Air Quality and Greenhouse Gas Analysis Lower Deer Creek Flood and Ecosystem Improvement Project

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ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
APCD	Air Pollution Control District
ATCM	airborne toxic control measure
CalEEMod	California Emissions Estimator Model
CAPCOA	California Air Pollution Control Officers Association
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
DPM	diesel particulate matter
DWR	California Department of Water Resources
EIA	U.S. Energy Information Administration
EO	Executive Order
GHG	greenhouse gas(es)
HAP	hazardous air pollutant
H_2S	hydrogen sulfide
MMT CO_2e	million metric tons of carbon dioxide equivalents
MT CO_2e	metric tons of carbon dioxide equivalents
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NO_2	nitrogen dioxide
NO_x	nitrous oxides
NSVAB	Northern Sacramento Valley Air Basin
NSVPA	Northern Sacramento Valley Planning Area
OEHHA	(California) Office of Environmental Health Hazard Assessment
Pb	lead
PM2.5	particulate matter of aerodynamic radius of 2.5 micrometers
PM10	particulate matter of aerodynamic radius of 10 micrometers
Project	Lower Deer Creek Flood and Ecosystem Improvement (also Proposed Project)
ROG	reactive organic gases
SB	Senate Bill
SO_2	sulfur dioxide

SRA	State Recreation Area
SVAB	Sacramento Valley Air Basin
SVAQEEP	Sacramento Valley Air Quality Engineering and Enforcement Professionals
SVRIC	Stanford-Vina Ranch Irrigation Company
TAC	toxic air contaminant
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WRCC	Western Regional Climate Center
°F	degrees Fahrenheit
$\mu g/m^3$	microgram per cubic meter

1.0 INTRODUCTION

This report presents the methods and results of an air quality and greenhouse gas (GHG) emissions analysis conducted for the Lower Deer Creek Flood and Ecosystem Improvement Project (Project or Proposed Project), which encompasses 680 acres in unincorporated Tehama County, California (**Figure 1**). This assessment also includes an energy consumption analysis. The Project would include flood and ecosystem improvements intended to accrue multiple benefits throughout the Lower Deer Creek watershed. The California Department of Water Resources (DWR), as the Lead Agency for the Project, will prepare a project-level environmental document in compliance with the California Environmental Quality Act (CEQA). The United States Army Corps of Engineers, under its regulatory authority to grant Section 408 (33 USC 408) permission for the project, will prepare an environmental document in compliance with the National Environmental Policy Act (NEPA). Therefore, this technical report's analysis considers both CEQA and NEPA air quality pollutant thresholds, where applicable, as discussed further in this report. This report's assessment was conducted to identify the existing air quality conditions and estimate potential impacts related to air quality pollutant and GHG emissions, and energy consumption, associated with the Proposed Project.

1.1 Project Summary

The Proposed Project would include the general elements described below. The Project's design is in progress and details of each Project element may change as the design is finalized. Assumptions regarding each Project element (i.e., construction equipment, duration, trips, import/export quantities) for use in this analysis are included in Section 3 and Appendix A. For one of the Project's elements, the Dam to Red Bridge levee setbacks, there are six alternatives considered (Alternatives A through F). Differences in the alternatives for this element of the Proposed Project are provided below and discussed in this report.

- **Downstream of Stanford-Vina Ranch Irrigation Company (SVRIC) Diversion Dam (Down SVRIC Div Dam):** The modification of a non-project (private) levee would increase floodplain width, and improvements to the project (USACE) levees in this reach would combine to enhance flood protection and meet freeboard requirements for the design flood flow. A deflection levee is proposed around the laundry facility of the New Clairvaux Abbey, and improvements for flow conveyance are proposed along China Slough. A channel migration easement is proposed downstream in this reach. The easement would promote natural fluvial processes in the lower reach of the creek.

- **Dam to Red Bridge:** The Project Alternatives include six different options for how far the existing levees in this reach would be set back or moved from their existing alignment. For five of the alternatives, project levee setbacks on both the north and south banks are proposed to allow for more flood conveyance. The area between the two levees would serve as a floodway easement to reduce local flooding. The levee setbacks would also encourage natural geomorphic function in this reach and improve rearing habitat for juvenile spring-run Chinook salmon. Upstream near Red Bridge, sections of the Project levees on the north and south banks are proposed to be raised to meet freeboard requirements. Setback Option A includes the maximum acreage of levee setbacks and floodplain lowering between SVRIC Dam and Red Bridge of 72 acres. Setback Option B includes the maximum acreage of levee setbacks and floodplain lowering between SVRIC Dam and Red Bridge, minus the southern bank parcel upstream of the SVRIC Dam—totaling 67.5 acres. Setback Option C includes the maximum acreage of levee setbacks and floodplain lowering on the north bank, and a reduced setback and floodplain lowering extent on the south bank—totaling 55.2 acres. Setback Option D includes a smaller acreage of levee setbacks and floodplain lowering on the north bank compared to Setback Options A through C, and the maximum setback and floodplain lowering extent on the south bank—totaling 42.4 acres. Setback Option E includes a smaller acreage of USACE levee setbacks and floodplain lowering on both north and south banks compared to Setback Options A through D, resulting in 30.1 acres of setback area/easements in total. Setback Option F would involve no USACE levee setbacks or floodplain lowering between the SVRIC Dam and Red Bridge, but the levees in the reach would need to be raised to meet the freeboard criteria.

- **Red Bridge:** A proposed improvement for Red Bridge includes rebuilding to a width of approximately 450 feet and a height capable of passing design flood flows. The road leading to the bridge would also be raised to accommodate the higher bridge.

- **Upstream of Red Bridge:** This section of the Project includes the proposed setback of a Project levee to allow flood waters to enter an existing easement on the north bank. Improvements to a Project levee are proposed on the south bank, as well as bank protection. This would protect the current ecological function and reduce future risk of flooding to downstream landowners.

- **China Slough:** Proposed improvements in China Slough include the removal of non-native vegetation and excavation of the Slough to add conveyance capacity for flows. These activities were analyzed as part of the "Down SVRIC Div Dam" element.

The design and proposed elements for the Proposed Project analyzed in this report are on a program-level. The Deer Creek Watershed Conservancy anticipates that final design for the Proposed Project would include some modifications to these program-level plans, so the environmental analysis has been developed with conservative assumptions to accommodate some level of modification. However, as Project details are further defined, additional modifications of the assumptions used in this report may be required.

1.2 Organization of this Document

This report contains the following components:

Section 1.0, *Introduction*, provides a brief description of the intent of this technical report, the Project description, and the organization of this report.

Section 2.0, *Environmental Setting*, describes the Proposed Project including its purpose and goals, the site where the Proposed Project would be constructed, the construction approach and activities, operation-related activities, and related permits and approvals. As needed, differences between the Project Alternatives are described.

Section 3.0, *Methods and Assumptions*, presents the methodology used to perform the air quality, GHG emissions, and energy consumption analyses, as well as summarizing the assumptions used for the analysis. This section also provides the significance thresholds used in the impact assessment.

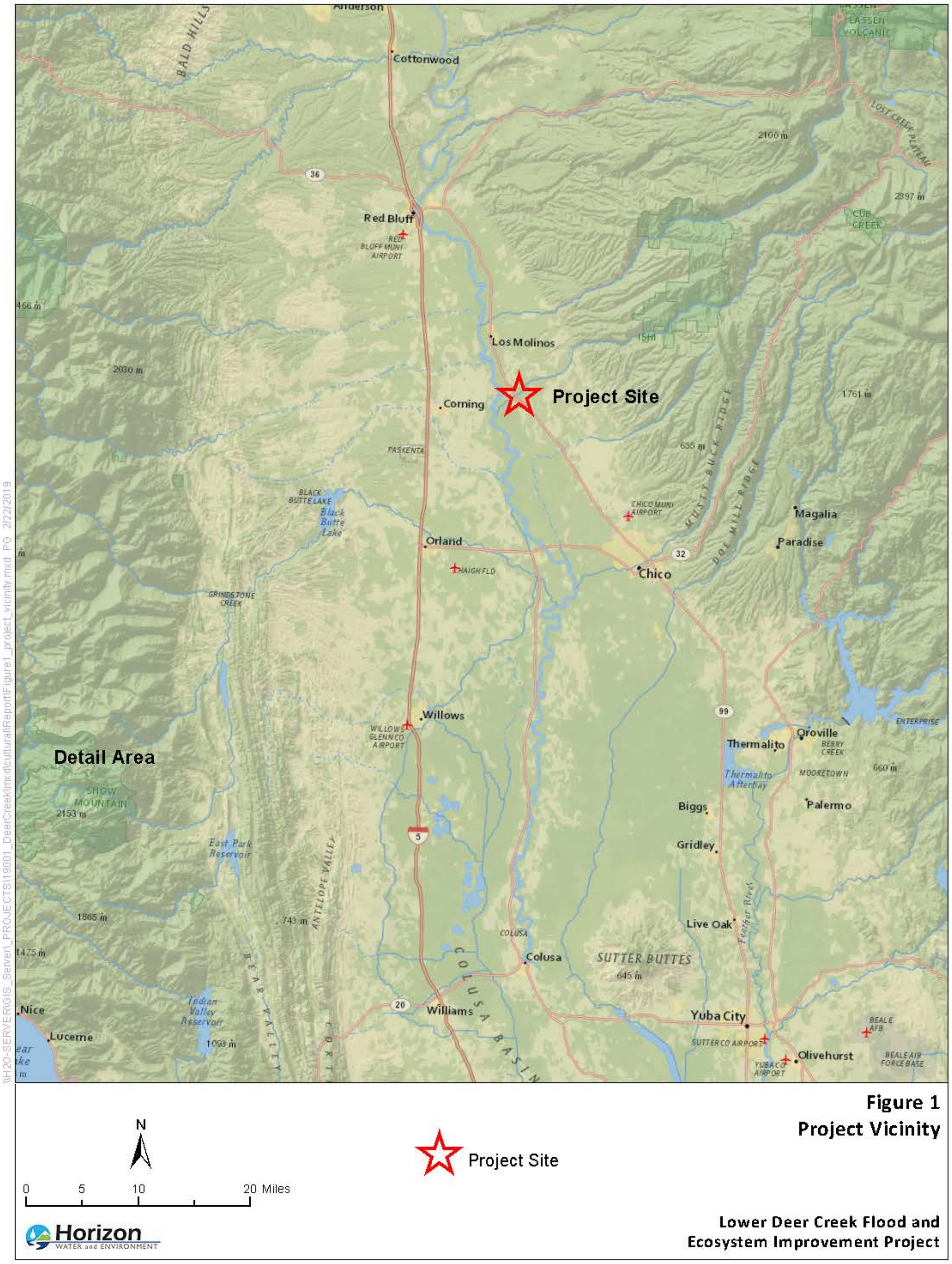
Section 4.0, *Impact Assessment*, identifies and discusses results of modeling performed for the Project and the potential air quality- and energy-related environmental impacts of the Proposed Project, based on the model provided in Appendix G of the CEQA Guidelines.

Section 5.0, *References*, provides a bibliography of printed references, websites, and personal communications used in preparing this report.

Appendices

Appendix A. Air Quality, GHG, and Energy Supporting Data

Figure 1. Project Vicinity



2.0 ENVIRONMENTAL SETTING

This section describes the existing setting for air quality conditions, GHG emissions, and energy consumption in the Project area, which is located in Tehama County (Figure 1). A brief summary of applicable regulations is also described in this section to provide context for the air quality summary and analysis.

