APPENDIX D-2: ATTACHMENT A, ENVIRONMENTAL AND REGULATORY SETTING

1.0 AESTHETICS

A. Existing Conditions

1. U.S.

The United States (U.S.), by 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, inorganic salts, and organic compounds.

2. California

Like 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 forestlands, 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 D-2a.

Table D-2a: 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…" 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) 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 projects 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 per kilometer — visibility of 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	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor

Applicable Regulations	Description
through 263 – Scenic Highways	protection programs that conform to requirements of the California Scenic Highway Program.
California Coastal Act (CCA), Section 30715	Projects located within the California Coastal Zone are subject to the CCA policies, including policies addressing visual access to the coastal zones.
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. This includes planning guidelines developed by ports. 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.

2.0 AGRICULTURE AND FORESTRY RESOURCES

A. Existing Conditions

1. U.S.

Forests in the U.S. are very diverse in composition and distribution, including oak-hickory and maple-beech-birch forests, as well as fir, pine, and redwood forests. It is estimated that, at the beginning of European settlement (circa 1630), the area of forestland in the current boundaries of the U.S. was approximately 423 million hectares, or about 46 percent of the total land area. By 1907, the area of forestland had declined to an estimated 307 million hectares, or 34 percent of the total land area. Forest area has been relatively stable since 1907. In 1997, 302 million hectares or 33 percent of the total land area of the U.S. was in forestland. As of 2000, forestland area amount to approximately 70 percent

of the area that was forested in 1630. Since 1630, approximately 120 million hectares of forestland have been converted to other uses, primarily agriculture.[1]

U.S. land area amounts to nearly 2.3 billion acres, with nearly 1.2 billion acres in agricultural lands. The proportion of the land base in agricultural uses declined from 63 percent in 1949 to 51 percent in 2007, the latest year for which data are available. Gradual declines have occurred in cropland and pasture/range, while grazed forestland has decreased more rapidly. In 2007, 408 million acres of agricultural land were in cropland (-17 percent from 1949), 614 million acres were in pasture and range (-3 percent), 127 million acres were in grazed forestland (-52 percent), and 12 million acres were in farmsteads and farm roads (-19 percent).[2]

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.

2. California

The State maps and classifies farmland through the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP). Classifications are based on a combination of physical and chemical characteristics of the soil and climate that determine the degree of suitability of the land for crop production. The classifications under the FMMP are as follows:

- Prime Farmland—land that has the best combination of features to produce agricultural crops;
- Farmland of Statewide Importance—land other than Prime Farmland that has a good combination of physical and chemical features to produce agricultural crops, but that has more limitations than Prime Farmland, such as greater slopes or less ability to store soil moisture;
- Unique Farmland—land of lesser quality soils used to produce the state's leading agricultural cash crops;
- Farmland of Local Importance—land of importance to the local agricultural economy;
- Grazing Land—existing vegetation that is suitable for grazing;

[1] U.S. Department of Agriculture, U.S. Forest Resource Facts and Historical Trends, August 2014, last accessed August 13, 2021, https://www.srs.fs.usda.gov/products/marketing/cards/fs-1035.pdf.
[2] U.S. Department of Agriculture, Ag and Food Statistics: Charting the Essentials, March 13, 2018, last accessed April 17, 2018, https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/.

- Urban and Built-Up Land—land occupied by structures in density of at least one dwelling unit per 1.5 acres;

- Land Committed to Nonagricultural Use—vacant areas; existing land that has a permanent commitment to development but has an existing land use of agricultural or grazing lands; and

- Other Land— land not included in any other mapping category, common examples of which include low-density rural developments, brush, timber, wetland, and vacant and nonagricultural land surrounded on all sides by urban development.

CEQA Section 21095 and CEQA Guidelines Appendix G, together, define Prime, Unique, and Farmland of Statewide Importance as "Important Farmland," whose conversion may be considered significant. Local jurisdictions can further consider other classifications of farmland as important and can also use an agricultural land evaluation and site assessment model to determine farmland importance and impacts from conversion.

As of 2012, California contained approximately 5 million acres of Prime Farmland; approximately 2.6 million acres of Farmland of Statewide Important; approximately 1.3 million acres of Unique Farmland; approximately 3.2 million acres of Farmland of Local Importance; and approximately 19.2 million acres of grazing land.[3]

In 2019, California produced 61 percent of the vegetables and 54 percent of the fruits and nuts in the U.S. California supplies 99 percent or more of the following to the U.S.: almonds, artichokes, celery, figs, garlic, raisin grapes, kiwifruit, honeydew melons, nectarines, olives, clingstone peaches, pistachios, plums, dried plums, sweet rice, ladino clover seed, and walnuts. In 2019, 69,900 farms operated in California, which is 0.7 percent more than in 2018. Almost 29 percent of California farms generated commodity sales over $100,000, greater than the national average of 18.5 percent. The amount of land devoted to farming and ranching in California was 24.3 million acres in 2019, the same as in 2018. The average farm size was 348 acres in 2019, slightly smaller than the 2018 average farm size and below the national average of 444 acres.[4]

a) Williamson Act

The California Land Conservation Act of 1965--commonly referred to as the Williamson Act--enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments which are much lower than normal because they are based upon farming and open space uses as opposed to full market value. The Open Space Subvention Act of 1971 provided local governments an annual

[3] California Department of Conservation, Farmland Mapping and Monitoring Program, California Farmland Conversion Report 2015, September 2015, last accessed August 13, 2021, http://www.conservation.ca.gov/dlrp/fmmp/Documents/fmmp/pubs/2010-2012/FCR/FCR%202015_complete.pdf.

[4] California Department of Food and Agriculture, California Agricultural Statistics Review, 2019-2020, last accessed August 13, 2021, https://www.cdfa.ca.gov/Statistics/PDFs/2020_Ag_Stats_Review.pdf.

subvention of forgone property tax revenues from the State through the year 2009; these payments have been suspended in more recent years due to revenue shortfalls.

Of California's 58 counties, 52 have executed contracts under the Land Conservation Act Program. The 12.7 million acres reported as enrolled in Land Conservation Act contracts statewide as of December 2017 represent approximately 40 percent of California's farmland total of about 31.4 million acres.[5]

b) Forestry Resources

Forestland is defined as land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits (PRC Section 12220[g]). There are approximately 32,101,515 acres of forests within California.[6]

Timberland is privately-owned land, or land acquired for State forest purposes, which is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses, of, at minimum 15 cubic feet per acre (Government Code Section 51104[f]). Forest managed for harvest is called timberland and includes 2,932,000 acres in private ownership; 146,000 acres in State ownership; 10,130,000 acres in federal ownership; and 4,551,000 acres of non-industrial timberland in private ownership.[7]

B. Regulatory Setting

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

Table D-2b: Applicable Laws and Regulations for Agriculture and Forest Resources

Applicable Regulations	Description
Federal	
Farmland Protection Policy Act (FPPA)	The FPPA directs federal agencies to consider the effects of federal programs or activities on farmland, and ensure that such programs, to the extent practicable, are compatible with state, local, and private farmland protection programs and policies. The rating process established under the FPPA was developed to help assess options for land use on an evaluation of productivity weighed against commitment to urban development.

[5] California Department of Conservation, The Williamson Act Status Report, 2016–17, last accessed August 13, 2021, https://www.conservation.ca.gov/dlrp/wa/Documents/stats_reports/2018%20WA%20Status%20Report.pdf.
[6] California Department of Fish and Wildlife, Timberland Conservation Program, last accessed June 9, 2021, https://wildlife.ca.gov/Conservation/Timber.
[7] California Department of Fish and Wildlife, Summary of Natural Community Conservation Plans, October 2017.

Applicable Regulations	Description
National Forest Management Act (NFMA) of 1976	The NFMA is the primary statute governing the administration of national forests. The NFMA requires the Secretary of Agriculture to assess forestlands, 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	
The California Land Conservation Act, also known as the Williamson Act (Government Code Section 51200 et seq.)	The 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. he 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 51201 (e)). However, uses deemed compatible by a county or city government must be consistent with the principles of compatibility set forth in Government Code, Section 51238.1. Approximately 16 million acres of farmland (about 50 percent of the State's total farmland) are enrolled in the program.

Applicable Regulations	Description
California Farmland Conservancy Program (CFCP) (PRC Section 10200 et seq.)	The CFCP 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.
FMMP (Government Code Section 65570, PRC Section 612)	Under the FMMP, 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.
State Lands Commission Significant Land Inventory	The State Lands Commission is responsible for managing lands owned by the State, including lands that the State has received from the federal government. These lands total more than 4 million acres and include tide and submerged lands, swamp and overflow lands, the beds of navigable waterways, and State School Lands. The State Lands Commission has a legal responsibility for, and a strong interest in, protecting the ecological and Public Trust values associated with the State's sovereign lands, including the use of these lands for habitat preservation, open space, and recreation. Projects located within these lands would be subject to the State Lands Commission permitting process.
Local	
Open Space Element (Government Code Section 65300 et seq.)	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.

3.0 AIR QUALITY

A. Existing Conditions

1. U.S.

At the federal level, the U.S. Environmental Protection Agency (U.S. EPA) has oversight of state programs. In addition, U.S. EPA has established emission standards for mobile sources such as vessels, trains, and airplanes. 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 D-2c.[8] 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 ($\mu g/m^3$).

2. California

The California Air Resources Board (CARB) 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 the NAAQS and California Ambient Air Quality Standards (CAAQS). CARB is charged with developing the State's SIP, which details the State's plan to achieve the NAAQS and is submitted to U.S. EPA for review.

a) 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 criteria air pollutant is provided below. Emission source types and health effects are summarized in Table D-2c.

[8] A summary of the current NAAQS is available at: https://www.epa.gov/criteria-air-pollutants/naaqs-table.

Table D-2c: Sources and Health Effects of Criteria Air Pollutants[9,10,11,12,13,14,15,16]

Pollutant	Sources	Health Effects
Ozone	Secondary pollutant resulting from reaction of ROG and NOx in presence of sunlight. ROG emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NOx results from the combustion of fuels.	Cough, pain, shortness of breath, lung inflammation. Aggravation of lung diseases including asthma. Possibly a main cause of developing asthma.
Carbon monoxide (CO)	Combustion of fossil fuels by vehicles and other machinery. Some household appliances such as gas heaters.	Headache, dizziness, fatigue, nausea, vomiting, death Permanent heart and brain damage
Nitrogen dioxide (NO_2)	Combustion devices, such as cars and other vehicles, off-road equipment, and power generation.	Coughing, difficulty breathing, possible development of asthma and increased vulnerability to respiratory infections.
Sulfur dioxide (SO_2)	Industrial facility and power plant combustion of fossil fuels.	Difficulty breathing, particularly for people with asthma.
Respirable particulate matter (PM_{10}) and fine particulate matter (PM2.5)	Fugitive dust from construction sites, unpaved roads, and fields. Smokestacks and fires. Formation in the atmosphere by condensation and/or transformation of SO_2 and NO_X emitted from power plants, industrial sources, and vehicles.	Decreased lung function, coughing, difficulty breathing, aggravation of asthma, premature death.

[9] U.S. Environmental Protection Agency, Basic Information about Carbon Monoxide (CO) Outdoor Air Pollution, September 8, 2016, last accessed June 1, 2021, https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution.
[10] U.S. Environmental Protection Agency, Basic Information about NO2, September 8, 2016, last accessed June 1, 2021, https://www.epa.gov/no2-pollution/basic-information-about-no2.
[11] U.S. Environmental Protection Agency, Sulfur Dioxide Basics, April 2, 2019, last accessed June 1, 2021, https://www.epa.gov/so2-pollution/sulfur-dioxide-basics.
[12] U.S. Environmental Protection Agency, Health Effects of Ozone Pollution, May 5, 2021, last accessed June 1, 2021, https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution.
[13] U.S. Environmental Protection Agency, Ground-Level Ozone Basics, May 5, 2021, last accessed June 1, 2021, https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics.
[14] U.S. Environmental Protection Agency, Particulate Matter (PM) Basics, May 6, 2021, last accessed June 1, 2021, https://www.epa.gov/pm-pollution/particulate-matter-pm-basics.
[15] U.S. Environmental Protection Agency, Health and Environmental Effects of Particulate Matter (PM), May 26, 2021, last accessed June 1, 2021, https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm.
[16] U.S. Environmental Protection Agency, Basic Information about Lead Air Pollution, January 14, 2021, last accessed June 1, 2021, https://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution.

