impact C.7.b, “Long-Term Operational Impacts on Geology Associated with New Facilities and Infrastructure,” reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Geological sequestration of CO₂ is a technology that injects and stores anthropogenic CO₂ produced by various industries (e.g., oil production and fuel processing facilities) in porous and permeable subsurface rock formations thousands of feet underground, thereby preventing the release of the CO₂ into the atmosphere where it may contribute to global warming.

The build-up of pressure within CO₂ reservoirs could result in small to moderate seismic upset, which, although detectable by humans and other species, would likely not cause substantial damage to the environment. However, as previously stated, this ~~Draft~~ Final EA takes a conservative approach. A catastrophic seismic event associated with or exacerbated by the CCS Protocol could result in the accidental release of noxious levels of CO₂ and other toxic constituents contained in reservoirs. Such an event could result in the asphyxiation of biological resources located within the vicinity of the reservoir's seal, which could lead to unlawful takings of protected species.

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

Potential biological 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.4.a: Implement mitigation Measure B.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 be 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 CCS Protocol would be **potentially significant and unavoidable**.

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

As discussed in Impact 2.b, implementation of the proposed CCS Protocol is anticipated to provide incentives for the modification of existing facilities and the construction of new facilities to capture CO₂ emissions, including low-CI fuel production facilities (e.g., ethanol plants and biomass gasification plants) with carbon capture systems.

Modification of existing facilities and construction of new facilities that produce low-CI fuels (e.g., ethanol plants and biomass gasification plants) could result in increased demand for fuel-based agricultural and forest feedstocks for production of ethanol and bio-syngas. In some cases, an increase in agricultural feedstocks 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 fuel-based agricultural feedstocks 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. Increased demand for agricultural and forest resources for biomass gasification could also result in land use changes (e.g., loss of forest land due to cultivation, or conversion of other land uses to agricultural land). Waste-derived biofuels would not require land conversion because they use waste biomass material from existing agricultural and forest operations (i.e., no attendant deforestation). However, cultivation of waste biomass for biofuel production could result in potential soil carbon and nutrient losses.

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 resulting from land use changes and cultivation of waste biomass could occur as well, such as increased pesticide and nutrient use, the runoff of which could be detrimental to individual species. Because the proposed CCS Protocol would provide incentives that could lead to an increase in the production of certain agricultural and forest feedstocks and increased cultivation of waste biomass for the production of low-carbon biofuels, land conversion and adverse effects on biological species and their habitats could occur. This impact could be potentially significant.

Potential biological 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.4.b: Implement Mitigation Measure B.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 be 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 CCS Protocol would be **potentially significant and unavoidable**.

5. Cultural Resources

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines and pipelines for CO₂ transport, boring of wells, erection of new buildings and structures, 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 CCS Protocol would be potentially significant.

Potential cultural 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.5.a: Implement Mitigation Measure B.5.a

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 short-term construction-related impact on cultural resources associated with the proposed CCS Protocol could be **potentially significant and unavoidable**.

Impact C.5.b: Long-term Operational Impacts on Cultural Resources

No excavation or other ground-disturbing activities are expected to occur during the operational phase of new or modified facilities and infrastructure associated with the proposed CCS Protocol. Therefore, the operation of new or modified facilities and infrastructure associated with the proposed CCS Protocol is not anticipated to have any adverse impact on prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, archaeological sites associated with agriculture and mining, heritage landscapes, and properties important to Native American communities and other ethnic groups. Long-term operations associated with the proposed CCS Protocol would have **no impact on cultural resources**.

6. Energy Demand

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Temporary construction-related increases in energy demand associated with new or modified facilities and infrastructure would include fuels used during construction, and construction-related 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 and infrastructure, it would be temporary and limited in magnitude such that a reasonable amount of energy would be expended.

Thus, short-term construction-related impacts on energy demand associated with the proposed CCS Protocol would be **less than significant**.

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

In the long term, implementation of the proposed CCS Protocol is anticipated to result in an increase in operational energy use due to the additional energy required to operate CO₂ capture, transport and sequestration systems (e.g., post-combustion CO₂

separation, compression and pumping of CO₂ to storage reservoirs, injection of CO₂ into storage reservoirs).

The CCS Protocol would also provide incentives that could lead to an increase in the production of low-carbon biofuels from agricultural-based and forest feedstocks. 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 CCS Protocol would not result in a change to total fuel demand; rather, it 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. An LCA model called the GREET, developed by Argonne National Laboratory, has been used to calculate the energy use and GHG emissions during the entire process. While the proposed CCS Protocol may reduce the average CI of fuels, the CI of a fuel is not necessarily directly related to its fuel energy efficiency. The amount of energy used to produce different types of low-carbon fuels from various feedstocks, and the associated CI values, can vary widely. The relative change in energy requirements, from the entirety of the California fuels market, is dependent on economic and market demands. Thus, it would be speculative to assume a substantial increase or decrease in energy demand related to changes in the use of low-carbon fuels associated with the adoption of the proposed CCS Protocol.

While the issue of energy demand associated with implementation of the proposed CCS Protocol 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 CCS Protocol would increase per capita energy consumption, because facilities with CCS systems would require increased energy input compared to facilities without CCS systems. Thus, the anticipated reasonably foreseeable compliance responses associated with the proposed CCS Protocol would increase overall energy demand, and would be considered a potentially significant long-term operational impact.

Potential energy 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.6.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to energy resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities and infrastructure 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 energy resources include:

- Proponents of new or modified facilities and infrastructure 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 energy resources. The definition of actions required to mitigate potentially significant energy impacts may include the following; however, any mitigation specifically required for a new or modified facility and infrastructure would be determined by the local lead agency.
 - For existing facilities, retain a qualified energy efficiency expert to evaluate energy use (electricity, natural gas, and other fuels) of the existing facility and processes and any proposed modifications. This survey shall be used to design facility modifications and changes to existing facilities and processes to minimize energy usage.
 - For new facilities and infrastructure, design facilities and processes to minimize energy use.
 - Incorporate renewable energy generation facilities, such as a solar installation and/or a wind farm, to reduce energy consumption from fossil fuels.

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.

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 energy resources associated with the proposed CCS Protocol would be **potentially significant and unavoidable**.

7. Geology and Soils

Impact C.7.a: Short-Term Construction-Related Impacts on Geology and Soils

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although it is reasonably foreseeable that construction and operational activities could occur, there is uncertainty as to the exact location of any new or modified facilities and infrastructure. Construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines and pipelines for CO₂ transport, boring of wells, erection of new buildings and infrastructure, and paving of parking lots, delivery areas, and roadways.

New facilities and infrastructure 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 facilities and infrastructure 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 CCS Protocol would be potentially significant.

Potential geological 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.7.a: Implement Mitigation Measure B.7.a

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 geology associated with the proposed CCS Protocol would be **potentially significant and unavoidable**.

Impact C.7.b: Long-Term Operational Impacts on Geology Associated with New Facilities and Infrastructure

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Geological sequestration of CO₂ is a technology that injects and stores anthropogenic CO₂ produced by various industries (e.g., oil production and fuel processing facilities) in porous and permeable subsurface rock formations thousands of feet underground, thereby preventing the release of the CO₂ into the atmosphere where it may contribute to global warming.

Most seismic events result from natural geologic processes that reshape 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 (e.g., wastewater injection), have also been demonstrated to increase the risk of seismic events by raising subsurface pressure and lubricating preexisting faults and fractures. When this happens, portions of the subsurface can be induced to move, generating unnatural seismic events.

The geological environment of the storage reservoir contributes to the potential for human-induced seismic events and differs on a project-by-project basis. Fluid injection into reservoirs that lie directly above geological basement rock (the hard, igneous and metamorphic rock that exists below the oldest sedimentary rock cover) has the most potential for induced seismicity. Injecting fluids into a reservoir can cause overpressure within the reservoir. If the caprock seal above the reservoir is competent enough to prevent fluids from rising through the sea out of the reservoir, the overpressure will be forced downward toward the bottom of the reservoir. In reservoirs located directly above

the crystalline basement, such overpressure can cause the basement to fracture, leading to induced earthquakes. However, if fluids are injected into reservoirs in which there exists at least one permeable interval between the storage zone and the basement, the interval will dissipate the overpressure such that it does not reach the basement, thus reducing the likelihood of induced seismic events associated with injection of fluids into the subsurface (Oldenburg et al 2017).

Notably, ground shaking events resulting from CCS-related activities are generally classified as small to moderate in intensity. As such, the associated impacts to nearby resources are largely inconsequential. These earthquakes may result in the movement of a fault extending several kilometers by a few centimeters. The physical effects of such events would be substantial such that populated areas would be able to detect an occurrence; however, human or structural damage or harm would not occur (Zoback and Gorelick 2012).

Nevertheless, small shifts (i.e., several centimeters) within a fault used for CCS could create a permeable hydraulic pathway which could compromise the seal integrity of a CO₂ reservoir. As such, the efficacy of the reservoir as a GHG-reducing measure could be adversely affected (Zoback and Gorelick 2012). For more detail regarding this topic, see the discussion under Impact C.8.b, Long-Term Operational Greenhouse Gas Impacts.

In order to reduce the likelihood of induced seismic events, the proposed CCS Protocol would include provisions to prohibit drilling wells through known faults and to require injection of CO₂ into reservoirs with an interval between the storage zone and basement rock that has sufficient transmissivity to dissipate pressure above the geological basement. Further, the CCS Protocol involves the implementation of a rigorous monitoring program of CO₂ reservoirs to ensure that leaks would not occur. In cases where leaks are detected, CARB or the responsible agency would take the necessary steps to repair the seal.

The specific long-term geological effects of potential CCS projects are largely unknown, and even with the above provisions, the increased risk of seismic events could still occur, especially given the uncertainty of individual project locations and geologic settings. Therefore, long-term impacts to soil and geologic resources associated with the proposed CCS Protocol would be potentially significant.

Potential geological 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.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 be 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 levels. The U.S. EPA issues Class VI permits under these regulations, which apply to injection wells that are drilled for the sole purpose of CO₂ 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 U.S. EPA pursuant to UIC regulations. Class II permits apply to injection wells constructed for the purpose of injecting fluids produced during oil and gas production such as brines, and including injection wells used in tertiary, or enhanced oil recover (EOR) methods that could also be used for the purpose of CO₂ sequestration as part of a CCS project.

To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering and geologic studies, and submit proposed injection well construction and operation plans. Requirements for these permits are likely to include: isopach maps, cross sections, and representative well logs that identify all geologic units, 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 CCS Protocol would be **potentially significant and unavoidable**.

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

As discussed in Impact 2.b, the proposed CCS Protocol would provide incentives that could lead to an increase in the production of certain agricultural feedstocks for the production of low-carbon biofuels, potentially resulting in land use changes and impacts on soil properties. 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. The cultivation of farm wastes and cellulosic feedstocks for the production of low-carbon biofuels could also result in similar impacts on soil properties, including increased soil erosion as well as soil carbon and nutrient loss that may lead to increased use of fertilizers. These impacts could also adversely affect water quality.

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. For example areas with deep organic loams are better able to sustain erosion without loss of productivity than are areas where topsoil is 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 those consumed over time.

Long-term operational impacts associated with changes in land use resulting from the CCS Protocol could include changes to soil properties such as erosion potential, quality, and drainage capability. Because the location of future lands used to produce biofuels, the number of biofuel projects, and the extent to which these impacts would result, is unknown, this impact would be potentially significant.

Potential soil 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.7.c: Implement Mitigation Measure B.7.bB-7.c

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 to soil associated with land use changes.

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 CCS Protocol would be **potentially significant and unavoidable**.

8. Greenhouse Gas Emissions

Impact C.8.a: Short-Term Construction-Related Greenhouse Gas Impacts

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

It is reasonably foreseeable that construction activities associated with modified or new facilities and infrastructure could occur, resulting in short-term increases in GHG emissions. 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 MTCO₂e/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 and EMFAC 2014. 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 CCS Protocol are

considered in relation to the overall long-term operational GHG benefits discussed below, they are not considered substantial and; therefore, **less than significant**.

Impact C.8.b: Long-Term Operational Greenhouse Gas Impacts

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Operation of CO₂ capture systems at retrofitted existing facilities or new facilities will likely result in additional GHG emissions compared to the baseline condition (i.e., an existing facility without a carbon capture system retrofit or a new facility without a carbon capture system). For pre-combustion carbon capture systems, syngas is produced, and the fuel is then converted to hydrogen in a shift reaction, generating CO₂ that can be separated from the hydrogen fuel prior to combustion. Pre-combustion systems require energy to produce the syngas and drive the shift reaction, resulting in additional CO₂ emissions. For post-combustion capture systems, CO₂ is typically separated from the exhaust stream using a solvent, typically an organic solvent such as monoethanolamine (MEA), that preferentially absorbs CO₂. The solvent is then heated to release the CO₂. Additional GHG emissions are generated through fuel use and/or electricity generated to compress and pump the CO₂ from the carbon capture system to the sequestration reservoir. A high-purity CO₂ emissions stream can also be generated by using high-purity oxygen to combust the fuel, which results in a high purity CO₂ stream post combustion of the fuel. In this scenario, additional energy usage is required to purify the input oxygen stream, resulting in additional CO₂ emissions. Although there are additional GHG emissions for facilities with carbon capture systems than for similar facilities without carbon capture systems, the capture and sequestration of CO₂ emissions provides a net atmospheric benefit (i.e., reduction in CO₂ emissions to the atmosphere) because a substantial portion of the GHG emissions are sequestered permanently.

As discussed under Impact C.7.b, Long-Term Operational Impacts on Geology Associated with New Facilities and Infrastructure, excess pressure within a CCS reservoir ~~would~~ result in small to moderate seismic events. While these episodes would not be substantial enough to result in damage to humans or structures, small cracks or pathways for CO₂ to escape into the atmosphere could occur. ~~It would be expected, however, that frequent monitoring of CO₂ reservoirs would detect and fix leaks in the seals of CO₂ reservoirs.~~ But the rigorous site selection provisions of the CCS Protocol are expected to limit the likelihood that sites will be selected in areas where excess pressure is likely to occur. The CCS protocol also requires continuous monitoring of CO₂ reservoirs to detect any potential leaks, and that such leaks be expeditiously mitigated.

While the complete failure of a reservoir to retain the sequestered CO₂ could result in a net increase in CO₂ emissions to the atmosphere, this potential impact would be mitigated with implementation of the CCS Protocol. The CCS Protocol ensures permanence of the injected CO₂ emissions through a detailed site evaluation and selection process, a rigorous monitoring program that includes pre-injection, operational, and post-injection monitoring, and post-closure site restrictions (e.g., restrictions on drilling within the sequestration zone). Therefore, implementation of the proposed CCS Protocol is anticipated to result in environmentally **beneficial** impacts.

9. Hazards and Hazardous Materials

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

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 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 CCS Protocol on hazards and hazardous materials would be potentially significant.

Potential hazard 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.9.a: Implement Mitigation Measure B.9.a

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 CCS Protocol would be **potentially significant and unavoidable**.

Impact C.9.b: Long-Term Operational Hazards Related to Increased Transport, Use and Disposal of Hazardous Materials

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although the specific type(s) and sizes of these facilities and infrastructure are uncertain, the operation of new and modified facilities could result in the transport, use and/or disposal of new or higher levels of hazardous chemicals compared to the baseline, depending on the type of facility and carbon capture system present. In the near term, most potential CCS projects would likely occur in processes at existing facilities that already produce high purity CO₂ streams, such as ethanol production and certain forms of steam methane reforming. These projects do not require a CO₂ capture step and are expected to occur sooner due to their lower cost. Therefore, these near term projects are likely to incur minimal changes in criteria and toxics emissions as a result of CO₂ compression, transport, and injection. For CCS projects that produce low purity CO₂ streams such as power plants, the CO₂ capture technology would likely be primarily based on chemical adsorption using amine-based solvents such as MEA.²⁴ Because amine-based solvents in carbon capture systems would be recycled in a closed system, emissions of amine-based solvents associated with carbon capture systems would be minimal. CO₂ capture technology that involves the use of amine solvents would produce amine waste due to amine degeneration. The waste amine requires further treatment and disposal. Thus, if an accident were to occur during treatment or disposal, hazardous consequences could result.