The Clean Air Act is implemented by the U.S. Environmental Protection Agency (USEPA) and sets ambient air limits, the National Ambient Air Quality Standards (NAAQS), for six criteria pollutants: particulate matter of aerodynamic radius of 10 micrometers or less (PM10), particulate matter of aerodynamic radius of 2.5 micrometers or less (PM2.5), carbon monoxide (CO), nitrogen dioxide (NO_2), ground-level ozone, and lead. Of these criteria pollutants, particulate matter and ground-level ozone pose the greatest threats to human health. Ground-level ozone is caused by emissions of ozone precursor, nitrous oxides (NO_X) and reactive organic gases (ROG).

The California Air Resources Board (CARB) sets the California Ambient Air Quality Standards (CAAQS), standards for criteria pollutants in California that are more stringent than the NAAQS and include the following additional contaminants: visibility-reducing particles, hydrogen sulfide, sulfates, and vinyl chloride. These national and state criteria pollutants are further described in this section and, as applicable, evaluated in Section 4.0, *Impact Assessment*.

2.1 Regional Setting

California has been divided into 15 air basins by geography and meteorological features to better manage air pollution. The Project is located in the Sacramento Valley Air Basin (SVAB), which is comprised of nine air districts and includes Shasta, Tehama, Glenn, Butte, Colusa, Yuba, Sutter, Yolo, Sacramento, and portions of Placer and Solano Counties. The SVAB is divided into two planning areas: the Northern Sacramento Valley Air Basin (NSVAB) and the Greater Sacramento Air Region (Tehama County 2008). Tehama County is part of the NSVAB, which includes Butte, Colusa, Glenn, Shasta, Sutter, Tehama, and Yuba Counties. The NSVAB is also known as the Northern Sacramento Valley Planning Area (NSVPA). The Tehama County Air Pollution Control District (APCD) manages attainment of air quality standards and permitting within the Tehama County portion of the NSVAB.

2.1.1 Sacramento Valley Air Basin

The NSVAB is generally shaped as an elongated bowl ranging from low valley elevations to mountains above 6,000 feet (Sacramento Valley Air Quality Engineering and Enforcement Professionals [SVAQEEP] 2015). The NSVAB is bounded on the north and west by the Coast Ranges, on the north by the Sierra Nevada, and on the east by the southern portion of the Cascade Mountain Range (SVAQEEP 2015). Winds from the south can transport pollutants to the NSVAB from the more populated, southern SVAB areas (Sacramento metropolitan area; Yolo, Solano, and portions of El Dorado, Placer, and Sutter Counties). The mountain ranges surrounding the NSVAB, particularly during temperature inversions, can trap transported and local air pollutant emissions (SVAQEEP 2015). The majority of the population is within the valley areas of the NSVPA (less than 1,000 feet elevation), although a substantial portion of the NSVPA is at elevations higher than 1,000 feet above mean sea level (SVAQEEP 2015).

2.1.2 Climate and Topography

Tehama County in the area of the Proposed Project has a Mediterranean climate characterized by cool, wet winters and hot, dry summers. Average temperatures range from a low of 36 degrees Fahrenheit (°F) in January to a high of 96°F in July (Western Regional Climate Center [WRCC] 2019). Average annual precipitation is approximately 26 inches, with most precipitation occurring from October through May (WRCC 2019). The predominant wind direction varies throughout the year but is generally from the south or north (Weather Spark 2019). Average wind speeds vary from approximately 4.8 to 6.2 miles per hour (Weather Spark 2019).

The Project area gradually slopes downward to the southwest away from the Sierra Nevada Mountain Range. Elevations in the assessment area range from approximately 190 to 310 feet above mean sea level.

2.2 Project Vicinity and Existing Land Uses

The Project area is located along Deer Creek and a portion of China Slough and the adjacent Sacramento River, in the vicinity of Vina (a census-designated place) in southern Tehama County (**Figure 2**). The Project area is located on land designated by the Tehama County General Plan (2009) as "valley floor ag" (agricultural uses) or "habitat resource." In Vina, land uses include valley floor agriculture, suburban, and public facility (Tehama County 2009).

2.3 Air Pollutants

Except where noted, the information below is taken from the California Air Pollution Control Officers Association (CAPCOA) "Health Effects" web page, which provides general information on the effects of air pollution on human health (CAPCOA 2019).

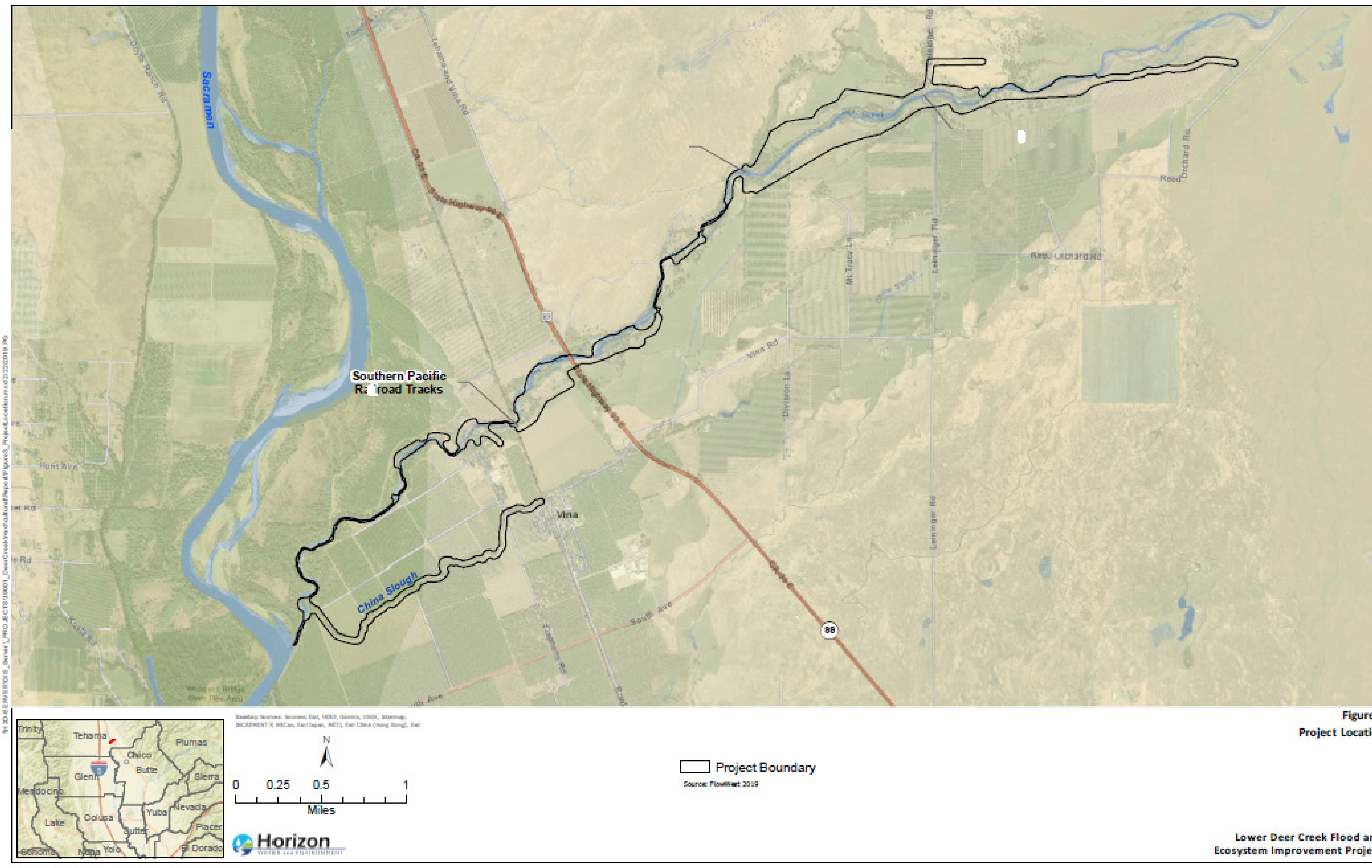
2.3.1 Carbon Monoxide

CO is an odorless, colorless gas that is highly toxic. CO is formed by the incomplete combustion of fuels and is emitted directly into the air. Ambient CO concentrations normally are considered a localized effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic, forming pollutant "hot spots." CO concentrations are also influenced by wind speed and atmospheric mixing. Under inversion conditions, CO concentrations may be distributed more uniformly over an area to some distance from vehicular sources. CO binds with hemoglobin, the oxygen-carrying protein in blood, and reduces the blood's capacity for carrying oxygen to the heart, brain, and other parts of the body. At high concentrations, CO can cause heart difficulties in people with chronic diseases, impair mental abilities, and cause death.

2.3.2 Nitrogen Oxides

NO_X is a family of gaseous nitrogen compounds and are precursors to the formation of ozone and PM. The major component of NO_X, nitrogen dioxide (NO_2), is a reddish-brown gas that is toxic at high concentrations. NO_X results primarily from the combustion of fossil fuels under high temperature and pressure. Fuel combustion, primarily from on-road and off-road motor vehicles and industrial sources, is the major source of this air pollutant.

Figure 2. Project Location



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2.3.3 Volatile Organic Compounds

Volatile organic compounds (VOCs) are hydrocarbon compounds that exist in the ambient air. VOCs contribute to the formation of smog and/or may themselves be toxic. VOC emissions are a major precursor to the formation of ozone.

2.3.4 Ozone

Ozone is a reactive gas consisting of three oxygen atoms. In the troposphere (the lowest region of the atmosphere), it is produced by a photochemical process involving the sun's energy. It is a secondary pollutant that is formed when NO_X and VOCs (known as ozone precursors) react in the presence of sunlight. Ozone at the earth's surface causes numerous adverse health effects and is a pollutant regulated by state and federal air quality agencies. It is a major component of smog. In the stratosphere, however, ozone exists naturally and shields the Earth from harmful incoming ultraviolet radiation. High concentrations of ground-level ozone can adversely affect the human respiratory system and aggravate cardiovascular disease and many respiratory ailments. Ozone also damages natural ecosystems, agricultural crops, and human-made materials such as rubber and plastics.

2.3.5 Particulate Matter

PM is a complex mixture of extremely small particles and liquid droplets. PM is made up of multiple components, including acids, organic chemicals, metals, and soil or dust particles. The size of particles in PM is directly linked to the particles' potential for causing health problems. PM10 is of concern because these particles pass through the throat and nose and are deposited in the thoracic region of the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. PM2.5 penetrates even more deeply into the thoracic and alveolar regions of the lungs.

2.3.6 Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. Suspended SO_2 particles can contribute to poor visibility within air basins and are a component of PM10.

2.3.7 Lead

Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. The health effects of lead poisoning include loss of appetite, weakness, apathy, and miscarriage. Lead poisoning can also cause lesions of the neuromuscular system, circulatory system, brain, and gastrointestinal tract.

In the past, gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels. Since the use of leaded fuel has been mostly phased out, ambient concentrations of lead have decreased dramatically.

2.3.8 Hydrogen Sulfide

Hydrogen sulfide (H_2S) is associated with geothermal activity, oil and gas production and refining, sewage treatment plants, and confined animal feeding operations. H_2S is extremely hazardous in high concentrations and can cause death (California Environmental Protection Agency's Office of Environmental Health Hazard Assessment [OEHHA] 2000).

2.3.9 Sulfates

Sulfates are the fully oxidized, ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds result primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates is comparatively rapid and complete in urban areas of California due to regional meteorological features (CARB 2009a).

CARB's sulfate standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels that exceed the standard include decreased ventilatory function, aggravation of asthmatic symptoms, and increased risk of cardiopulmonary disease. Sulfates are particularly effective in degrading visibility and, because they are usually acidic, can harm ecosystems and damage materials and property.