Pollutant	Sources	Health Effects
Lead	Metal processing	Adverse effects to the nervous systems, kidneys, immune system, cardiovascular system, and reproductive systems.

b) Ozone

Ozone is a gas composed of three atoms of oxygen (O_3). Ozone occurs both in the Earth's upper atmosphere (stratospheric) and at ground level (tropospheric). Stratospheric ozone occurs naturally in the upper atmosphere, where it forms a protective layer that shields us from the sun's harmful ultraviolet rays. Tropospheric, or ground level ozone, is not emitted directly into the air, but is created by chemical reactions between NOx and volatile organic compounds (VOCs). This happens when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight. Ozone at ground level is a harmful air pollutant, because of its effects on people and the environment, and it is the main ingredient in "smog".[17]

c) Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NO_X and are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a geographical area may not be representative of the local sources of NO_X emissions.[18]

d) Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction equipment, fires, and particulate matter formed in the atmosphere by reaction of gaseous precursors. $PM_{2.5}$ includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. .

e) Emissions Inventory

Exhibit 1 summarizes emissions of criteria air pollutants 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 NOx accounting for approximately 43 percent and 83 percent, respectively, of the total

[17] U.S. Environmental Protection Agency, Ground-Level Ozone Basics, May 5, 2021, last accessed June 1, 2021, https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics.
[18] U.S. Environmental Protection Agency, Basic Information about NO2, September 8, 2016, last accessed June 1, 2021, https://www.epa.gov/no2-pollution/basic-information-about-no2.

emissions. Area wide sources account for approximately 83 percent and 65 percent of California's PM_{10} and $PM_{2.5}$ emissions, respectively.[19]

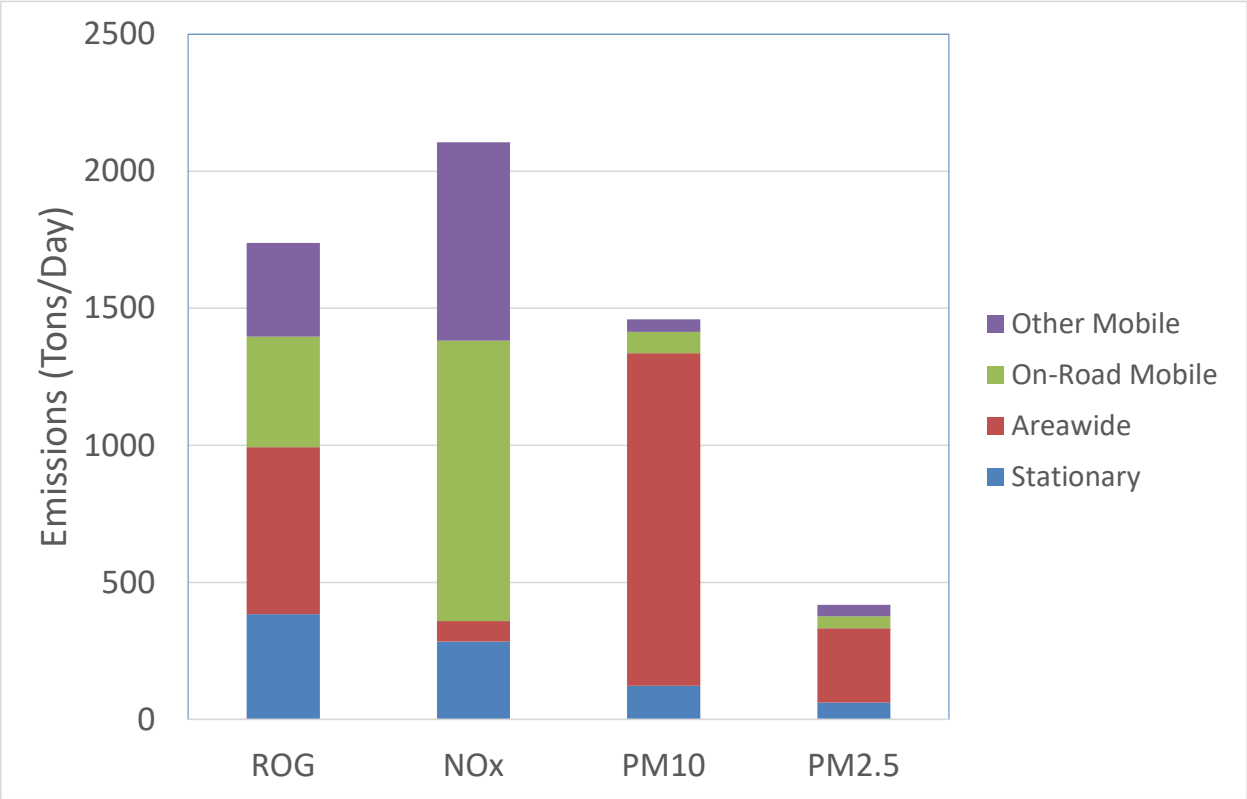

Exhibit 1 California 2012 Emissions Inventory

f) Toxic Air Contaminants

Concentrations of 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...." (HSC, section 39655, subd. (a).) 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.

Today, the emissions from combustion of fuel in motor vehicles and off-road equipment are the primary source of air toxics risk in California. Particulate matter (PM) from diesel-fueled engines is a TAC and diesel PM accounts for approximately 60 percent of the current estimated inhalation cancer risk for background ambient air. Some examples of sources that contribute to higher potential health impacts from mobile diesel PM include freight hubs, like ports, rail yards and distribution centers. Because diesel PM cannot be directly measured in the ambient air, we use surrogate compounds and the emission inventory to estimate the ambient concentration. Both the combustion and evaporation of gasoline used in vehicles, lawn and garden equipment, recreational watercraft, and others produce other prevalent air toxics. Examples of stationary sources that also contribute to

[19] CARB, 2016 SIP Emission Projection Data, 2012 Estimated Annual Average Emissions Statewide, last accessed April 17, 2018.

increased health risks to nearby residents include: metal finishing/manufacturing, chrome plating facilities, various product manufacturing (e.g., food, chemical, material, and etc.), stationary diesel engines (e.g., emergency backup generators), and refineries.[20]

B. Regulatory Setting

Applicable laws and regulations associated with air quality are discussed in Table D-2d.

Table D-2d: Applicable Laws and Regulations for Air Quality

Regulation	Description
Federal	
Clean Air Act (CAA) (42 U.S. Code [USC] Section 7401 et seq.; 40 CFR (e.g., Subchapter C- Air Programs, Subpart U- Air Emission Controls))	The CAA, which was last amended in 1990, requires U.S. EPA to set NAAQS for pollutants considered harmful to public health and the environment. The 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. The U.S. EPA Office of Air Quality Planning and Standards has set NAAQS for criteria air pollutants. Title III of the CAA directed U.S. EPA to promulgate national emissions standards for Hazardous Air Pollutants (HAPs). The CAA also required U.S. EPA to promulgate vehicle or fuel standards containing reasonable requirements that control TAC 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 a 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.

[20] California Air Resources Board and California Air Pollution Control Officers Association, Risk Management Guidance for Stationary Sources of Air Toxics, July 23, 2015, last accessed August 13, 2021, https://www.arb.ca.gov/toxics/rma/rmgssat.pdf.

Regulation	Description
U.S. EPA Final Rule for Control of Air Pollution From Nonroad Diesel Engines and Fuel	In 2004, the U.S. EPA finalized Tier 4 emission standards for nonroad diesel engines and sulfur reductions in nonroad diesel fuel, including diesel fuel for large recreational vessels, locomotives, and harbor craft. The intent of this rule is to further reduce harmful emissions and assist State and local areas designated as 8-hour ozone non-attainment improve air quality. This rule includes the introduction of increasingly strict emission standards for new non-road diesel engines to phase out old engine standards as new engines are manufactured.
State	
California Clean Air Act (CCAA) (Health and Safety Code, e.g., Division 26, (commencing with Section 39000 et seq.); CCR Title 13, Division 3 (commencing with Section 1900 et seq.) and Title 17, Division 3 (commencing with Section 60000 et seq.)	CARB 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 CARB to develop and enforce the CAAQS.
Waste Heat and Carbon Emissions Reduction Act (Public Utilities Code Section 2840 et seq.)	The Waste Heat and Carbon Emissions Reduction 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 (MW). Section 2843 of the act provides that the California Energy Commission's (CEC) guidelines require that CHP systems: be designed to reduce waste energy; have a minimum efficiency of 60 percent; have NOx emissions of no more than 0.07 pounds per megawatt-hour (MWh); 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.
CARB 2006 Emission Reduction Plan for Ports and Goods Movement Plan	The plan was developed with the intent of reducing community exposure to air pollution and to meet new federal air quality standards for ozone and fine particulate matter (PM2.5). The plan includes the implementation of the Goods Movement Action Plan, which includes policies and programs aimed at reducing congestion and addressing the environmental impacts resulting from the increased movement of goods in California.

Regulation	Description
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., Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807) Tanner, Ch. 1047, Statutes of 1983 and Air Toxics "Hot Spots" Information and Assessment (AB 2588), Connelly, Ch.1252, Stats. of 1987.).
Local	
Air Districts	Air Districts have primary responsibility for preparation, adoption, and implementation of stationary and area emission control measures and for the preparation of the SIP and any amendments.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

4.0 BIOLOGICAL RESOURCES

A. Existing Conditions

1. U.S.

The U.S. is composed of many different biological provinces, or biomes, including tundra, coniferous and deciduous forest, grassland, and desert. Each biome provides a sanctuary to a diverse variety of biological species. Scientists have documented more than 200,000 species in the U.S., representing more than 10 percent of the species worldwide.[21]

2. California

The State's geography and topography have created distinct local climates ranging from high rainfall in northwestern mountains to the driest place in North America, Death Valley. North to south, the State extends for almost 800 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. Summer rain is indicative of the eastern mountains and deserts, driven by the western margin of the North American monsoon. Along the northern coast abundant precipitation and ocean air produces foggy, moist conditions. High mountains have cooler conditions, with a deep winter snow pack in normal climate years. Desert conditions exist in the rain shadow of the mountain ranges.[22]

[21] The Nature Conservancy, States of the Union: Ranking America's Biodiversity, April 2002, last accessed August 13, 2021, https://www.researchgate.net/publication/269111849/download.
[22] California Department of Fish and Wildlife, California State Wildlife Action Plan, September 2015, last accessed August 13, 2021, https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=110399&inline.

While the State is largely considered to have a Mediterranean climate, it can be further subdivided into six major climate types: Desert, Marine, Cool Interior, Highland, Steppe, and Mediterranean. California deserts, such as the Mojave, are typified by a wide range of elevation with more rain and snow in the high ranges, and hot, dry conditions in valleys. Cool Interior and Highland climates can be found on the Modoc Plateau, Klamath, Cascade, and Sierra ranges. Variations in slope, elevation, and aspect of valleys and mountains result in a range of microclimates for habitats and wildlife. For example, the San Joaquin Valley, exhibiting a Mediterranean climate, receives sufficient springtime rain to support grassland habitats, while still remaining hot and relatively dry in summer. Steppe climates include arid, shrub-dominated habitats that can be found in the Owens Valley, east of the Sierra Nevada, and San Diego, located in coastal southern California.[23]

The Marine climate has profound influence over terrestrial climates, particularly near the coast. Additionally, the State is known for variability in precipitation because of the El Niño-Southern Oscillation (ENSO) and the Pacific Decadal Oscillation. Oscillations are the cyclical shifting of high and low-pressure systems, as evidenced by the wave pattern of the jet stream in the northern hemisphere. The ENSO is the cycle of air pressure systems influenced by the location of warm and cold sea temperatures. El Niño events occur when waters are warmer in the eastern Pacific Ocean, typically resulting in greater precipitation in southern California and less precipitation in northern California, and La Niña events occur when waters are colder in the eastern Pacific resulting in drier than normal conditions in southern California and wetter conditions in northern California during late summer and winter. The warmer ocean temperatures associated with El Niño conditions also result in decreased upwelling in the Pacific Ocean.[24]

California has the highest numbers of native and endemic plant species of any state, with approximately 6,500 species, subspecies, and varieties of plants, representing 32 percent of all vascular plants in the United States. 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. Within the California Floristic Province, which encompasses the Mediterranean area of Oregon, California, and northwestern Baja, 2,124 of the 3,488 species are endemic, representing a 61 percent rate of endemism. Over 200 species, subspecies, and varieties of native plants are designated as rare, threatened, or endangered by State law, and over 2,000 more plant taxa are considered to be of conservation concern.[25]

California has a large number of animal species, representing a substantial proportion of the wildlife species nationwide. The state's diverse natural communities provide a wide variety of habitat conditions for wildlife. The state's wildlife species include approximately 100 reptile species, 75 amphibian species, 650 bird species, and 220 mammal species. Additionally, 48 mammals, 64 birds, 72 amphibians and reptiles, and 20 freshwater fish live in California and nowhere else.[26]

[23] Ibid.
[24] Ibid.
[25] Ibid.
[26] Ibid.