New or expanded ethanol plants may use additional quantities of anhydrous ammonia, a California Accidental Release Prevention (CalARP) Program-regulated hazardous chemical, and generate hazardous wastes (e.g., ammonia and acid wastes). In addition, ethanol is a volatile, flammable, colorless liquid and has a strong characteristic odor. It

²⁴ Capture technologies such as pre-combustion capture, other solvents or sorbents, or entirely new power cycles, may have different emissions impacts but have not yet been demonstrated commercially.

is easily ignited by heat, sparks, or flames. Thus, if an accident were to occur during transport or plant operation, hazardous consequences could result.

Transport of hazardous materials (e.g., caustic soda, ammonia, acid and solvent wastes, ethanol, and solvents) are regulated under the 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.

Geologic sequestration involves the injection of CO₂ thousands of feet underground where it is trapped within the pore spaces of solid rock. U.S. EPA requires that sequestration sites have confining subsurface zones, or layers of impermeable rock, to keep CO₂ from escaping into overlying geologic layers, ground water, or the surface (40 CFR 146.83(a)(2)). Under the geologic sequestration rule, U.S. 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)) (U.S. EPA 2010).

In some cases, 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 CO₂ using novel foams and gels (Department of Energy 2014). In addition, use of industrial sources of CO₂, 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 CO₂, that could become contaminants). Although operators would take steps to ensure the CO₂ and other pollutants remained sequestered, the risk would remain that some emissions could be released into the air, soil, aquifers, or surface waterways because of unidentified and/or poorly abandoned wells or other pathways (e.g., natural fractures). The long-term operational impacts associated with the proposed CCS Protocol on hazards and hazardous materials described above would be potentially significant.

Potential hazard 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.9.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to hazards and hazardous materials. CARB 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, UIC permits administered pursuant to the SDWA at the federal and State and levels. U.S. EPA issues Class VI permits under these regulations, which apply to injection wells that are drilled for the sole purpose of CO₂ 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 U.S. EPA pursuant to UIC regulations. Class II permits apply to injection wells constructed for the purpose of injecting fluids produced during oil and gas production, such as brines, and include injection wells used in tertiary or EOR methods that could also be used for the purpose of CO₂ sequestration as part of a CCS project.

To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering and geologic studies, and submit proposed injection well construction and operation plans. Requirements for these permits are likely to include: isopach maps, cross sections, and representative well logs that identify all geologic units, 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 long-term operational impacts on hazards related to increased transport, use and disposal of hazardous materials associated with the proposed CCS Protocol could be **potentially significant and unavoidable**.

10. Hydrology and Water Quality

Impact C.10.a: Short-Term Construction-Related Hydrologic Resource Impacts

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure

such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines and pipelines for CO₂ transport, boring of wells, 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 of new facilities would not be anticipated to result in substantial demands due to the nature of associated activities. Potential hydrologic 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

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 CARB and not within its purview.

Mitigation Measure C.10.a: Implement Mitigation Measure B.10.a

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 CCS Protocol would be **potentially significant and unavoidable**.

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

As indicated in Impact 2.b, construction and operation of new ethanol plants and biomass gasification plants could lead to increased demand for and cultivation of fuel-based agricultural and forest feedstocks, resulting in direct or indirect land use changes (i.e., direct conversion of rangeland, grassland, forests or other land uses to agriculture, or indirect conversion through displacement of food-based production to other land uses). Similarly, increased demand for agricultural and forest resources for biomass

gasification could also result in land use changes (e.g., loss of forest land due to cultivation, or conversion of other land uses to agricultural or forest land). If improperly managed, activities from working farms can also affect water quality. Agricultural 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 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 include sediment, nutrients, 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. Regardless, implementation of the proposed CCS Protocol could result in adverse effects on water quality.

In general, farmers may employ 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 CCS Protocol could result in adverse effects on water quality. Thus, this impact would be potentially significant.

Potential hydrologic 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.10.b: Implement Mitigation Measure B.10.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 be implemented to reduce potentially significant impacts to long-term effect on hydrology and water quality associated with land use changes.

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 CCS Protocol would be **potentially significant and unavoidable**.

Impact C.10.c: Long-Term Impacts of New and Modified Facilities and Infrastructure on Hydrology and Water Quality

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol could result in implementation of EOR projects or injection of CO₂ into underground formations. Technologies to implement EOR projects and inject CO₂ into underground formations are evolving. For instance, projects are currently underway to consider mobility control of the injected CO₂ using novel foams and gels (Department of Energy 2014). In addition, use of industrial sources of CO₂, 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 CO₂, that could become contaminants). Although operators would take steps to ensure that pressure is maintained to trap sequestered CO₂ and other potential constituents, the risk would remain that some emissions could be released into the air, soil, aquifers, or surface waterways because of unidentified and/or poorly abandoned wells or other pathways (e.g., natural fractures).

As previously discussed, the pressure associated with CCS could result in minor to moderate seismic events, which could cause several centimeters of shift within a fault line. While these events could not be substantial such that damage to humans or structures would occur, brine displacement could result through the formation of leaks within geologic formations. This could result in contamination of groundwater resources; however, reservoirs are often selected that exist below the groundwater tables so as to avoid contamination of these resources in the case of leakage (Newmark et al. 2010).

Additionally, use of CCS would place additional demand on water resources which could present new water challenges for the State. Given the State's uncertain future regarding water security, water used for CO₂ sequestering activities could result in depleted water resources during periods of drought (Newmark et al. 2010).

Due to the adverse impacts described above, long-term operational impacts to hydrologic resources associated with CCS projects that could be incented under the proposed CCS Protocol would be potentially significant.

Potential hydrologic 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.10.c.a: Implement Mitigation Measure B.10.a

The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to hydrology and water quality. CARB 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, UIC permits administered pursuant to the SDWA at the federal and State and levels. U.S. EPA issues Class VI permits under these regulations, which apply to injection wells that are drilled for the sole purpose of CO₂ 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 U.S. EPA pursuant to UIC regulations. Class II permits apply to injection wells created for extracting oil and gas, including injection wells used for EOR methods that could also be used for the purpose of CO₂ 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 Amendments would be **potentially significant and unavoidable**.

11. Land Use and Planning

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Short-term agricultural land use changes associated with new or modified industrial facilities and infrastructure, as described in Impact 2.a, could result in removal of existing vegetation, immediate loss of natural habitat and subsequent reduction in biodiversity (Bertzky 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 CCS Protocol 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 Draft Final EA.

Potential short-term construction-related 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 C.2.a., 2.b., C.4.a., C.7.a., and C.10.a.

Impact C.11.b: Long-Term Operational Impacts Related to Feedstock Production

Implementation of the proposed CCS Protocol 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 CCS Protocol 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 CARB, 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.

The marginal land use change by feedstock are important considerations in terms of the contribution of potential feedstock demands from the California market only. However, non-GHG impacts such as decreased biodiversity and impacts on water resources are not accounted for in this metric. 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 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, C.2.b, 4.a, C.4.b, C.7b, C.7.c, and C.10.b.

12. Mineral Resources

Impact C.12.a: Short-Term Construction-Related Impacts on Mineral Resources

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although it is reasonably foreseeable that construction activities could occur, the location and extent of construction activities related to new or modified industrial facilities and infrastructure cannot be determined at this time. Construction associated with new or modified facilities would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered mineral resource issues. Although construction of new infrastructure (e.g., piping) could occur in areas outside the footprints of existing facilities, short-term construction impacts would only temporarily affect the availability of known mineral resources of local regional, or state value. As a result, construction of new and modified facilities and infrastructure for CCS projects would not be considered to have a significant impact on the availability of a known mineral resource or recovery site. Thus, short-term construction-related mineral resources impacts associated with the CCS Protocol would be **less than significant**.

Impact 12.b: Long-Term Operational Impacts on Mineral Resources

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Implementation of the CCS Protocol could result in the injection of CO₂ into subsurface reservoirs and the subsequent sealing and permanent closure of these reservoirs after reaching the CO₂ storage capacity limit. The sealing and closure of subsurface reservoirs could result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state or a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. For example, injection and sequestration of CO₂ into a former oil reservoir where oil production is not economically feasible at the time of sequestration, followed by closure of the reservoir once CO₂ storage capacity is reached, would prevent further oil production from the reservoir when further production of the reservoir becomes economically feasible in the future. Access to mineral resources in reservoirs above or below a permanently closed reservoir may also be restricted, depending on the geology of the site. This would be a potentially significant impact.

Potential mineral 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.12.b

The Regulatory Setting in Attachment 1 includes applicable laws and regulations that pertain to mineral resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities and infrastructure 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 and infrastructure 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 mineral resource impacts include:

- Proponents of new or modified facilities and infrastructure 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 known mineral resources impacts may include the following; however, any mitigation specifically required for a new or modified facility and infrastructure would be determined by the local lead agency.
- Conduct a survey to identify mineral resources of local regional, or state value at the project site.
- Site and design new or modified facilities and infrastructure to avoid or minimize restrictions to known mineral resources and recovery sites.

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 long-term operational-related impact regarding mineral resources resulting from the operation of new or modified facilities and infrastructure associated with the proposed CCS Protocol could be **potentially significant and unavoidable**.

13. Noise

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

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.

Although detailed construction equipment lists would depend on the types and sizes of facilities and infrastructure to be modified or constructed, 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 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 to 109 VdB and from 0.003 to 0.089 in/sec 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 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 CCS Protocol would be potentially significant.

Potential noise 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.13.a: Implement mitigation Measure B.13.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 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 short-term construction-related impact regarding noise resulting from the construction of new or modified facilities and infrastructure associated with the proposed CCS Protocol could be **potentially significant and unavoidable**.

Impact C.13.b: Long-Term Operational Noise Impacts

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Implementation of the proposed CCS Protocol could result in changes to land use to collect or cultivate biofuel and forest feedstocks, as described above in Impact 2.b. In general, these activities already take place under existing conditions. For example, any new farmland used for feedstock cultivation is likely to be adjacent to similar uses. Also, 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 CCS Protocol could also include operation of new and expanded facilities and infrastructure, including natural gas processing plants, ethanol plants, hydrogen plants, and biomass gasification plants as well as carbon capture systems and pumps to transport CO₂. Operation of these new or modified facilities would likely occur within footprints of existing facilities, areas with zoning that would permit the development of industrial uses, or public lands where the appropriate State or federal agency has determined that such uses are allowable. However, the locations of infrastructure to transport captured CO₂ emissions

(e.g., pumping stations for CO₂ transport through pipelines) may operate in areas outside of the footprints of existing facilities or areas zoned for manufacturing or industrial uses, depending on the locations of the storage reservoirs.

Thus, implementation of reasonably foreseeable compliance responses could result in the generation of long-term operational noise in excess of applicable standards or that result in a substantial increase in ambient levels at nearby sensitive receptors. Long-term operational-related impacts on noise associated with the proposed CCS Protocol could be potentially significant.

Potential noise 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.13.b: Implement Mitigation Measure B.13.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 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 long-term operational-related impact regarding noise resulting from new or modified facilities and infrastructure associated with the proposed CCS Protocol could be **potentially significant and unavoidable**.

14. Population, Employment, and Housing

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

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). Similarly, operational activities would be anticipated to require relatively small workforces or increases to workforces. Therefore, a substantial amount of worker migration would not be likely to occur, and a sufficient employment base would likely be available for

construction and operation. Operation of modified existing facilities and 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 CCS Protocol is not expected to lead to job losses or large-scale worker displacement.

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

15. Public Services

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although it is reasonably foreseeable that activities associated with modified or new facilities and infrastructure could occur, there is uncertainty as to the exact location or character of any modified or new facilities and infrastructure. 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). Similarly, operational activities would be anticipated to require relatively small workforces or increases to workforces. Therefore, it would be anticipated that the need for a substantial amount of construction and operational worker migration would not occur and that a sufficient employment base would likely be available for construction and operation of the facilities and infrastructure. 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 CCS Protocol on response times and/or service ratios for fire protection and police protection schools, parks, and other facilities would be **less than significant**.

16. Recreation

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure

such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

These activities would likely occur within footprints of existing manufacturing facilities, or in areas with appropriate zoning. 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) 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 CCS Protocol would be **less than significant**.

17. Transportation and Traffic

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Although detailed information about potential specific construction activities is not currently available, these activities 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.

Potential transportation 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels

Mitigation Measure C.17.a: Implement Mitigation Measure B.17.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 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 impact regarding traffic resulting from the construction of new facilities and infrastructure or modification of existing facilities associated with the proposed CCS Protocol would be **potentially significant and unavoidable**.

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

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

As indicated in Impact 2.b, the CCS Protocol could result in an increase in production of agriculture-based and forest-based biofuels within and outside of California. This could result in increased rail and truck traffic to transport these low-carbon fuels. An attempt to determine the exact times and quantities of different types of low-carbon fuels would be speculative. The locations of exports and imports is based upon numerous unknown factors including: weather patterns, demand, and other economic drivers. While changes to the existing trade patterns can be anticipated, 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 fuel to and within California.

Upon entering the State, low-carbon fuels would be transported to appropriate facilities (e.g., blending facilities, distribution centers). While the proposed CCS Protocol 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, and could impact the amount of traffic for both worker commute trips and material deliveries. Depending on the amount of trip generation and the locations of 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. The impacts described above would be potentially significant.

Potential transportation 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.17.b: Implement Mitigation Measure B.17.b

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 CCS Protocol would be **potentially significant and unavoidable**.

18. Utilities and Services

Impact C.18.a: Increased Demand for Water, Wastewater, Electricity and Gas Services

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol include the modification of existing industrial facilities or construction of new industrial facilities to capture CO₂ emissions, and the construction of new infrastructure such as pipelines, wells, and other surface facilities to transport and sequester CO₂ emissions.

Reasonably foreseeable compliance responses associated with the proposed CCS Protocol could result in new demand for water, wastewater, electricity, and gas services. Generally, facilities would be sited 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. Potential 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.

Any new or modified facilities, no matter their size and location, would be required to obtain 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. It is assumed that facilities proposed in other states would be subject to comparable federal, State, and/or local environmental review requirements (e.g., CEQA) and that the environmental review process 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 calculated; 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). Resulting environmental impacts would also be determined through this process.

CCS-related operations could place additional strain on existing and future water resources. Depending on variations in water security, which vary year-to-year, the water required to facilitate the transfer for CO₂ into storage reservoirs could compete with other water demands within the vicinity of CCS operations. Thus, long-term operational impacts on utilities and services systems associated with the proposed CCS Protocol would be potentially significant.

Potential utility 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 U.S. or abroad) with approval authority over the particular development projects. However, because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels.

Mitigation Measure C.18.a: Implement mitigation Measure B.18.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 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 impact to utilities and service systems resulting from the operation of new facilities associated with the proposed CCS Protocol would be **potentially significant and unavoidable**.

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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. The California Air Resources Board's (CARB's or Board's) certified regulatory program (17 CCR 60000-60008) does not provide specific direction on a cumulative impacts analysis, and while CARB, by 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).

The CEQA Guidelines state that a previously approved plan for the reduction of GHG emissions may be used in cumulative impacts analysis, and that the pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference (Cal. Code Regs., tit. 14, §15130(d)). Furthermore, no further cumulative impacts analysis is required when a project is consistent with a general, specific, master or comparable programmatic plan where the lead agency determines that the regional or area wide cumulative impacts of the proposed project have already been adequately addressed, as defined in section 15152(f), in a certified EIR for that plan. (Cal. Code Regs., tit. 14, §15130(d)). CEQA further directs that a tiered EIR focus on significant environmental effects that were not already analyzed in the previous environmental analysis. (Pub. Resources Code §21068.5; 21093; see also 21094(c).)