2.3.10 Vinyl Chloride

Vinyl chloride is a colorless gas that does not occur naturally; it is formed when substances such as trichloroethane, trichloroethylene, and tetrachloroethylene are broken down. Vinyl chloride is used to make PVC, which is used in plastic products such as pipes, wire and cable coatings, and packaging materials (Agency for Toxic Substances & Disease Registry 2006).

2.3.11Toxic Air Contaminants

Toxic air contaminants (TACs) are air pollutants that may lead to serious illness or increased mortality, even when present in relatively low concentrations. Hundreds of different types of TACs exist, with varying degrees of toxicity. Many TACs are confirmed or suspected carcinogens or are known or suspected to cause birth defects or neurological damage. For some chemicals, such as carcinogens, no thresholds exist below which exposure can be considered risk free. Examples of TAC sources associated with the proposed project are fossil fuel combustion sources.

Sources of TACs include stationary sources, area-wide sources, and mobile sources. USEPA maintains a list of 187 TACs, also known as hazardous air pollutants (HAPs). These HAPS are included on CARB's list of TACs along with additional chemicals identified as TACs in California (CARB 2011). According to the *California Almanac of Emissions and Air Quality* (CARB 2013), many researchers consider diesel particulate matter (DPM) to be a primary contributor to health risk from TACs because particles in the exhaust carry many harmful organics and metals, rather than being a single substance, as are other TACs. Using the CARB emission inventory's PM10 database, ambient PM10 monitoring data, and results from several studies, CARB has made preliminary estimates of DPM concentrations throughout the state (Office of Environmental Health Hazard Assessment [OEHHA] 2001). According to estimates by CARB, outdoor (ambient) DPM concentrations in 2012 have decreased by 68 percent from 1990 levels (from approximately 1.8 micrograms per cubic meter [$\mu g/m^3$] to less than 0.6 $\mu g/m^3$) (CARB 2016a).

2.4 Existing Air Quality Conditions

2.4.1 Air Monitoring Data

USEPA, CARB, and local air districts operate an extensive air monitoring network to measure progress toward attainment of the NAAQS and CAAQS. The closest air monitoring station to the Project area with available data for recent years is the Red Bluff Walnut Street station, which is approximately 23 miles from the Project area. **Table 1** shows the most recent 3 years (2017–2019) of available data at the time that modeling was conducted.

Table 1. Air Monitoring Data for 2017–2019

Pollutant Standard	2017 No. Exceed*	2017 Maximum Concentration	2018 No. Exceed*	2018 Maximum Concentration	2019 No. Exceed*	2019 Maximum Concentration
Ozone: 1-hr	0/0	0.108 ppm	0/0	0.092 ppm	0/0	0.075 ppm
Ozone: 8-hr	4/5	0.082 ppm	11/8	0.087 ppm	0	0.067ppm
PM10: Annual	NA	20.0 $\mu g/m^3$	NA	23.8 $\mu g/m^3$	NA	14.6$\mu g/m^3$
PM10: 24-hr	12/0	100.9 $\mu g/m^3$	33/0	105.7 $\mu g/m^3$	0/0	45.1$\mu g/m^3$
PM2.5: Annual	NA	7.2 $\mu g/m^3$	NA	10.5 $\mu g/m^3$	NA	5.4 $\mu g/m^3$
PM2.5: 24-hr	5	85.9 $\mu g/m^3$	24	130.7 $\mu g/m^3$	0	22.6$\mu g/m^3$

Notes:

hr = hour; NA = not available (insufficient or no data available); ppb = parts per billion; ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter

* Indicates the number of exceedance days recorded annually at this monitoring station for a particular constituent compared to that constituent's NAAQS and CAAQS. The first number is the state value and the second number is the federal value if they are different. Highest maximum (state or national) used.

No data were available in Tehama County during 2017-2019 for nitrogen dioxide, carbon monoxide, sulfur dioxide, and hydrogen sulfide.

Source: CARB 2019a, CARB 2021

Annual emissions of criteria air pollutants for the most recent years available for Tehama County are provided in **Table 2**.

Table 2. Estimated Annual Average Emissions in Tehama County

Year	ROG	NO_X	CO	SO_X	PM10	PM2.5
2012	6.71	11.28	24.4	0.10	8.26	2.22
2015	7.8	12.2	35.8	0.1	15.6	4.4
2020	7.4	9.4	32.4	0.1	15.9	4.4

Note: All measurements are in tons per day.

Source: CARB 2009b

2.4.2 Existing Sources of Air Pollution and Odors

Existing sources of air pollution and/or odors in Tehama County include motor vehicles (particularly on Interstate 5 and Highway 99), dust from unpaved roads, wood burning from stoves and fireplaces, agricultural operations, timber operations, industrial processes, and construction activities (Tehama County 2008). Combustion of fossil fuels by motor vehicles within the county is the largest contributor of ozone, while dust from unpaved roads is the largest source of PM10 (Tehama County 2008). Transport of pollutants from the Greater Sacramento Air Region, south of the NSVAB, has a substantial effect on the air quality, particularly ozone concentrations, within the NSVAB and Tehama County (CARB 2001, Tehama County 2008).

2.4.3 TACs in the Project Vicinity

According to the Air Toxics "Hot Spots" Program data (CARB 2019b), in Tehama County, there were approximately 60 stationary sources of TAC emissions, with the majority occurring in Red Bluff and Corning. Two facilities were located within the Project vicinity (Vina area). Emissions from those sources are provided in **Table 3**. However, the primary source of TACs in the Project vicinity is combustion of fossil fuels, in particular gasoline and diesel fuel, from on-road and off-road vehicles along Highway 99.

Table 3. Summary of Stationary Facility Sources of TAC Emissions in Project Vicinity, 2016

Contaminant	ROG	CO	NOx	SOx	Total PM	PM10
Carl Woods Construction	--	--	--	--	5.02	2.51
Deer Creek Rock	0.28	2.33	6.34	3.56	6.59	3.67

Notes:

All measurements are in tons per day.

-- means that data are not available. Data are from 2016. Emission inventory updates are required every four years. Both sources are located in Vina on Leininger Road.

Source: CARB 2019b

2.4.4 Attainment Status

Table 4 shows the current attainment status in Tehama County for the state and federal ambient air quality standards. Tehama County is designated as nonattainment for the state ozone and PM10 standards. All areas of Tehama County, including the Project area are in attainment or unclassified for the federal ozone standard, as well as the other national ambient air quality standards.

Table 4. Attainment Status of the State and Federal Ambient Air Quality Standards in the Tehama County Portion of the Sacramento Valley Air Basin

Contaminant	Averaging Time	Concentration[1,2]	State Standards Attainment Status[3]	Federal Standards Attainment Status[4]
Ozone[5]	1 hour	0.09 ppm	N	NA
Ozone[5]	8 hours	0.070 ppm[5]	N	A[6]
Carbon Monoxide	1 hour	20 ppm	U	NA
Carbon Monoxide	1 hour	35 ppm	NA	A
Carbon Monoxide	8 hours	9.0 ppm	U	A
Nitrogen Dioxide[7]	1 hour	0.18 ppm	A	NA
Nitrogen Dioxide[7]	1 hour	0.100 ppm [2]	NA	A
Nitrogen Dioxide[7]	Annual arithmetic mean	0.030 ppm	A	NA

Contaminant	Averaging Time	Concentration[1,2]	State Standards Attainment Status[3]	Federal Standards Attainment Status[4]
Nitrogen Dioxide[7]	Annual arithmetic mean	0.053 ppm	NA	A
Sulfur Dioxide (SO_2) [8, 9]	1 hour	0.25 ppm	A	NA
Sulfur Dioxide (SO_2) [8, 9]	1 hour	0.075 ppm[9]	NA	A
Sulfur Dioxide (SO_2) [8, 9]	24 hours	0.04 ppm	A	NA
Sulfur Dioxide (SO_2) [8, 9]	24 hours	0.14 ppm	NA	A
Sulfur Dioxide (SO_2) [8, 9]	Annual arithmetic mean	0.030 ppm	NA	A
Particulate Matter (PM_{10})	24 hours	50 µg/m^3	N	NA
Particulate Matter (PM_{10})	24 hours	150 µg/m^3	NA	A
Particulate Matter (PM_{10})	Annual arithmetic mean	20 µg/m^3	N	NA
Fine Particulate Matter ($PM_{2.5}$)[10]	24 hours	35 µg/m^3	NA	U
Fine Particulate Matter ($PM_{2.5}$)[10]	Annual arithmetic mean	12 µg/m^3	U	U
Sulfates	24 hours	25 µg/m^3	A	NA
Lead[11,12]	30-day average	1.5 µg/m^3	A	NA
Lead[11,12]	3-month rolling average	0.15 µg/m^3	NA	U/A
Hydrogen Sulfide	1 hour	0.03 ppm	U	NA

Contaminant	Averaging Time	Concentration[1,2]	State Standards Attainment Status[3]	Federal Standards Attainment Status[4]
Vinyl Chloride (chloroethene) [11]	24 hours	0.010 ppm	U	NA
Visibility Reducing Particles[13]	8 hours (10:00 to 18:00 PST)	See footnote 13	U	NA

A – attainment; N – non-attainment; U – unclassified; pm – parts per million; PST – Pacific Standard Time; µg/m³ – micrograms per cubic meter; NA – threshold not applicable

Notes:

1. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this stable refers to ppm by volume, or micromoles of pollutant per mole of gas.
2. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
3. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
4. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the 4th highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m3 is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations averaged over three years, are equal to or less than the standard.
5. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
6. The project area is in attainment of the standard. The Tuscan Buttes (outside of the project area) is not in attainment for ozone.
7. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

8. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
9. Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
10. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
11. The CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
12. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
13. In 1989, the CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Source: CARB 2016b, 2017; USEPA 2019; Tehama County 2015.

2.5 Sensitive Receptors

Sensitive receptors are those segments of the population most susceptible to poor air quality: children, the elderly, and individuals with serious pre-existing health problems affected by air quality (e.g., asthma) (CARB 2005). Examples of locations that contain sensitive receptors are residences, schools and school yards, parks and playgrounds, daycare centers, nursing homes, and medical facilities. Residences include houses, apartments, and senior living complexes. Medical facilities can include hospitals, convalescent homes, and health clinics. Playgrounds include play areas associated with parks or community centers. The Proposed Project is located in an area with agricultural land uses, scattered rural residences, and recreational areas centered around the local water ways (Sacramento River).

The nearest community to the Project area is Vina, which is a census-designated place with a population of roughly 240. Highway 99 intersects the Project area as it travels in a northwest-southeast direction. Otherwise, most land uses surrounding the Project area are agricultural, as described above in Section 2.2, "Project Vicinity and Existing Land Uses" (Tehama County 2009).