California exhibits a wide range of aquatic habitats from the Pacific Ocean to isolated hillside seeps, to desert oases that support both water-dependent species and provide essential seasonal habitat for terrestrial species. Perennial and ephemeral rivers and streams, riparian areas, vernal pools, and coastal wetlands support a diverse array of flora and fauna, including 150 animal and 52 plant species that are designated special-status species. The California Natural Diversity Database identifies 123 different aquatic habitat-types in California, based on fauna. Of these, 78 are stream habitat-types located in seven major drainage systems: Klamath, Sacramento-San Joaquin, North/Central Coast, Lahontan, Death Valley, South Coast, and Colorado River systems. These drainage systems are geologically separated and contain distinctive fishes and invertebrates. California has approximately 70 native resident and anadromous fish species, and 72 percent of the native freshwater fishes in California are either listed, or possible candidates for listing as threatened or endangered, or are extinct.[27]

B. Regulatory Setting

Applicable laws and regulations associated with biological resources are discussed in Table D-2e.

Table D-2e: Applicable Laws and Regulations for Biological Resources

Applicable Law	Description
Federal	
Federal Endangered Species Act (ESA) (16 USC Section 1531 et seq.)	The 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.[28]
Marine Mammal Protection Act (MMPA) of 1972 (Updated in 1994)	The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. Proposed projects located adjacent to marine areas with the potential to disrupt marine mammals must be analyzed under the MMPA to ensure marine mammals would not be harassed or injured by project activities. Any project activities that may result in harassment, injury, or mortality of

[27] Ibid.
[28] U.S. Fish and Wildlife Service, Habitat Conservation Plans: Section 10 of the Endangered Species Act, December 2005, last accessed August 13, 2021, https://www.fws.gov/endangered/esa-library/pdf/HCP_Incidental_Take.pdf.

Applicable Law	Description
	marine mammals would require consultation with the National Marine Fisheries Service and the USFWS.
Migratory Bird Treaty Act (MBTA) (16 USC Section 703 et seq.)	The MBTA makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated under the MBTA.
Clean Water Act (CWA) (33 USC Section 1251 et seq.)	The 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	The Rivers and Harbors Act requires a permit or letter of permission from USACE prior to any work being completed within navigable waters.
U.S. EPA Section 404 (b)(1) Guidelines	Section 404 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 (CDCA) Plan	The CDCA Plan comprises one of two national conservation areas established by Congress in 1976. The FLPMA outlines how BLM would manage public lands. Congress specifically provided guidance for the management of the CDCA Plan and directed the development of the 1980 CDCA Plan.
Federal Noxious Weed Act of 1974 (P.L. 93-629) (7 USC 2801 et seq.; 88 Stat. 2148)	The Federal Noxious Weed Act 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 (EO) 13112, “Invasive Species,” February 3, 1999	EO 13112 mandates that federal agencies 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.
EO 11988, “Floodplain Management,” May 24, 1977	EO 11988 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.

Applicable Law	Description
EO 11990, "Protection of Wetlands," May 24, 1977	EO 11990 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.
EO 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," January 10, 2001	EO 13186 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 with USFWS that shall promote the conservation of migratory bird populations.
Bald and Golden Eagle Protection Act (16 USC Section 668 et seq.)	The 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	This policy 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	These plans and strategies provide guidance for the conservation and management of sufficient habitat to maintain viable populations of listed species and ecosystems. Relevant examples include, but are not limited to, the Desert Tortoise Recovery Plan, Flat-tailed Horned Lizard Rangewide Management Strategy; Amargosa Vole Recovery Plan; and Recovery Plan for Upland Species of the San Joaquin Valley.
State	
California Endangered Species Act of 1984 (Fish and Game Code, section 2050 et seq.)	Protects California's rare, threatened, and endangered species.
California Coastal Act (CCA), 1976	The CCA of 1976 recognizes California ports, harbors, and coastline beaches as primary economic and coastal resources and as essential elements of the national maritime industry. Decisions to undertake specific development projects, where feasible, are to be based on consideration of alternative locations and designs in order to minimize any adverse environmental impacts. The CCA is implemented by the California Coastal Commission.

Applicable Law	Description
Natural Community Conservation Planning (NCCP) Act 1991 (Fish and Game Code, section 2800 et seq.)	The primary objective of the NCCP Act 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.[29]
Porter-Cologne Water Quality Control Act (Water Code Sections 13000 et seq.)	The 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.
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 Act (PRC Section 5093.30 et seq.)	The California Wilderness Act 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.)	This policy 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 sections 3503 and 3503.5)	These policies protect 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)	This policy protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame birds.

[29] California Department of Fish and Wildlife, Summary of Natural Community Conservation Plans, October 2017.

Applicable Law	Description
Fur-bearing Mammals (Fish and Game Code sections 4000 and 4002)	This policy lists fur-bearing mammals require a permit for take.
Fully Protected Species (Fish and Game Code sections 3511, 4700, 5050, and 5515)	These policies identify several amphibian, reptile, fish, bird, and mammal species that are Fully Protected. CDFW cannot issue a take permit for these species, except for take related to scientific research.
CEQA Guidelines Section 15380	CEQA defines rare species more broadly than the definitions for species listed under the State and federal Endangered Species Acts. Under Section 15830, species not protected through State or federal listing but nonetheless demonstrable as “endangered” or “rare” under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society and some animals on the CDFW’s Special Animals List.
Oak Woodlands (PRC Section 21083.4)	This policy 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 section 1600 et seq.)	This policy 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)	The California Desert Native Plants Act 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	CDFA is designated to prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.

Applicable Law	Description
Marine Invasive Species Program (California State Land Commission Marine Environmental Protection Division)	The California Legislature established the Marine Invasive Species Program in 1999 to address the threat of species introductions from vessels arriving at California's ports. In 2003, the Marine Invasive Species Act reauthorized and expanded the Program. This program works to prevent new species introductions by implementing vessel ballast water and biofouling management regulations that are authorized by the Marine Invasive Species Act. These regulations apply to vessels that are 300 gross registered tons or more and capable of carrying ballast water.
Noxious Weeds (Title 3, CCR Section 4500)	List of plant species that are considered noxious weeds.
Nonindigenous Aquatic Nuisance Prevention and Control Act as amended by the National Invasive Species Act (Ballast Water Discharge Regulations)	The California Marine Invasive Species Act of 2003 renewed and expanded on the Ballast Water Management for Control of Nonindigenous Species Act of 1999 to address the threats posed by the introduction of nonindigenous species. The law charged the California State Lands Commission with oversight and administration of the State's program to prevent or minimize the release of nonindigenous species from vessels that are 300 gross register tonnage and above. Both the U.S. Coast Guard (USCG), Ballast Water Management, and U.S. EPA, Vessel General Permit, regulate ballast water discharges, and both agencies currently require ballast water exchange for most vessels operating in U.S. waters. California requires ballast water exchange on coastwise voyages; however, at present, the discharge standards in California are more stringent than federal regulations.
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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

5.0 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 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 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.[30] 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.[31] 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

[30] Jones, Klar, California Prehistory: Colonization, Culture, and Complexity, 2007.
[31] Ibid.

the State.[32] 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.[33]

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 like 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.[34] 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.[35,36,37] 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.[38] 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.[39]

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.[40] 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

[32] Ibid.
[33] Ibid.
[34] Ibid.
[35] Moratto, Michael J, California Archaeology, 1984, Print Edition.
[36] Chartkoff, Joseph L., Kerry K. Chartkoff, The Archaeology of California, 1984, Print Edition.
[37] Jones, Klar, California Prehistory: Colonization, Culture, and Complexity, 2007.
[38] Ibid.
[39] Moratto, Michael J, California Archaeology, 1984, Print Edition.
[40] Jones, Klar, California Prehistory: Colonization, Culture, and Complexity, 2007.

strings of dentalium shell as a form of currency, and by variation in burial types and associated grave goods.[41,42,43] 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.[44] Osteological evidence points to intergroup conflict and warfare in some regions during this period, 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.[45,46]

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.[47,48,49,50,51] 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.[52]

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.[53,54,55,56] 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.[57] Networks of foot trails were used to connect groups to

[41] Moratto, Michael J, California Archaeology, 1984, Print Edition.
[42] Chartkoff, Joseph L., Kerry K. Chartkoff, The Archaeology of California, 1984, Print Edition.
[43] Jones, Klar, California Prehistory: Colonization, Culture, and Complexity, 2007.
[44] Ibid.
[45] Ibid.
[46] Ibid.
[47] Kroeber, Alfred L, Handbook of the Indians of California, 1925, Print Edition.
[48] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[49] Ibid.
[50] Sturtevant, William C, Handbook of North American Indians, Volume 10, Southwest, Ortiz, Alfonso, 1983, Print Edition.
[51] Sturtevant, William C, Handbook of North American Indians, Volume 11, Great Basin, D'Azevedo, Warren L, 1986, Print Edition.
[52] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[53] Kroeber, Alfred L, Handbook of the Indians of California, 1925, Print Edition.
[54] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[55] Sturtevant, William C, Handbook of North American Indians, Volume 10, Southwest, Ortiz, Alfonso, 1983, Print Edition.
[56] Sturtevant, William C, Handbook of North American Indians, Volume 11, Great Basin, D'Azevedo, Warren L, 1986, Print Edition.
[57] Cook, Sherburne A., The Population of the California Indians: 1769–1970, 1976, Print Edition.

hunting or plant gathering areas, rock quarries, springs or other water sources, villages, ceremonial places, or distant trade networks.[58]

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.[59] 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.[60,61]

At the time of Spanish contact, religious practices among native Californian groups varied, but ethnographers have recognized several major religious systems.[62] 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.[63] 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

[58] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[59] Ibid.
[60] Ibid.
[61] Arnold, Jeanne E., Foundations of Chumash Complexity, Perspectives in California Archaeology, Volume 7, 2004, Print Edition.
[62] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[63] Ibid.

specific items, clamshell disk beads made from two clam species available on the Pacific coast were widely used as a form of currency.[64] 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.[65] In the 1830s, foreign disease epidemics swept through the densely populated Central Valley, adjacent foothills, and North Coast Ranges decimating indigenous population numbers.[66] 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 2017, the Native American population in California was estimated at over 672,123.[67] 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. There are currently 164 federally and non-federally recognized tribes within the State.[68] 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

[64] Kroeber, Alfred L, Elements of Culture in Native California, 1922, Print Edition.
[65] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[66] Ibid.
[67] U.S. Census Bureau, Quickfacts: California; United States, 2018, last accessed April 17, 2018, https://www.census.gov/quickfacts/fact/table/CA,US/RHI825216.
[68] Native American Heritage Commission, California Native American Heritage Commission Five-Year Strategic Plan 2018-2022, January 19, 2018, last accessed August 13, 2021, http://nahc.ca.gov/wp-content/uploads/2018/04/2018-NAHC-Strategic-Plan.pdf.

Franciscan Order established a series of 21 missions paralleling the coast along El Camino Real between San Diego and Sonoma.[69] Between 1769 and 1782, Spain built four presidios (i.e., 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.[70] 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, because 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.[71]

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.[72,73] 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.[74]

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.[75,76] Most Native

[69] Rolle, W.F., California: A History, 1969, Print Edition.
[70] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[71] Ibid.
[72] Beck, Warren A., Haase. Ynez D., Historical Atlas of California, 1974, Print Edition.
[73] Staniford, Edward F, The Pattern of California History, 1975, Print Edition.
[74] Hoover, et al., Historic Spots in California, 2002, Print Edition.
[75] Sturtevant, William C, Handbook of North American Indians, Volume 8, California, Heizer, Robert F, 1978, Print Edition.
[76] Hoover, et al., Historic Spots in California, 2002, Print Edition.