For purposes of this analysis, CARB is relying on the summary of projections contained in the Environmental Analysis (EA) prepared for California’s 2017 Climate Change Scoping Plan (Scoping Plan EA). The Scoping Plan EA provided a program level review of significant adverse impacts associated with the reasonably foreseeable compliance responses that appeared most likely to occur because of implementing the recommended measures. 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 EA considered cumulative impacts of a full range of reasonably foreseeable compliance responses to all the recommendations, including the low carbon fuel standard (LCFS), along with the expected background growth in California in its impacts conclusions for each resource topic area. The Scoping Plan EA considered the cumulative effect of 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)). CARB has determined that the cumulative effects of the proposed Regulatory Amendments to the Low Carbon Fuel Standard (Proposed Amendments) have been examined at a sufficient level of detail in the Scoping Plan EA.²⁵ Therefore, CARB has determined that for a cumulative analysis of the Proposed Amendments, it is appropriate to rely on the cumulative analysis contained in the Scoping Plan EA, which is the statewide plan designed to reduce GHGs. The analysis of the Scoping Plan EA is hereby incorporated by reference. The portions of the Scoping Plan EA relevant to this discussion are also summarized below.

The analysis of cumulative impacts includes the following:

- A summary of the cumulative impacts found for each resource area in the Scoping Plan EA (certified by the Board in December 2017).
- A discussion of the types of compliance responses associated with the Proposed Amendments, pertinent to each resource area.
- A significance conclusion that determines if the Proposed Amendments 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” (Cal. Code Regs., tit. 14, §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).

²⁵A copy of the Scoping Plan EA is available at https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.

1. Summary of the Scoping Plan Compliance Responses

The Scoping Plan EA provided a program-level review of significant adverse impacts associated with the reasonably foreseeable compliance responses that appeared most likely to occur because of implementing the recommended measures. The impact discussion includes, where relevant, construction-related effects, operational effects of new or modified facilities, and influences of the recommended measures on GHG and air pollutant emissions. The Scoping Plan EA, certified by the Board in December 2017, was prepared as a program environmental document for the entire statewide plan of GHG reductions projects, including the Proposed Amendments. The Scoping Plan recommended six measures to achieve the 2030 target: renewable energy and energy efficiency, Senate Bill (SB) 350, increased stringency of LCFS, 18 percent carbon intensity (CI) reduction by 2030, Mobile Source Strategies and Sustainable Freight Strategy, Short-Lived Climate Pollutant (SLCP) Reduction Strategy, increased stringency of SB 375 2035 targets for Sustainable Communities Strategies, and post-2020 Cap-and-Trade Programs with declining caps and linkage to Ontario, Canada. The compliance responses associated with these sectors measures are described as follows.

a) Renewable Energy and Energy Efficiency

The reasonably foreseeable compliance responses associated with implementation of proposed measures for renewable energy and energy efficiency, including SB 350 would range from minor modifications to existing buildings and large-scale construction projects that would allow for increased use of renewable energy and storage of produced renewable energy. Additional renewable energy supplies would be produced from new wind, solar thermal, solar photovoltaic, geothermal, solid-fuel biomass, biogas, and small hydroelectric facilities. These may require new and upgraded transmission lines to move the electricity from the source of generation to substations near population centers. Individual energy projects augment electrical grids by capturing excess electrical energy during periods of low demand and storing it in other forms until needed on an electrical grid. This energy storage may be procured from buildings, such as solar panels, and from large-scale renewable energy facilities. Energy storage systems are expected to consist of lithium battery-based systems. These systems are likely to be in industrial areas and cover large areas of land (i.e., more than one acre). In addition, regionalization of the grid may result in increased construction and operation of renewable energy projects. Expansion of the energy grid would require upgraded and new transmission lines.

Doubling of energy efficiency at existing buildings would include modifications to buildings, such as replacement of heating, ventilation, and air conditioning (HVAC) systems with heat pumps and installation of more efficient water heaters. Other upgrades, such as installation of more efficient insulation, window replacements, and whole house or whole-building retrofits could occur as well, with the overall goals of creating zero net energy buildings. These activities would occur over a long period, such that the existing production rate of equipment would be sufficient to meet demand.

That is, there would be no new manufacturing facilities needed or other earth-moving activities.

b) Carbon Intensity Levels under the Low Carbon Fuel Standard

As discussed in the Scoping Plan EA and in this ~~Draft~~ Final EA, reasonably foreseeable compliance responses to a carbon intensity (CI) reduction of at least 18 percent in the LCFS regulation could include incentives for various projects, such as processing plants for agriculture-based ethanol, cellulosic ethanol, and biomethane. Such incentives could result in minor expansions to existing operations, such as collection of natural gas from landfills, dairies, and wastewater treatment plants, modifications to crude production facilities (e.g., onsite solar, wind, heat, and/or steam generation electricity), and installation of energy management systems at refineries. It is also reasonably foreseeable that some existing fossil refiners may start to produce biofuels. This may require some minor modifications to existing sites to retrofit onsite technologies and equipment.

c) Mobile Source Strategy (Clean Technology and Fuels Scenario) and Sustainable Freight Strategy

The Scoping Plan contains recommended measures for on-road light-duty vehicles, on-road heavy-duty vehicles, off-road federal and international sources, and off-road equipment. Reasonably foreseeable compliance responses evaluated in the Scoping Plan EA associated with the strategy included increased infrastructure for natural gas and hydrogen refueling stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports, increased recycling or refurbishment of lithium batteries, and increased emission testing of vehicles which may cause construction of new testing centers to monitor vehicle emissions throughout the State. The replacement rate of on-road light-duty and heavy-duty vehicles, as well as off-road equipment and engines is anticipated to increase requiring older models to be sold outside of California, scrapped, or recycled. Compliance responses could also include construction or operation of new manufacturing facilities to support zero and near-zero emission technologies and increased manufacturing of low-nitrogen oxide (NO_x) engines.

d) Short-Lived Climate Pollutant Reduction Strategy

In the Scoping Plan, the SLCP sector addressed ozone depleting substances (ODS), a large group of chemicals known to destroy the stratospheric ozone layer when released into the atmosphere. ODS were historically used in a wide variety of applications, including refrigerants, foam blowing agents, solvents, and fire suppressants. Four general concepts were associated with the Short-Lived Climate Pollutants Sector within the Scoping Plan Update: high-global warming potential (GWP) fluorinated gas phasedown, low-GWP requirements, ODS recovery and destruction, and high-GWP fees. Reasonably foreseeable compliance responses consisted of replacement of high-

GWP compounds with low-GWP compounds, which was considered to require construction of new manufacturing facilities or modification of existing manufacturing facilities.

CARB staff presented the Final Short-Lived Climate Pollutant Reduction Strategy, and associated Final EA, to the Board on March 23, 2017. At this hearing the Board certified the Final EA, (including the response to environmental comments document and the CEQA findings and statement of override) and approved the Final Short-Lived Climate Pollutant Reduction Strategy. More information can be found at: <http://www.arb.ca.gov/cc/shortlived/shortlived/shortlived.htm>

e) Increased Stringency of Senate Bill 375 2035 Targets for Sustainable Communities Strategies

In the Scoping Plan, SB 375 supported the State's climate action goals to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities. Reasonably foreseeable compliance responses evaluated in the Scoping Plan included planning and construction responses from new housing, commercial and industrial development, preservation of open space, and roadway and infrastructure improvements. New infrastructure associated with SB 375 and Sustainable community Strategies (SCSs) could include commuter rail lines, electric charging and hydrogen fueling infrastructure, and new manufacturing or modified facilities to accommodate the increased use of zero emission vehicles (ZEVs) and plug-in hybrid electric vehicles (PHEVs).

f) Post-2020 Cap-and-Trade Program with Declining Caps and Linkage to Ontario, Canada

In the Scoping Plan, the Cap-and-Trade Regulation was updated to include declining caps for the post-2020 program and declining caps and linkage to Ontario, Canada. Anticipated compliance responses include construction activities, infrastructure and equipment installations, and significant operational changes to facilities. An EA was prepared for the post-2020 Cap-and-Trade program, titled Final Environmental Analysis prepared for the Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation, certified by the Board on July 27, 2017. Refer to that document for a more thorough description of the measures, potential compliance responses, and potential impacts: <https://www.arb.ca.gov/regact/2016/capandtrade16/capandtrade16.htm>

2. Summary of the Scoping Plan Environmental Impacts

The Scoping Plan EA evaluated the environmental impacts related to the reasonably foreseeable compliance responses described above. Table 5-1 provides a summary of the conclusions of these impacts.

**Table 5-1
Summary of California’s 2017 Climate Change Scoping Plan Environmental
Analysis Impacts by Sector**

| Resource Areas and Impact Categories | Significance Determination |
|--|-----------------------------------|
| Aesthetics | |
| Construction-Related Impacts | PSU |
| Operational Impacts | PSU |
| Agriculture and Forest Resources | |
| Construction-Related Impacts | PSU |
| Operational Impacts | PSU |
| Air Quality | |
| Construction-Related Impacts | PSU |
| Operational Impacts | LTS |
| Construction-Related and Operational Odors Impacts | PSU |
| Biological Resources | |
| Construction-Related Impacts | PSU |
| Operational Impacts | PSU |
| Cultural Resources | |
| Construction-Related and Operational Impacts | PSU |
| Energy Demand | |
| Construction-Related Impacts | LTS |
| Operational Impacts | B |
| Geology and Soils | |
| Construction-Related Impacts | PSU |
| Operational Impacts | PSU |
| Greenhouse Gas | |
| Construction-Related and Operational Impacts | B |
| Hazards and Hazardous Materials | |
| Construction-Related Impacts | PSU |
| Operational Impacts | PSU |
| Hydrology and Water Quality | |
| Construction-Related Impacts | PSU |

**Table 5-1
Summary of California’s 2017 Climate Change Scoping Plan Environmental
Analysis Impacts by Sector**

| Resource Areas and Impact Categories | Significance Determination |
|---|-----------------------------------|
| Operational Impacts | PSU |
| Land Use Planning | |
| Construction-Related Impacts | LTS |
| Operational Impacts | PSU |
| Mineral Resources | |
| Construction-Related Impacts | LTS |
| Operational Impacts | LTS |
| Noise | |
| Construction-Related Impacts | PSU |
| Operational Impacts | PSU |
| Population and Housing | |
| Construction-Related Impacts | LTS |
| Operational Impacts | LTS |
| Public Services | |
| Construction-Related Impacts | LTS |
| Operational Impacts | LTS |
| Recreation | |
| Construction-Related Impacts | LTS |
| Operational Impacts | PSU |
| Transportation/Traffic | |
| Construction-Related Impacts | PSU |
| Operational Impacts | PSU |
| Utilities and Service Systems | |
| Operational Impacts | PSU |

B. Significance Determinations and Mitigation

Implementation of the measures in the Scoping Plan was determined to potentially result in cumulatively considerable contributions to significant cumulative impacts in 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 EA found that implementation of the recommended actions within the various sectors, which included the recommendation for the LCFS, could result in a significant cumulative impact to aesthetic resources from construction and operational activities associated with new or modified facilities or infrastructure. As discussed in the Scoping Plan 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 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, which includes LCFS, could result in a significant cumulative aesthetics-related impact.

The Proposed Amendments' 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 identified project-level mitigation could effectively reduce the incremental contribution from the Proposed Amendments 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 CARB. Thus, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on aesthetic resources.

2. Agricultural and Forest Resources

The Scoping Plan EA found that implementation of the recommended measures within the various sectors, which included the recommendation for the LCFS, could result in a significant cumulative impact to agricultural and forest resources. As discussed in the Scoping Plan 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. Additionally, increased demand for feedstock for fuels could result in indirect land use changes where food-based agriculture could shift to other areas and increase pressure to convert rangeland, grassland, forests, and other uses to agriculture. Because CARB 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 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, which includes LCFS, could result in a significant cumulative impact to agricultural and forest resources.

The Proposed Amendments' 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 Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on agricultural and forest resources.

3. Air Quality

The Scoping Plan EA found that implementation of the recommended measures within the various sectors, which included the recommendation for the LCFS, could result in a significant cumulative impact to short-term construction-related air quality. As discussed in the Scoping Plan EA, reasonably foreseeable compliance responses associated with LCFS could result in short-term construction-related increases in criteria air pollutants and toxic air contaminants (TACs) 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 from using heavy-duty construction equipment on a short-term basis. Therefore, LCFS 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, no matter their size or type would be required to seek local or State land use approvals

prior to their implementation. Part of the land use entitlement process in California requires that each of these projects undergo environmental review consistent with California environmental review requirements (e.g., 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.

CARB 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, short-term construction-related air quality impacts were determined to be potentially significant and unavoidable. For more detailed discussion on mitigating air quality impacts via project-specific review, see Chapter 4. Thus, the Scoping Plan, which included LCFS, could result in a short-term, construction-related cumulatively considerable impact to air quality.

The Proposed Amendments' 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 short-term construction related impacts on air quality. 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 Amendments **could result in a cumulatively considerable contribution to a significant cumulative short-term construction related impact** on air quality.

Overall, while there would be some criteria air pollutant emissions and TACs associated with operations of the Scoping Plan, which includes LCFS, in the long term the measures would result in beneficial operational impacts. Therefore, the Scoping Plan, which includes LCFS, would not have a cumulatively considerable impact on operational air quality; nor would the Proposed Regulation.

CARB's analysis of long-term operational NO_x and PM emissions due to biomass-based diesel use associated with the Proposed Amendments utilized the biomass-based diesel attribution approach developed to further evaluate emissions impacts associated with the original LCFS regulation. As described in Chapter 4, biomass-based diesel use attributed to the LCFS as part of the Proposed Amendments could result in an overall potential decrease in long-term operational NO_x and PM emissions relative to use of conventional diesel in all State- and federally-designated ozone non-attainment areas from 2019 through 2030. There is also a projected increase in both long-term operational NO_x and PM_{2.5} emissions due to biomass and biofuel transportation and distribution as a result of the Proposed Amendments, but these emission increases are much less than the tailpipe emission benefits provided by the use of biomass-based

diesel that would be incented by the Proposed Amendments. Additionally, it is expected that the Proposed Amendments will result in an increase in production and/or expansion at California alternative fuel facilities and modification of alternative fuel facilities to accommodate CCS projects. While these compliance responses will result in increased long-term operational NO_x and PM_{2.5} emissions at these facilities, there is a projected overall net decrease in both long-term operational NO_x and PM_{2.5} emissions for alternative fuel production facilities and solar steam projects due to the large reduction in emissions from natural gas-fired steam generators as solar steam projects are implemented. As indicated above, the Proposed Amendments will also reduce potential NO_x emissions increases associated with biomass-based diesel use through a revision to the sunset provision in the ADF regulation. Finally, the Proposed Amendments are expected to result in an increase in the use of AJF at California airports. There are projected reductions in long-term operational NO_x and PM_{2.5} emissions from the use of AJF. Overall, the Proposed Amendments are expected to result in lower total long-term operational NO_x and PM_{2.5} emissions in each year from 2019 through 2030.

As described in Chapter 4, the CCS Protocol could result in potentially significant emissions of air concentrations of TACs at nearby sensitive receptors due to increased fuel use associated with carbon capture systems.

CARB does not believe significant localized increases are likely, and as discussed in Chapter 4 above, CARB anticipates overall beneficial long-term operational impacts statewide. Nevertheless, in an abundance of caution and for the purposes of complete public disclosure, CARB concludes that implementation of the Proposed Amendments would result in long-term operational impacts that would be potentially significant and unavoidable; thus, they **could result in a cumulatively-considerable contribution to a significant long-term operational related impact** on air quality.

Implementation of the Proposed Amendments 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 using 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 Amendments **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 measures in the Scoping Plan, which included the recommendation for LCFS, 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. In addition, new regulations could affect biological resources 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.

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 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 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. Implementation of mitigation measures would not reduce these impacts to a less-than-significant level. Thus, the Scoping Plan, which includes LCFS, could result in a significant cumulative impact on biological resources.

The Proposed Amendments' 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 biological 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 be 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 Amendments **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, which included the recommendation for LCFS, 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 CARB, any mitigation identified would not reduce these impacts to a less-than-significant level. Thus, the Scoping Plan, which includes LCFS, could result in a significant cumulative impact on cultural resources.

The Proposed Amendments' 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 cultural resources. 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 short-term construction-related impact on cultural resources **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, which included the recommendation for LCFS, 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 would not result in a cumulative short-term construction-related impact on energy demand.

The long-term operational energy demand impacts associated with the recommended actions under the Scoping Plan, which includes LCFS, would be primarily beneficial and; thus, the Scoping Plan, which includes LCFS, would not result in a considerable contribution to a cumulative long-term operational impact on energy demand.