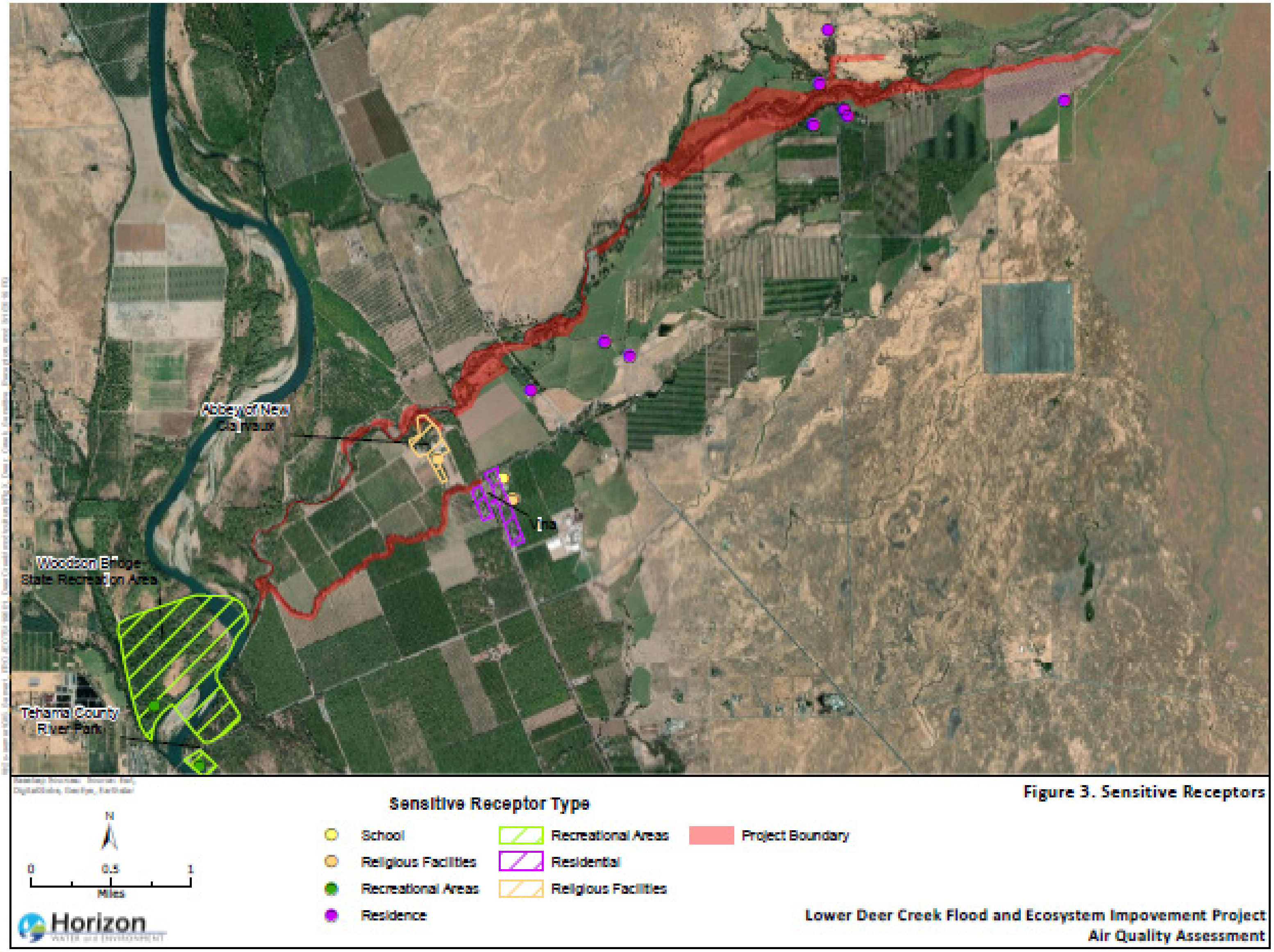
Sensitive receptors near the Project area, including all six setback alternatives and the hauling routes, are indicated in **Figure 3**. Nearest receptors include residences in Vina, residences along Leininger Road, two recreational areas (Woodson Bridge State Recreation Area [SRA], Tehama County River Park), a religious facility (Abbey of New Clairvaux), and Vina elementary school. For the purposes of air quality calculations, the edge of these properties would be located approximately 15 (residence in Vina), 90 (residence on Leininger Road), 185 (Woodson Bridge SRA), 690 (Vina elementary), 760 (Abbey), and 4,640 feet (Tehama County River Park), respectively, from the edge of the Project area. Distances from the Proposed Project's stockpile and hauling areas are provided in **Table 5**. Additional sensitive receptors (middle and high schools, dependent care, medical care facilities [hospital], and preschools) are located at least 1.5–4 miles from the Project area in/near the city of Corning.

Table 5. Sensitive Receptors in the Vicinity of the Proposed Project

Sensitive Receptor Type	Sensitive Receptor Name	Approx. Distance (feet) from Project Boundary	Approx. Distance (feet) from Nearest Project Stockpile Area	Approx. Distance (feet) from Nearest Project Hauling Routes
Residence	7th Street, Vina	15	830	830
Residence	Leininger Road	90	255	175
Recreation Area	Woodson Bridge State Recreation Area	185	7,940 (1.5 miles)	1,230
Elementary School	Vina Elementary School	690	1,810	1,810
Religious Facilities	Abbey of New Clairvaux	760	0	0
Recreation Area	Tehama County River Park	4,639 (0.9 mile)	12,083 (2.3 miles)	5,926 (1.1 miles)
Dependent Care Home	Serenity House	8,800 (1.7 miles)	16,160 (3.1 miles)	9,240 (1.7 miles)

Sensitive Receptor Type	Sensitive Receptor Name	Approx. Distance (feet) from Project Boundary	Approx. Distance (feet) from Nearest Project Stockpile Area	Approx. Distance (feet) from Nearest Project Hauling Routes
High School	Centennial High School	23,340 (4.4 miles)	29,940 (5.7 miles)	23,500 (4.5 miles)
Daycare / Preschool	Busy Bees Preschool	23,870 (4.5 miles)	28,510 (5.4 miles)	24,025 (4.5 miles)
Middle School	Maywood Middle School	39,390 (7.5 miles)	31,205 (5.9 miles)	24,815 (4.7 miles)

Figure 3. Sensitive Receptors



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2.6 Air Quality Planning and Regulations

The Tehama County APCD participates in the Sacramento Valley Basinwide Air Pollution Control Council and Technical Advisory Committee, which seek to address and coordinate regional air quality planning efforts. In addition to these regional efforts, the Tehama County APCD participated in the preparation of the Northern Sacramento Valley Planning Area 2018 Triennial Air Quality Attainment Plan (2018 Plan) and the 2015 plan version, which was prepared to address ozone non-attainment in the NSVPA. A particulate-matter–focused air quality attainment plan has not been prepared (Mann 2019, pers. comm.).

The Tehama County General Plan's (2009) Open Space and Conservation Element identifies air quality goals and policies that would be relevant to the Project Alternatives. Applicable air quality goals and policies from the General Plan include:

> **Goal OS-2:** To maintain, protect, and improve the air quality in Tehama County at acceptable levels as defined by state and federal standards.
>
> > **Policy OS-2.1:** The County shall require new development projects to incorporate appropriate measures to reduce impacts to air quality.

It should be noted that while the Proposed Project would be required to comply with both state and federal air quality-related regulations, the Proposed Project would not be subject to a federal general conformity analysis since it is located in an attainment area and not in maintenance or nonattainment areas for federal ambient air quality standards.

USEPA and CARB regulate various stationary sources, area sources, and mobile sources. USEPA has regulations involving performance standards for specific sources that may release TACs, known at the federal level as hazardous air pollutants (HAPs). In addition, USEPA has regulations involving emission criteria for off-road sources such as emergency generators, construction equipment, and vehicles. CARB is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB also establishes passenger vehicle fuel specifications. Airborne Toxic Control Measures (ATCMs), including the following relevant measures, are implemented to address sources of TACs:

- ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater
- ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling
- ATCM to Reduce Particulate Emissions from Diesel-Fueled Engines – Standards for Non-vehicular Diesel Fuel
- ATCM for Stationary Compression Ignition Engines

2.7 Greenhouse Gas Emissions

Climate change is caused, in part, from accumulation in the atmosphere of GHGs, which are produced primarily by the burning of fossil fuels for energy. Because GHGs (carbon dioxide [CO_2], methane [CH_4], and NO_2) persist and mix in the atmosphere, emissions anywhere in the world affect the climate everywhere in the world. GHG emissions are typically reported in terms of carbon dioxide equivalents (CO_2e) which converts all GHGs to an equivalent basis taking into account their global warming potential compared to CO_2.

Global climate change is already affecting ecosystems and societies throughout the world. Climate change adaptation refers to the efforts undertaken by societies and ecosystems to adjust to and prepare for current and future climate change, thereby reducing vulnerability to those changes. Human adaptation has occurred naturally over history; people move to more suitable living locations, adjust food sources, and more recently, change energy sources. Similarly, plant and animal species also adapt over time to changing conditions; they migrate or alter behaviors in accordance with changing climates, food sources, and predators.

Many national, as well as local and regional, governments are implementing adaptive practices to address changes in climate, as well as planning for expected future impacts from climate change. Some examples of adaptations that are already in practice or under consideration include conserving water and minimizing runoff with climate-appropriate landscaping, capturing excess rainfall to minimize flooding and maintain a constant water supply through dry spells and droughts, protecting valuable resources and infrastructure from flood damage and sea level rise, and using water-efficient appliances.

In 2018, total California GHG emissions from routine emitting activities were 425.3 million metric tons of carbon dioxide equivalents (MMT CO_2e) (CARB 2020). This represents an increase from 2017 and a 13-percent reduction compared to peak levels reached in 2004. Declining emissions from the electricity sector were responsible for much of the reduction due to growing zero-GHG energy generation sources. In 2018, the transportation sector of the California economy was the largest source of emissions, accounting for approximately 39 percent of the total emissions.

Tehama County has not yet prepared a climate action plan or similar document to address GHG emissions and preparation for climate change. However, in support of the potential future preparation of such a document, the County has performed an inventory of GHG emissions. A baseline inventory of Tehama County's GHG emissions (Tehama County Planning Department et al. 2014), based on 2008 emissions data, indicates transportation (56 percent) is the greatest GHG emissions source in the county. Other GHG sources and their corresponding percent contributions to the total baseline emissions include residential built environment (16 percent), off-road equipment (8 percent), agriculture[1] (8 percent), non-residential built environment (6 percent), water and wastewater (4 percent), solid waste (1 percent), and stationary sources (<1 percent). Of the off-road equipment emissions, the majority of the off-road equipment emissions came from agricultural equipment (64 percent) and construction equipment only accounted for approximately 6 percent (4,150 metric tons of carbon dioxide equivalents [MT CO_2e]). The total 2008 GHG emissions in Tehama County were 821,570 MT CO_2e. It was estimated that under baseline as usual conditions, emissions in 2020 and 2028 would increase to approximately 959,000 and 1,061,000 MT CO_2e. (Tehama County Planning Department et al. 2014).

2.8 Greenhouse Gas Plans and Regulations

At the federal level, USEPA has developed regulations to reduce GHG emissions from motor vehicles and has developed permitting requirements for large stationary emitters of GHGs. On April 1, 2010, USEPA and the National Highway Traffic Safety Administration (NHTSA) established a program to reduce GHG emissions and improve fuel economy standards for new model year 2012–2016 cars and light trucks. On August 9, 2011, USEPA and the NHTSA announced standards to reduce GHG emissions and improve fuel efficiency for heavy-duty trucks and buses. In August 2016, USEPA and the NHTSA jointly finalized Phase 2 Heavy-Duty National Program standards to reduce GHG emissions and improve fuel efficiency of medium- and heavy-duty vehicles for model year 2018 and beyond (USEPA 2020). However, in August 2018, USEPA and the NHTSA proposed amendments to the standards covering model years 2021 – 2026 that would decrease the existing fuel efficiency requirements for those years and these amendments were finalized in March 2020 (NHTSA 2020).