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.[77] 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 D-2f). 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.[78]

Table D-2f: Divisions of Geologic Time[79]

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	

[77] California Department of Transportation, A Historical Context and Archaeological Research Design for Mining Properties in California, 2008, last accessed August 13, 2021, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/ser/mining-study-a11y.pdf.
[78] Jefferson, George T, Paleontologic Resources and Collections Management Policy, 2004.
[79] USGS, Divisions of Geologic Time- Major Chronostratigraphic and Geochronologic Units, July 2010, last accessed August 16, 2021, https://pubs.usgs.gov/fs/2010/3059/pdf/FS10-3059.pdf.

Era	Period	Time in Millions of Years Ago (approximately)	Epoch
Paleozoic	Permian	299	
	Carboniferous	359	
	Devonian	416	
	Silurian	444	
	Ordovician	488	
	Cambrian	542	
Precambrian		2,500	

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 State Park in Ordovician sediments dating to circa 450 million years ago. Limestone outcrops of Pennsylvanian and Permian in the Providence Mountains State Recreation Area 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.[80]

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.[81] The lack of fossil remains of the majority of earth's large vertebrates, particularly terrestrial, marine, and flying reptiles (dinosaurs, ichthyosaurs, mosasaurs, plesiosaurs, and pterosaurs), as well as many

[80] Paleontology Portal, 2003, California, last accessed November 12, 2011, http://paleoportal.org/index.php?globalnav=time_space&sectionnav=state&name=California.
[81] San Diego Natural History Museum, Ankylosaur, last accessed August 13, 2021, http://www.sdnhm.org/exhibitions/fossil-mysteries/fossil-field-guide-a-z/ankylosaur.

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 D-2g.

Table D-2g: Applicable Laws and Regulations for Cultural Resources

Applicable Regulation	Description
Federal	
NHPA of 1966	The NHPA requires federal agencies to consider the preservation of historic and prehistoric resources. The NHPA authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places (NRHP), and it establishes an Advisory Council on Historic Preservation (ACHP) as an independent federal entity. Section 106 of the NHPA requires federal agencies to consider 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 (16 USC Sections 470aa-470ll)	The 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) (25 USC Section 3001 et seq.)	The 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 NAGPRA 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

Applicable Regulation	Description
	Native American human remains and specified objects possessed or controlled by federal agencies or museums.
Advisory Council Regulation, Protection of Historic Properties (36 CFR Part 800)	This regulation establishes procedures for compliance with Section 106 of the NHPA. These regulations define the Criteria of Adverse Effect, define the role of State Historic Preservation Officer (SHPO) in the Section 106 review process, set forth documentation requirements, and describe procedures to be followed if significant historic properties are discovered during implementation of an undertaking. Prehistoric and historic resources deemed significant (i.e., eligible for listing in the NRHP, per 36 CFR 60.4) must be considered in project planning and construction. The responsible federal agency must submit any proposed undertaking that may affect NRHP-eligible properties to the SHPO for review and comment prior to project approval.
National Park Service Regulations, NRHP (36 CFR Part 60)	These regulations set 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 (Federal Register [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 Department of Transportation Act requires a comprehensive evaluation of all environmental impacts resulting from federal-aid transportation projects administered by the Federal Housing Administration (FHA), Federal Transit Administration (FTA), and Federal Aviation Administration (FAA) that involve the use—or interference with use—of several types of land: public park lands, recreation areas, and publicly or privately owned historic properties of federal, state, or local significance. The Section 4(f) evaluation must be sufficiently detailed to permit the U.S. Secretary of Transportation to

Applicable Regulation	Description
	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	
Health and Safety Code Sections 7052 and 7050.5 and PRC Section 5097.98	Disturbance of human remains without the authority of law is a felony (Health and Safety Code Section 7052). According to State law (Health and Safety Code Section 7050.5; 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 Health and Safety Code, six or more human burials at one location constitute a cemetery (Health and Safety Code Sections 8100 and 7003), and disturbance of Native American cemeteries is a felony (Health and Safety Code Section 7052). Section 7050.5 requires that construction or excavation be stopped near 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 (Health and Safety Code 7050.5(c); PRC Section 5097.98).

Applicable Regulation	Description
CEQA (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.
AB 52 (Statutes of 2014)	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 (local register of historical resources is defined in PRC Section 5020.1(k)). 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, USFS, California State Parks [CSP], Bureau of Indian Affairs, Department of Defense, and others) 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 Part 61).
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

6.0 ENERGY DEMAND

A. Existing Conditions

1. United States

Petroleum, natural gas, coal, nuclear energy, and renewable energy are the primary energy sources of the United States. Electricity is a secondary energy source that is generated from primary energy sources. In 2020, the U.S. energy mix was:[82]

- Petroleum: 35 percent,
- Natural gas: 34 percent,
- Renewable energy: 12 percent,
- Coal: 10 percent, and
- Nuclear electric power: 9 percent.

Energy sources are measured in different physical units: liquid fuels in barrels or gallons, natural gas in cubic feet, coal in short tons, and electricity in kilowatts and kilowatt-hours. In the United States, British thermal units (Btu), a measure of heat energy, are commonly used to compare different types of energy to each other. In 2020, total U.S. primary energy consumption was equal to approximately 93 quadrillion (or one thousand trillion) Btu.[83]

In 2020, the shares of total primary energy consumption for the four end-use energy-consuming sectors were:[84]

- Industrial—36 percent,
- Transportation—35 percent,
- Residential—17 percent, and
- Commercial—12 percent.

Fossil fuels have dominated the U.S. energy mix for more than 100 years, but the mix has changed over time. Energy production trends and current production are summarized as follows:[85]

- Coal production peaked in 2008 and trended down through 2020. Coal production in 2020 was the lowest amount since 1965. The primary reason for the general decline in coal production in recent years is the decrease in coal consumption for electricity generation.

[82] U.S. Energy Information Administration, U.S. Energy Facts Explained, May 14, 2021, last accessed May 24, 2021, https://www.eia.gov/energyexplained/us-energy-facts/.
[83] Ibid.
[84] Ibid.
[85] Ibid.

- Natural gas production reached a record high in 2019. More efficient drilling and production techniques have resulted in increased production of natural gas from shale and tight geologic formations.

- Crude oil production generally decreased each year between 1970 and 2008. In 2009, the trend reversed, and production began to rise. U.S. crude oil production reached a record high in 2019. More cost-effective drilling and production technologies helped to boost production, especially in Texas and North Dakota. Crude oil production was lower in 2020 than in 2019 because the demand for U.S. petroleum dropped substantially in March and April 2020 in response to the COVID-19 pandemic.

- Natural gas plant liquids (NGPLs) are hydrocarbon gas liquids extracted from natural gas before the natural gas is put into pipelines for transmission to consumers. NGPL production has generally increased since 2005 alongside increases in natural gas production. In 2020, NGPL production reached a record high.

- Nuclear energy production in the United States generally leveled off after 2000. Although fewer nuclear reactors operated in 2020 than in 2000, the amount of nuclear energy production in 2020 was the second highest (behind 2019)—the result of increased capacity from power plant upgrades and shorter refueling and maintenance cycles.

- Total renewable energy production and consumption both reached record highs in 2020 primarily because of record-high solar and wind energy production. Hydroelectric power production in 2020 was about 1 percent higher than in 2019 but about 9 percent below the 50-year average. Total biomass production and consumption in 2020 were both 10 percent lower than the highest levels, which were recorded in 2018. Geothermal energy use was nearly the same in 2020 as it was in 2014, when the highest annual level of geothermal energy production and consumption was recorded.

2. California

In 2018, California's total energy consumption was second highest in the nation, but the state's per capita energy consumption ranked 47th, attributable in part to its mild climate and energy efficiency programs. California is the largest consumer of both jet fuel and motor gasoline among the 50 states, and it is the second-largest consumer of all petroleum products combined, accounting for 10 percent of the U.S. total. California was the seventh-largest producer of crude oil among the 50 states in 2019 and, as of January 2020, third in oil refining capacity with foreign suppliers providing more than half of the crude oil refined in the state in 2019. In 2019, California ranked second in the nation in conventional hydroelectric power generation and first as a producer of electricity from solar, geothermal, and biomass resources. In 2019, California was the fourth-largest electricity producer in the nation, but it also was the nation's largest importer of electricity,

receiving approximately 28 percent of its electricity supply from generating facilities outside of California, including imports from Mexico.[86]

In 2018, California's power mix consisted of 34.23 percent from natural gas, 31.70 percent from renewable sources (i.e., solar, wind, biomass, geothermal, and small hydropower), 14.62 percent from large hydropower; 8.98 percent from nuclear energy production, 7.5 percent from miscellaneous nonrenewable sources (i.e., oil, waste heat/petroleum coke, and unspecified), and 2.96 percent from coal.[87] Approximately 72 percent of total electricity generation was from in-state sources, with the remaining electricity coming from out-of-state imports from the Pacific Northwest (9 percent) and the Southwest (19 percent).[88]

B. Regulatory Setting

Applicable laws and regulations associated with energy resources are discussed in Table D-2h.

Table D-2h: Applicable Laws and Regulations for Energy Resources

Regulation	Description
Federal	
Energy Policy and Conservation Act of 1975	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 (NHTSA), which is part of the U.S. Department of Transportation (DOT), is responsible for establishing additional vehicle standards and for revising existing standards. From 1986 to 2012, fuel economy standards for passenger vehicles remained nearly stagnant at between 20.7 miles per gallon (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 model years through 2025 were adopted in 2012. Translating the GHG standards to mpg 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

[86] U.S. Energy Information Administration, California: State Profile and Energy Estimates, February 18, 2021, last accessed May 14, 2021, https://www.eia.gov/state/?sid=CA.
[87] California Energy Commission, 2019 Total System Electric Generation, last accessed August 13, 2021, https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2019-total-system-electric-generation.
[88] Ibid.

Regulation	Description
	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 model years. Fuel economy standards for these vehicles vary by vehicle profession and include explicit mpg goals as well as percent reduction targets. In 2016, NHTSA and U.S. EPA adopted new standards for medium- and heavy-duty vehicles for 2018 through 2027 that would achieve GHG emissions reductions of approximately 1.1 billion metric tons.[89] 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 U.S. EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. 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, DOT is authorized to assess penalties for noncompliance.
Energy Policy Act (EPAct) of 1992	The EPAct was passed to reduce the country's dependence on foreign petroleum and improve air quality. The EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. The EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in the EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.
Energy Policy Act of 2005	The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

[89] U.S. Environmental Protection Agency, EPA and NHTSA Adopt Standards to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles for Model Year 2018 and Beyond, August 2016, last accessed August 13, 2021, https://nepis.epa.gov/Exe/ZyPDF.cgi/P100P7NL.PDF?Dockey=P100P7NL.PDF.

Regulation	Description
State	
Warren-Alquist State Energy Resources Conservation and Development Act of 1974 (PRC Section 25000 et seq.)	The Warren-Alquist Act is the legislation that created and gives statutory authority to CEC (formally called the State Energy Resources Conservation and Development Commission).
Integrated Energy Policy Reports (Senate Bill [SB] 1389)	SB 1389 (Bowen, Chapter 568, Statutes of 2002) requires 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)). 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.[90]
California Long-Term Energy Efficiency Strategic Plan	On September 18, 2008, 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.
Energy Action Plan	The first Energy Action Plan emerged in 2003 from a crisis atmosphere in California's energy markets. The State's three major energy policy agencies (CEC, CPUC, and the Consumer Power and Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and

[90] California Energy Commission, ICF International, Combined Heat and Power: Policy Analysis and 2011-2030 Market Assessment, June 2012, last accessed August 13, 2021, https://efiling.energy.ca.gov/GetDocument.aspx?tn=65855.