Implementation of reasonably foreseeable compliance responses associated with the Proposed Amendments could also require construction and operational activities associated with new or modified facilities or infrastructure. 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 Amendments **would not result in a cumulatively considerable contribution to a cumulative construction-related impact on energy demand.**

The Proposed Amendments' contribution to a cumulative long-term operational impact on energy demand would be cumulatively considerable, given the conclusion in Chapter 4 that the CCS Protocol may result in a significant adverse impact on energy demand. 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 Amendments **could result in a cumulatively considerable contribution to a cumulative long-term operational impact on energy demand.**

7. Geology and Soils

Implementation of the reasonably foreseeable compliance responses associated with the recommended measures in the Scoping Plan, including LCFS, could require construction and operational activities associated with new or modified facilities or infrastructure. In addition, implementation of new fuels regulations could increase or

change agricultural practice. 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.

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, which includes LCFS, could result in a significant cumulative impact on geology and soils.

The Proposed Amendments' contribution to this significant impact would be cumulatively considerable, given the conclusion in Chapter 4 that the Proposed Amendments may themselves result in a significant adverse impact on geology and soils. 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 Amendments **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, which includes LCFS, 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 are considered less than significant when considered in comparison to the overall GHG reduction associated with implementation of the Scoping Plan.

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 to reduce emissions to achieve 2020 and post-2020 emission reduction goals.

Thus, the Scoping Plan, including LCFS, would not result in a cumulatively considerable contribution to a significant cumulative impact on GHG emissions.

Implementation of reasonably foreseeable compliance responses associated with the Proposed Amendments 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 Amendments are considered less than significant when considered in comparison to the overall GHG reduction associated with implementation of the Proposed Amendments. Thus, the Proposed Amendments **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 measures in the Scoping Plan, which includes LCFS, 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 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 remains for a significant release of hazardous materials into the environment. Consequently, 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 Proposed Amendments' 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 from hazards and hazardous materials. 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 be 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 from hazards and hazardous materials could be potentially significant and unavoidable. Thus, the Proposed

Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on hazards and hazardous materials.

10. Hydrology and Water Quality

Construction activities and long-term operations associated with reasonably foreseeable compliance responses to the recommended measures in the Scoping Plan, which includes LCFS, could be 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. In addition, fuels regulation could alter agricultural practices, resulting in discharges to waterways of sediment, nutrients, pathogens, pesticides, metals, and salts. 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, which includes LCFS, could result in a significant cumulative impact to hydrology and water quality.

The Proposed Amendments' 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 hydrology and water quality. 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 be 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 short-term construction-related impacts to hydrology and water quality could be potentially significant and unavoidable. Thus, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on hydrology and water quality.

11. Land Use and Planning

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan, which includes LCFS, 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. Implementation of the Scoping Plan would also include avoided deforestation through Forest Offset Protocols. Because avoided conversion projects could occur on land planned for other, non-forest uses and, if so, would prevent the planned non-forest use from occurring, avoided conversion projects could conflict with local land use plans. Thus, implementation of the recommended actions could divide an established community or conflict with a land use or conservation plan. Therefore, the Scoping Plan would result in a considerable contribution to a cumulative land use planning-related impact. 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, which includes LCFS, would not result in a significant cumulative land use planning-related impact.

Implementation of the Proposed Amendments 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, which includes LCFS, 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 or modified facilities and infrastructure. New facilities and infrastructure would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered mineral resources issues. Although construction of new facilities and infrastructure could occur in areas outside the footprints of existing facilities, short-term construction impacts would only temporarily affect the availability of known mineral resources of local regional, or state value. Thus, the Scoping Plan would not result in a considerable

contribution to a cumulative short-term construction-related impact on mineral resources.

Some of the recommended actions and associated compliance responses could require the extraction of minerals (e.g., 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, which includes LCFS, would not result in a considerable contribution to a cumulative long-term operational impact on mineral resources.

The Proposed Amendments would result in less-than significant effects on availability of mineral resources during construction activities, as described in Chapter 4. Therefore, the Proposed Amendments would not result in a cumulatively considerable contribution to a cumulative short-term construction-related impact on mineral resources.

The Proposed Amendments' contribution to a cumulative long-term operational impact would be cumulatively considerable, given the conclusion in Chapter 4 that the Proposed Amendments, including the CCS Protocol, may themselves result in a significant adverse impact on mineral resources. 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 Amendments **could result in a cumulatively considerable contribution to a cumulative long-term operational impact on mineral resources.**

13. Noise

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan, which includes LCFS, 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 noise related to new facilities, mining operations, and renewable energy projects could emit excessive levels of noise near sensitive receptors. Thus, operational effects of equipment constructed as a result of implementation of recommended actions associated with Scoping Plan 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, which includes LCFS, could result in significant cumulative construction-related and operational noise impacts.

The Proposed Amendments' 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 noise. 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 be 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 noise could be potentially significant and unavoidable. Thus, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on noise.

14. Population and Housing

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the Scoping Plan, which includes LCFS, 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, which includes LCFS, would not result in a significant cumulative impact related to population and housing growth.

Implementation of reasonably foreseeable compliance responses associated with the Proposed Amendments 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 Amendments 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 Amendments **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, which includes LCFS, 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, which includes LCFS, would not result in a significant cumulative impact related to public services.

Reasonably foreseeable compliance responses associated the Proposed Amendments 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 Amendments **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, which includes LCFS, 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. However, new renewable energy projects could be located on recreational land or in close proximity to recreation resources. Therefore, the Scoping Plan, which includes LCFS, would result in a considerable contribution to a cumulative impact related to recreational facilities.

As described in Chapter 4, implementation of reasonably foreseeable compliance responses associated with the Proposed Amendments 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 Amendments **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, which includes LCFS, could require construction and operations of new or modified facilities or infrastructure. In addition, new fuels standards could result in changes to imports and statewide shipments of feedstock and distribution of fuels. 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. As a result, transportation and traffic impacts during construction projects associated with the Scoping Plan, which includes LCFS, would be potentially significant.

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 could result in a cumulative short-term transportation and traffic-related impact.

Implementation of the reasonably foreseeable compliance responses under the Scoping Plan could also result in impacts associated with long-term operational changes in traffic patterns or vehicle trips, or conflict with existing circulation plans.

The Proposed Amendments' 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 to transportation and traffic. 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 be 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 transportation and traffic could be potentially significant and unavoidable. Thus, the Proposed Amendments **could result in a cumulatively considerable contribution to a 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, which includes LCFS, 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, no matter their size and location would be required to seek 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 undergo environmental review consistent with the requirements of CEQA and the CEQA Guidelines. It is assumed that facilities proposed in other states would be subject to comparable federal, state, and/or local environmental review requirements (e.g., CEQA) and that the environmental review process 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 CARB 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, which includes LCFS, could result in a significant cumulative impact with respect to utilities and service systems.

The Proposed Amendments' contribution to this significant impact would not be cumulatively considerable, given the conclusion in Chapter 4 that the proposed regulations may themselves result in a significant adverse impact to utility service systems. 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 be 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 utility service systems could be potentially significant and unavoidable. Thus, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on utility 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 Amendments 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 Amendments 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 amendments to the Low Carbon Fuel Standard (LCFS).

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 amendments to the LCFS. 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 amendments, 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; (3) threaten to eliminate a plant or animal community; or (4) substantially reduce the number or restrict the range of an endangered, rare, or threatened species. Chapter 4 of this EA addresses impact 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 various environmental resource areas that could indirectly affect human beings areas are analyzed in Chapter 4 above, those that could directly affect human beings include air quality (short-term and long-term), geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation/traffic, and utilities. Impacts to those resources areas are addressed in Chapter 4 of this EA.

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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., approval of the proposed amendments to the Low Carbon Fuel Standard [LCFS]), 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 (CARB) 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 CARB'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 CARB, 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 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 CARB'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 primary objectives of the Proposed Amendments are listed below.

1. Improve California's long-term ability to support the consumption of increasingly lower-carbon intensity (CI) fuels and to improve the program's overall effectiveness;
2. Strengthen the CI reduction targets beyond 2020 in-line with California's 2030 GHG reduction requirement enacted through Senate Bill (SB) 32 (Pavley, 2016);
3. Reduce the CI of transportation fuels in the California market by at least 20 percent of its 2010 level by 2030;
4. Provide greater diversification of the State's fuel portfolio;
5. Provide reduced dependence on petroleum;
6. Decrease the associated economic impacts of gasoline and diesel price spikes caused by volatile oil price changes;
7. Provide greater innovation and development of cleaner fuels, and support for California's ongoing efforts to improve ambient air quality;
8. Provide additional, cost-effective LCFS compliance options including clarification on the use of carbon capture and sequestration (CCS) and the introduction of credit for alternative jet fuel; and
9. Mitigate potential NO_x emissions increases relative to conventional diesel due to biodiesel use attributed to the LCFS.

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. This analysis considers the continuation of the existing LCFS regulation, followed by three action alternatives: 25 Percent CI Reduction Target Alternative, Exempt Biodiesel from the LCFS Alternative, and No LCFS Incorporation of CCS Protocol Alternative.

1. Alternative 1: No Project Alternative – Continuation of the Current Low Carbon Fuel Standard Regulation

a) Alternative 1 Description

CARB's certified regulatory program does not mandate consideration of a "No-Project Alternative." (Cal. Code Regs., tit. 17, § 60006.) CARB is including Alternative 1, the No-Project Alternative, to provide a good faith effort to disclose environmental information that is important for considering the Proposed Amendments. Under CARB's certified regulatory program, the alternatives considered, among other things, must be "consistent with the state board's legislatively mandated responsibilities and duties." (Cal. Code Regs., tit. 17, § 60006.) 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]).

Under the No-Project Alternative, the Proposed Amendments would not be approved. The LCFS would continue without strengthening the CI reduction targets beyond 2020, maintaining the 10 percent CI reduction below 2010 levels target beyond 2020. Also, the list of fuels subject to the regulation and the opt-in and/or exempt status of particular fuels would remain the same, which means that alternative jet fuel and propane would not be eligible to earn LCFS credits. Finally, the CCS Protocol, which allows for credit generation under the LCFS for CCS projects, would also not be included. Other CARB programs intended to reduce GHG emissions would continue in accordance with their statutory authorities and adopted regulation.

b) Alternative 1 Discussion

The No-Project Alternative would fail to meet many of the project objectives described in Chapter 2 and reiterated above. The objective of the Proposed Amendments is to improve California's long-term ability to support the consumption of increasingly lower-CI fuels and to improve the program's overall effectiveness. Without strengthening the CI reduction targets through 2030, there would be no incentives to reduce CI values of fuels, diversify the State's fuel portfolio, or commercialize pathways for new alternative fuels. Thus, the basic project objectives would not be met.

Without eliminating the fuel exemptions for aviation fuel and propane and incentives to further reduce the CI value of fuels in California, the feedstocks, fuels, and petroleum projects would be different than under the Proposed Amendments. This would result in having no additional incentives beyond what is available with the existing LCFS to reduce the CI values of fuels or diversify the State's fuel portfolio. This alternative may also result in stranded assets as credits that would have been generated from electricity and hydrogen under the Project increase post-2020 and displace alternative fuels and petroleum projects that were necessary to achieve the 2020 target. There would also be less incentive to develop second generation biofuels, which may be required for California to achieve deep emission reductions necessary to achieve long-term GHG targets. Finally, without the Proposed Amendments, alternative jet fuel and propane will

not be eligible to earn LCFS credits, thereby hampering the transition of these fuels to lower carbon alternatives.

c) Alternative 1 Environmental Impacts

Implementation of Alternative 1 would avoid some of the potential environmental impacts described in Chapter 4 of this ~~Draft~~ Final EA, specifically those associated with construction and operation of facilities related to the implementation of specific compliance responses or projects to further reduce the CI value of fuels in California beyond current LCFS targets. If compliance responses associated with the Proposed Amendments would not occur, California's fuel portfolio would be less likely to change substantially such that average CI values of fuels are reduced beyond 10 percent. Thus, potentially significant impacts related to compliances responses that could result in changes in shipment patterns, land use changes, additional infrastructure, energy demand, and methods used to obtain CI credits could be avoided.

But without implementation of the Proposed Amendments, GHG reductions within the transportation sector would be substantially impeded after 2020, compared to reductions associated with the Proposed Amendments. The beneficial environmental impacts of reduced GHG emissions on climate change after 2020 and the air quality co-benefits associated with the LCFS program after 2020 would not be realized. The State's ability to contribute to the avoidance of the most environmentally damaging impacts of long-term climate change would be limited to benefits achieved in other programs.

**2. Alternative 2: 25 Percent Carbon Intensity Reduction
Alternative**

a) Alternative 2 Description

This alternative includes the proposed amendments described in Chapter 2 with a 25 percent LCFS CI reduction target by 2030 as opposed to the 20 percent CI reduction target proposed by CARB staff. This alternative maintains the rest of the amendments proposed in Chapter 2. Stakeholders, such as NextGen California (NextGen 2017) and Natural Resources Defense Council (NRDC) (Natural Resources Defence Council 2017), suggested this alternative to ensure that the 2030 statewide reduction measures will more likely to be met. NextGen California expressed concern that the 18 percent CI reduction target initially proposed by staff would not incentivize sufficient GHG reductions for the state to meet its 40 percent economy-wide GHG reduction target specified by SB 32. They expressed that selecting a weaker CI target for the LCFS foregoes the opportunity to significantly reduce emissions of harmful pollutants from transportation activities, especially NO_x and particulate matter (PM). They also expressed that selecting a higher CI target would reduce the risk that the State would fail to meet its statutory GHG reduction target, reduce pressure on the cap-and-trade market, stimulate the deployment of fuels capable of meeting mid-century GHG goals,

and significantly improve air quality in California. Staff subsequently raised the target to a 20 percent reduction, in part based on its evaluation of these comments.

b) Alternative 2 Discussion

Compliance responses for this alternative are expected to be the same types as those discussed for the 20 percent LCFS CI reduction target identified by CARB staff as part of these Proposed Amendments. However, under this alternative, the compliance responses would be expected to occur at a greater intensity because of the more aggressive reduction target of 25 percent by 2030. For example, there would be an expected greater increased production from biodiesel, renewable diesel, alternative jet fuel, propane, and cellulosic ethanol; greater increased innovative crude and refinery projects; greater number of CCS projects; and a greater number of dairy methane projects under this alternative compared to the Proposed Amendments.

c) Alternative 2 Environmental Impacts

This alternative would meet the project objectives and result in increased GHG emission reduction compared to the Proposed Amendments because of the increased reduction target. However, the environmental impacts from construction and operation of alternative fuel industries, as described in Chapter 4, would also increase because of more intense reduction target. This would include impacts to aesthetics, air quality, cultural resources, geology and soil, hazards and hazardous materials, hydrology and water quality, noise, and transportation and traffic due to short-term construction-related processes as well as, in some instances, long-term operational processes. Additionally, mineral resources, agricultural and forest resources, and biological resources would be impacted to a greater extent in this increased reduction alternative due to the increase of new facilities, increased conversion of agriculture or forest areas to feedstock cultivations for alternative fuel types, and other changes to land use including the construction of additional processing facilities. In addition, as found in the analysis for the LCFS Standardized Regulatory Impact Assessment (SRIA), the cost per metric ton of carbon dioxide (CO₂) would increase by 180 percent as compared to the Proposed Amendments.