In recent years, California has enacted a number of policies and plans to address GHG emissions and climate change. In 2006, the California State Legislature enacted Assembly Bill (AB) 32, the Global Warming Solutions Act, which set the overall goals for reducing California's GHG emissions to 1990 levels by 2020. Senate Bill (SB) 32 codified an overall goal for reducing California's GHG emissions to 40 percent below 1990 levels by 2030. Executive Orders (EOs) S-3-05 and B-16-2012 further extend this goal to 80 percent below 1990 levels by 2050. CARB has completed rulemaking to implement several GHG emission reduction regulations and continues to investigate the feasibility of implementing additional GHG emission reduction regulations. These include the low carbon fuel standard, which reduces GHG emissions associated with fuel usage, and the renewable portfolio standard, which requires electricity suppliers to increase the amount of electricity generated from renewable sources to 33 percent by 2020 and 50 percent by 2030. SB 350 established a California GHG reduction target of 40 percent below 1990 levels and sets a renewable portfolio goal of 50 percent by 2030, along with encouraging energy efficiency savings and electrification of transportation. In 2018, SB 100 updated the Renewable Portfolio Standard

[1] Agricultural emissions in the inventory included emissions from cattle and fertilizer use. Emissions related to agricultural equipment were included in the "off-road equipment" category.

to require 50 percent renewable resources by the end of 2026, 60 percent by the end of 2030, and 100 percent renewable energy and zero carbon resources by 2045. EO B-55–18 signed by Gov. Brown set a goal of statewide carbon neutrality by 2045 and net negative emissions thereafter.

CARB approved the First Update to the AB 32 Scoping Plan on May 22, 2014 (CARB 2014). This update defines climate change priorities for the next 5 years and also sets the groundwork to reach long-term goals set forth in EOs S-3-05 and B-16-2012. The update also highlights California's progress toward meeting the near-term 2020 GHG emission reduction goals and evaluates how to align the State's longer term GHG reduction strategies with other state policy priorities for water, waste, natural resources, clean energy, transportation, and land use. CARB updated the Scoping Plan to reflect progress since 2005, additional reduction measures, and plans for reductions beyond 2020. CARB released and adopted a 2017 Scoping Plan Update (CARB 2017) to reflect the 2030 target set by EO B-30-15 and codified by SB 32 (CARB 2017, 2018).

2.9 Energy Resources and Consumption

Energy resources are regulated through a variety of federal, state, and local regulations. At the federal level, the USEPA and NHTSA have developed regulations to improve the efficiency of cars and light-, medium-, and heavy-duty vehicles. Energy resource-related regulations, policies, and plans at the state level require the regular analysis of energy data and developing recommendations to reduce statewide energy use and setting requirements on the use of renewable energy sources. In addition, California's 2017 Climate Change Scoping Plan, which details the state's strategy for achieving the state's GHG targets, includes energy-related goals and policies.

Energy resource-related regulations, policies, and plans at the state level, require the regular analysis of energy data and developing recommendations to reduce statewide energy use, and setting requirements on the use of renewable energy sources. SB 1389, passed in 2002, requires the California Energy Commission (CEC) to prepare an Integrated Energy Policy Report for the governor and legislature every 2 years (CEC 2019). The report analyzes data and provides policy recommendations on trends and issues concerning electricity and natural gas, transportation, energy efficiency, renewable energy, and public interest energy research (CEC 2019). The 2018 Integrated Energy Policy Report Update includes policy recommendations such as addressing the vulnerability of California's energy infrastructure to extreme events related to climate change, including sea-level rise and coastal flooding (CEC 2018).

California has extensive energy resources, including an abundant supply of crude oil, high production of conventional hydroelectric power, and leads the nation in electricity generation from renewable resources (solar, geothermal, and biomass resources) (U.S. Energy Information Administration [EIA] 2021). California has the second highest total energy consumption in the United States but one of the lowest energy consumption rates per capita due to its mild climate and energy efficiency programs (EIA 2021). A comparison of California's energy consuming end-use sectors indicates that the transportation sector is the greatest energy consumer compared to the other end-use sectors (industrial, commercial, and residential, which are listed in order of greatest to least consumption) (EIA 2021). California is the largest consumer of motor gasoline and jet fuel in the United States (EIA 2021).

In Tehama County, energy consumption patterns would generally align with the GHG emission patterns described above, and transportation would be the largest consumer of energy resources. Off-road equipment, and in particular construction equipment, is not a large energy consumer (<1 percent of total GHG emissions) compared to other GHG emission sources in the county.

3.0 METHODS AND ASSUMPTIONS

This section describes the methodology, significance thresholds, and assumptions used to perform the energy consumption and air quality pollutant and GHG emissions analyses for the Proposed Project.

The Project's design is intended to reduce maintenance needs--particularly related to sediment management, but operation and maintenance activities would still be needed. Specific operation and maintenance actions that are compatible with the ecology, hydrology, and geomorphology in Deer Creek will be developed in subsequent design stages and documented in an operation and maintenance plan for the project. Operational and maintenance information is not yet available to quantify emissions or make an impact determination. Therefore, this analysis does not include any discussions related to potential impacts or make any significance conclusions with regards to maintenance- or operation-related emissions of air quality pollutants and GHGs and energy consumption.

3.1 Air Quality Methodology

Construction-related air quality impacts of the Proposed Project were evaluated quantitatively and qualitatively by considering the Proposed Project's sources and duration of criteria pollutant, TAC, and odor emissions; proximity to sensitive receptors; and frequency and duration of emissions. In addition, the NSVAB's existing air quality attainment status and applicable air quality plans were reviewed and considered in the impact analysis. Where specific construction-related details were lacking, impacts were conservatively judged to be significant, and prescriptive mitigation measures were developed to ensure significant impacts would be minimized. As detailed in the Project's traffic study and project description, the six alternatives for the Project have differing material export/import quantities, hauling truck trip quantities, and areas of impact. To capture the range of potential impacts resulting from the six setback alternatives, the emissions from the greatest and least impactful alternative options, specifically Alternatives A and F, were quantified. Since all other alternatives would have an area of impact and hauling truck use in between Alternatives A and F, this approach was determined to represent the full range of potential impacts.

The Tehama County APCD has established thresholds of significance for criteria pollutant emissions, which are detailed further below, in its Air Quality Planning & Permitting Handbook (2015). In addition, because the Project would have a federal nexus and be required to comply with NEPA, a General Conformity analysis would be required if the Project is located in a nonattainment or maintenance area for national ambient air quality standards. The General Conformity Rule, required under the Clean Air Act, requires federal agencies to "work with state, tribal and local governments in a nonattainment or maintenance area to ensure that federal actions conform to the air quality plans established in the applicable state or tribal implementation plan" (USEPA 2017). The NSVAB in Tehama County is in attainment for all national ambient air quality standards in the project area. Therefore, a general conformity analysis would not be required. As such, the impact analysis quantitatively considers only the applicable local (Tehama County APCD) thresholds of significance. Potential criteria pollutant emissions were estimated for the Project using the California Emissions Estimator Model (CalEEMod), version 2016.3.2, based on assumptions detailed below and in Appendix A.

For TACs and odors associated with the Project, impacts were evaluated qualitatively using the Tehama County APCD's Air Quality Planning & Permitting Handbook (2015). This qualitative analysis was conducted based on pertinent information regarding TAC and odor sources (i.e., frequency and duration of emissions, type of sources, location of stockpile and project areas, equipment and vehicle usage) and the proximity to sensitive receptors. Using this information, the Project was evaluated for the potential to create objectionable odors affecting a substantial number of people.

3.2 Greenhouse Gas Emissions Methodology

Construction-related GHG emissions were evaluated both quantitatively and qualitatively by considering the Proposed Project's potential sources of GHG emissions, including fossil-fueled or electric energy-consuming equipment and vehicles, along with potential frequency and duration of emissions. The quantitative analysis compared potential construction-related GHG emissions from the Project's range of alternatives to the Tehama County APCD's GHG significance threshold. It should be noted that because this Project is not a DWR project (i.e. DWR will not be implementing it), DWRs Climate Action Plan and quantitative GHG threshold do not apply to the Project.

Projected changes in climate associated with global warming may have related effects on other resources in the future, including effects on the Proposed Project (such as changes in weather patterns). Anticipated potential worldwide climate change effects include coastal erosion, sea level rise, melting glaciers, atmospheric temperature warming, increased wildfire risk, ocean warming, food production issues (e.g., decreased crop yields), effects on terrestrial and marine ecosystems, flooding and/or drought conditions, and altered hydrologic patterns such as changes in river flows or lake levels (Intergovernmental Panel on Climate Change 2014). California-specific climate change effects and indicators of climate change are similar to those that may be experienced globally and are discussed in *Indicators of Climate Change in California*, a report prepared by OEHHA (2018). The evaluation of such effects on the Proposed Project is beyond the scope of this GHG analysis.

3.3 Energy Consumption Methodology

Energy consumption analysis considered estimated energy consumption from the Proposed Project's, consideration of energy efficiency, and the overall energy consumption in Tehama County. In general, the methods used to analyze the energy-related impacts (identified in the significance thresholds below) is qualitative. However, the Project's energy consumption has been estimated to provide some quantitative information. The quantity of energy consumed by the Proposed Project was estimated by calculating the fuel consumption from the Project's construction-related trips (worker, vendor, and hauling), as well as fuel use by off-road construction equipment. The quantity of vehicle trips, the construction equipment quantities, and construction equipment types used in this analysis are the same as those used in the CalEEMod modeling (and shown below in the project assumptions discussion).

3.4 Significance Thresholds

The thresholds described in this section were used for the impact discussions in Chapter 4, *Impact Assessment*. To support preparation of a CEQA document for the Proposed Project, the thresholds provided here include thresholds from the State CEQA Guidelines, as well as detailed thresholds from the local (Tehama County APCD) thresholds. Based on Appendix G of the State CEQA Guidelines, the Proposed Project would result in a significant impact with regard to air quality and GHG emissions, or energy resources if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;
- Expose sensitive receptors to substantial air pollutant concentrations;
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people;
- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment;
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHGs;
- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation; or
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

Tehama County APCD Significance Thresholds

The Tehama County APCD's recommended CEQA thresholds are outlined in its *Air Quality Planning and Permitting Handbook – Guidelines for Assessing Air Quality Impacts* (Tehama County APCD 2015) and summarized in **Table 6**. The Tehama County APCD's analysis and recommended mitigation measures follow a tiered approach based on the overall project-generated emissions. The Tehama County APCD's thresholds for ROG and NO_X, which are ozone precursors, are 25 pounds per day (lbs/day) for each pollutant. The PM10 threshold of significance would be 80 lbs/day. Ozone precursor emissions are generated from both heavy- and light-duty vehicle use. In addition to these significance thresholds, the Tehama County APCD has determined that projects with emissions greater than the thresholds described above would be potentially significant and may require implementation of recommended mitigation measures to ensure a less than significant impact. Further, according to Tehama County APCD's guidance, projects generating more than 137 lbs/day for ROG, NO_X, or PM10 would have significant impacts and would require implementation of mitigation measures. Projects generating between 25 and 137 lbs/day would be potentially significant unless mitigation measures could reduce emissions below 25 lbs/day for ROG and NO_x and 80 lbs/day for PM10.

For GHG emissions, the Tehama County APCD established a significance threshold of 900 MT CO_2e, as discussed below. As described above, since DWR is not implementing this project, DWR's thresholds would not be applicable. Therefore, DWR has adopted the Tehama County APCD CEQA thresholds for purposes of evaluating potential environmental impacts of the Proposed Project.