Regulation	Description
	set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.
California Building Energy Efficiency Standards (24 CCR Part 6)	California's Building Energy Efficiency Standards (Title 24, Part 6 of the CCR) serve to conserve electricity and natural gas in new building construction and are administered by CEC. Local governments enforce the standards through local building permitting and inspections. CEC updates these standards on a triennial basis. The 2016 Building Energy Efficiency Standards, which took effect on January 1, 2017, are approximately 28 percent more efficient than previous standards (2013) for residential land uses and 5 percent more efficient for nonresidential land uses. On May 9, 2018, CEC adopted the 2019 Building Energy Efficiency Standards, which contain new requirements to further improve the energy efficiency of new buildings and will go into effect on January 1, 2020.
Comprehensive Energy Efficiency Plan for Existing Buildings (AB 758)	AB 758 (Skinner, Chapter 470, Statutes 2009) requires CEC, in collaboration with CPUC and stakeholders, to develop a comprehensive program to achieve greater energy efficiency in the state's existing buildings.
California Renewable Energy Portfolio Standard (RPS) (SB X1-2)	In 2011, Governor Brown signed SB X1-2, which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 33 percent of their electricity supply (portfolio) from renewable sources by 2020. CPUC and CEC jointly implement the statewide RPS program through rulemakings and monitoring the activities of electric energy utilities in the state.
California Qualifying Facility and CHP Program Settlement	In December 2010, CPUC approved California's Qualifying Facility and CHP Program Settlement, which established a CHP framework for the state's investor-owned utilities. The settlement established a near-term target of 3,000 MW of CHP for entities under the jurisdiction of CPUC, although this target includes not just new CHP, but capacity from renewal of contracts due to expire in the next three years. 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.[91]
California Strategy to Reduce Petroleum Dependence (AB 2076)	AB 2076 (Chapter 936, Statutes of 2000) requires CEC and 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

[91] Ibid.

Regulation	Description
	to include recommendations to increase transportation energy efficiency as well as the use of non-petroleum fuels and advanced transportation technologies including alternative fuel vehicles, hybrid vehicles, and high-fuel efficiency vehicles. The strategy, “Reducing California’s Petroleum Dependence,” was adopted by 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 (AB 118)	AB 118 (Statutes of 2007) created the CEC’s Alternative and Renewable Fuel and Vehicle Technology Program. The statute, subsequently amended by AB 109 (Statutes of 2008), authorizes 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 (AB 1007)	AB 1007 requires CEC to prepare a State plan to increase the use of alternative fuels in California. Any environmental document prepared for a strategic growth plan, regional blueprint general plan metropolitan planning or transportation plan should include an evaluation of alternative fuels for emissions or criteria pollutants, TACs, GHGs, water pollutants, and other harmful substances, and their impacts on petroleum consumption, and set goals for increased alternative fuel use in the State for the next decades, and recommend 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 (EO S-06-06)	EO 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. The EO 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 EO also calls for the State to meet a target for use of biomass electricity.

Regulation	Description
Governor's Low Carbon Fuel Standard (LCFS) (EO S-01-07)	EO 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 EO 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, and approved amendments to the LCFS in January 2019.
SB 100	SB 100, approved on September 10, 2018, amends the California Renewables Portfolio Standard. This bill revises the legislative findings and declarations of the statewide goal of achieving 50 percent renewable resources by December 31, 2030 as mandated by the Renewables Portfolio Standard Program to a 60 percent target by December 31, 2030. The bill would require that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44 percent and 60 percent of retail sales by the target dates stated above, respectively. This bill would also require that the State supply 100 percent of retail sales of electricity to California end-use customers from renewable energy resources and zero-carbon resources by December 31, 2045.
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 and plug-in hybrid electric vehicles and the construction of infrastructure for these types of vehicles. In March 2018, CARB released and adopted the second round of GHG reduction targets for the state's 18 MPOs.
Clean Energy and Pollution Reduction Act of 2015 (SB 350)	The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by 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.

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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

7.0 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 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.[92] Precipitation in California is highly variable year-to-year and across

[92] U.S. Geological Survey, Ground Water Atlas of the United States: California, Nevada, 1995, last accessed August 13, 2021, http://pubs.usgs.gov/ha/ha730/ch_b/index.html.

the state. The southeast deserts typically receive less than 5 inches a year and the north coast can often receive up to 100 inches per year, averaging about 50 inches across the state. Approximately 75 percent of the state's annual precipitation falls between October and April, primarily in the form of rain, except for high mountain elevations.[93] Overall, northern California is wetter than southern California with most 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.[94] 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.[95]

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 predict precisely where or when an earthquake will occur and what its magnitude will be.

[93] California Department of Water Resources, California Precipitation, 2014, last accessed August 13, 2021, https://cw3e.ucsd.edu/wp-content/uploads/2015/02/CA_Precip_final.pdf.
[94] Harden, Deborah R, California Geology, 1997, Print Edition.
[95] Ibid.

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.[96] 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.[97]

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,

[96] Ritchie, David, Alexander E. Gates, Encyclopedia of Earthquakes and Volcanoes, 2001, Print Edition.
[97] California Geological Survey, Earthquake Fault Zones: A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California, 2018, last accessed August 13, 2021, https://www.conservation.ca.gov/cgs/Documents/Publications/Special-Publications/SP_042.pdf.

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 D-2i.

Table D-2i: Applicable Laws and Regulations for Geology and Soils

Regulation	Description
Federal	
Safe Drinking Water Act (SDWA) - Federal Underground Injection Control (UIC) Class VI Program for Carbon Dioxide Geology Sequestration Wells	Under the SDWA, the 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 (CO_2) 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 CO_2 storage sites.
SDWA - Federal UIC 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 U.S. 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 (40 CFR 112)	The CWA was enacted to restore and maintain the chemical, physical, and biological integrity of the nation's waters by regulating point and nonpoint pollution sources, helping 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 Storm Water Pollution Prevention Plans (SWPPPs). In California, the state's NPDES permit program is implemented and administered by the local RWQCBs.

Regulation	Description
Earthquake Hazards Reduction Act and National Earthquake Hazards Reduction Program Act	This Act established the National Earthquake Hazards Reduction Program to reduce the risks to life and property from future earthquakes. This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act by refining the description of agency responsibilities, program goals and objectives.
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 et seq.)	The Seismic Hazards Mapping Act of 1990 (PRC, Chapter 7.8, Division 2) directs the DOC Division of Mines and Geology (now called 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 (PRC Section 2621 et seq.)	California's Alquist-Priolo Act (PRC Section 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

Regulation	Description
	or in the shallow subsurface, using standard professional techniques, criteria, and judgment.
California Division of Oil, Gas, and Geothermal Resources (DOGGR) (PRC Section 3106).	PRC Section 3106 mandates the supervision of drilling, operation, maintenance, and abandonment of oil wells for 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 Title 14 CCR Chapter 4, Subchapter 1 (commencing with Section 1710 et seq.).
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, 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) (PRC Section 2710 et seq.)	The intent of the SMARA of 1975 was to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using Mineral Resource Zones (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

Regulation	Description
	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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

8.0 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.[98] 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

[98] Ahrens, C. Donald, Meteorology Today: An Introduction to Weather, Climate and the Environment, 2003.

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 degrees Fahrenheit (°F) (6 degrees Celsius [°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 July 10, 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 January 20, 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), with an average January minimum of 49°F (9°C), and an average July 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 averaging 93°F (34°C).

Annual precipitation varies from only 2 inches (5 centimeters [cm]) in the Imperial Valley to 68 inches (173 cm) at Blue Canyon, near Lake Tahoe. San Francisco had an average annual precipitation (1971–2000) of 20 inches (51 cm), Sacramento 17.9 inches (45.5 cm), Los Angeles 13.2 inches (33.5 cm), and San Diego 10.8 inches (27.4 cm). The largest one-month snowfall ever recorded in the U.S., 390 inches (991 cm), fell in Alpine County in January 1911. Snow averages between 300 and 400 inches (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 miles per hour (mph) (18 kilometers per hour [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), the scientific body established by the World Meteorological Organization and by the United Nations Environment Programme, 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 GHG concentrations. GHGs, which are emitted from both natural and anthropogenic sources, include water vapor, CO_2, methane, nitrous oxide (N_2O), 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 due to higher concentrations of GHGs in the Earth's atmosphere. As a result, global climate warming is occurring faster than at any other time on record within the past 650,000 years. Long-term, decadal, and inter-annual fluctuations in the Earth's climate have historically 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. Anthropogenic activities that result in emissions of GHGs include the burning of fossil fuels such as coal, oil, and natural gas, cutting down trees (i.e., deforestation), and 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 sequester CO_2. Emissions of GHGs associated with human activities have increased globally since pre-industrial times, with an increase of 70 percent between 1970 and 2004.[99]

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 United Nations Climate Change Convention and the Kyoto Protocol). Six major GHGs have been the focus of efforts to reduce emissions and are included in the California Global Warming Solutions Act (AB 32): CO_2, methane, N_2O, HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). They are regulated under the Kyoto Protocol. Nitrogen trifluoride was later added to the list of important GHGs to reduce and codified in California statute.

The "global warming potential" (GWP) metric is used to convert all GHGs into "CO_2-equivalent" (CO_2e) units. Importantly, metrics such as GWP have been used as an exchange rate in multi-gas emissions policies and frameworks. Each gas's GWP is defined relative to CO_2. For example, using values from the IPCC's Fourth Assessment

[99] Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis, 2007, last accessed August 13, 2021, https://www.ipcc.ch/site/assets/uploads/2018/05/ar4_wg1_full_report-1.pdf.

Report, N_2O's GWP is 298, meaning a unit mass of N_2O warms the atmosphere 298 times more than a unit mass of CO_2. SF_6 and PFCs have extremely long atmospheric lifetimes, resulting in their essentially irreversible accumulation in the atmosphere once emitted. However, in terms of quantity of emissions, CO_2 dominates world and U.S. GHG emissions.

Because the major GHGs have longer lives, they build up in the atmosphere so that past, present, and future emissions ultimately contribute to total atmospheric concentrations. Thus, while reducing emissions of conventional air pollutants decreases their concentrations in the atmosphere in a relatively short time, atmospheric concentrations of the major GHGs can only be gradually reduced over years and decades. More specifically, the rate of emission of CO_2 currently greatly exceeds its rate of removal, and the slow and incomplete removal implies that small to moderate reductions in its emissions would not result in stabilization of CO_2 concentrations, but rather would only reduce the rate of its growth in coming decades. Many of the same activities that emit conventional air pollutants also emit GHGs (e.g., the burning of fossil fuels to produce electricity, heat or drive engines and the burning of biomass). Some conventional air pollutants also have greenhouse effects; for example, soot/black carbon and tropospheric ozone (see Short-Lived Climate Pollutants below).

c) Attributing Climate Change—Greenhouse Gas Emission Sources

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial, and agricultural sectors. In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation. Anthropogenic emissions of CO_2 are byproducts of fossil fuel combustion. Methane, a potent GHG, resulting primarily from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions), is largely associated with fugitive emissions from oil and gas operations, natural gas transmission, agricultural practices, and landfills. N_2O is also largely attributable to agricultural practices nitrogen-based fertilizers) and soil management. CO_2 sinks, or reservoirs, include vegetation, soils, and the ocean, which absorb CO_2 through sequestration and dissolution, respectively, two of the most common processes of CO_2 sequestration.

CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect (i.e., GWP). The GWP is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, "Calculation References," of the General Reporting Protocol of the California Climate Action Registry (CCAR) 1 ton of methane has the same contribution to the greenhouse effect as

approximately 34 tons of CO_2.[100,101] Therefore, methane is a much more potent GHG than CO_2. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

The California GHG inventory compiles statewide anthropogenic GHG emissions and sinks. It includes estimates for CO_2, methane, N_2O, SF_6, nitrogen trifluoride, HFCs, and PFCs. The current inventory covers years 2000 to 2018.[102]

Between 2000 and 2018, California's emissions of GHGs decreased by 9 percent, from 468.2 $MMTCO_2e$ in 2000 to 425.3 $MMTCO_2e$ in 2018, with a maximum of 490.9 $MMTCO_2e$ in 2004. During the same period, California's population grew by 17 percent. As a result, California's per capita GHG emissions have decreased over the same time period from 13.8 to 10.7 metric tons (MT) CO_2e per person. In 2018, emissions decreased for the transportation sector since the prior year. Emissions from the other sectors (i.e., electric power, industrial, commercial and residential, agriculture, high GWP, and recycling and waste) remained relatively flat or increased slightly from 2017.[103]

d) Short-Lived Climate Pollutants

Climate policy and research have mainly concentrated on long-term climate change and controlling the long-lived GHGs. However, there is growing recognition within the scientific community that efforts to address climate change should also focus on near-term actions to reduce climate-warming substances with much shorter atmospheric lifetimes. These non-CO_2 pollutants, known as short-lived climate pollutants (SLCPs), include methane, fluorinated gases including HFCs, and black carbon.