3. Alternative 3: Exempt Biodiesel from the Low Carbon Fuel Standard Alternative

a) Alternative 3 Description

Exempting biodiesel from the LCFS would mean that biodiesel would not be eligible to generate credits. This alternative still maintains the proposed 20 percent reduction in CI by 2030 from a 2010 baseline for both gasoline and gasoline substitutes, as well as diesel and diesel substitute fuels. It also maintains the rest of the Proposed Amendments described in Chapter 2.

b) Alternative 3 Discussion

The use of biodiesel in place of conventional diesel, in isolation, results in a slight increase in NO_x emissions and a large decrease in PM emissions. Biodiesel is currently one of the least expensive compliance options. Because of this, other, more expensive fuels and petroleum-based projects would be necessary to replace credits expected to be generated by biodiesel. Therefore, this alternative would raise costs associated with the LCFS program, and would therefore not as effectively meet the cost effectiveness goals in project objective 8. It would also reduce the diversity of the State's fuel portfolio, in conflict with project objective 4.

c) Alternative 3 Environmental Impacts

Overall, this alternative would result in similar types of impacts as described above for the Proposed Amendments. Because of the nature of biodiesel, this alternative may result in slightly increased NO_x benefits compared to those under the Proposed Amendments. In addition, because development of biodiesel would not be incented, the number of new facilities and converted farmland to meet demand would be reduced; thus, reducing the magnitude of environmental impacts related to construction and operation of these new facilities. This would include less-intensive impacts to biological resources, geology and soils, hydrology and water quality, and utility and service systems. The reduced magnitude of feedstock cultivation would additionally reduce impacts to agricultural and forestry resources from land use changes. However, changes to land use for the purpose of creating production facilities for non-biodiesel alternative fuels will still impact the State similar to the Proposed Amendments. These changes would include additional impacts stemming from the short-term construction-related and long-term operational processes of the non-biodiesel new production facilities. Areas potentially significantly impacted would include aesthetics, air quality, cultural resources, geology and soils, mineral resources, noise, transportation and traffic, agricultural and forest resources, biological resources, and demand on utility and service systems. While the increased use of biodiesel was found to increase NO_x emissions, it is important to note that the increased NO_x emissions associated with the overall effect of the Proposed Amendments would is ultimately expected to result in less-than-significant/beneficial NO_x level at a statewide level due to overall tailpipe emissions benefits compared against fossil fuels, and due to NO_x-reducing additives for biodiesel; thus, this would ultimately not be a differing factor for this alternative as it would result in more of a benefit, but the Proposed Amendments would also still result in a beneficial impact statewide. Local NO_x impacts from LCFS-incented biodiesel are eliminated in this alternative, but other potential local sources of LCFS-incented NO_x, such as additional stationary source emissions from newly constructed non-biodiesel facilities for LCFS compliance, remain potentially significant and unavoidable. This is because the tailpipe emission benefits provided by the use of the biodiesel and renewable diesel provide much more emissions reductions than the increases in NO_x emissions attributable to the use of biodiesel, as described in Chapter 4. This alternative would still have the same GHG emissions reduction because the 20 percent target would remain unchanged.

However, this alternative would result in less PM reduction, as biodiesel use results in lower PM emissions as compared to diesel and renewable diesel which would be allowed under the Proposed Amendments. Because biodiesel is one of the most cost-effective compliance options, by not allowing it, credit prices could be higher in the future.

4. Alternative 4: No Low Carbon Fuel Standard Incorporation of Carbon Capture and Sequestration Protocol Alternative

a) Alternative 4 Description

This alternative would not incorporate the CCS Protocol into the LCFS. Thus, CCS projects would not be eligible to generate credits. This alternative maintains the proposed 20 percent reduction in CI by 2030 from a 2010 baseline for both gasoline and its substitutes and diesel and its substitutes, as well as the rest of the amendments described in Chapter 2.

b) Alternative 4 Discussion

Capture (and compression) of carbon from exhaust streams that are low in CO₂ concentration is energy intensive. Depending on the source of energy used, carbon capture may result in additional criteria pollutant emissions at the capture site. If the capture facility is located in populated areas, this could result in negative health effects. Conversely, carbon capture from exhaust streams that are high in CO₂ concentration (e.g., ethanol facilities) is much less energy intensive and is a relatively low-cost GHG abatement method. Potential carbon capture projects at petroleum refineries, oil fields, and alternative fuel production facilities would not receive LCFS credit and, therefore, may not be built. This will necessitate additional credit generation from alternative fuels and other petroleum-based projects.

c) Alternative 4 Environmental Impacts

This alternative would likely result in potentially fewer criteria pollutant emissions at refineries and oil fields in California for CCS projects with low CO₂ concentration exhaust streams. The alternative would also likely result in fewer criteria air pollutant emissions, and other ground-disturbing-related impacts, from the construction and operation of pipelines, injection equipment, and capture equipment associated with CCS. However, this alternative could result in higher cost alternatives (i.e., greater increase in alternative fuel production and implementation of other petroleum-based projects) to meet the LCFS targets, which would lead to higher credit prices. The emission impacts of the higher cost alternatives will depend on the types and locations of the alternative fuel production and petroleum-based projects as compared to CCS projects, and therefore, the net environmental effect of not incorporating the CCS protocol is unknown. Finally, without the use of CCS, it may be difficult to achieve long-term GHG emission reduction goals. Therefore, this alternative would not meet several of the project objectives.

This alternative would reduce the potentially significant and unavoidable impacts from the development of CCS infrastructure on aesthetics, agricultural resources, air quality, biological resources, cultural resources, energy demand, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, transportation, and demand on utility and services due to construction-related and long-term operation of CCS facilities and infrastructure. However, the long-term operational greenhouse gas reduction benefits of this alternative could potentially be more beneficial on a case-by-case basis than the Proposed Amendments. This is because facilities with low CO₂ concentration exhaust streams, where CCS would be more energy intensive, would be less likely to incorporate CCS, while facilities with higher CO₂ concentration exhaust streams may still find benefit in incorporating the technology. Additionally, CO₂ injection into subsurface reservoirs and the subsequent sealing and closure of the reservoirs could result in the loss of access to a mineral resource of value to a region. This alternative would reduce such mineral impact.

5. Alternative 5: Omit Alternative Jet Fuels from Generating Credits under the Low Carbon Fuel Standard Alternative

a) Alternative 5 Description

Maintaining the exemption of AJF from the LCFS would mean that alternative jet fuel would not be eligible to generated credits. This alternative still maintains the proposed 20 percent reduction in CI by 2030 from a 2010 baseline for both gasoline and its substitutes and diesel and its substitutes, as well as the rest of the proposed amendments described in Chapter 2.

b) Alternative 5 Discussion

Renewable diesel and, to some extent, biodiesel use the same low-carbon feedstocks as used for producing AJF. Moreover, renewable diesel and AJF are produced at the same facilities (i.e., hydrotreating and Fischer-Tropsch refineries). Therefore, if we assume a world that is low-CI feedstock limited, continuing to exempt AJF may mean that renewable diesel and biodiesel would have less competition with AJF for feedstock and production capacity resulting in greater consumption of the biomass-based diesel fuels in California and greater reductions in PM emissions from on- and off-road vehicles. Conversely, airlines have demonstrated a strong track record for supporting the production of AJF through direct investment in facilities and offtake agreements. Because these same facilities also produce renewable diesel, continuing the aviation fuel exemption may result in less airline industry investment and less production of both alternative jet fuel and renewable diesel. Not allowing alternative jet fuel to generate LCFS credits will continue to dis-incentivize the production and use of the fuel in California. Additionally, potential credits generated using AJF would instead need to be generated through increased use of other alternative fuels and petroleum projects.

c) Alternative 5 Environmental Impacts

This alternative would likely result in less GHG emission reduction in the aviation industry, which is largely reliant on efficiency improvements and biofuels to achieve emission reductions, since electrification of aviation is not currently practical. Without the use of AJFs, it could be difficult to achieve long-term GHG emission reduction goals involving deep decarbonization of all sectors. Because AJFs also reduce PM and sulfur oxide (SO_x) emissions (including a slight or no decrease in NO_x) as compared to conventional jet fuel, this alternative would also result in greater criteria pollutant emissions at airports. The additional need for biofuels for AJF would potentially increase the impacts from construction-related and long-term operation of biofuel production facilities and land use changes for feedstock cultivation. While these impacts would potentially materialize due to the needs imposed by biofuel generation for on- and off-road vehicles, they would be magnified to an extent for the creation of AJF. These impacts include potentially significant and unavoidable impacts to aesthetics, air quality, cultural resources, geology and soil, hazards and hazardous materials, hydrology and water quality, noise, and transportation and traffic due to construction-related processes. Long-term operational impacts would also impact aesthetics, air quality, cultural resources, geology and soil, mineral resources, noise, and transportation and traffic. The increase in demand for new facilities and feedstock cultivation would change land uses and impact biological, agricultural, and forestry resources and impact geology and soil, and hydrology and water quality.

6. Alternatives Considered but Rejected

Additional alternatives were considered during scoping of the Proposed Amendments. 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) provide all alternatives proposed through public outreach efforts (available at www.arb.ca.gov).

a) No LCFS Alternative

The no LCFS Alternative was submitted by the Western States Petroleum Association (WSPA) in response to CARB’s solicitation for alternatives. The main differences between staff’s preliminary Proposed Amendments and the no LCFS alternative are listed below:

- The no LCFS alternative proposes allowing the GHG emissions currently attributable to the LCFS program to instead be achieved by the Assembly Bill (AB) 32 Cap and Trade program in the most cost-effective manner to address GHG emissions. WSPA notes that the LCFS program results in no incremental GHG emission reductions. WSPA believes that, because fuel emissions are already covered under the Cap and Trade program, every emission reduction that results from the LCFS program simply displaces an

emission reduction that would otherwise have had to occur in the Cap and Trade program.

- the no LCFS alternative proposes that in order to maintain a strong incentive for innovation in the transportation fuels sector, this alternative would also include an incentive-based program as opposed to the current regulatory-based program.

Under the no LCFS alternative, the LCFS would no longer exist and would be replaced by an incentive-based program to incentivize alternative fuels. GHG reductions from fuel emissions would rely on the Cap and Trade program. WSPA recommended that CARB could start by assessing the current incentives in place for each of the fuels or activities covered by the LCFS program. Then, pursuant to discussions with alternative fuel suppliers and other stakeholders, CARB could determine what combined level of incentive is appropriate for each fuel. These incentives would be targeted, transitional, and designed for each fuel or activity. At some pre-determined time, each of these fuels must be able to stand on their own without incentives.

The no LCFS alternative is not responsive to the direction in the 2017 Climate Change Scoping Plan, as the LCFS is one of the primary measures for achieving the state's GHG 2030 target called out in that plan.

WSPA's proposal did not provide clarity about how the incentive portion of their proposal would be funded or which fuels should be targeted by the new incentive program. Therefore WSPA's proposal contains no guarantees that the following project objectives would be achieved:

- Reduce the CI of transportation fuels in the California market by at least 20 percent of its 2010 level by 2030;
- Provide greater diversification of the State's fuel portfolio;
- Provide reduced dependence on petroleum;
- Decrease the associated economic impacts of gasoline and diesel price spikes caused by volatile oil price changes;
- Provide greater innovation and development of cleaner fuels

Further, by creating policy uncertainty (essentially through abandoning a successful program and restarting the State's support for low carbon fuels from scratch), WSPA's proposal would also limit progress in developing low carbon fuels, which will be needed in increasing quantities to meet the state's 2030 and 2050 climate goals. As a result, this alternative is considered to fail in meeting most of the basic project objectives and is unable to avoid significant environmental impacts. Therefore, it is not considered further.

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ATTACHMENT 1: ENVIRONMENTAL AND REGULATORY SETTING

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1. AESTHETICS

A. Existing Conditions

1. U.S.

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 (CARB 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 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..." |

| Table 1: Applicable Laws and Regulations for Aesthetic Resources | |
|--|---|
| Applicable Regulations | Description |
| | 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. U.S.

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 U.S.

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 (CENGICANÑA 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 |

| Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources | |
|--|--|
| Applicable Regulations | Description |
| | 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 Williamson Act (Government Code Section 51200) | The California Department of Conservation’s (DOC’s) Division of Land Resource Protection administers the Williamson Act program, which permits property tax adjustments for 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 |

| Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources | |
|---|---|
| Applicable Regulations | Description |
| | 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. |
| 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. <ul style="list-style-type: none"> • 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, |

| Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources | |
|--|---|
| Applicable Regulations | Description |
| | 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 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. CARB 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, U.S. EPA alone establishes emission standards for certain mobile sources such as ships, trains, and airplanes.

U.S.

At the federal level, U.S. Environmental Protection Agency (EPA) has oversight of State programs. In addition, U.S. EPA established emission standards for mobile sources

such as ships, trains, and airplanes. The U.S. EPA has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, which are called criteria air pollutants. Periodically, the standards are reviewed and may be revised. The current standards are listed below in Table A1-1. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$).

California

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. CARB 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. EPA has oversight of State programs. In addition, U.S. EPA alone has jurisdiction to establish 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.

| Pollutant | Sources | Acute¹ Health Effects | Chronic² Health Effects |
|------------------------------------|--|---|---|
| Ozone | Secondary pollutant resulting 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 | Increased respiration and pulmonary resistance; cough, pain, shortness of breath, lung inflammation | Permeability of 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, | Chronic bronchitis, decreased lung function |

| Table 3: Sources and Health Effects of Criteria Air Pollutants | | | |
|--|---|--|--|
| Pollutant | Sources | Acute¹ Health Effects | Chronic² Health Effects |
| | | cough, cyanosis, chest pain, rapid heartbeat, death | |
| 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 relatively high concentrations.

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

Sources: U.S. 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

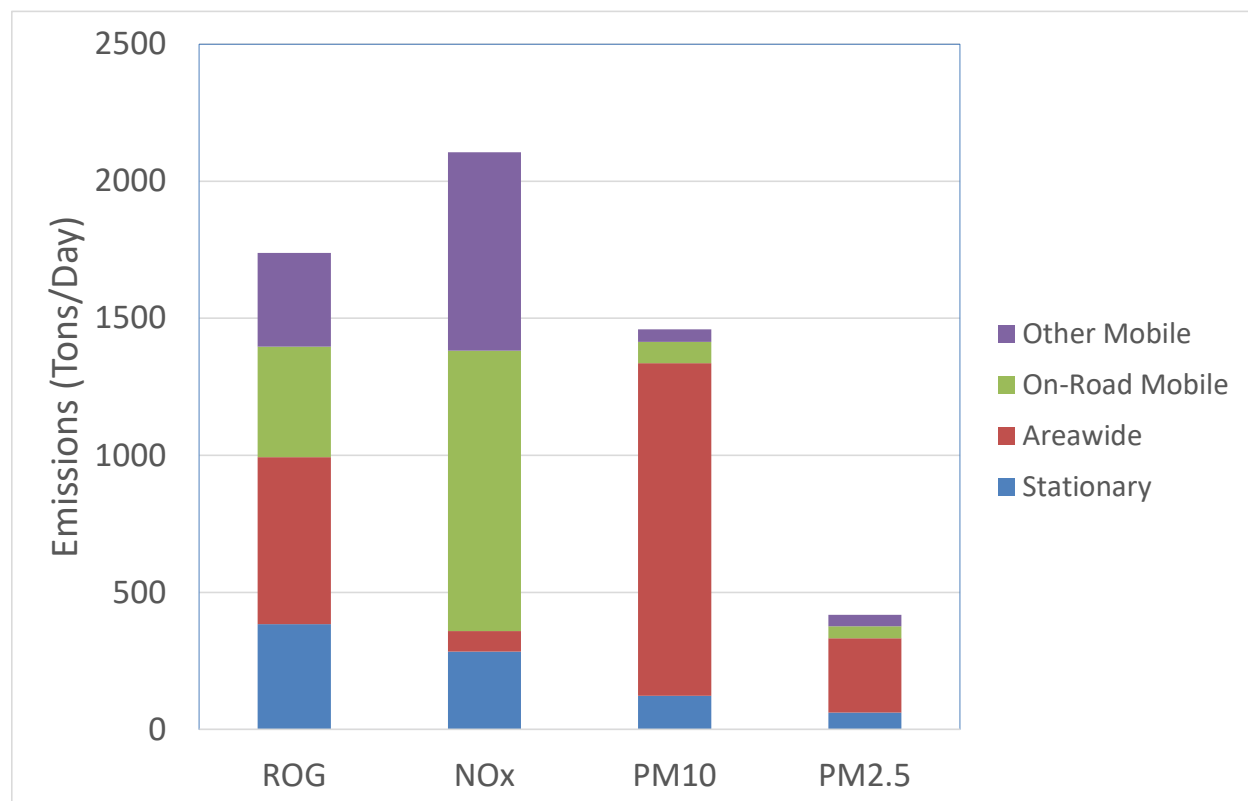
NO₂ is a brownish, highly-reactive gas that is present in all urban environments. The major human-made sources of NO₂ are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO₂. The combined emissions of NO and NO₂ are referred to as NO_x and are reported as equivalent NO₂. Because NO₂ is formed and depleted by reactions associated with photochemical smog (ozone), the NO₂ concentration in a 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 PM₁₀. PM₁₀ 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. PM₁₀ 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 PM₁₀ 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 PM₁₀ (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 PM₁₀ and PM_{2.5} emissions, respectively (ARB 2013).