Table 6. Applicable Tehama County APCD Significance Thresholds under CEQA

Pollutant	Level A Emissions Threshold (pounds/day)	Level B Emissions Thresholds (pounds/day)	Level C Emissions Thresholds (pounds/day)
Oxides of nitrogen (NO_X; ozone precursor)	<25	>25	>137
Reactive organic gases (ROG; ozone precursor)	<25	>25	>137
Particulate matter (PM10)	<80	>80	>137
Level of Significance	Less than Significant	Potentially Significant	Significant
Mitigation Recommendations	Standard	Standard and Best Available	Standard, Best Available, and potentially Off-site measures

Source: Tehama County APCD 2015

Due to the variable nature of construction activity, the generation of TAC emissions in most cases would be temporary, especially considering the short amount of time such equipment is typically operating within an influential distance that would result in the exposure of sensitive receptors to substantial concentrations. Chronic and cancer-related health effects estimated over short periods are uncertain. Cancer potency factors are based on animal lifetime studies or studies of workers with long-term exposure to the carcinogenic agent. There is considerable uncertainty in trying to evaluate the cancer risk from exposure that would last only a small fraction of a lifetime. Some studies indicate that the dose rate may change the potency of a given dose of a carcinogenic chemical. In other words, a dose delivered over a short period may have a different potency than the same dose delivered over a lifetime (OEHHA 2015). Given that the construction period for the Proposed Project, which would range from approximately 150 to 240 days, would not involve the use of substantial quantities of construction equipment for a lengthy duration, a qualitative analysis was determined to be the appropriate level of detail required to determine the impact of potential TAC emissions.

For construction, health risks from TACs were evaluated by identifying the Proposed Project's potential to generate TAC emissions and determining whether sensitive receptors could be affected by those emissions.

Tehama County APCD established screening criteria that specify an acceptable distance (1 mile) between sensitive receptors and common sources of odors, such as landfills and wastewater treatment plants. The Tehama County APCD acknowledges that a Lead Agency has discretion under CEQA to use established odor detection thresholds or other significance thresholds for CEQA review. Because the Proposed Project does not involve any odor sources included in the Tehama County APCD's screening criteria, this analysis uses a qualitative assessment of potential odor sources and their impact.

With regard to the criterion of consistency with applicable plans and policies, this report's impact analysis evaluates the Project's emissions for consistency with CARB's Scoping Plan and updates, which outline the strategies that will need to be implemented for the state to meet the goals of AB 32, SB 32, and Executive Order S-3-05. Specifically, if the Proposed Project would not conflict with CARB's GHG emission reduction policies, it would have a less-than-significant impact.

The CEQA Guidelines also require a determination of whether the Project would generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. For GHG emissions, the Tehama County APCD established a significance threshold of 900 MT CO_2e. This "bright-line threshold" of 900 MT CO_2e was set for the 2020 goal established in AB 32. At the time of publication of this report, the Tehama County APCD has not provided an updated analysis regarding the applicability of this bright-line threshold to the 2030 and 2050 goals of SB 32. Because implementation of the Proposed Project would take place after 2020, the GHG analysis should consider whether the project would make substantial progress toward these future goals. In absence of guidance from Tehama County

APCD, the relevance of an appropriate threshold for post-2020 GHG emissions must be considered.

The Sacramento Metropolitan Air Quality Management District (SMAQMD) initially conducted an analysis of the CEQA projects that would be captured by establishing a bright-line threshold for the 2020 goals. Recently, SMAQMD updated its analysis and determined that the existing bright-line threshold would still capture over 98 percent of GHG emissions (SMAQMD 2020). Thus, it would be reasonable to assume that an updated analysis by Tehama County APCD would find that projects would continue to achieve a high capture rate of total GHG emissions with use of this bright-line threshold. This conclusion supports the continued use of 900 MT CO_2e as a significance threshold post-2020 and indicates that continued progress toward the 2030 and 2050 goals is likely to be maintained with this bright-line threshold. This report's impact analysis relies on this quantitative threshold to determine the significance of this impact.

3.5 Project Assumptions

3.5.1 Project Schedule

The Proposed Project's construction schedule, including that of the different setback alternatives, is provided in **Table 7**. This estimated schedule is based on information provided by FlowWest and the Project's traffic study (KD Anderson & Associates, Inc. 2021). Phases were divided based on the anticipated project activities. For the purposes of this report and modeling efforts, a separate material hauling activities phase captured all worker, vendor, and hauling trips associated with the duration of the Proposed Project. For Alternatives A through E, it was estimated that the total hauling phase duration would be 240 days and begin on March 1st, 2023. For Alternative F, the hauling phase duration would be 150 days and begin on June 1st, 2023. For all activities, it was assumed that there would be six workdays per week. It was assumed that construction phases would be phased sequentially and would not overlap, apart from the overlap of the material hauling phase with the other construction phases.

Table 7. Project and Alternatives Construction Schedule

Construction Phase	Construction Duration (number of workdays)	Construction Start Date	Construction End Date
Downstream of SVRIC Diversion Dam	30	June 2023	July 2023
Dam to Red Bridge (setback Alternatives A / B / C / D / E / F)	100 / 90 / 80 / 70 / 60 / 30	July 2023	Varies by Alternative
Red Bridge	20	November 2023	December 2023

Construction Phase	Construction Duration (number of workdays)	Construction Start Date	Construction End Date
Upstream Red Bridge	15	July 2023	July 2023
Hauling Phase (Alternatives A – E)/Hauling Phase (Alternative F)	240/150	March 2023/June 2023	December 2023

3.5.2 Project Construction Equipment Assumptions by Construction Phase

The Proposed Project's construction equipment quantities, types, and sizes are as provided in **Table 8**. The estimated project equipment quantities and types were based on similar project types, CalEEMod default equipment types and sizes, and information from FlowWest. Off-road construction equipment was accounted for in the construction phases, apart from the hauling phase.

Table 8. Project Construction Equipment

Construction Phase	Construction Equipment Type	Construction Equipment Quantity	Daily Usage Hours	Horsepower
Down SVRIC Div Dam	Graders	2	8	187
Down SVRIC Div Dam	Tractors/Loaders/ Backhoes	2	8	97
Down SVRIC Div Dam	Rubber Tired Dozers	2	8	247
Down SVRIC Div Dam	Pumps	2	8	97
Down SVRIC Div Dam	Excavators	1	8	158
Down SVRIC Div Dam	Plate Compactors	1	8	8
Down SVRIC Div Dam	Off-Highway Trucks	2	8	402
Down SVRIC Div Dam	Concrete/Industrial Saws	1	8	81
Dam to Red Bridge	Tractors/Loaders/Back hoes	2	8	97
Dam to Red Bridge	Rubber Tired Dozers	2	8	247
Dam to Red Bridge	Off-Highway Trucks	4	8	402
Dam to Red Bridge	Pumps	2	8	84
Dam to Red Bridge	Excavators	2	8	158

Construction Phase	Construction Equipment Type	Construction Equipment Quantity	Daily Usage Hours	Horsepower
Dam to Red Bridge	Graders	2	8	187
Red Bridge	Cement and Mortar Mixers	1	6	9
Red Bridge	Tractors/Loaders/Backhoes	1	6	97
Red Bridge	Concrete/Industrial Saws	1	8	81
Red Bridge	Air Compressors	1	6	78
Red Bridge	Excavators	1	8	158
Red Bridge	Other Material Handling Equipment	4	8	168
Red Bridge	Pumps	2	8	84
Red Bridge	Plate Compactors	1	8	8
Red Bridge	Cranes	1	4	231
Red Bridge	Forklifts	2	6	89
Upstream Red Bridge	Rubber Tired Dozers	1	8	247
Upstream Red Bridge	Tractors/Loaders/ Backhoes	2	8	97
Upstream Red Bridge	Off-Highway Trucks	2	8	402
Upstream Red Bridge	Pumps	2	8	84
Upstream Red Bridge	Graders	1	8	187
Upstream Red Bridge	Excavators	1	8	158

3.5.3 Project Construction Trips and Anticipated Soil Import/Export Activities

Anticipated worker, vendor, and hauling trips for the Project's alternatives are based on information from FlowWest and the Project's traffic study (2021). Using that information, **Table 9** provides the assumed worker and vendor trips for the two alternatives (A and F), which represent the Project's alternatives range for trips and related import/export quantities. Hauling trips were calculated based on an assumed 20-cubic-yard-capacity truck for the soil import/export quantities indicated in Table 9. In addition, daily truck trips were based on an assumed 240-day construction period for Alternatives A-E, an assumed 150-day construction period for Alternative F, and two trip ends per truck load. Worker and vendor trip lengths were assumed to be 30 and 22 miles, respectively. Hauling trip lengths varied by the material type (import/export of soils or other materials) and the corresponding material disposal or source area locations, as detailed in the Project's traffic study. Thus, import, export, and other material hauling distances were 33, 10, and 170 miles/day, respectively.

Table 9. Project Trips and Import/Export Quantities

Construction Phase	Daily Worker Trips (one-way)	Daily Vendor Trips (one-way)	Daily Hauling Trips (one-way)	Total Hauling Trips	Soil/Material Import (cubic yards)	Soil/Material Export (cubic yards)
Hauling Material (Alternative A)	60	20	421	100,836	109,059	889,706
Hauling Material (Alternative B)	60	20	384	92,160	101,895	811,267
Hauling Material (Alternative C)	60	20	361	86,640	109,403	746,287
Hauling Material (Alternative D)	60	20	309	74,160	111,177	621,163
Hauling Material (Alternative E)	60	20	286	68,640	122,617	554,215
Hauling Material (Alternative F)	60	20	152	22,800	89,395	129,546

4.0 IMPACT ASSESSMENT

This section presents results of the air quality, GHG emissions, and energy consumption impact assessment.

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan and which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects need to be evaluated to determine whether they would generate population and employment growth and, if so, whether that growth would exceed the growth rates included in the relevant air quality plans.

As discussed previously, the Proposed Project is within the planning area of the NSVAB Attainment Plan, which was prepared to address ozone nonattainment. There are no air quality plans that address particulate matter in Tehama County.

The Proposed Project would be required to comply with the applicable regulations, including Tehama County APCD rules and measures, and the County's General Plan. The County's General Plan focuses on protecting public health and environmental resources, including air quality. The Proposed Project would comply with the County's General Plan Goal OS-2 and Policy OS-2.1, which require new projects to maintain, protect, and improve the air quality in Tehama County at acceptable levels and incorporate appropriate measures to reduce impacts to air quality. The Proposed Project would involve construction activities over an approximate 240-day construction period for Alternatives A-E and an approximate 150-day construction period for Alternative F. The Project would not increase the total number of employees in the area. Therefore, the Proposed Project would be consistent with applicable planning documents.

The Proposed Project would follow all federal, state, and local regulations related to area sources of air pollutants including obtaining appropriate permits from the Tehama County APCD. Therefore, because the Proposed Project would be consistent with the applicable general plan goal and policy, as referenced above, and would comply with all applicable regulations for sources of air pollutants, the Proposed Project would have a **less-than-significant** impact and would not obstruct or conflict with applicable air quality plans.

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

During construction of the Proposed Project, the combustion of fossil fuels for operation of construction equipment, material hauling, and worker trips would result in construction-related criteria air pollutant emissions. The Proposed Project's emissions were estimated using the California Emissions Estimator Model (CalEEMod) version 2016.3.2. The Proposed Project's construction-related emissions are provided in **Table 10 and Table 11**.