From a global perspective, SLCPs represent nearly 40 percent of the total climate pollutant emissions. In California, their contribution is smaller at around 30 percent. SLCPs have relatively short lifetimes in the atmosphere, but have significant GWP, which represent the ability to trap heat relative to CO_2. Since SLCPs remain in the atmosphere for periods of only a few days to a few decades, reducing their emissions results in immediate benefits. Thus, controlling sources of SLCPs is a critical climate strategy for reducing the near-term rate of global warming, particularly in regions most vulnerable to climate change.

California has established a strong track record with significant SLCP reductions as a co-benefit to its long-standing programs to clean up the air and protect public health. These include diesel engine controls, advanced clean cars, restrictions on burning, development

[100] Intergovernmental Panel on Climate Change, Climate Change 2013: The Physical Science Basis, 2013, last accessed August 13, 2021, https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf.
[101] California Climate Action Registry, California Climate Action Registry General Reporting Protocol, April 2008, last accessed August 13, 2021, https://www.climateactionreserve.org/wp-content/uploads/videos/GRP_V3_April%202008_FINAL.pdf.
[102] California Air Resources Board, California Greenhouse Gas Emissions for 2000 to 2018: Trends of Emissions and Other Indicators, 2020, last accessed August 13, 2021, https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2018/ghg_inventory_trends_00-18.pdf.
[103] Ibid.

of a refrigerant management program, and landfill controls. In March 2017, CARB adopted the SLCP Reduction Strategy to further reduce SLCP emissions as a component of achieving statewide GHG reduction goals. The SLCP Reduction Strategy aims to reduce emissions of methane from the solid waste, agricultural, wastewater, and oil and gas sectors; reduce emissions of carbon dioxide through forest management practices; and reduce emissions of fluorinated gases through more stringent protocols regarding the use and manufacturing of refrigerants.[104]

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 NOx and 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 SIPs. 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 (NOx 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 several 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

[104] California Air Resources Board, Short-Lived Climate Pollutant Reduction Strategy, March 2017, last accessed August 13, 2021, https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf.

also contributed by non-anthropogenic or "natural" sources such as wetlands, oceans, forests, fires, terrestrial arthropods (such as termites) and geological sources (such as submarine gas seepage, micro seepage over dry lands and geothermal seeps).

iii) Hydrofluorocarbons

HFCs are synthetic gases that are the fastest growing climate forcers in the U.S. as well as in many other countries. HFCs represent just three percent of all GHG emissions in California, but their warming effect is hundreds to thousands of times that of CO_2. HFCs are primarily produced for use as substitutes for ozone-depleting substances 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 IPCC global average temperature is expected to increase by 3–7°F by the end of the century, depending on future GHG emission scenarios.[105] Resource areas other than air quality and global average temperature could be indirectly affected by the

[105] Intergovernmental Panel on Climate Change, Climate Change 2013: The Physical Science Basis, 2013, last accessed August 13, 2021, https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf.

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 CEC, statewide average temperatures increased by about 1.7°F from 1895 to 2011.[106] 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.[107]

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.

[106] California Energy Commission, ICF International, Combined Heat and Power: Policy Analysis and 2011-2030 Market Assessment, June 2012, last accessed August 13, 2021, https://efiling.energy.ca.gov/GetDocument.aspx?tn=65855.
[107] Ibid.

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 CNRA 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.[108]

B. Regulatory Setting

Applicable laws and regulations specific to the reduction of GHG emissions are listed in Table D-2j below. It should be noted that other laws and regulations described under Energy Demand in this Environmental Setting would also reduce GHG emissions.

Table D-2j: Applicable Laws and Regulations for Greenhouse Gases

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 $MTCO_2e$ 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	On September 15, 2009, U.S. EPA and 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 (EPCA). This proposed

[108] Ibid.

Regulation	Description
	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 DOT, develop, through notice and comment rulemaking, a coordinated National Program under the CAA and the EPCA, as amended by the Energy Independence and Security Act, to reduce fuel consumption by and GHG emissions of light-duty vehicles for model years 2017–2025. U.S. EPA and NHTSA are developing the proposal based on extensive technical analyses, an examination of the factors required under the respective statutes and on discussions with individual motor vehicle manufacturers and other stakeholders. The National Program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles (light-duty vehicles) built in those model years (76 FR 48758). The first part of this program (i.e., 2012–2016) is implemented. The next part (i.e., 2017-2025) was released by U.S. EPA in 2016 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.
Endangerment and Cause or Contribute Findings	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 U.S. 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 the concentrations of the six key GHGs (i.e., CO_2, methane, N_2O, HFCs, PFCs, and SF_6) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and therefore the threat of climate change. The Administrator found that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the CAA. The evidence supporting this finding consists of human activity resulting in "high atmospheric levels" of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore,

Regulation	Description
	the observed and projected results of climate change (e.g., higher likelihood of heat waves, wild fires, droughts, sea level rise, and higher intensity storms) are a threat to the public health and welfare. Therefore, GHGs were found to endanger the public health and welfare of current and future generations. The Administrator also found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. U.S. EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHGs fit within the CAA definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements but rather allow U.S. EPA to finalize the GHG standards proposed earlier in 2009 for new light-duty vehicles as part of the joint rulemaking with DOT.
Significant New Alternatives Policy (SNAP)	U.S. EPA's SNAP program provides 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 CAA 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	
EO S-3-05	EO 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 EO established statewide GHG emission reduction targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The EO directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG 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

Regulation	Description
	mitigation and adaptation plans to combat these impacts. To comply with the EO, the Secretary of the CalEPA created the Climate Action Team made up of members from various State agencies and commission. The Climate Action Team 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.
AB 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. AB 32 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 institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.
EO B-30-15	EO 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 GHG emissions. CARB initiated a public process in the summer of 2015 and worked closely with other State agencies to update the State's Climate Change Scoping Plan. The 2017 Scoping Plan, released and adopted in December 2017, provides the framework for achieving the 2030 target. Concurrent planning efforts related to energy efficiency in existing buildings (AB 758), SLCPs, sustainable freight, Greenhouse Gas Reduction Fund Investments, forest health, and others will be coordinated with, and feed into, the 2017 Scoping Plan.

Regulation	Description
SB 32 and AB 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 contained in EO 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.
EO-N-79-20	In September 2020, Governor Newsom issued EO N-79-20, calling for reduced carbon pollution from the transportation sector. The EO directs CARB, in coordination with other State agencies, U.S. EPA, and local air districts, to develop and propose technologically feasible and cost-effective strategies to achieve 100 percent zero-emission from off-road vehicles and equipment operations in the State by 2035.
SB 350, Clean Energy and Pollution Reduction Act of 2015 (Statutes of 2015)	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 50 percent by 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.
SB 100, Renewables Portfolio Standard Program: Emissions of Greenhouse Gases	SB 100, approved on September 10, 2018, amends the California Renewables Portfolio Standard. This bill revises the legislative findings and declarations of the statewide goal of achieving 50 percent renewable resources by December 31, 2030 as mandated by the Renewables Portfolio Standard Program to a 60 percent target by December 31, 2030. The bill would require that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44 percent and 60 percent of retail sales by the target dates stated above, respectively. This bill would also require that the State supply 100 percent of retail sales of electricity to California end-use customers from renewable energy resources and zero-carbon resources by December 31, 2045.

Regulation	Description
SB 605, SLCPs (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. In 2017, CARB published and adopted the SLCP Reduction Strategy, which serves as one of five pillars identified by Governor Jerry Brown to achieve the state's GHG reduction goals for 2030 and 2050.
AB 1493, Statutes of 2002	In September 2004, CARB approved regulations to reduce GHG emissions from new motor vehicles. CARB took this action pursuant to Chapter 200, Statutes of 2002 (AB 1493, Pavley) which directed CARB to adopt regulations that achieve the maximum feasible and cost-effective reduction in GHG 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.
EO S-1-07	EO 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 the LCFS could be adopted as a discrete early action measure after meeting the mandates in AB 32. CARB adopted the original LCFS regulation on April 23, 2009.
SB 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 CPUC to establish a GHG emission performance standard for baseload generation from investor owned utilities by February 1, 2007. CEC must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed

Regulation	Description
	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 CPUC and CEC.
SB 1078, Statutes of 2002, SB 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 RPS to 33 percent renewable power by 2020.
SB 97, Statutes of 2007	As directed by SB 97, the CNRA 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.
SB 375, Statutes of 2008	SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires MPOs to adopt an SCS or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's RTP. CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light-duty trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four 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. This bill also extends the minimum time period for the Regional Housing Needs Allocation cycle from five years to eight 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."
EO 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

Regulation	Description
	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 EO S-13-08 on November 14, 2008. This EO directed the CNRA to develop the 2009 California Climate Adaptation Strategy, 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.[109] This EO also directed the Office of Planning and Research (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 and OPR continues to further refine land use planning guidance related to climate change impacts.[110] EO S-13-08 also directed CNRA to convene an independent panel to complete the first California Sea Level Rise Assessment Report. This report is to be completed no later than December 1, 2010. The report is intended to provide information on the following: • Relative sea level rise projections specific to California, considering 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

[109] California Natural Resources Agency, 2009 California Climate Adaptation Strategy, 2009, last accessed August 13, 2021, http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf.
[110] Ibid.

Regulation	Description
	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 also adopted rules to implement federal standards for the installation of gas collection and control systems.
AB 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.
AB 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.
AB 1257 (Statutes of 2013)	AB 1257 (Bocanegra, Chapter 749, Statutes of 2013) directs 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.
AB 1900 (Statutes of 2012)	AB 1900 (Gatto, Chapter 602, Statutes of 2012) directed CPUC to adopt natural gas constituent standards (in consultation with CARB and the Office of Environmental Health and Hazard Assessment [OEHHA]). 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.
SB 1122 (Statutes of 2012)	SB 1122 (Rubio, Chapter 612, Statutes 2012) directed 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 megawatts of cumulative electricity generation from biogas facilities that commence operating on or after June of 2013.

Regulation	Description
AB 691 (Proactively Planning for Sea Level Rise Impacts)	AB 691, signed in 2013, requires that ports and other land use management districts submit to the State Lands Commission, no later than July 1, 2019, an assessment of how sea-level rise impacts on tidelands are being addressed. The assessment must include: an assessment of the impact of sea-level rise on granted public trust lands as described by certain documents; maps showing the areas that may be affected by sea level rise for the years 2030, 2050, and 2100, and also include the impacts of 100-year storm events; an estimate of the financial cost of the impact of sea-level rise; and a description of how natural and human-made resources and facilities could be protected and preserved.
Local	
Local Climate Action Plans (CAPs)	CARB encourages local governments to adopt GHG reduction goals for municipal operations emissions and establish goals parallel to the State's commitment to reducing GHG emissions. Development projects within a jurisdiction with adopted, verified CAPs would be subject to the requirements of the CAP.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

9.0 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. A number of properties may cause a substance to be considered hazardous, including toxicity (causes human health effects), ignitibility (can burn), corrosivity (causes severe burns or damage to materials), and reactivity (causes explosions or generates toxic gases). The term "hazardous material" refers to both hazardous substances and hazardous wastes. A hazardous waste is a waste with a chemical composition or other properties that make it capable of causing illness, death, or some other harm to humans and other life forms when mismanaged or released into the environment. 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. 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

Health and Safety Code Section 25501 defines "hazardous materials," in part, as a material identified in statute 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 include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering regulatory agency has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment. A number of properties may cause a substance to be considered hazardous, including toxicity (causes human health effects), ignitibility (can burn), corrosivity (causes severe burns or damage to materials), and reactivity (causes explosions or generates toxic gases). A hazardous waste is a waste with a chemical composition or other properties that make it capable of causing illness, death, or some other harm to humans and other life forms when mismanaged or released into the environment. 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 provide criteria to use to determine whether a waste is hazardous, including the following: 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 hazardous materials are also found in California, including asbestos. 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 D-2k.

Table D-2k: 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.
SDWA	SDWA is the main federal law that ensures the quality of Americans' drinking water. Under the SDWA, U.S. EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. The 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. The SDWA does not regulate private wells which serve fewer than 25 individuals.
Federal Hazardous Materials Regulations (Title 49, CFR, 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 USC Section 2601 et seq.	The TSCA provides U.S. EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. The TSCA addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls, asbestos, radon, and lead-based paint.
Resource Conservation and Recovery Act (RCRA) (42 USC Section 6901 et seq. (40 CFR Parts 260-273)	The 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. The RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to the RCRA enabled U.S. EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. The Federal Hazardous and Solid Waste Amendments are the 1984 amendments to the 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 U.S. EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program. Federal regulations adopted by U.S. EPA are found in 40 CFR.