Source: CARB 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, CARB has made preliminary concentration estimates based on a PM exposure method. This method uses the CARB emissions inventory's PM₁₀ database, ambient PM₁₀ 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).

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 U.S. 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” 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. U.S. 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 U.S. EPA to promulgate national emissions standards for Hazardous Air Pollutants. The CAA also required the U.S. 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 U.S. 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. |

| Table 4: Applicable Laws and Regulations for Air Quality | |
|---|--|
| Regulation | Description |
| 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 CARB to establish California ambient air quality standards (CAAQS). |
| Assembly Bills 398 and 617 (Statutes of 2017) | Governor Brown signed AB 398 (Garcia, Chapter 135, Statutes of 2016) on July 25, 2017, and AB 617 (Garcia, Chapter 136, Statutes of 2017) on July 26, 2017. AB 398 allows CARB's regulations establishing a system of market-based declining annual aggregate emissions limits for sources or categories of sources that emit greenhouse gases, applicable from January 1, 2012, to December 31, 2030, inclusive. It also required CARB to update its Scoping Plan as specified. AB 617 requires CARB and air districts to take various measures to analyze and address criteria air pollutants and toxic air contaminants in communities affected by a high exposure burden. |
| 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 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. U.S.

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 U.S.

Brazil is one of the most biodiverse countries in the world, accounting for 20 percent of the world's 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 Rangelwide 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 maintain these standards. |

| Table 5: Applicable Laws and Regulations for Biological Resources | |
|--|---|
| Applicable Law | Description |
| 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 Native Plant Society (CNPS) and some animals on the CDFW's Special Animals List. |

| Table 5: Applicable Laws and Regulations for Biological Resources | |
|---|---|
| Applicable Law | Description |
| 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. U.S.

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 (Shibley 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 |
| | | 23 | Miocene |
| | | 34 | Oligocene |
| | | 56 | Eocene |
| | | 65 | Paleocene |
| Mesozoic | Cretaceous | 145 | |
| | Jurassic | 200 | |
| | Triassic | 251 | |
| Paleozoic | Permian | 299 | |

| Table 6: Divisions of Geologic Time | | | |
|--|---------------|--|--------------|
| Era | Period | Time in Millions of Years Ago (approximately) | Epoch |
| | 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, pleiosaurs, 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 | |
| Natural Historic Preservation Act (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 |

| Table 7: Applicable Laws and Regulations for Cultural Resources | |
|--|--|
| Applicable Regulation | Description |
| | National Register of Historic Places (NRHP), and it establishes an Advisory Council on Historic Preservation (ACHP) as an independent federal entity. Section 106 of the Act requires federal agencies to take into account the effects of their undertakings on historic properties and afford the ACHP a reasonable opportunity to comment on the undertaking prior to licensing or approving the expenditure of funds on any undertaking that may affect properties listed, or eligible for listing, in the NRHP. |
| 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-470ll) | 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 |

| Table 7: Applicable Laws and Regulations for Cultural Resources | |
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| Applicable Regulation | Description |
| | and construction. The responsible federal agency must submit any proposed undertaking that may affect NRHP-eligible properties to the SHPO for review and comment prior to project approval. |
| National Park Service Regulations, National Register of Historic Places (NRHP) (36 CFR 60) | Sets forth procedures for nominating properties to the NRHP, and present the criteria to be applied in evaluating the eligibility of historic and prehistoric resources for listing in the NRHP. |
| Archaeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (FR 190:44716–44742) | Non-regulatory technical advice about the identification, evaluation, documentation, study, and other treatment of cultural resources. Notable in these Guidelines are the “Standards for Archaeological Documentation” (p. 44734) and “Professional Qualifications Standards for Archaeology” (pp. 44740–44741). |
| 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 | |

| Table 7: Applicable Laws and Regulations for Cultural Resources | |
|--|---|
| Applicable Regulation | Description |
| 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 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. |

| Table 7: Applicable Laws and Regulations for Cultural Resources | |
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| Applicable Regulation | Description |
| Assembly Bill 52 (Statutes of 2014) | Assembly Bill (AB) 52 (Gatto, Chapter 532, Statutes of 2014) recognizes that tribal sovereignty and the unique relationship of California local governments and public agencies with California Native American tribal governments, while respecting the interests and roles of project proponents. This requires specific consultation processes for project review and approval. |
| 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 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. U.S.

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 37 percent 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 of 1975 | <p>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.</p> <p>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, U.S. 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 U.S. EPA released fuel economy standards for medium- and heavy-duty vehicles (over 8,500 pounds gross vehicle weight) for 2014 through 2018</p> |

| Table 8: Applicable Laws and Regulations for Energy Resources | |
|--|--|
| Regulation | Description |
| | <p>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.</p> <p>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 manufacturers' compliance with the fuel economy standards. The U.S. 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.</p> |
| Energy Policy Act (EPAAct) of 1992 | <p>EPAAct was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAAct 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 EPAAct. 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.</p> |
| Energy Policy Act of 2005 | <p>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.</p> |
| State | |
| Warren-Alquist State Energy Resources Conservation and Development Act of 1974 | <p>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).</p> |

| Table 8: Applicable Laws and Regulations for Energy Resources | |
|--|--|
| Regulation | Description |
| 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 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 |

| Table 8: Applicable Laws and Regulations for Energy Resources | |
|---|---|
| Regulation | Description |
| | 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 Settlement | 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 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 CARB 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, <i>Reducing California's Petroleum Dependence</i> , was adopted by the CEC and CARB 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 (Statutes of 2007) created the CEC's Alternative and Renewable Fuel and Vehicle Technology Program. The statute, subsequently amended by Assembly Bill 109 (Statutes 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 |

| Table 8: Applicable Laws and Regulations for Energy Resources | |
|---|---|
| Regulation | Description |
| | 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 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. |
| The Sustainable Communities and Climate Protection Act of 2008 (SB 375) | SB 375 augments the existing federal requirement for metropolitan planning organizations (MPOs) to prepare regional transportation plans (RTPs) by requiring RTPs to include sustainable community strategies (SCSs). SCSs contain land use, transportation, and housing strategies to reduce vehicle miles traveled (VMT)-related GHG emissions from the automobile and light-duty truck sector. In 2010, CARB released the first round of GHG reduction targets for each of California’s 18 MPOs. Strategies to reduce GHGs include incentive programs for the use of zero emission vehicles (ZEVs) and plug-in hybrid electric vehicles (PHEVs) and the construction of ZEV and PHEV infrastructure. |

| Table 8: Applicable Laws and Regulations for Energy Resources | |
|--|---|
| Regulation | Description |
| 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. U.S.

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 subaerial and submarine landslides that displace large volumes of water. Subaerial 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 U.S. 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. |
| 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 | 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 |

| Table 9: Applicable Laws and Regulations for Geology and Soils | |
|---|--|
| Regulation | Description |
| Hazards Reduction Program Act | Program Act by refining the description of agency responsibilities, program goals and objectives. |
| 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 | |
| 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 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 |

| Table 9: Applicable Laws and Regulations for Geology and Soils | |
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| Regulation | Description |
| | 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 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. |
| Surface Mining and Reclamation Act (SMARA) | The intent of SMARA of 1975 is to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using MRZs to designate lands that contain mineral deposits are designed to protect mineral deposits from encroaching urbanization and |

| Table 9: Applicable Laws and Regulations for Geology and Soils | |
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| Regulation | Description |
| | 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. |
| 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. U.S. 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 (CO₂), methane, nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆). They are regulated under the Kyoto Protocol. Nitrogen trifluoride (NF₃) 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 “CO₂-equivalent” (CO₂e) 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 CO₂. For example, N₂O’s GWP is 310, meaning a unit mass of N₂O warms the atmosphere 310 times more than a unit mass of CO₂. SF₆ 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, CO₂ 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 CO₂ 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 CO₂ 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 CO₂ 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. N₂O is also largely attributable to agricultural practices (nitrogen-based fertilizers) and soil management. CO₂ sinks, or reservoirs, include vegetation, soils, and the ocean, which absorb CO₂ through sequestration and dissolution, respectively, two of the most common processes of CO₂ sequestration.

CO₂ equivalent (CO₂e) 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 CO₂ (IPCC 2013). Therefore, methane is a much more potent GHG than CO₂. Expressing emissions in CO₂e 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 CO₂ were being emitted.

The California GHG inventory compiles statewide anthropogenic GHG emissions and sinks. It includes estimates for CO₂, methane, N₂O, SF₆, NF₃, 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 CO₂e (MMTCO₂e) in 2001 to 448.1 MMTCO₂e in 2011, with a maximum of 489.2 MMTCO₂e 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 CO₂e 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-CO₂ pollutants, known as "short-lived climate pollutants" (SLCP), include tropospheric ozone, methane, HFC, black carbon, and N₂O.

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 CO₂. 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. CARB 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 CO₂. 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 CARB 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 CARB’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 | |
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| Regulation | Description |
| Federal | |
| Mandatory Greenhouse Gas Reporting Rule | On September 22, 2009, U.S. EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the U.S. In general, this national reporting requirement will provide U.S. EPA with accurate and timely GHG emissions data from facilities that emit 25,000 metric tons or more of CO ₂ per year. This publicly 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 | <p>On September 15, 2009, U.S. 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 U.S. 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 U.S. 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.</p> <p>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).</p> |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|---|
| Regulation | Description |
| | <p>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 CARB is proposed to accept compliance thereof as also being acceptable for California compliance, similar to what was done for the first part.</p> |
| Endangerment and Cause or Contribute Findings | <p>On December 7, 2009, U.S. 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 [CO₂], methane, nitrous oxide [N₂O], hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF₆]) 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.</p> <p>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.</p> <p>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</p> |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|--|
| Regulation | Description |
| | reduction requirements but rather allow U.S. 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. |
| Significant New Alternatives Policy (SNAP) | U.S. EPA’s Significant New Alternatives Policy (SNAP) program provide an evolving list of alternatives (i.e., chemicals that may replace one that is currently in use for a specific purpose). U.S. EPA makes decisions informed by the overall understanding of the environmental and human health impacts as well as the current knowledge regarding available substitutes. Where U.S. EPA is determining whether to add a new substitute to the list, U.S. EPA compares the risk posed by the new substitute to the risks posed by other alternatives on the list and determines whether that specific new substitutes poses more risk than already-listed alternatives for the same use. Section 612 of the Clean Air Act provides that U.S. EPA must prohibit the use of a substitute where it has determined that there are other available substitutes that pose less overall risk to human health and the environment. |
| State | |
| Senate Bill 32 and Assembly Bill 197 (Statutes of 2016) | Governor Brown signed SB 32 (Pavley, Chapter 249, Statutes of 2016) and AB 197 (Garcia, Chapter 250, Statutes of 2016) on September 8, 2016. SB 32 establishes a statewide target of reducing statewide GHG emissions to 40 percent below 1990 levels by 2030. This is the same target as Executive Order B-30-15 (2015). SB 32 authorizes CARB to adopt regulations to achieve the maximum technologically-feasible and cost-effective GHG reductions. AB 197 creates a legislative committee to oversee CARB and requires CARB to take specific actions when adopting plans and regulations pursuant to SB 32 related to disadvantaged communities, identification of specific information regarding reduction measures, and information regarding existing greenhouse gases at the local level. |
| Assembly Bills 398 and 617 (Statutes of 2017) | Governor Brown signed AB 398 (Garcia, Chapter 135, Statutes of 2016) on July 25, 2017, and AB 617 (Garcia, Chapter 136, Statutes of 2017) on July 26, 2017. AB 398 allows CARB’s regulations establishing a system of market-based declining annual aggregate emissions limits for sources or categories of sources that emit greenhouse gases, applicable from January 1, |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|---|
| Regulation | Description |
| | 2012, to December 31, 2030, inclusive. It also required CARB to update its Scoping Plan as specified. AB 617 requires CARB and air districts to take various measures to analyze and address criteria air pollutants and toxic air contaminants in communities affected by a high exposure burden. |
| Executive Order B-30-15 | Executive Order B-30-15 (2015) established a California GHG reduction target of 40 percent below 1990 levels by 2030. To accomplish this goal, directs state agencies to take measures consistent with their existing authority to reduce greenhouse gas emissions. |
| Executive Order S-3-05 | <p>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.</p> <p>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.</p> |
| Senate Bill 350, Clean Energy and Pollution Reduction | The Clean Energy and Pollution Reduction Act of 2015 (De León, Chapter 547, Statutes of 2015) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50percent by |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|--|
| Regulation | Description |
| Act of 2015 (Statutes of 2015) | December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers, through energy efficiency and conservation, by December 31, 2030. |
| Senate Bill 605, Short-Lived Climate Pollutants (Statutes of 2014) | SB 605 (Lara, Chapter 605, Statutes of 2014) directs CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants in the state through the following actions: (1) Complete an inventory of sources and emissions of short-lived climate pollutants in the state based on available data. (2) Identify research needs to address any data gaps. (3) Identify existing and potential new control measures to reduce emissions. (4) Prioritize the development of new measures for short-lived climate pollutants that offer co-benefits by improving water quality or reducing other air pollutants that impact community health and benefit disadvantaged communities, as identified pursuant to Section 39711 of the Health and Safety Code. (5) Coordinate with other state agencies and districts to develop measures identified as part of the comprehensive strategy. |
| 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 CARB to develop and implement regulations to reduce statewide GHG emissions from substantial stationary and mobile source categories. Requires CARB 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 CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at 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 |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|--|
| Regulation | Description |
| | 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, CARB 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 CARB to determine if this LCFS could be adopted as a discrete early action measure after meeting the mandates in AB 32. CARB 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, Statutes of 2006, and SBx1 2 | 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 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. |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|--|
| Regulation | Description |
| 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 | <p>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. CARB 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.</p> <p>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."</p> |
| 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 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 |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|--|
| Regulation | Description |
| | <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • 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. |
| CARB’s Landfill Methane Control Measure | The regulation requires owners and operators of certain uncontrolled municipal solid waste landfills to install gas collection and control systems, and requires existing and newly installed gas and control systems to operate in an optimal manner. The regulation allows local air districts to voluntarily enter into agreements with CARB to implement and enforce the regulation and to assess fees to cover costs. Some local air districts have |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|---|
| Regulation | Description |
| | also adopted rules to implement federal standards for the installation of gas collection and control systems. |
| Assembly Bill 341 (Statutes of 2011) | AB 341 (Chesbro, Chapter 476, Statutes of 2011) established a State target to reduce by 75 percent the amount of solid waste sent to landfills by 2020 through recycling, composting, and source reduction practices. |
| Assembly Bill 1826 (Statutes of 2014) | AB 1826 (Chesbro, Chapter 727, Statutes of 2014) requires businesses generating specified amounts of organic wastes to begin arranging for the recycling and diversion of those wastes from landfill disposal beginning in 2016. |
| Refrigerant Management Plan | The Refrigerant Management Plan requires facilities with refrigeration systems with more than 50 pounds of high-GWP refrigerant to: conduct and report periodic leak inspections; promptly repair leaks; and keep service records on site. |
| Compliance Offset Protocols under the State's Cap-and-Trade Program | Compliance Offset Protocols under the State's Cap-and-Trade Program include a livestock protocol, rice cultivation protocol, and mine methane capture protocol. The protocols provide methods to quantify, report, and credit GHG emission reductions from sectors not covered by the Cap-and-Trade Program. |
| Assembly Bill 1257 (Statutes of 2013) | AB 1257 (Bocanegra, Chapter 749, Statutes of 2013) directs the CEC to assemble a report by November 2015 (and every four years after), in consultation with other State agencies, to identify strategies for maximizing the benefits obtained from natural gas as an energy source. |
| Assembly Bill 1900 (Statutes of 2012) | AB 1900 (Gatto, Chapter 602, Statutes of 2012) directed the CPUC to adopt natural gas constituent standards (in consultation with CARB and the Office of Environmental Health and Hazard Assessment). The legislation is also designed to streamline and standardize customer pipeline access rules, and encourage the development of statewide policies and programs to promote all sources of biomethane production and distribution. |
| Senate Bill 1122 (Statutes of 2012) | SB 1122 (Rubio, Chapter 612, Statutes 2012) directed the CPUC to require the State's investor-owned utilities to develop and offer 10 to 20-year market-price contracts to procure an additional 250 |

| Table 10: Applicable Laws and Regulations for Greenhouse Gases | |
|---|---|
| Regulation | Description |
| | megawatts of cumulative electricity generation from biogas facilities that commence operating on or after June of 2013. |

9. HAZARDS AND HAZARDOUS MATERIALS

A. Existing Conditions

1. U.S.

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 (Asbestos.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 U.S. 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, U.S. EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation’s public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. SDWA does not regulate private wells which serve fewer than 25 individuals. |

| Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials | |
|---|--|
| Regulations | Description |
| 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 Control Act (TSCA) 15 U.S.C. Section 2601 et seq. | TSCA provides U.S. EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. TSCA addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls (PCBs), asbestos, radon and lead-based paint. |
| Resource Conservation and Recovery Act (RCRA) 42 U.S.C. Section 6901 et seq. (40 CFR) | RCRA of 1976 gives U.S. 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 U.S. 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 U.S. EPA are found in Title 40, Code of Federal Regulations (40 CFR). |

| Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials | |
|--|--|
| Regulations | Description |
| 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 (EPCRA) (42 USC Section 9601 et seq.) | 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 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. |

| Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials | |
|---|---|
| Regulations | Description |
| 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 a 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 |

| Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials | |
|--|--|
| Regulations | Description |
| | 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 Code Sections 25500 – 25520 19 CCR, Division 2, Chapter 4, Article 3 & 4 | 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, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidentally released into the environment, is 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 |

| Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials | |
|--|---|
| Regulations | Description |
| | <p>six hazardous waste and materials program elements covered by the CUPA include:</p> <ol style="list-style-type: none"> 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 <p>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.</p> |
| 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 U.S. EPA and the volumes reported on a quarterly basis. |
| 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. U.S.