Table 10. Proposed Project Emissions Compared to Tehama County APCD Thresholds for Alternatives A through C

Emissions Type	ROG	NO_X	CO	SO_X	PM10	PM2.5
Proposed Project Construction (lbs/day) -- Alternative A						
Proposed Project Construction (Alternative A Unmitigated Emissions-- Combined All Construction Phases)	15.3	197.9	125.6	0.8	37.3	18.2
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	--	--	80/137	--
Exceeds Threshold (Unmitigated Alternative A)?	N	**Y**	N/A	N/A	N	N/A
Mitigated Alternative A Emissions	6.5	**107.6**	155.8	0.8	33.2	14.4
Exceeds Threshold (Mitigated Alternative A)?	N	**Y/N**	N/A	N/A	N	N/A
Proposed Project Construction (lbs/day) -- Alternative B						
Proposed Project Construction (Alternative B Unmitigated Emissions-- Combined All Construction Phases)	15	190	124	0.7	36.3	17.9
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	--	--	80/137	--
Exceeds Threshold (Unmitigated Alternative B)?	N	**Y**	N/A	N/A	N	N/A
Mitigated Alternative B Emissions	6.2	**100**	154.4	0.7	32.2	14.1

Emissions Type	ROG	NO_X	CO	SO_X	PM10	PM2.5
Exceeds Threshold (Mitigated Alternative B)?	N	**Y/N**	N/A	N/A	N	N/A
Proposed Project Construction (lbs/day) -- Alternative C						
Proposed Project Construction (Alternative C -- Combined All Construction Phases)	14.8	184.6	123.2	0.7	35.4	17.7
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	--	--	80/137	--
Exceeds Threshold (Unmitigated Alternative C)?	N	**Y**	N/A	N/A	N	N/A
Mitigated Alternative C Emissions	6.1	**94.3**	153.3	0.7	31.3	13.9
Exceeds Threshold (Mitigated Alternative C)?	N	**Y*/N**	N/A	N/A	N	N/A

Note: All measurements are in pounds per day. N = no; Y = yes; N/A = not applicable.

* The mitigated emissions for Alternatives A and F exceed the Level B significance threshold for NO_X of 25 lbs/day. Therefore, impacts are assumed to remain potentially significant.

** Estimated mitigated emissions for PM10 are only based on reductions in exhaust-related emissions. Use of watering equipment not fully quantified in this analysis would be likely to minimize fugitive dust-related emissions.

Source: CalEEMod results provided in Appendix A.

Table 11. Proposed Project Emissions Compared to Tehama County APCD Thresholds for Alternatives D through F

Emissions Type	ROG	NO_X	CO	SO_X	PM10	PM2.5
Proposed Project Construction (lbs/day) -- Alternative D						
Proposed Project Construction (Alternative D Unmitigated Emissions-- Combined All Construction Phases)	14.4	172.9	121	0.6	33.8	17.2
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	--	--	80/137	--
Exceeds Threshold (Unmitigated Alternative D)?	N	**Y**	N/A	N/A	N	N/A

Emissions Type	ROG	NO_X	CO	SO_X	PM10	PM2.5
Mitigated Alternative D Emissions	5.7	82.7	151.1	0.6	29.7	13.4
Exceeds Threshold (Mitigated Alternative D)?	N	**Y/N**	N/A	N/A	N	N/A
Proposed Project Construction (lbs/day) – Alternative E						
Proposed Project Construction (Alternative E Unmitigated Emissions-- Combined All Construction Phases)	14.2	167.2	119.9	0.6	32.9	17
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	--	--	80/137	--
Exceeds Threshold (Unmitigated Alternative E)?	N	**Y**	N/A	N/A	N	N/A
Mitigated Alternative E Emissions	5.5	76.9	150	0.6	28.7	13.2
Exceeds Threshold (Mitigated Alternative E)?	N	**Y/N**	N/A	N/A	N	N/A
Proposed Project Construction (lbs/day) -- Alternative F						
Proposed Project Construction (Alternative F -- Combined All Construction Phases)	14	155	114	0.45	41	22
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	--	--	80/137	--
Exceeds Threshold (Unmitigated Alternative F)?	N	**Y**	N/A	N/A	N	N/A
Mitigated Alternative F Emissions	4.7	**47**	149	0.45	36	18
Exceeds Threshold (Mitigated Alternative F)?	N	**Y*/N**	N/A	N/A	N	N/A

Note: All measurements are in pounds per day. N = no; Y = yes; N/A = not applicable.
* The mitigated emissions for Alternatives A and F exceed the Level B significance threshold for NO_X of 25 lbs/day. Therefore, impacts are assumed to remain potentially significant.

** Estimated mitigated emissions for PM10 are only based on reductions in exhaust-related emissions. Use of watering equipment not fully quantified in this analysis would be likely to minimize fugitive dust-related emissions.

Source: CalEEMod results provided in Appendix A.

As described above, the Tehama County portion of the NSVAB is designated as a state non-attainment area for ozone and PM10, and is in attainment or unclassified for all other federal and state criteria air pollutants. All of the potential emissions from the Proposed Project's multiple construction phases were combined for the Project Alternatives (A through F) to illustrate the total emissions from the Proposed Project's various alternatives. NO_X emissions from the Proposed Project would exceed the Level C significance thresholds established by Tehama County APCD. All other Project emissions would be less than the Tehama County APCD thresholds.

The Tehama County APCD recommends implementation of fugitive dust control measures and requires a fugitive dust permit be obtained for construction activities meeting certain requirements. To ensure that the Proposed Project minimizes its potential contribution to the existing PM10 nonattainment status and minimizes potential fugitive dust emissions, the Proposed Project would implement the best management practices described in Mitigation Measure AQ-1 and obtain a fugitive dust permit from the Tehama County APCD. With implementation of PM fugitive dust emissions and using Tier 4 Final for construction equipment over 25 horsepower, the PM10 emissions are below the Tier A threshold and would be less than significant with mitigation.

As project details are further finalized, the Lead Agency will work with the Tehama County APCD to implement appropriate mitigation measures or project design changes to minimize NOX emissions as indicated in Mitigation Measure AQ-2. All Project Alternatives would emit unmitigated NOx emissions in excess of the Level C significance threshold. With implementation of potential construction equipment mitigation (assuming all equipment over 25 horsepower was a Tier 4 Final level), emissions for the Project Alternatives would be reduced to a level in between the Level B and Level C Tehama County APCD significance levels of 25 and 137 lbs/day for NOx, respectively. However, since it is unknown at this time if the Proposed Project would be able to reduce NOX emissions below the Tehama County APCD threshold, this impact would be potentially significant. Thus, emissions related to construction of the Proposed Project may be anticipated to violate air quality standard and, therefore, make a substantial contribution to the existing ozone nonattainment status. This impact would be potentially significant even with mitigation implemented.

Mitigation Measure AQ-1: Dust Control Measures

The Lead Agency shall implement basic dust control measures in compliance with the Tehama County APCD's recommendations. Current measures include the following:

- Water shall be applied by means of truck(s), hoses and/or sprinklers as needed prior to any land clearing or earth movement to minimize dust emission.

- All disturbed areas shall be watered at least two times per day, and more often during periods of high wind.

- All haul trucks transporting soil, sand, or other loose material onsite or off-site shall be covered.
- All visibly dry disturbed soil surface areas of operation shall be treated with a dust palliative agent and/or watered to minimize dust emission.
- All visibly dry disturbed unpaved road surface areas of operation shall be watered to minimize dust emission.
- Unpaved roads may be graveled to reduce dust emissions.
- All visible mud or dirt track-out onto adjacent paved public roads shall be removed using wet power vacuum street sweepers at least once per day unless conditions warrant a greater frequency. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads and those entering and existing the construction areas shall be limited to a speed which minimizes dust emissions (15 mph or less).
- Unpaved, disturbed haul roads shall be sprayed down at the end of the work shift to form a thin crust. This application of water shall be in addition to the minimum rate of application.
- Construction workers shall park in designated parking area(s) to help reduce dust emissions.
- Soil pile surfaces shall be moistened if dust is being emitted from the pile(s). Adequately secured tarps, plastic or other material may be required to further reduce dust emissions.
- Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications.
- Maximize to the extent feasible, the use of diesel construction equipment meeting current CARB certification standards for off-road heavy-duty diesel engines.
- Registration in the CARB DOORS program (www.arb.ca.gov/msprog/ordiesel/ordiesel.htm) and meeting all applicable standards for replacement and/or retrofit.

- All portable equipment, including generators and air compressors rated over 50 brake horse power, registered in the Portable Equipment Registration Program (www.arb.ca.gov/portable/portable.htm), or permitted through the District as a stationary source.

- Post a publicly visible sign with the telephone number and person to contact regarding dust complaints. Following the review of any dust complaints, this person shall respond and take corrective action within 24 hours. The telephone number of the TCAPCD shall also be visible to ensure compliance with TCAPCD Rule 4:1 & 4:24 (Nuisance and Fugitive Dust Emissions).

Mitigation Measure AQ-2: Material Hauling NO_X Control Measures

The Lead Agency shall implement any combination of the following measures to reduce NOx emissions to the equivalent of the CARB Fleet Average and 2008 model year On-road Vehicle Standard or demonstrate equivalency from these options:

a. Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes as a maximum (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations).

b. Reduce quantity or duration of construction equipment use on a daily basis.

c. Develop a plan demonstrating that off-road equipment (greater than 50 horsepower) and material hauling vehicles used during Proposed Project construction (i.e., owned, leased, and subcontracted vehicles) achieve emission reductions to the maximum extent feasible. Equipment and material hauling vehicles shall achieve at least a Project-wide fleet average equal to the recent CARB fleet average or up to a Tier IV final-equivalent engine.

   Acceptable options for reducing emissions include the low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available. The Proposed Project shall demonstrate that Project-wide fleet average reductions are achieved by presenting equivalent emission calculation or other methodologies using appropriate models. Annual and final project reports shall be prepared and reviewed by the project representative.

d. Limit the number of daily one-way material hauling trips.

e. Use newer model year material hauling vehicles that emit less NOx emissions per trip.