Regulations	Description
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	The 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. The 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 National Priorities List. The Superfund Amendments and Reauthorization Act (SARA) of 1986 reauthorized the 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 the SARA authorized the Emergency Planning and Community Right-to-Know Act (EPCRA).
EPCRA (42 USC Section 9601 et seq.)	The SARA of 1986 created the EPCRA (40 CFR Parts 350-372), also known as the 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. The EPCRA required the establishment of state/tribe emergency response commissions, responsible for coordinating certain emergency response activities and for appointing local emergency planning committees.
Fuels and Fuel Additive Program (40 CFR Part 79)	U.S. 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. OPPTS requires that all chemicals produced in the U.S. are registered with the TSCA. 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.
USCG 33 CFR and 46 CFR	USCG, through Title 33 (Navigation and Navigable Waters) and Title 46 (Shipping) of the CFR, is the federal agency responsible for vessel inspection, marine terminal operations safety, coordination of federal responses to marine emergencies, enforcement of marine pollution statutes, marine safety (such as navigation aids), and operation of the National Response Center for spill response. USCG is the lead agency for offshore spill response. USCG implemented a revised vessel-boarding program in 1994 designed to identify and eliminate substandard vessels from U.S. waters.

Regulations	Description
Ports and Waterways Safety Act (33 USC Chapter 25)	The Ports and Waterways Safety Act of 1972 (PWSA) authorizes the U.S. Coast Guard to establish vessel traffic service/separation schemes for ports, harbors, and other waters subject to congested vessel traffic.
State	
Hazardous Materials Transportation (Vehicle Code Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620)	Regulations pertaining to the safe transport of hazardous materials are in 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 (Health and 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, including batteries. The Hazardous Waste Control Law and implementing regulations are administered and enforced by Department of Toxic Substances Control (DTSC).
California Accidental Release Prevention (CalARP) Program (19 CCR Division 2, Chapter 4.5, Sections 2735-2785)	The purpose of the CalARP program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right-to-know laws. This is accomplished by requiring businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop a Risk Management Plan (RMP). An RMP is a detailed engineering analysis of the potential accident factors present at a business and the mitigation measures that can be implemented to reduce this accident potential.
Hazardous Material Business Plan & Area Plan Program (Health and Safety 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 accidently released into the environment, is not now available to firefighters, health officials, planners, public safety officers, health care providers, regulatory agencies, and other interested persons. The information provided by business and area plans is necessary in order to prevent or mitigate the damage to the

Regulations	Description
	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 CalEPA to carry out several of the hazardous waste/hazardous materials regulatory programs administered by the State in a coordinated and consistent manner. The six hazardous waste and materials program elements covered by the CUPA include: 1) Hazardous Waste Generators 2) Underground Tanks 3) Above Ground Tanks 4) Accidental Release Program 5) Hazardous Material Release Response Plans & Spill Notification 6) Hazardous Materials Management Plans & Inventory Reporting The intent of the CUPA is to simplify the hazardous materials regulatory environment and provide a single point of contact for businesses to address inspection, permitting, billing, and enforcement issues.
Local	
Various Local Ordinances	Various ordinances, codes, or emergency operations plans may be adopted at the local level (including individual ports) to provide stricter requirements in the management of hazardous materials and waste activities within the jurisdiction.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

10.0 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 most 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.

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.[111] 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.[112] Groundwater recharge occurs more readily in areas underlain by coarse sediments, primarily in mountain base alluvial fan settings. As a result, most 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.

[111] California Department of Water Resources, California's Groundwater (Bulletin 118), 2003, last accessed August 13, 2021, https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118.
[112] Ibid.

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.[113] 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 U.S. EPA and the State Water Resources Control Board (SWRCB) through RWQCBs. 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 D-2l.

Table D-2l: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply

Regulation	Description
Federal	
National Flood Insurance Program	Designated floodplain mapping program, flooding and flood hazard reduction implementation, and federal subsidized flood insurance for residential and commercial property. Administered by the Federal Emergency Management Agency (FEMA).
EO 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.

[113] U.S. Environmental Protection Agency, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993, last accessed August 13, 2021, https://www.epa.gov/nps/guidance-specifying-management-measures-sources-nonpoint-pollution-coastal-waters.

Regulation	Description
CWA	Administered primarily by U.S. EPA, the CWA 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 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. Several of the cities and counties issue their own NPDES municipal stormwater permits for the regulations of stormwater discharges. These permits require that controls are implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, these permit holders have created Stormwater Management Plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects, applicants will be required to follow the guidance contained in the Stormwater Management Plans as defined by the permit holder in that location.
CWA Section 404	Permit system for dredging or filling activity in waters of the U.S., including wetlands, and administered by USACE.
National Toxics Rule and California Toxics Rule	Applicable receiving water quality criteria promulgated by U.S. EPA for priority toxic pollutants consisting generally of trace metals, synthetic organic compounds, and pesticides.
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.

Regulation	Description
Rivers and Harbors Act of 1899, Section 10	The Rivers and Harbors Act is the primary federal law regulating activities that may affect navigation on the nation's waterways. Section 10 of the Rivers and Harbors Act grants USACE exclusive authority to approve construction of smaller structures, such as wharves, booms, and bulkheads, as well as to approve dredging and filling operation.
State	
California Water Rights	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 (Water Code Sections 13000 et seq. and Title 23)	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 Pesticide Regulation, DTSC, CDFW, and OEHHA.
Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California	The State Implementation Policy provides implementation procedures for discharges of toxic pollutants to receiving waters.

Regulation	Description
Thermal Plan	The Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California was adopted by SWRCB in 1972 and amended in 1975. The Thermal Plan restricts discharges of thermal waste or elevated temperature waste to waters of the state. Generally, the Thermal Plan prohibits discharges from increasing ambient temperatures by more than 1ºF over more than 25 percent of a stream cross section, increasing ambient temperatures by more than 4ºF in any location, and prohibits discharge of waste that exceeds more than 20ºF above the ambient temperature.
Statewide NPDES General Permit for Stormwater Associated with Land Disturbance and Construction Activity (Order No. 2009-0009-DWQ, NPDES No. CAR000002)	NPDES permit for stormwater and non-storm discharges from construction activity that disturbs greater than 1 acre. The general construction permit requires the preparation of a SWPPP that identifies Best Management Practices (BMPs) to be implemented to control pollution of storm water runoff. The permit specifies minimum construction BMPs based on a risk-level determination of the potential of the project site to contribute to erosion and sediment transport and sensitivity of receiving waters to sediment. While small amounts of construction-related dewatering are covered under the General Construction Permit, RWQCBs have 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.
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.
SB 1168, Statutes of 2014 Chapter 346, Pavley	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

Regulation	Description
	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.
AB 1739, Statutes of 2014, Dickinson, Chapter 347	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 SWRCB or, in certain areas, to an entity designated as a local agency by SWRCB.
SB 1319, Statutes of 2014, Chapter 348, Pavley	This bill allows 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 DWR under specified conditions.
Local	
Water Agencies	Water agencies enter into contracts or agreements with the federal and State governments to protect the water supply and to ensure the lands within the agency have a dependable supply of suitable quality water to meet present and future needs.
Floodplain Management	General plans guide county land use decisions, and require the identification of water resource protection goals, objectives, and 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	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).
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

11.0 LAND USE AND PLANNING

A. Existing Conditions

1. U.S.

The way 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 (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 D-2m.

Table D-2m: Applicable Laws and Regulations for Land Use and Planning

Regulation	Description
Federal	
FLPMA	FLPMA is the principal law governing how BLM manages public lands. FLPMA requires BLM to manage public land resources for multiple use and sustained yield for both present and future generations. Under FLPMA, BLM is authorized to grant rights-of-way for generation, transmission, and distribution of electrical energy. Although local agencies do not have jurisdiction over the federal lands managed by BLM, under FLPMA and BLM regulations at 43 CFR Part 1600, BLM must coordinate its planning efforts with State and local planning initiatives. FLPMA defines an Area of Critical Environmental Concern (ACEC) as an area within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. 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.
RMPs	Established by FLPMA, RMPs are designed to protect present and future land uses and to identify management practices needed to achieve desired conditions within the management area covered by the RMPs. Management direction is set forth in the RMPs in the form of goals, objectives, standards, and guidelines. These, in turn, direct management actions, activities, and uses that affect land management, and water, recreation, visual, natural, and cultural resources.
NFMA	The NFMA is the primary statute governing the administration of national forests. The act requires the Secretary of Agriculture to assess forestlands, 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

Regulation	Description
	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 (Government Code Section 65300 et seq.)	Establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of the city or county. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city or county's vision for the area. The general plan is also a long-range document that typically addresses the physical character of an area over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals.
Subdivision Map Act (Government Code section 66410 et seq.)	In general, land cannot be divided in California without local government approval. The primary goals of the Subdivision Map Act are: (a) to encourage orderly community development by providing for the regulation and control of the design and improvements of the subdivision with a proper consideration of its relation to adjoining areas; (b) to ensure that the areas within the subdivision that are dedicated for public purposes will be properly improved by the subdivider so that they will not become an undue burden on the community; and (c) to protect the public and individual transferees from fraud and exploitation. (61 Ops. Cal. Atty. Gen. 299, 301 [1978]; 77 Ops. Cal. Atty. Gen. 185 [1994]). Dividing land for sale, lease or financing is regulated by local ordinances based on the State Subdivision Map Act (Government Code Section 66410 et seq.).
SB 375, Statutes of 2008	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.
CCA	The CCA was enacted by the Legislature as a comprehensive scheme to govern land use planning for the entire coastal zone of California. A combination of local land use planning procedures and enforcement to achieve maximum responsiveness to local conditions, accountability, and public accessibility, as well as continued state coastal planning and management through the CCA, is relied upon to ensure conformity with the provisions of the CCA.

Regulation	Description
	The Sea Level Rise Policy Guidance (adopted by the California Coastal Commission in 2015) provides principles for addressing sea-level rise in the coastal zone, an overview of the science behind sea-level rise as well as a description of the potential consequences, and an outline of the steps for addressing sea-level rise in plans or Coastal Development Permits.
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 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 Section 15332	CEQA Guidelines Section 15332 provides for certain types of infill projects that may be determined to be categorically exempt from CEQA review by 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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

12.0 MINERAL RESOURCES

A. Existing Conditions

1. International

Various countries export the mineral resources used in the production of lithium-ion batteries (e.g., lithium, cobalt) to international manufacturers. In 2018, Australia exported 51,000 tons of lithium, Chile exported 16,000 tons, Argentina exported 6,200 tons, and China exported 8,000. The U.S. currently imports lithium from Argentina (55 percent), Chile (36 percent), China (5 percent), Russia (2 percent) and others (2 percent).[114] Major suppliers of cobalt, a precious metal used in the manufacturing of batteries, include the Democratic Republic of the Congo, which mined an estimated 95,000 tons of cobalt in 2020, well over half of the world's total supply of cobalt. Estimated cobalt mining totals for other countries for 2020 include Russia (6,300 tons), Australia (5,700 tons), the Philippines (4,700 tons), Cuba (3,600 tons), Canada (3,200 tons), Papua New Guinea (2,800 tons), and China (2,300 tons).[115]

2. 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.

3. 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. 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.

[114] USGS, Lithium Data Sheet, last accessed August 16, 2021, https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-lithium.pdf.
[115] USGS, Cobalt Data Sheet, 2020, last accessed August 13, 2021, https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-cobalt.pdf.

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.[116]

B. Regulatory Setting

Applicable laws and regulations associated with mineral resources are discussed in Table D-2n.

Table D-2n: 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	
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 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

[116] Clinkenbeard, John, Smith, Joshua, California Non-Fuel Minerals 2011, 2011, last accessed August 13, 2021, https://www.conservation.ca.gov/cgs/Documents/Minerals/california-non-fuel-mineral-production-2011.pdf.

Regulation	Description
	on the Uniform Building Code, 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.
PRC Sections 2762-2763	PRC 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. PRC 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 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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

13.0 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 decibels (dB) are presented in Table D-2o.