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 U.S. 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. |
| 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. |

| Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply | |
|---|---|
| Regulation | Description |
| 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 U.S. EPA for priority toxic pollutants consisting generally of trace metals, synthetic organic compounds, and pesticides. |
| 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 1°F over more than 25 percent of a stream cross section, increasing ambient temperatures by more than 4°F in any location, and prohibits discharge of waste that exceeds more than 20°F 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. |
| 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. |
| 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 |

| Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply | |
|---|--|
| Regulation | Description |
| | 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 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 on-site sewage disposal systems (e.g., septic systems and leach fields, cesspools). |

11. LAND USE AND PLANNING

A. Existing Conditions

1. U.S.

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 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 |

| Table 13: Applicable Laws and Regulations for Land Use and Planning | |
|--|---|
| Regulation | Description |
| | 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. |
| 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 |

| Table 13: Applicable Laws and Regulations for Land Use and Planning | |
|--|---|
| Regulation | Description |
| | 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.). |
| SB 375 | SB 375 augments the existing federal requirement for MPOs to develop RTPs for their respective regions. Under SB 375, MPOs must prepare an SCS to supplement their RTPs. RTP/SCSs contain land use strategies to reduce VMT-related emissions of GHGs. Following the adoption of an RTP/SCSs, land use strategies must be implemented at the local level by land use agencies. |
| 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. |
| CEQA Guidelines 15332 | CEQA guidelines 15332 provides for certain types of infill projects that may be determined to be categorically exempt from CEQA review by local lead agencies. Infill projects that may be exempt from environmental review under this class of categorical exemption must: be consistent with the applicable general plan and zoning designations; be within city limits and on a parcel no greater than five acres; not contain valuable habitat for any federal or state listed species; not contribute to any significant effects to traffic, noise, or air and water quality; and be adequately served by existing utilities and public services. |

12. MINERAL RESOURCES

A. Existing Conditions

1. U.S.

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 |

| Table 14: Applicable Laws and Regulations for Mineral Resources | |
|--|--|
| Regulation | Description |
| | Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using 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. |
| Public Resources Code Sections 2762-3 | Public Resources Code Section 2762 states that the general plan must establish mineral resource management policies if the State Geologist has identified resources of statewide or regional significance within the city or county. Public Resources Code Section 2763 requires that city and county land use decisions affecting areas with minerals of regional or statewide significance be consistent with mineral resource management policies in the general plan, including protection of known mineral resources. |
| 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 |

| Table 14: Applicable Laws and Regulations for Mineral Resources | |
|--|---|
| Regulation | Description |
| | 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 measured in A-weighted decibels (dBA) 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 |

| Table 15: Typical Noise Levels | | |
|--|-------------------------|---------------------------------|
| Common Outdoor Activities | Noise Level (dB) | Common Indoor Activities |
| 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 many 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 accustomed 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 1 micro (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) U.S. EPA (40 CFR 201-211) | This act established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. U.S. EPA was given the responsibility for providing information to the public regarding identifiable effects of noise on public health or welfare, publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety, coordinating federal research and activities related to noise control, and establishing federal noise emission standards for selected products distributed in interstate commerce. This act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations. |
| Quiet Communities Act (1978) | This act promotes the development of effective state and local noise control programs, to provide funds for noise research, and to produce and disseminate educational materials to the public on the harmful effects of noise and ways to effectively control it. |
| 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) | 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. |

| Table 17: Applicable Laws and Regulations for Noise | |
|---|--|
| Regulation | Description |
| Compatible Use Zones [AICUZ Program) | |
| 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, Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration [OSHA]) | This regulation established a standard for noise exposure in the workplace. |
| 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 |

| Table 17: Applicable Laws and Regulations for Noise | |
|--|---|
| Regulation | Description |
| | 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 accordance with the State Aeronautics Act | In Section 5006, the regulations state that: “The level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dBA for purposes of these regulations. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep, and community reaction. |
| 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 L _{dn} levels to 45 dBA in any habitable room. |
| Local | |
| City/County General Plan Noise Elements | <p>Local general plans in California must include a noise element per CA Government Code Section 65302(f).</p> <p>The General Plan Guidelines maintained and published by OPR provide detailed guidance to local agencies on standards and methods of analysis that should be used when developing or updating a noise element.</p> <p>Local governments must “analyze and quantify” noise levels and the extent of noise exposure through actual measurement or the use of noise modeling. Technical data relating to mobile and point sources must be collected and synthesized into a set of noise control policies and programs that “minimizes the exposure of community residents to excessive noise.” Noise level contours must be mapped and the conclusions of the element used as a basis for land use decisions. The noise element must include implementation measures and possible solutions to existing and foreseeable noise problems. Furthermore, the policies and standards must be sufficient to serve as a guideline for compliance with sound transmission control requirements. The noise element directly correlates to the land use, circulation, and housing elements.</p> |

| Table 17: Applicable Laws and Regulations for Noise | |
|--|---|
| Regulation | Description |
| | A noise element is to be used as “a guide for establishing a pattern of land uses in the land use element that minimizes the exposure of community residents to excessive noise.” (OPR 2003) |
| City/County Noise Regulations | Most local governments in California maintain and enforce noise regulations contained in local codes and ordinances that apply to diverse types of activities in the community. These regulations may include noise standards that apply to construction activities associated with new development projects, as well as ongoing operational activities associated with existing or future land uses. |

14. EMPLOYMENT, POPULATION, AND HOUSING

A. Existing Conditions

1. U.S.

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 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. U.S.

EPA is charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. The U.S. 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: CARB (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. U.S.

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 trails, 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 are involved 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 AND TRAFFIC

A. Existing Conditions

1. U.S. 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 (National Academy of Sciences 2014). 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 U.S.

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 | |
| SB 375 | SB 375 supplements the requirements under the Federal-Aid Highway Act. In addition to |

| Table 21: Applicable Laws and Regulations for Transportation and Traffic | |
|---|---|
| Regulation | Description |
| | preparing RTPs, under SB 375, MPOs must develop SCSs that address VMT-related GHG emissions and include strategies to reduce emissions. Through the RTP/SCSs, MPOs allocate federal and State transportation funding to local and regional projects that would reduce VMT-related emissions. |
| 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. |
| CEQA [Public Resources Code CEQA Sections 21099(b)(2) and (c)(1)] | CEQA Section 21099(b)(2) states that automobile delay, as described solely by level of service or similar measures of traffic congestion are not a significant environmental impact except in certain specified locations. Section 21099(c)(1) permits OPR to establish alternative metrics for assessing traffic impacts outside transit priority areas. |
| Local | |
| City/County Codes | Many local governments in California maintain and enforce local codes that apply standards to transportation facilities and services. |

18. UTILITIES AND SERVICE SYSTEMS

A. Existing Conditions

1. U.S.

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 on-site 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. |
| 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 |

| Table 22: Applicable Laws and Regulations for Utilities | |
|---|---|
| Regulation | Description |
| | contracting and pricing provisions between CHP operators and the Investor Owned Utilities in November 2012. |
| Assembly Bill 1900 (Statutes of 2012) | AB 1900 (Gatto, Chapter 602, Statutes of 2012) directed the CPUC to adopt natural gas constituent standards (in consultation with CARB and the Office of Environmental Health and Hazard Assessment). The legislation is also designed to streamline and standardize customer pipeline access rules, and encourage the development of statewide policies and programs to promote all sources of biomethane production and distribution. |
| 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. |
| Local | |
| City/County General Plan | Local general plans in California must include a circulation element per CA Government Code Section 65302(b), which includes identification of the locations and extent of existing and proposed public utilities and facilities. The circulation element of a general plan should assess the adequacy and availability of community water, sewer, and drainage facilities and the need for expansion and improvements; trends in peak and average daily flows; the number and location of existing and proposed power plants, oil and gas pipelines, and major electric transmission lines and corridors; existing and projected capacity of treatment plants and trunk lines; and potential future development of power plants (OPR 2003). |
| City/County Codes and Ordinances | Most cities and counties have adopted municipal codes and ordinances that pertain to utilities and service systems. Local codes and ordinances include, but not limited to, limitations on the locations of wells, sewers, and other water-related facilities; and development standards for future utility land use projects. |

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ATTACHMENT 2: SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|--|---|---|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| Aesthetics | | |
| <p><i>Impact B.1.a: Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.1.a</i></p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of aesthetic resources. CARB 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:</u></p> <ul style="list-style-type: none"> • 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. | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|--|---|--|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> • 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. | |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> 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. | |
| <p>Impact C.1.a: Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.1.a: Implement Mitigation Measure B.1.a</p> <p>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 scenic and nighttime lighting impacts.</p> | <p>Potentially Significant and Unavoidable</p> |
| Agriculture Resources | | |
| <p>Impact B.2.a: Conversion of Agricultural and Forest Resources Related to New Facilities</p> <p>Potentially Significant</p> | <p>Mitigation Measure B.2.a</p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of agricultural and forest resources. CARB 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</u></p> | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|--|--|--|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>required to avoid and/or minimize impacts to agriculture and forest resources include:</u></p> <ul style="list-style-type: none"> • 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 CARB 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: <ul style="list-style-type: none"> ○ 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. | |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ▪ Permanent preservation of off-site 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. | |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|---|---|--|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| <i>Impact C.2.a: Conversion of Agricultural and Forest Resources Related to New Facilities</i> Potentially Significant | <i>Mitigation Measure C.2.a: Implement Mitigation Measure B.2.a</i> 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 related to the conversion of agriculture and forest resources. | Potentially Significant and Unavoidable |
| <i>Impact B.2.b: Agricultural and Forest Resource Impacts Related to Feedstock Cultivation</i> Potentially Significant | <i>Mitigation Measure B.2.b: Implement Mitigation Measure B.2.a</i> 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. | Potentially Significant and Unavoidable |
| <i>Impact 2.C.b: Agricultural and Forest Resource Impacts Related to Feedstock Cultivation</i> Potentially Significant | <i>Mitigation Measure C.2.b: Implement Mitigation Measure B.2.a</i> 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. | Potentially Significant and Unavoidable |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|---|---|---|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| Air Quality | | |
| <p>Impact B.3.a: Short-Term Construction-Related Air Quality Impacts</p> <p>Potentially Significant</p> | <p>Mitigation Measure B.3.a</p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of air quality. CARB 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:</u></p> <ul style="list-style-type: none"> • 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 | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|---|--|---|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>environmental document to reduce or substantially lessen the construction-related air quality impacts of the project.</p> <ul style="list-style-type: none"> • 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. | |
| <p>Impact C.3.a: Short-Term Construction-Related Air Quality Impacts</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.3.a: Implement Mitigation Measure B.3.a</p> <p>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</p> | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|--|---|--|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | threshold levels of significance depending on the magnitude of construction activities. | |
| Impact B.3.b: Long-Term Operational Air Quality Emissions Potentially Significant | <p>Mitigation Measure B.3.b <u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of air quality. CARB does not have the authority to require implementation of mitigation related to operation of 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:</u></p> <ul style="list-style-type: none"> • Proponents of new or modified facilities constructed and operated 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 | Potentially Significant and Unavoidable |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|---|--|---|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>complied with CEQA and other applicable regulations, prior to project approval.</p> <ul style="list-style-type: none"> • 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 operational-related air quality impacts of the project. • Project proponents would apply for, secure, and comply with all appropriate air quality permits for project operation from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to commencement of project operation. • 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., 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 operation of the project. | |
| <p>Impact C.3.b: Long-Term Operational Air Quality Emissions</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.3.b: Implement Mitigation Measure B.3.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</p> | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
|---|---|--|
| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. With mitigation, operational emissions could still exceed local air district threshold levels of significance, though this is not likely. | |
| <i>Impact B.3.c: Short-Term Construction-Related and Long-Term Operational Impacts from Odors</i> Less Than Significant | No Mitigation Required | Not Applicable |
| <i>Impact C.3.c: Short-Term Construction-Related and Long-Term Operational Impacts from Odors</i> Less Than Significant | No Mitigation Required | Not Applicable |
| Biological Resources | | |
| <i>Impact B.4.a: Short-Term Construction-Related and Long-Term Impacts on Biological Resources Related to New Facilities</i> Potentially Significant | <i>Mitigation Measure B.4.a</i> <u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of biological resources. CARB 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</u> | Potentially Significant and Unavoidable |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>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:</u></p> <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> ○ 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 | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.</p> <ul style="list-style-type: none"> ○ 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 | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>protect against the inadvertent release of potentially toxic materials.</p> <ul style="list-style-type: none"> ○ Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with "no net loss" requirements. | |
| <p><i>Impact C.4.a: Short-Term Construction-Related and Long-Term Impacts on Biological Resources Related to New Facilities and Infrastructure</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.4.a: Implement mitigation Measure B.4.a</i></p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |
| <p><i>Impact B.4.b: Effects on Biological Resources Associated with Land Use Changes</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.4.b: Implement Mitigation Measure 4.a</i></p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |
| <p><i>Impact C.4.b: Effects of Biological Resources Associated with Land Use Changes</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.4.b: Implement Mitigation Measure B.4.a</i></p> <p>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</p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts. | |
| Cultural Resources | | |
| <p><i>Impact B.5.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Cultural Resources</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.5.a</i></p> <p><u>The Regulatory Setting in Attachment 1 includes, but is not limited to, applicable laws and regulations that provide protection of cultural resources. CARB 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:</u></p> <ul style="list-style-type: none"> • 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 | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>prepared in compliance with applicable regulations and would approve the project for development.</p> <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> ○ 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 | |

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| | <p>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.</p> <ul style="list-style-type: none"> ○ 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 | |

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| | <p>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:</p> <ul style="list-style-type: none"> ▪ 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. | |
| <p>Impact C.5.a: Short-Term Construction-Related Impacts on Cultural Resources</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.5.a: Implement Mitigation Measure B.5.a 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.</p> | <p>Potentially Significant and Unavoidable</p> |

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| <i>Impact C.5.b: Long-term Operational Impacts on Cultural Resources</i> <u>Less Than Significant</u> <u>No Impact</u> | No Mitigation Required | Not Applicable |
| Energy Demand | | |
| <i>Impact B.6.a: Short-Term Construction-Related Impacts on Energy Demand</i> Less Than Significant | No Mitigation Required | Not Applicable |
| <i>Impact C.6.a: Short-Term Construction-Related Impacts on Energy Demand</i> Less Than Significant | No Mitigation Required | Not Applicable |
| <i>Impact B.6.b: Long-Term Operational Impacts on Energy Demand</i> Beneficial | No Mitigation Required | Not Applicable |
| <i>Impact C.6.b: Long-Term Operational Impacts on Energy Demand</i> Potentially Significant | <i>Mitigation Measure C.6.b</i> <u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to energy resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities and infrastructure that would be approved</u> | Potentially Significant and Unavoidable |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>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 energy resources include:</u></p> <ul style="list-style-type: none"> • Proponents of new or modified facilities and infrastructure 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 energy resources. The definition of actions required to mitigate potentially significant energy impacts may include the following; however, any mitigation specifically required for a new or modified facility and infrastructure would be determined by the local lead agency. | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> ○ For existing facilities, retain a qualified energy efficiency expert to evaluate energy use (electricity, natural gas, and other fuels) of the existing facility and processes and any proposed modifications. This survey shall be used to design facility modifications and changes to existing facilities and processes to minimize energy usage. ○ For new facilities and infrastructure, design facilities and processes to minimize energy use. ○ Incorporate renewable energy generation facilities, such as a solar installation and/or a wind farm, to reduce energy consumption from fossil fuels. | |
| Geology, Soils and Minerals | | |
| <p><i>Impact B.7.a: Short-Term Construction-Related and Long-Term Operational Effects on Geology and Soil Related to New Facilities</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.7.a</i></p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of geology and soils. CARB 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:</u></p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> ○ 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 | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>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.</p> <ul style="list-style-type: none"> 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). | |
| <p>Impact C.7.a: Short-Term Construction-Related Impacts on Geology and Soils</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.7.a: Implement Mitigation Measure B.7.a</p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |
| <p>Impact B.7.b: Long-Term Operational Impacts to Geology and Soil Associated with Land Use Changes</p> <p>Potentially Significant</p> | <p>Mitigation Measure B.7.b</p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of geology and soils. CARB 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-</u></p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology and soils include:</u></p> <ul style="list-style-type: none"> • 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. | |
| <p><i>Impact C.7.b: Long-Term Operational Impacts on Geology Associated with New Facilities and Infrastructure</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.7.b</i></p> <p>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</p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>the degree of mitigation that may ultimately be implemented to reduce potentially significant geology and soils impacts.</p> <p>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 levels. The U.S. EPA issues Class VI permits under these regulations, which apply to injection wells that are drilled for the sole purpose of CO₂ 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 U.S. EPA pursuant to UIC regulations. Class II permits apply to injection wells constructed for the purpose of injecting fluids produced during oil and gas production such as brines, and including injection wells used in tertiary, or enhanced oil recover (EOR) methods that could also be used for the purpose of CO₂ sequestration as part of a CCS project.</p> <p>To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering and geologic studies, and submit proposed injection well construction and operation plans. Requirements for these permits are likely to include: isopach maps, cross sections, and representative well logs that identify all geologic units, 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.</p> | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| <p><i>Impact C.7.c: Long-Term Operational Impacts to Soil Associated with Land Use Changes</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.7.c: Implement Mitigation Measure B.7.bB.7.c</i></p> <p>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 to soil associated with land use changes.</p> | <p>Potentially Significant and Unavoidable</p> |
| Greenhouse Gas Emissions | | |
| <p><i>Impact B.8.a: Short-Term Construction- and Long-term Operational Related Greenhouse Gas Impacts</i></p> <p>Beneficial</p> | <p>No Mitigation Required</p> | <p>Not Applicable</p> |
| <p><i>Impact C.8.a: Short-Term Construction-Related Greenhouse Gas Impacts</i></p> <p>Less Than Significant</p> | <p>No Mitigation Required</p> | <p>Not Applicable</p> |
| <p><i>Impact C.8.b: Long-Term Operational Greenhouse Gas Impacts</i></p> <p>Beneficial</p> | <p>No Mitigation Required</p> | <p>Not Applicable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| Hazards and Hazardous Materials | | |
| <p>Impact B.9.a: Short-Term Construction-Related Hazard Impacts</p> <p>Potentially Significant</p> | <p>Mitigation Measure B.9.a</p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that apply to accident-related hazards and risk of upset. CARB 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:</u></p> <ul style="list-style-type: none"> • 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 | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>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.</p> <ul style="list-style-type: none"> ○ 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. | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| <p><i>Impact C.9.a: Short-Term Construction-Related Hazard Impacts</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.9.a: Implement Mitigation Measure B.9.a</i></p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |
| <p><i>Impact B.9.b: Long-Term Increased Transport, Use, and Disposal of Hazardous Materials</i></p> <p>Less Than Significant</p> | <p>No Mitigation Required</p> | <p>Not Applicable</p> |
| <p><i>Impact C.9.b: Long-Term Operational Hazards Related to Increased Transport, Use and Disposal of Hazardous Materials</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.9.b</i></p> <p>The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to hazards and hazardous materials. CARB 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.</p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>Permits and/or agreements to reduce potential hazards and hazardous materials impacts could include, but are not limited to, UIC permits administered pursuant to the SDWA at the federal and State and levels. U.S. EPA issues Class VI permits under these regulations, which apply to injections wells that are drilled for the sole purpose of CO₂ 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 U.S. EPA pursuant to UIC regulations. Class II permits apply to injection wells constructed for the purpose of injecting fluids produced during oil and gas production, such as brines, and include injection wells used in tertiary or EOR methods that could also be used for the purpose of CO₂ sequestration as part of a CCS project.</p> <p>To obtain these permits, the project proponent would be required to conduct various evaluations, such as engineering and geologic studies, and submit proposed injection well construction and operation plans. Requirements for these permits are likely to include: isopach maps, cross sections, and representative well logs that identify all geologic units, 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.</p> | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| Hydrology and Water Quality | | |
| <p><i>Impact B.10.a: Short-Term Construction-Related and Long-Term Operational Hydrologic Resource Impacts</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.10.a</i></p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to hydrology and water quality. CARB 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:</u></p> <ul style="list-style-type: none"> • 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. | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> ○ 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 off-site 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 off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility | |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>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.</p> <ul style="list-style-type: none"> ○ 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 | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | alternative technologies or changes to water supply operations, or otherwise compensate or offset the groundwater reductions. | |
| Impact C.10.a: Short-Term Construction-Related Hydrologic Resource Impacts Potentially Significant | Mitigation Measure C.10.a: Implement Mitigation Measure B.10.a 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. | Potentially Significant and Unavoidable |
| Impact B.10.b: Long-Term Effects on Hydrology and Water Quality Related to Changes in Land Use Potentially Significant | Mitigation Measure B.10.b: Implement Mitigation Measure B.10.a <u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of hydrology and water quality. CARB 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.</u> | Potentially Significant and Unavoidable |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>Recognized practices that are routinely required to avoid and/or minimize impacts to hydrology and water quality:</u></p> <ul style="list-style-type: none"> • 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. | |
| <p><i>Impact C.10.b: Long-Term Effects on Hydrology and Water Quality Related to Changes in Land Use</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.10.b: Implement Mitigation Measure B.10.b</i></p> <p>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</p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | project-specific details of mitigation, there is inherent uncertainty in the degree of mitigation that may ultimately be implemented to reduce potentially significant impacts to long-term effect on hydrology and water quality associated with land use changes. | |
| <p>Impact C.10.c: Long-Term Impacts of New and Modified Facilities and Infrastructure on Hydrology and Water Quality</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.10.c.a: Implement Mitigation Measure B.10.a</p> <p>The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to hydrology and water quality. CARB 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.</p> <p>Permits and/or agreements to reduce potential hydrology and water quality impacts could include, but are not limited to, UIC permits administered pursuant to the SDWA at the federal and State and levels. U.S. EPA issues Class VI permits under these regulations, which apply to injection wells that are drilled for the sole purpose of CO₂ 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 U.S. EPA pursuant to UIC regulations. Class II permits apply to injection wells created for extracting oil and gas, including injection wells used for EOR</p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>methods that could also be used for the purpose of CO₂ sequestration as part of a CCS project.</p> <p>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.</p> <p>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.</p> | |
| Land Use and Planning | | |
| <p><i>Impact B.11.a: Short-Term Construction-Related Impacts Related to New or Modified Facilities</i></p> <p>Potentially Significant</p> | <p>See Mitigation Measures: <u>B.2.a</u>, <u>2.b</u>, <u>B.4.a</u>, <u>4.b</u>, <u>B.7.a&b</u>, and <u>B.10.a</u></p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| <i>Impact C.11.a: Short-Term Construction-Related Impacts Related to New or Modified Facilities and Infrastructure</i> Potentially Significant | See Mitigation Measures: <u>C.2.a</u> , 2.b , <u>C.4.a</u> , <u>C.7a</u> , and <u>C.10.a</u> | Potentially Significant and Unavoidable |
| <i>Impact B.11.b: Long-Term Operational Impacts on Land Use Related to Feedstock Production</i> Potentially Significant | See Mitigation Measures: 2.a , <u>B.2.b</u> , 4.a , <u>B.4.b</u> , <u>B.7.b7.c</u> , 8.a , 8.b , and <u>B.10.b10.a</u> | Potentially Significant and Unavoidable |
| <i>Impact C.11.b: Long-Term Operational Impacts Related to Feedstock Production</i> Potentially Significant | See Mitigation Measures: 2.a , <u>C.2.b</u> , 4.a , <u>C.4.b</u> , <u>C.7.b</u> , <u>C.7.c</u> , and <u>C.10.b</u> | Potentially Significant and Unavoidable |
| Mineral Resources | | |
| <i>Impact B.12.a: Short-Term Construction-Related Impacts on Mineral Resources</i> Less Than Significant | No Mitigation Required | Not Applicable |
| <i>Impact C.12.a: Short-Term Construction-Related Impacts on Mineral Resources</i> Less Than Significant | No Mitigation Required | Not Applicable |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| <p><i>Impact B.12.b: Long-Term Operational-Related Impacts on Mineral Resources</i></p> <p><u>Less Than Significant Potentially Significant</u></p> | <p><u>Mitigation Measure B.12.b</u></p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that provide protection of mineral resources. CARB 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 most likely 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 mineral resources include:</u></p> <ul style="list-style-type: none"> <u>Proponents of construction activities implemented as a result of reasonably foreseeable compliance responses associated with the Proposed Regulation 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 follow all applicable environmental regulations as part of approval of a project for development.</u> <u>Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or</u> | <p><u>Not Applicable Potentially Significant and Unavoidable</u></p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>substantially lessen the potentially significant impacts on mineral resources associated with the project.</u></p> <ul style="list-style-type: none"> • <u>Actions required to mitigate potentially significant mineral resource impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the local lead agency.</u> <ul style="list-style-type: none"> ○ <u>Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare an investigation/study, which would include an evaluation of the development's impact on the availability of mineral resources valuable to the region and residents of the state or delineated on a local general plan, specific plan, or other land use plan.</u> ○ <u>Proponents of new or modified facilities or infrastructure would provide a complete site plan showing any overlapping areas between the proposed plan and locally-important mineral resources delineated on a local general plan, specific plan, or other land use plan. Proponents would avoid locating facilities that would result in the loss of availability of locally-important mineral resources, as much as possible.</u> | |
| <p>Impact C.12.b: Long-Term Operational Impacts on Mineral Resources</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.12.b</p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that pertain to mineral resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities and infrastructure that could be approved by local jurisdictions. The ability to require such measures is under</u></p> | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities and infrastructure 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 mineral resource impacts include:</u></p> <ul style="list-style-type: none"> • Proponents of new or modified facilities and infrastructure 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 known mineral resources impacts may include the following; however, any mitigation specifically required for a new or modified facility and infrastructure would be determined by the local lead agency. | |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> • Conduct a survey to identify mineral resources of local regional, or state value at the project site. • Site and design new or modified facilities and infrastructure to avoid or minimize restrictions to known mineral resources and recovery sites. | |
| Noise | | |
| <p><i>Impact B.13.a: Short-Term Construction-Related Noise Impacts</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.13.a</i></p> <p><u>The Regulatory Setting in Attachment 1 includes, but is not limited to, applicable laws and regulations that pertain to noise. CARB 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:</u></p> <ul style="list-style-type: none"> • 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 | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>certify that the environmental document was prepared in compliance with applicable regulations and would approve the project for development.</p> <ul style="list-style-type: none"> • 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. | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <ul style="list-style-type: none"> • 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. | |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| <p><i>Impact C.13.a: Short-Term Construction-Related Noise Impacts</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.13.a: Implement mitigation Measure B.13.a</i></p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |
| <p><i>Impact B.13.b: Long-Term Operational Noise Impacts</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.13.b: Implement Mitigation Measure B.13.a</i></p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |
| <p><i>Impact C.13.b: Long-Term Operational Noise Impacts</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.13.b: Implement Mitigation Measure B.13.a</i></p> <p>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</p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| Population and Housing | | |
| <i>Impact B.14.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Population, Employment, and Housing</i> Less Than Significant | No Mitigation Required | Not Applicable |
| <i>Impact 14.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Population, Employment and Housing</i> Less Than Significant | No Mitigation Required | Not Applicable |
| Public Services | | |
| <i>Impact B.15.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Public Services</i> Less Than Significant | No Mitigation Required | Not Applicable |
| <i>Impact C.15.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Public Services</i> Less Than Significant | No Mitigation Required | Not Applicable |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| Recreation | | |
| <i>Impact B.16.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Recreation</i> Less Than Significant | No Mitigation Required | Not Applicable |
| <i>Impact C.16.a: Short-Term Construction-Related Impacts and Long-Term Operational Impacts on Recreation</i> Less Than Significant | No Mitigation Required | Not Applicable |
| Transportation and Traffic | | |
| <i>Impact B.17.a: Short-Term Construction-Related Impacts on Traffic and Transportation</i> Potentially Significant | <i>Mitigation Measure B.17.a</i> <u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to transportation. CARB 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</u> | Potentially Significant and Unavoidable |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>authority. Recognized practices that are routinely required to avoid and/or minimize construction traffic impacts include:</u></p> <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> ○ 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 | |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>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.</p> <ul style="list-style-type: none"> ○ Prepare a Construction Traffic Control Plan and a Traffic Management Plan. | |
| <p><i>Impact C.17.a: Short-Term Construction-Related Impacts on Traffic and Transportation</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.17.a: Implement Mitigation Measure B.17.a</i></p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |
| <p><i>Impact B.17.b: Long-Term Operational Impacts on Traffic and Transportation</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.17.b</i></p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations in regard to transportation. CARB 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</u></p> | <p>Potentially Significant and Unavoidable</p> |

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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p><u>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:</u></p> <ul style="list-style-type: none"> • 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; and • Consultation with local emergency service providers to ensure that operating conditions on local roadways and freeway facilities are maintained. | |
| <p>Impact C.17.b: Long-Term Operational Impacts on Traffic and Transportation</p> <p>Potentially Significant</p> | <p>Mitigation Measure C.17.b: Implement Mitigation Measure B.17.b</p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| Utilities and Service Systems | | |
| <p><i>Impact B.18.a: Increased Demand for Water, Wastewater, Electricity, and Gas Services</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure B.18.a</i></p> <p><u>The Regulatory Setting in Attachment 1 includes applicable laws and regulations that relate to utilities and service systems. CARB 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:</u></p> <ul style="list-style-type: none"> • 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 | <p>Potentially Significant and Unavoidable</p> |

| Attachment 2: Summary of Environmental Impacts and Mitigation Measures | | |
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| Resource Area Impact Significance Before Mitigation | Potential Mitigation | Significance After Mitigation |
| | <p>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.</p> <ul style="list-style-type: none"> ○ 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 on-site 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. | |
| <p><i>Impact C.18.a: Increased Demand for Water, Wastewater, Electricity and Gas Services</i></p> <p>Potentially Significant</p> | <p><i>Mitigation Measure C.18.a: Implement mitigation Measure B.18.a</i></p> <p>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.</p> | <p>Potentially Significant and Unavoidable</p> |