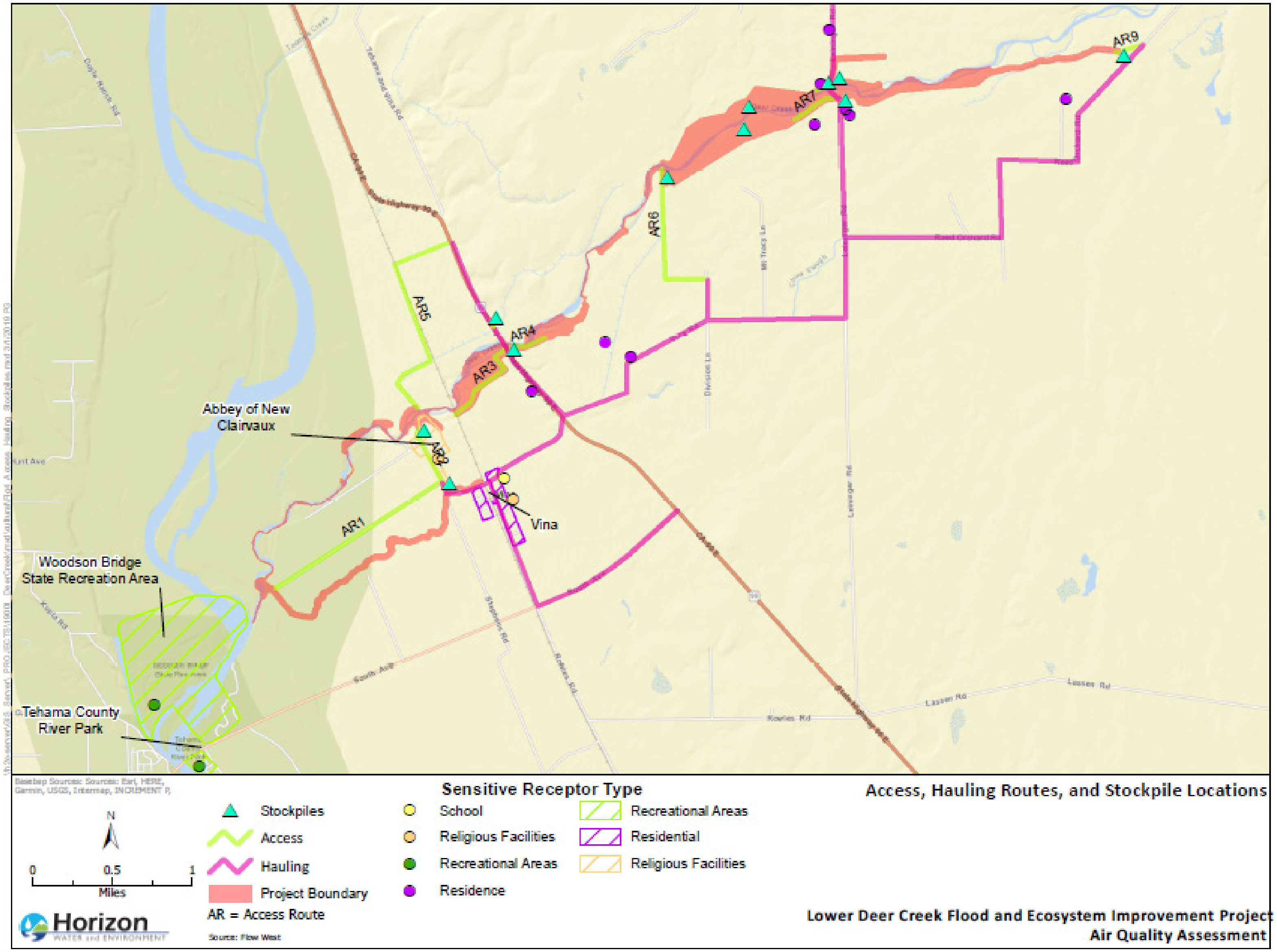
c. Would the project expose sensitive receptors to substantial air pollutant concentrations?

The closest sensitive receptors to the Proposed Project's construction areas, stockpile areas, and hauling routes would be the occupants of the Abbey of New Clairvaux and residences located approximately 0–800 feet from the various project areas (Table 5 and **Figure 4**). The pollutants of concern and TACs that would affect sensitive receptors are particulates, specifically PM10 and PM2.5 contained in fugitive dust, and DPM from construction equipment. In addition, gasoline fuel combustion emissions that are classified as TACs could be emitted by construction equipment. As discussed above, implementation of Mitigation Measure AQ-1 would involve dust control measures, such as periodic watering of disturbed areas, to reduce fugitive dust emissions during construction. The Project's construction activities would occur only over a period of up to 240 days during the summer dry season. However, the Proposed Project's alternatives include vehicle hauling trips ranging from approximately 22,800 to over 100,000 total trips for Alternatives F and A, respectively. Hauling trips for the other Project alternatives would fall within this range.

Due to the variable nature of construction activity, the generation of TAC emissions in most cases would be temporary, especially considering the short amount of time such equipment is typically operating within an influential distance that would result in the exposure of sensitive receptors to substantial concentrations. Chronic and cancer-related health effects estimated over short periods are uncertain. Cancer potency factors are based on animal lifetime studies or worker studies with long-term exposure to the carcinogenic agent. There is considerable uncertainty in trying to evaluate the cancer risk from exposure that would last only a small fraction of a lifetime. Some studies indicate that the dose rate may change the potency of a given dose of a carcinogenic chemical. In others words, a dose delivered over a short period may have a different potency than the same dose delivered over a lifetime (OEHHA 2015). Furthermore, construction impacts are most severe adjacent to the construction area and decrease rapidly with increasing distance. Concentrations of mobile-source DPM emissions are typically reduced by 70 percent at a distance of approximately 500 feet (CARB 2005).

Since some sensitive receptors are located within 500 feet of the hauling routes, the Proposed Project would potentially emit substantial quantities of DPM and result in a potentially significant impact. Although construction activities would only occur over a limited timeframe, and implementation of Mitigation Measures AQ-1 and AQ-2 would reduce the potential DPM emissions, it is conservatively assumed that the Project may still emit substantial temporary quantities of DPM and the Proposed Project's effect on nearby sensitive receptors due to construction-related air pollutant emissions would remain potentially significant and unavoidable.

Figure 4. Access, Hauling Routes, and Stockpile Locations



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d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Construction activities associated with the Proposed Project would not generate permanent or long-term objectionable odors but could generate odors related to excavated material and the operation of gasoline- or diesel-powered equipment. Odors may also be associated with decaying organic material contained in excavated or dredged material. The Proposed Project does not involve activities or facilities identified by Tehama County APCD (2015) as common odor-causing sources. Although the Proposed Project is located in a rural area, there are limited sensitive receptors near the Project area as discussed previously who could be impacted by objectionable odors. To minimize these potential odors on nearby sensitive receptors, Mitigation Measure AQ-3 would be implemented to cover stockpiles when not in use to minimize odors. With implementation of this mitigation measure, this impact would be less than significant.

Mitigation Measure AQ-3: Cover Stockpiles

The Lead Agency will require that contractors handle stockpiles of potentially odorous excavated or dredged material, or other potentially odorous materials, in a manner that avoids affecting residential areas or other sensitive receptors to the extent feasible. Specifically, the contractor will cover the stockpiles of these materials when they are not actively being used.

e. Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

The Proposed Project would generate GHG emissions during construction. Construction-related GHG emissions would result from the combustion of fossil-fueled construction equipment, material hauling, and worker trips. The Proposed Project's annual construction-related GHG emissions in the anticipated construction year would range from 1,972 MT CO_2e per year for Alterative F up to 6,494 MT CO_2e per year for Alternative A. All GHG emissions for the Project Alternatives are provided in **Table 12**. Thus, the Proposed Project's emissions would exceed the construction significance threshold of 900 MT CO_2e per year.

Table 12. Proposed Project GHG Emissions

Project Alternative	CO_2e (Metric tons/year)
Alternative A	6,494
Alternative B	5,986
Alternative C	5,595

Project Alternative	CO_2e (Metric tons/year)
Alternative D	4,845
Alternative E	4,435
Alternative F	1,972

Therefore, this impact would be potentially significant. Implementation of Mitigation Measure AQ-2 and further refinement of the Project's anticipated construction activities as the Project's design details are further developed may reduce these GHG emissions to less than the threshold by reducing the potential construction equipment use or hauling trips, and using cleaner equipment or trucks. However, since these potential reductions are unknown at this time, this impact would still be considered potentially significant.

f. Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

The State of California has implemented AB 32 to reduce GHG emissions. The Proposed Project does not pose any conflict with the most recent list of CARB's early action strategies, nor is it one of the sectors at which these early strategies are targeted. Water and Natural and Working Lands are two of the sectors targeted in the AB 32 scoping plan (CARB 2008), the First Update to the AB 32 Scoping Plan (CARB 2014), and the Final 2017 Scoping Plan (CARB 2017). The Final 2017 Scoping Plan does not mention flood management-related projects, similar to the Proposed Project, as a specific target for additional strategies. The Proposed Project would primarily be located on natural lands and agricultural lands but would not involve carbon sequestration activities or forest restoration activities discussed in the Final 2017 Scoping Plan. However, by addressing potential flooding issues and being implemented as efficiently as possible, the Proposed Project would be in compliance with the overall goals of the AB 32 target sectors (to minimize energy use and adapt to climate change). The Proposed Project's construction activities would be complete by 2024 and would have no impact on emissions in 2030 or 2050.

However, emissions generated by the Proposed Project are in exceedance of Tehama County APCD's GHG significance threshold. Therefore, the Proposed Project would have a temporary and potentially substantial contribution to the ongoing impact on global climate change. For this reason, the Proposed Project would potentially conflict with AB 32, SB 32, or the goals of EO-S-3-05. Therefore, this impact would be potentially significant.

g. Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?

The Proposed Project's construction activities would require the consumption of energy (fossil fuels) for construction equipment, worker vehicles, and truck trips. **Table 13** shows the estimated fuel use during construction from construction equipment, worker vehicles, and truck trips. The calculations used to develop these estimates are presented in Appendix A.

Table 13. Project Fuel and Energy Use

Construction Fuel Consumption	Gasoline Fuel Use (gallons)	Diesel Fuel Use (gallons)
Construction On-Road Vehicles[1] (Alternative A)	14,689	467,910
Construction Off-Road Equipment[2] (Alternative A)	N/A	64,789
Total for Construction (Alternative A)	**14,689**	**532,699**
Construction On-Road Vehicles[1] (Alternative B)	14,689	428,696
Construction Off-Road Equipment[2] (Alternative B)	N/A	61,628
Total for Construction (Alternative B)	**14,689**	**490,324**
Construction On-Road Vehicles[1] (Alternative C)	14,689	403,746
Construction Off-Road Equipment[2] (Alternative C)	N/A	57,520
Total for Construction (Alternative C)	**14,689**	**461,267**
Construction On-Road Vehicles[1] (Alternative D)	14,689	347,339
Construction Off-Road Equipment[2] (Alternative D)	N/A	53,413
Total for Construction (Alternative D)	**14,689**	**400,751**
Construction On-Road Vehicles[1] (Alternative E)	14,689	322,389
Construction Off-Road Equipment[2] (Alternative E)	N/A	49,305
Total for Construction (Alternative E)	**14,689**	**371,694**
Construction On-Road Vehicles[1] (Alternative F)	9,180	98,330
Construction Off-Road Equipment[2] (Alternative F)	N/A	36,036
Total for Construction (Alternative F)	**9,180**	**134,366**

[1] Fuel use for construction worker vehicles was estimated using fuel use estimates from EMFAC with an estimated rate of 29.19 miles per gallon. Fuel use for vendor and hauling vehicles was estimated using fuel use estimates from EMFAC with an estimated rate of

8.75 and 7.03 miles per gallon, respectively. Fuel Consumption is total miles multiplied by the percent gasoline or diesel respectively and then divided by fuel economy. It was assumed all vendor and hauling trucks are diesel. Worker Vehicles were assumed to be a mix of gasoline and diesel as ratioed by their vehicle miles traveled.

[2] Fuel use for off-road construction equipment was estimated using a fuel use factor from CARB's off-road in-use engine emissions model of 0.367 pound of diesel per horsepower-hour (for engines greater than or equal to 100 horsepower), or 0.408 pound of diesel per horsepower-hour (for engines less than 100 horsepower). Fuel use was also calculated assuming diesel fuel density of 7.1089 pounds per gallon.

Source: Appendix A.

Energy consumption during construction is necessary for the protection of public safety from flooding and the improvement of current ecological functions, and aquatic habitat. These activities would not cause wasteful, inefficient, and unnecessary consumption of energy or cause a substantial increase in energy demand and the need for additional energy resources. There would be no energy consumption associated with operational activities, and energy consumption related to maintenance activities would be de minimis.

In addition, the Proposed Project would not conflict with any of the goals, policies, or implementation actions identified in the applicable energy plans, such as the 2018 Integrated Energy Policy Report Update, because the Proposed Project would be completed as efficiently as possible. Although no mitigation measures are necessary to reduce this impact to a less-than-significant level, implementation of Mitigation Measures AQ-2 would reduce the Project's effect by requiring minimization of idling times, requiring that all equipment be maintained and tuned properly, and reducing the potential fossil fuel use by requiring the implementation of low-emission diesel products, or alternative fuels. The Proposed Project's effects on energy resources would be less than significant and the Proposed Project would not conflict with any plans relating to renewable energy or energy efficiency.

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