Table D-2o: Typical Noise Levels[117]

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet	100	--
Gas lawnmower at 3 feet	90	--
Diesel truck moving at 50 mph at 50 feet	80	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	60	
Quiet urban daytime	50	Large business office, Dishwasher in next room
Quiet urban nighttime	40	Theater, Large conference room (background)
Quiet suburban nighttime	30	Library, Bedroom at night, Concert hall (background)
Quiet rural nighttime	20	Broadcast/Recording Studio
	10	--
Threshold of Human Hearing	0	Threshold of Human Hearing

Notes: dB=A-weighted decibels; mph=miles per hour

1. Sound Properties

A sound wave is initiated in a medium by a vibrating object (e.g., vocal cords, 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 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

[117] Caltrans, Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013, last accessed August 13, 2021, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf.

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.[118]

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.[119]

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.

Minimum Noise Level (L_{min}): The lowest instantaneous noise level during a specified time.

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): Like 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

[118] Caltrans, California Airport Land Use Planning Handbook, October 2011, last accessed August 13, 2021, https://dot.ca.gov/-/media/dot-media/programs/aeronautics/documents/californiaairportlanduseplanninghandbook-a11y.pdf.
[119] Caltrans, Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013, last accessed August 13, 2021, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf.

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.[120] These subjective reactions to changes in noise levels was developed based on 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.[121]

[120] Egan, M. David, Architectural Acoustics, 2007.
[121] Caltrans, Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013, last accessed August 13, 2021, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf.

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.[122,123] PPV and root mean square (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.[124] This is based on a reference value of 1 microinch per second (µin/sec).

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.[125]

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.

[122] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018, last accessed August 13, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.
[123] Caltrans, Transportation and Construction Vibration Guidance Manual, April 2020, last accessed August 13, 2021, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf.
[124] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018, last accessed August 13, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.
[125] Ibid.

Constant or transient vibrations can weaken structures, crack facades, and disturb occupants.[126]

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 D-2p describes the general human response to different levels of groundborne vibration-velocity levels.

Table D-2p: Human Response to Different Levels of Groundborne Noise and Vibration[127]

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 microinch per second and based on the root mean square (RMS) velocity amplitude.

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 D-2q.

[126] Ibid.
[127] Ibid.

Table D-2q: 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 Compatible Use Zones Program)	Air Installations Compatible Use Zones plans prepared for individual airfields are primarily intended as recommendations to local communities regarding the importance of maintaining land uses which are compatible with the noise and safety impacts of military aircraft operations.
23 CFR, Part 772, Federal Highway Administration standards, policies, and procedures	Federal Highway Administration 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.

Regulation	Description
29 CFR, Part 1910, Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration)	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 Railroad Noise Emission Compliance Standards) and 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 CPUC establishes statewide requirements for airport land use compatibility planning and requires nearly every county to create an Airport Land Use Commission or other alternative.
California Airport Noise Regulations promulgated in accordance with the State Aeronautics Act (21 CCR Section 5000 et seq.)	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

Regulation	Description
	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	Local general plans in California must include a noise element per Government Code Section 65302(f). 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. 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. 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."[128]
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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

[128] Office of Planning and Research, State of California General Plan Guidelines, 2017, last accessed August 13, 2021, http://www.opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf.

14.0 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 Census. The estimated population in 2019 for the U.S. was approximately 328,239,523 and the estimated number of housing units was 139,684,244.[129] The estimated average number of persons per household in 2014-2018 was 2.63 in the U.S..[130] In December 2020, the unemployment rate in the U.S. declined from 14.8 percent in April 2020 to 6.7 percent.[131]

2. California

a) Population

According to the Census data, the estimated population of California in 2019 was 39,512,223.[132] 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.[133] It is expected that the population of California will reach and surpass the 50-million mark sometime between 2040 and 2050 if the current growth rates persist.[134]

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 D-2r. Data was derived from the 2010 Census.[135]

[129] U.S. Census Bureau, Quickfacts: California; United States, 2019, https://www.census.gov/quickfacts/fact/table/CA,US/RHI825216.
[130] Ibid.
[131] Bureau of Labor Statistics, Economy at a Glance: California, last accessed August 13, 2021, https://www.bls.gov/eag/eag.ca.htm.
[132] U.S. Census Bureau, Quickfacts: California; United States, 2019, https://www.census.gov/quickfacts/fact/table/CA,US/RHI825216.
[133] U.S. Census Bureau, Census: Population and Foreign-Born. February 2001, Volume 8, Number 2, last accessed April 17, 2018, https://migration.ucdavis.edu/mn/more.php?id=2302.
[134] University of Southern California, New California Population Projection Shows Massive Slowdown, April 24, 2012, last accessed August 13, 2021, https://www.sciencedaily.com/releases/2012/04/120424142117.htm.
[135] U.S. Census Bureau, Quickfacts: California; United States, 2018, last accessed April 17, 2018, https://www.census.gov/quickfacts/fact/table/CA,US/RHI825216.

Table D-2r: California Housing Profile[136]

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

c) Employment

In December 2020, the civilian labor force in California was approximately 18,705,475, and the unemployment rate decreased from 16.0 percent in April 2020 to 9.3 percent in December 2020.[137]

B. Regulatory Setting

See land use planning and housing-related regulations in Section 11.0, Land Use and Planning.

15.0 PUBLIC SERVICES

A. Existing Conditions

1. U.S.

U.S. EPA is charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. U.S. EPA Criminal Investigation Division's primary mission is the enforcement of 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 USC 3063). These environmental laws include those specifically related to air, water, and land resources. USFS is an agency of 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 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.

[136] Ibid.

[137] Bureau of Labor Statistics, Databases, Tables & Calculations by Subject, last accessed June 9, 2021, https://data.bls.gov/timeseries/LASST060000000000003.

2. California

a) Law Enforcement

California's environmental laws are enforced by a matrix of State and local agencies, some at CalEPA, each charged with enforcing the laws governing a specific media such as air, water, hazardous waste, solid waste, and pesticide laws, the Attorney General's Office, local District Attorneys and City Attorneys. 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. Regarding 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 filing numerous actions against the Trump Administration opposing federal rollbacks of environmental protection regulations and requiring implementation of existing rules. These actions involve a range of regulations, including those concerning greenhouse gas emissions from stationary sources and vehicles, regulations of toxic air pollution, and planning requirements for criteria pollution planning. The Attorney General also continues to work broadly to support CARB actions, including 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.

CalEPA was created in 1991 by Governor's EO. CalEPA's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality, and economic vitality. CalEPA is composed of various boards, departments, and offices, including: CARB, Department of Pesticide Regulation, DTSC, OEHHA, 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 wastewater officials, and the California Department of Public Health.
- Hazardous Waste: DTSC (part of CalEPA) and CUPAs.
- Carcinogens/Reproductive Toxins: Prop. 65 through OEHHA (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. 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 D-2s.

Table D-2s: Applicable Laws and Regulations for Public Services

Regulation	Description
Federal	
American with Disabilities Act	Guidelines to ensure that facilities are accessible to individuals with disabilities. Implements requirements for the design and construction of buildings.
State	
State Fire Responsibility Areas	Areas delineated by 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.
CCA	The CCA established a coastal zone boundary within which specific planning and development requirements must be met in order to protect and preserve the State's coastal resources. The

Regulation	Description
	CCA includes policies that govern public access. Included policies pertain to maintaining access to the coast, providing coastal access from the nearest public roadway to the shoreline, and avoiding overcrowding along the coast
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.
Local	
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

16.0 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 trials, and marine reserves and estuaries. Each federal agency's programs include recreation components.

2. California

California contain approximately 14,000 parks, managed by nearly 1,000 agencies.[138] 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.

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.

[138] California State Parks, Meeting the Park Needs of All Californians, 2015 Statewide Comprehensive Outdoor Recreation Plan, last accessed August 13, 2021, https://www.parksforcalifornia.org/scorp/2015.

B. B. Regulatory Setting

Applicable laws and regulations associated with recreation are discussed in Table D-2t.

Table D-2t: 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	
CCA	The CCA established a coastal zone boundary within which specific planning and development requirements must be met in order to protect and preserve the states coastal resources. This Act includes policies that govern recreation opportunities. Policies included pertain to promoting recreational boating in coastal waters, and maintaining areas suited for water-oriented recreational activities.
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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

17.0 TRANSPORTATION

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 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 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).

B. Regulatory Setting

Applicable laws and regulations associated with transportation and traffic are discussed in Table D-2u.

Table D-2u: 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.
USCG CFR Titles 33, 40, and 46	USCG, through Title 33 (Navigation and Navigable Waters), Title 40 (Protection of Environment), and Title 46 (Shipping) of the CFR, regulates marine terminals and vessels. These regulations address design and construction standards, operational standards, and spill prevention and cleanup. The applicable regulations provide USCG with the responsibility for the navigation system of U.S. ports to maintain waterside access to port facilities.
U.S. Department of Defense	The U.S. Department of Defense, through USACE, is responsible for reviewing all aspects of a project and spill response activities that could affect navigation. The USACE Operations and Maintenance program is responsible for maintaining navigation channels, removing navigation obstructions, and accomplishing structural repairs. They also have regulatory jurisdiction for all work and structures in, over, or under navigable waters that could affect the course, location, condition, or navigable capacity of any navigable waters of the U.S.
State	
SB 375, Statutes of 2008	The Sustainable Communities and Climate Protection Act of 2008 (Sustainable Communities Act, SB 375, Chapter 728, Statutes of 2008) supplements the requirements under the Federal-Aid Highway Act. In addition to preparing RTPs, under SB 375, MPOs must develop SCSs that address VMT-related GHG emissions and include strategies to reduce

Regulation	Description
	emissions. Through the RTP/SCSs, MPOs allocate federal and State transportation funding to local and regional projects that would reduce VMT-related emissions.
SB 743, Statutes of 2013, Chapter 386	SB 743, passed in 2013, requires OPR to develop new CEQA guidelines that address traffic metrics under CEQA. As stated in the legislation, upon adoption of the new guidelines, "automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the guidelines, if any." CNRA is currently in the process of reviewing the updates to the CEQA Guidelines proposed by OPR.
Vehicle Code Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620; Health and Safety Code Section 25160 et seq.	Regulates the highway transport of hazardous materials.
Vehicle Code 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.
Vehicle Code Sections 35100 et seq.; 35250 et seq.; 35400 et seq.	Specifies limits for vehicle width, height, and length.
Vehicle Code 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 [PRC 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.

Regulation	Description
Local	
City/County Codes	Many local governments in California maintain and enforce local codes that apply standards to transportation facilities and services.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

18.0 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.[139] 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 USBR and DWR. In California, the Mid-Pacific Region of 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.[140]

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 supply contractors in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California.[141]

[139] U.S. Bureau of Reclamation, About the Central Valley Project, April 18, 2017, last accessed April 17, 2018, https://www.usbr.gov/mp/cvp/about-cvp.html.
[140] Ibid.
[141] California Department of Water Resources, State Water Project, last accessed August 13, 2021, https://water.ca.gov/Programs/State-Water-Project.

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

SWRCB is the State agency responsible for the regulation of wastewater discharges to surface waters and groundwater via land discharge. 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 also administers water rights in California. The RWQCBs 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

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.

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), is responsible for the regulation of the disposal and recycling of all solid waste generated in California. CalRecycle 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 CalRecycle, 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 D-2v.

Table D-2v: 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 (NGA) of 1938	Together with the Federal Power Act of 1935, the 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 NGA 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 (NGPA) of 1978	The NGPA granted FERC the 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 CPUC, CEC, and local electric utilities to develop incentive programs and technical efficiency guidelines to encourage the installation of small CHP systems. CEC approved efficiency and certification guidelines for eligible systems under AB 1613 in January 2010, and CPUC approved standardized contracting and pricing provisions between CHP operators and the Investor Owned Utilities in November 2012.

Regulation	Description
AB 1900 (Statutes of 2012)	AB 1900 (Gatto, Chapter 602, Statutes of 2012) directed CPUC to adopt natural gas constituent standards (in consultation with CARB and OEHHA). 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/ Water Code Section 10910 et seq.	Required the preparation of a water supply assessment 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 water supply assessment 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. A water supply assessment 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 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.[142]
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.
Harbors and Marinas	Jurisdictions with harbors and marinas develop and implement master plans which serve as the governing land use documents for those areas.

[142] Office of Planning and Research, State of California General Plan Guidelines, 2017, last accessed August 13, 2021, http://www.opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf.