24. Air Quality

24.1 Introduction

This chapter analyzes potential air quality impacts of all alternatives in the Extended, Secondary, and Primary study areas. Descriptions and maps of these three study areas[1] are provided in Chapter 1 Introduction.

Permits and authorizations for air quality are presented in Chapter 4 Environmental Compliance and Permit Summary. The regulatory setting for air quality is presented in Appendix 4A Environmental Compliance.

This chapter focuses primarily on the counties in the Primary Study Area, given potential impacts to air quality would primarily be limited to the construction phase, with greatest emphasis on the existing air quality conditions and potential Sites Reservoir Project (Project)-related emissions and impacts in Glenn and Colusa counties. Air quality conditions and potential impacts in the Extended and Secondary study areas were evaluated and discussed qualitatively. Mitigation measures are provided for identified potentially significant impacts, where appropriate and feasible.

24.2 Environmental Setting/Affected Environment

The California Air Resources Board (ARB) and the U.S. Environmental Protection Agency (USEPA) use ambient air quality monitoring data to determine whether geographic areas throughout the State achieve the standards that they have established for criteria pollutants.[2] Areas that achieve standards are designated as attainment areas,[3] and areas that do not achieve standards are nonattainment areas,[4] in accordance with the National Ambient Air Quality Standards (NAAQS)[5] and California Ambient Air Quality Standards (CAAQS).[6] An area may be an attainment area for one pollutant and a nonattainment area for others (USEPA, 2006). Table 24-1 lists the NAAQS and CAAQS.

[1] For this resource, the Extended Study Area consists of 39 counties that are located in the following air basins: San Francisco Bay Area, Sacramento Valley, Mountain Counties, San Joaquin Valley, Salton Sea, Mojave Desert, South Coast, North Central Coast, San Diego County, Lake Tahoe, and South Central Coast. The Secondary Study Area consists of 22 counties that are located in the Sacramento Valley Air Basin (SVAB), San Francisco Bay Area Air Basin, Mountain Counties Air Basin, and North Coast Air Basin. The Primary Study Area consists of portions of the SVAB, in Glenn and Colusa counties only.

[2] Criteria Pollutant: An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set (ARB, 2010). The criteria pollutants are ozone (O_3), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), and lead.

[3] Attainment Area: A geographic area considered to have air quality as good as or better than the national and/or State ambient air quality standards (NAAQS and CAAQS, respectively) (USEPA, 2006).

[4] Nonattainment Area: A geographic area identified by the USEPA and/or ARB as not meeting either NAAQS or CAAQS standards for a given pollutant (ARB, 2010).

[5] NAAQS: Standards established by USEPA that apply to ambient air throughout the country (USEPA, 2006).

[6] CAAQS: A legal limit that specifies the maximum level and time of exposure in the ambient air for a given air pollutant and which is protective of human health and public welfare (Health and Safety Code section 39606b). CAAQSs are recommended by the California Office of Environmental Health Hazard Assessment and adopted into regulation by the ARB. CAAQS are the standards which must be met per the requirements of the CCAA (ARB, 2010).

Table 24-1
Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS[a]	NAAQS[b]	
			Primary[c]	Secondary[d]
Ozone	8 hours[i] 1 hour	0.070 ppm 0.09 ppm	0.070 ppm —	0.070 ppm —
PM_{10}	Annual Arithmetic Mean 24 hours	20 µg/m^3 50 µg/m^3	— 150 µg/m^3	— 150 µg/m^3
$PM_{2.5}$	Annual Arithmetic Mean[j] 24 hours	12 µg/m^3 —	12 µg/m^3 35 µg/m^3	15 µg/m^3 35 µg/m^3
CO	8 hours 1 hour	9.0 ppm 20 ppm	9 ppm 35 ppm	— —
NO_2	Annual Arithmetic Mean 1 hour	0.030 ppm 0.18 ppm	0.053 ppm 0.100 ppm[e]	0.053 ppm —
SO_2	24 hours 3 hours 1 hour	0.04 ppm — 0.25 ppm	— — 0.075 ppm[f]	— 0.5 ppm —
Lead[g]	Calendar Quarter Rolling 3-month Average 30-day Average	— — 1.5 µg/m^3	1.5 µg/m^3 0.15 µg/m^3 —	1.5 µg/m^3 0.15 µg/m^3 —
Visibility-reducing Particles[h]	8 hours	See Footnote h	—	—
Sulfates	24 hours	25 µg/m^3	—	—
Hydrogen Sulfide	1 hour	0.03 ppm	—	—
Vinyl Chloride[g]	24 hours	0.01 ppm	—	—

[a]California standards for ozone, CO (except 8-hour Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded.

[b]National standards other than ozone, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

[c]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[d]National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[e]To attain the 1-hour NO_2 national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 0.100 ppm (100 ppb).

[f]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 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.075 ppm (75 ppb).

[g]ARB identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure for adverse health effects.

[h]In 1989, ARB converted the general statewide 10-mile visibility standard to an instrumental equivalent of "extinction of 0.23 per kilometer."

[i]On October 1, 2015, USEPA reduced the federal primary and secondary 8-hour ozone standards from 0.075 to 0.070 ppm.

[j]On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

Source: ARB, 2016b

Notes:
µg/m^3 = microgram(s) per cubic meter
CO = carbon monoxide
NO_2 = nitrogen dioxide
$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
ppb = part(s) per billion
ppm = part(s) per million
SO_2 = sulfur dioxide

24.2.1 Extended Study Area

The Extended Study Area comprises 33 California counties in the following air basins: San Francisco Bay Area, Sacramento Valley, Mountain Counties, San Joaquin Valley, Salton Sea, Mojave Desert, South Coast, North Central Coast, San Diego County, Lake Tahoe, and South Central Coast. Many of these counties and air basins are designated by USEPA and ARB as nonattainment areas pursuant to the NAAQS and CAAQS. Air quality in these basins varies and is influenced by a variety of complex conditions. In general, air quality related to the ozone standards tends to be poorer in urban areas, primarily due to mobile source emissions, and better in rural areas, where the NAAQS and CAAQS for ozone are achieved. Fugitive dust in rural areas often results in ambient air quality that does not achieve the ambient standards for PM_{10}. The relative locations of the California air basins, air districts, and Project are shown on Figure 24-1.

24.2.2 Secondary Study Area

The Secondary Study Area includes lands within 18 counties that are located in the Sacramento Valley Air Basin (SVAB), the San Francisco Bay Area Air Basin, the Mountain Counties Air Basin, and the North Coast Air Basin. Fourteen of the 18 counties in the Secondary Study Area are also located within the Extended Study Area: Alameda, Butte, Colusa, Contra Costa, El Dorado, Glenn, Placer, Sacramento, Santa Clara, Shasta, Solano, Sutter, Tehama, and Yolo counties (see Figure 24-1).

24.2.3 Primary Study Area

24.2.3.1 Sacramento Valley Air Basin and County Air Quality Characteristics

Glenn and Colusa counties, are part of the SVAB. Glenn and Colusa counties are designated as unclassified or attainment for all of the NAAQS (USEPA, 2016). Table 24-2 lists the attainment status for the CAAQS in the two counties. Glenn and Colusa counties were redesignated from nonattainment to attainment for the CAAQS for ozone in 2013, and both counties are currently designated as nonattainment for the CAAQS for PM_{10}, according to the ARB's "Chronology of State PM_{10} designations", dated January 5, 2016 (ARB, 2017). Because of historical issues with ozone attainment, and current issues with PM_{10}, the pollutants of greatest concern in the Primary Study Area are ozone and the ozone precursors, nitrogen oxides (NO_x) and reactive organic gases (ROG),[7] primarily from vehicle and equipment exhaust, and particulate matter (PM_{10}) from soil disturbance and wind erosion (fugitive dust).

[7] The terms reactive organic gases, volatile organic compounds, and hydrocarbons are used synonymously in this document.

Table 24-2
State Attainment Status for the Two Counties that Compose the Primary Study Area (Glenn and Colusa)

Pollutant	Glenn County 2015 State Nonattainment Designations – CAAQS (Source: ARB, 2016)	Colusa County 2015 State Nonattainment Designations – CAAQS (Source: ARB, 2016)
Ozone	A	A
$PM_{2.5}$	A	A
PM_{10}	N	N
Carbon monoxide	U	U
Nitrogen dioxide	A	A
Sulfur dioxide	A	A
Sulfates	A	A
Lead	A	A
Hydrogen sulfide	U	U
Visibility-reducing particles	U	U

*California Ambient Air Quality Standards

Notes:

A = Attainment.
N = Nonattainment.
$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
U = Unclassified.

Sources: ARB, 2017c, 2017d, 2017e.

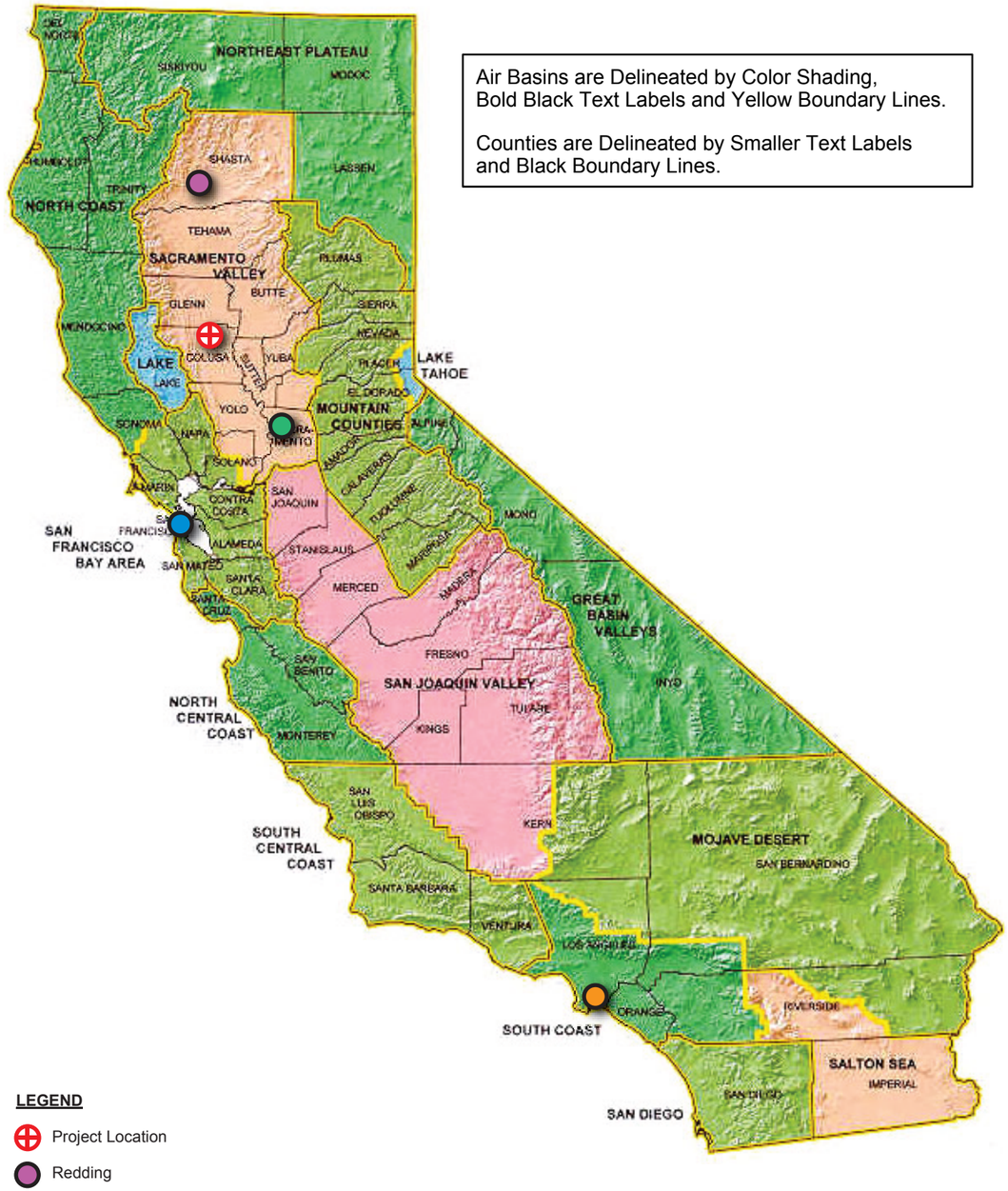
The ARB compiles annual average emissions of total organic gases, ROG, CO, NO_x, sulfur oxides, particulate matter, PM_{10}, and $PM_{2.5}$ for areas throughout the State. Table 24-3 lists the estimated annual average emission inventory for stationary sources, area-wide sources, and mobile sources for each of these pollutants in 2015 for the SVAB, and for Glenn and Colusa counties. As shown, each of the counties' contributions to the emissions was minor, when compared to the emissions for the SVAB as a whole.

The region's topographic features restrict air movement through and out of the basin. As a result, the northern SVAB is highly susceptible to pollutant accumulation over time. In addition, transport of pollutants into the northern SVAB from the Sacramento Metropolitan Area is primarily influenced by air movement northward. Sources in the Sacramento Metropolitan Area contribute to the region's poorest air quality, which typically occurs during the summer months.

California Air Basins and Counties

Air Basins are Delineated by Color Shading,
Bold Black Text Labels and Yellow Boundary Lines.

Counties are Delineated by Smaller Text Labels
and Black Boundary Lines.



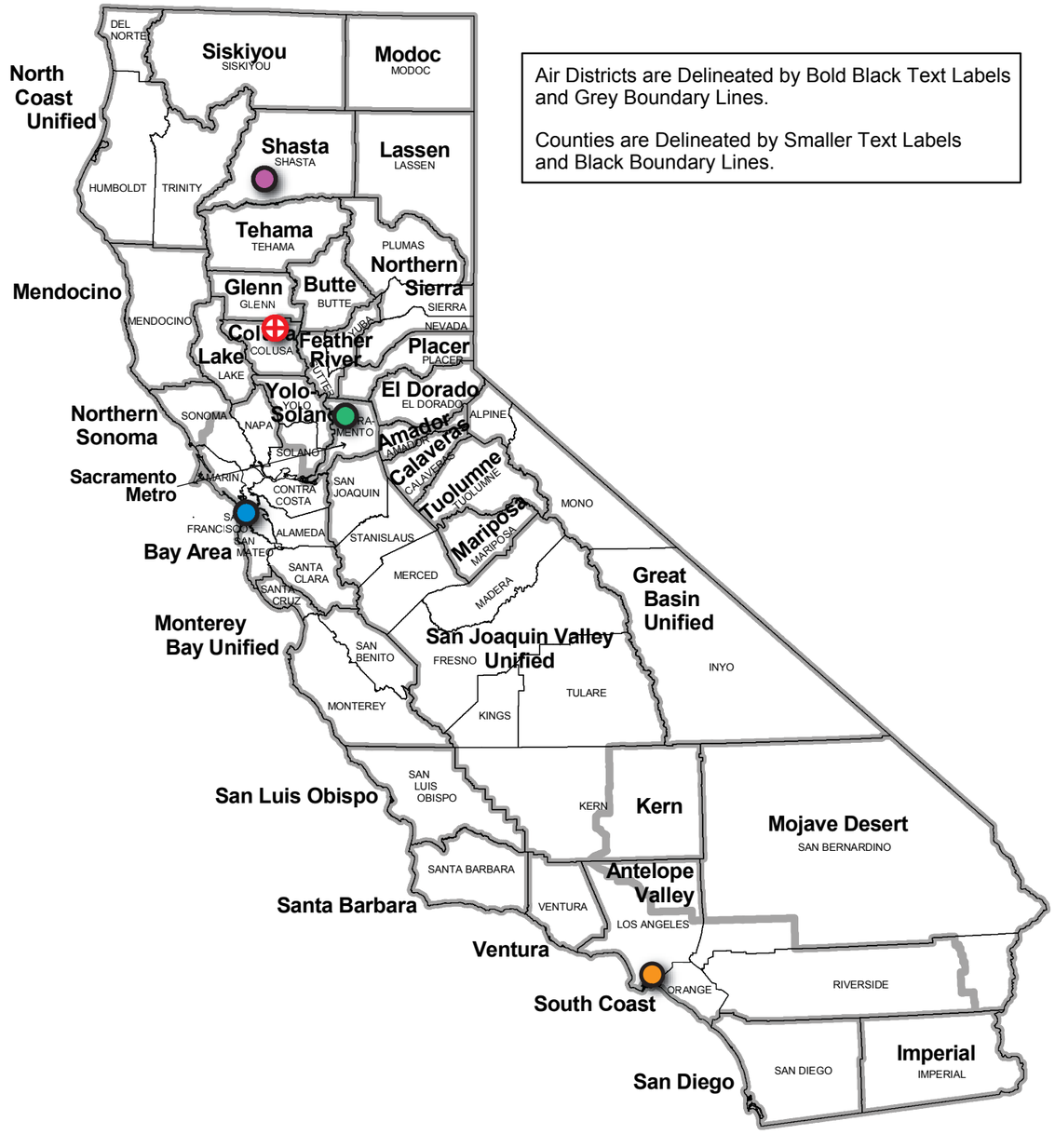
LEGEND

- Project Location
- Redding
- Sacramento
- San Francisco
- Los Angeles

California Air Districts and Counties

Air Districts are Delineated by Bold Black Text Labels
and Grey Boundary Lines.

Counties are Delineated by Smaller Text Labels
and Black Boundary Lines.



0 50 100 150 200 Miles

N

FIGURE 24-1
Project Location Relative to Air Basins and Air Districts
Sites Reservoir Project EIR/EIS

Source: California Air Resources Board, 2010.

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Table 24-3
2015 Estimated Annual Average Emissions (tons per day) for the Sacramento Valley Air Basin and Glenn and Colusa Counties

Pollutant	Area		
	2015 SVAB[d]	2015 Glenn County	2015 Colusa County
Stationary Sources[a]			
Total organic gases	195.2	11.9	6.1
Reactive organic gases	35.4	3.1	2.5
Carbon monoxide	54.5	3.9	1.6
Nitrogen oxides	36.6	3.9	5.0
Sulfur oxides	1.7	0.2	0.3
Particulate matter	32.6	2.7	2.1
PM_{10}	19.1	1.4	0.9
$PM_{2.5}$	11.1	0.7	0.3
Area-wide Sources[b]			
Total organic gases	175.8	21.0	12.5
Reactive organic gases	64.5	5.1	3.0
Carbon monoxide	296.9	31.0	11.3
Nitrogen oxides	9.4	0.1	0.7
Sulfur oxides	0.8	0.0	0.1
Particulate matter	381.8	24.5	31.6
PM_{10}	208.4	13.8	16.2
$PM_{2.5}$	56.5	4.8	3.3
Mobile Sources[c]			
Total organic gases	77.7	1.5	1.6
Reactive organic gases	71.6	1.4	1.5
Carbon monoxide	565.9	9.9	8.8
Nitrogen oxides	151.8	5.0	5.3
Sulfur oxides	1.0	0.0	0.0
Particulate matter	10.3	0.3	0.3
PM_{10}	10.0	0.3	0.3
$PM_{2.5}$	7.7	0.2	0.2

[a]Stationary sources can include fuel combustion, waste disposal, cleaning and surface coating, petroleum production and distribution, and industrial processes.

[b]Area-wide sources include solvent evaporation and miscellaneous processes, such as farming operations and other sources of fugitive dust.

[c]Mobile sources include on-road motor vehicles and other mobile sources.

[d]SVAB

Notes:

$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.

Source: ARB, 2016a. The estimated annual average emission inventory values for 2015 were obtained in queries using ARB Almanac Emission Projection Data published in 2009.

Tables 24-4 and 24-5 summarize the ambient concentrations for the pollutants ozone and PM_{10} in the Primary Study Area over the 12-year period of 2004 to 2015. Ozone concentrations and the number of days the ozone standard(s) are exceeded each year are presented in comparison to the State 1-hour and 8-hour standards, and the federal 8-hour standards (data for the 1997, 2008, and 2015 federal 8-hour standards are provided). PM_{10} concentrations are presented in comparison to the State and federal 24-hour standards. The reported data in these tables were taken from the Colusa-Sunrise Boulevard ARB monitoring station in Colusa County, and the Willows East Laurel Street and Willows 720 North Colusa Street ARB monitoring stations in Glenn County.

Table 24-4
Number of Days State 1-hour and 8-hour and Federal 8-hour Ozone Standards Were Exceeded, and Maximum Ozone Concentrations Measured, in Glenn and Colusa Counties (2004 to 2015)

Year	% of Days Monitored[a]	Number of Days Ozone Standard Was Exceeded		Maximum Measured 1-hr and 8-hr Ozone Concentrations (ppm[e])	
		State Standards (Number of Days > 1-hr; > 8-hr State Standard)	Federal 8-hr Standards (Number of Days >1997; >2008; >2015 Standards)	1-hr High	8-hr High
Glenn County					
2015[c]	100	0; 0	0; 0; 0	0.078	0.068
2014[c]	99	0; 1	0; 0; NA	0.081	0.072
2013[c]	93	0; 1	0; 0; NA	0.085	0.071
2012[c]	99	0; 0	0; 0; NA	0.078	0.069
2011[c]	89	0; 1	0; 0; NA	0.082	0.072
2010[c]	100	0; 0	0; 0; NA	0.076	0.064
2009[c]	100	0; 4	0; 0; NA	0.085	0.075
2008[c]	99	0; 2	0; 0; NA	0.085	0.071
2007[c]	98	0; 3	0; NA; NA	0.091	0.078
2006[b,d]	80	0; 0	0; NA; NA	0.076	0.066
2005[b]	100	0; 1	0; NA; NA	0.077	0.070
2004[b]	95	0; 1	0; NA; NA	0.084	0.070
Colusa County					
2015	96	0; 0	0; 0; 0	0.077	0.070
2014	99	0; 0	0; 0; NA	0.072	0.067
2013	98	0; 0	0; 0; NA	0.068	0.061
2012	98	0; 0	0; 0; NA	0.074	0.067
2011	99	0; 0	0; 0; NA	0.090	0.066
2010	98	0; 1	0; 1; NA	0.082	0.076
2009	94	0; 0	0; 0; NA	0.078	0.068
2008	98	0; 6	0; 1; NA	0.091	0.081
2007	97	0; 0	0; NA; NA	0.080	0.067
2006	100	0; 2	0; NA; NA	0.084	0.076

Year	% of Days Monitored[a]	Number of Days Ozone Standard Was Exceeded		Maximum Measured 1-hr and 8-hr Ozone Concentrations (ppm[e])	
		State Standards (Number of Days > 1-hr; > 8-hr State Standard)	Federal 8-hr Standards (Number of Days >1997; >2008; >2015 Standards)	1-hr High	8-hr High
2005	100	0; 2	0; NA; NA	0.085	0.074
2004	99	0; 1	0; NA; NA	0.084	0.073

[a]Based on 1-Hour Year Coverage.

[b]Data from Willows-E Laurel Street ARB monitoring station in Glenn County.

[c]Data from Willows-720 N Colusa Street ARB monitoring station in Glenn County.

[d]Data were available for both Glenn County ARB monitoring stations. The Willows-E Laurel Street station data were assumed to be more representative because this station had a yearly coverage of 80 percent, while the Willows-720 N Colusa station only had a yearly coverage of 18 percent.

[e]Parts per million.

Notes:

California 1-hour Ozone Standard = 0.09 ppm (ARB, 2016b).

California 8-hour Ozone Standard = 0.070 ppm (ARB, 2016b). Effective May 17, 2006.

Federal 8-hour Ozone Standard (1997) = 0.08 ppm; the federal 8-hour Standard was reduced to 0.075 ppm in March 2008 (USEPA, 2008), and further reduced to 0.070 ppm on October 1, 2015 (ARB, 2016b).

The national 1-hour ozone standard was revoked in June 2005 and is no longer in effect.

NA = Not applicable

Source: ARB, 2017a.

Table 24-5
PM_{10} Concentrations in Glenn and Colusa Counties (2004 to 2015)

Year	% of Days Monitored	Number of Days PM_{10} Standard Was Exceeded		Maximum 24-hr PM_{10} Concentration ($\mu g/m^3$)[f]		Annual Average PM_{10} Concentration ($\mu g/m^3$)	
		State 24-hr	Federal 24-hr	State	Federal	State	Federal[a]
Glenn County							
2015[d]	0	[b]	0	118.0	114.6	[b]	27.0
2014[d]	0	13.2	0	76.4	74.1	22.2	21.8
2013[d]	65	[b]	[b]	43.9	44.6	[b]	19.1
2012[d]	98	18.7	0	86.5	84.0	22.6	22.3
2011[d]	100	0	0	49.1	48.1	19.1	19.0
2010[d]	100	0	0	44.5	45.2	16.7	16.5
2009[d]	100	11.8	0	73.1	71.3	20.2	20.0
2008[d]	100	[b]	0	120.4	121.5	[b]	26.8
2007[d]	99	0	0	43	43	20	19.4
2006[c,e]	62	[b]	[b]	77	78	[b]	20.0
2005[c]	98	18.3	0	69	67	21.5	21.1
2004[c]	100	23.7	0	138	135	25.5	25.2
Colusa County							
2015	90	25.2	0	73.5	73.5	24.9	24.7
2014	88	[b]	0	57.1	56.1	[b]	22.3
2013	87	[b]	[b]	74.9	73.4	[b]	26.1

Year	% of Days Monitored	Number of Days PM_{10} Standard Was Exceeded		Maximum 24-hr PM_{10} Concentration ($\mu g/m^3$)[f]		Annual Average PM_{10} Concentration ($\mu g/m^3$)	
		State 24-hr	Federal 24-hr	State	Federal	State	Federal[a]
2012	83	[b]	0	96.7	94.6	[b]	23.3
2011	97	17.6	0	69.7	69.7	21.6	21.1
2010	100	[b]	0	49.8	49.6	[b]	17.0
2009	99	18.4	0	56.6	56.5	22.1	21.7
2008	95	62.4	0	90.3	90.3	30.5	30.4
2007	86	0	0	43	43	22	21.5
2006	75	[b]	[b]	69	68	[b]	19.3
2005	93	25.8	0	92	91	25.5	23.8
2004	91	[b]	[b]	81	81	[b]	18.5

[a]The national annual PM_{10} standard was revoked in December 2006, and is no longer in effect. The statistic shown here applies only to that standard and is included only for retrospective use.

[b]There were insufficient (or no) data available to determine the value.

[c]Data from Willows-E Laurel Street ARB monitoring station in Glenn County.

[d]Data from Willows-720 N Colusa Street ARB monitoring station in Glenn County.

[e]Data were available for both Glenn County ARB monitoring stations. The Willows-E Laurel Street station date were assumed to be more representative because this station had a yearly coverage of 62 percent, while the Willows-720 N Colusa station only had a yearly coverage of 27 percent.

[f]microgram per cubic meter

Notes:

California 24-hour PM_{10} Standard = 50 $\mu g/m^3$ (ARB, 2017b).
California Annual Arithmetic Mean Standard = 20 $\mu g/m^3$ (ARB, 2017b).
Federal 24-hour PM_{10} Standard = 150 $\mu g/m^3$ (ARB, 2017b).

Source: ARB, 2017b.

The higher ozone concentrations, including those that exceed standards, typically occur during the months of May through October in the northern SVAB. NO_x and ROG are chemical precursors for ground-level ozone (or smog), which is formed when ROG and NOx react in the presence of sunlight. ROG sources include facilities and equipment that burn or store fuels, or use solvents or pesticides (ARB, 2009). As shown in the emission inventory data in Table 24-3, mobile sources such as motor vehicles, stationary sources such as power plants and factories, and area sources such as use of chemical solvents and pesticides are leading emitters of these pollutants in the SVAB. Ozone is a regional pollutant, so the specific location of these sources is not so much of an issue as are other considerations, such as pollutant transport, and the co-location of ozone precursor pollutants and extensive sunshine.

Table 24-5 shows the PM_{10} concentrations from 2004 to 2015. Particulate matter can cause damage to human lungs when it enters the body through the respiratory system. The extent of the damage depends on the toxicity of the substance and the particle size. Sources of these pollutants include industries that emit airborne pollution, agricultural operations, dust resulting from high winds and soil erosion, dust from construction, vehicular travel on paved and unpaved roads, and vehicular exhaust emissions. As shown in Table 24-5, monitoring stations in both counties recorded PM_{10} levels exceeding the State standard.

In 2015, PM_{10} monitoring data in Glenn County were not sufficient to evaluate the number of days the State 24-hour standard was exceeded. In 2014, there were 13.2 days in Glenn County when the PM_{10} measurements were above the State 24-hour standard, and in 2015, there were 25.2 days when air in

Colusa County exceeded the State 24-hour PM_{10} standard. In 2015, there were no days in Glenn or Colusa County when the PM_{10} measurements were above the national 24-hour standard (ARB, 2017b).

24.2.3.2 Regional Haze and Visibility Impairment

Natural and human-caused pollution in the atmosphere can degrade visibility, resulting in what is known as regional haze (ARB, 2008). Particulate pollution, including sulfates, nitrates, organics, soot, fine soil dust, and particles, contribute to the regional haze that impairs visibility, in addition to affecting public health. Haze is not typically reported as an air quality problem in the study area, unless smoke from area wildfires or fog contribute to localized visibility impairment.

24.2.3.3 General Conformity

Under the conformity provisions of the CAA, no federal agency can approve or undertake a federal action, or project, unless the project has been demonstrated to conform to the applicable state implementation plan (SIP). These conformity provisions were enacted so that federal agencies would not interfere with efforts to attain the NAAQS. Applicable only in areas designated as nonattainment or maintenance for NAAQS, the general conformity rule prohibits any federal action that does not conform to the applicable air quality attainment plan or SIP.

24.2.3.4 Toxic Air Contaminant/Hazardous Air Pollutant Emissions

In addition to the criteria air pollutants, toxic air contaminants (TACs) are another group of airborne pollutants that may be hazardous to human health, even in small quantities. TACs can cause or contribute to an increase in deaths or serious illness, or can pose a present or potential hazard to human health (ARB, 2011). Substances that have been identified as hazardous air pollutants pursuant to Section 112 (b) of the federal Clean Air Act are also included in the ARB list of TACs. TACs can cause short-term (acute) and long-term (chronic or carcinogenic) adverse human health effects. They can be emitted from a variety of common sources, including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. Agricultural and construction activities can also contribute to toxic air emissions. In 1998, the ARB identified particulate emissions from diesel-fueled engines (i.e., diesel PM) as a TAC.

24.2.3.5 Existing Sensitive Receptors

A sensitive receptor is generically defined as a location where human populations (especially children, seniors, or ill persons) are found, and there is reasonable expectation of human exposure to air pollutants of concern. Examples of sensitive receptors include residences, hospitals, day-care centers, and schools. The Primary Study Area is rural, for the most part, with a few residences located near areas proposed for construction and operation of the Project. The nearest residences to the construction areas include one residence approximately 680 feet west of the proposed headgate structure at the terminal regulating reservoir (TRR), one residence approximately 100 feet southwest of the proposed railroad siphon replacement at the Glenn-Colusa Irrigation District (GCID) Main Canal, and two residences within 1 mile of the proposed Delevan Pipeline Intake/Discharge Facilities.

24.2.3.6 Odors

Odors may result from construction and operation of projects, especially if activities involve or would result in anaerobic decomposition of organic materials. Odors rarely cause physical health effects but may be unpleasant and may result in complaints from the public. Odor impacts vary in frequency and severity, depending on the nature, frequency, and intensity of the source, the wind speed and direction, and the

sensitivity and location of the receptors. Projects may result in objectionable odors if located near receptors. Air districts typically regulate odor sources under nuisance regulations, and base the level of significance (LOS) of odors on the number of complaints received.

24.3 Environmental Impacts/Environmental Consequences

24.3.1 Regulatory Setting

Air quality throughout California is regulated at the federal, State, and local levels. Provided below is a list of the applicable regulations that were in effect as of February 2017. These plans, policies, and regulations are discussed in detail in Appendix 4A Environmental Compliance of this EIR/EIS.

24.3.1.1 Federal Plans, Policies, and Regulations

- Federal Clean Air Act
- National Ambient Air Quality Standards and Federal Air Quality Designations
- Federal General Conformity Requirements[8]
- Prevention of Significant Deterioration/New Source Review and New Source Performance Standards
- Federal Regulations for Hazardous Air Pollutants
- Federal Standards for Mobile Sources

24.3.1.2 State Plans, Policies, and Regulations

- California Clean Air Act (CCAA)
- Mulford-Carrell Act
- California Ambient Air Quality Standards and State Air Quality Designations
- State Implementation Plans
- California Air Toxics Programs
- California Mobile Source Emission Control Programs

24.3.1.3 Regional and Local Plans, Policies, and Regulations

- Regional and Local Air Quality Management Plans
- Local Air District California Environmental Quality Act (CEQA) Guidance Documents Pertaining to Air Quality
- Glenn and Colusa County General Plans

24.3.2 Evaluation Criteria and Significance Thresholds

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. Appendix G of the *CEQA Guidelines* suggests the following evaluation criteria for air quality:

[8]Glenn and Colusa counties are designated as unclassified or attainment for all the NAAQS, so the general conformity rule does not apply to the Project or alternatives. General conformity applies only to emissions from federal actions that are in areas that are designated as nonattainment or maintenance for one or more of the NAAQS.

Would the Project:

- Conflict with or obstruct implementation of the applicable air quality plan?
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation?
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?
- Expose sensitive receptors to substantial pollutant concentrations?
- Create objectionable odors affecting a substantial number of people?

The evaluation criteria used for this impact analysis represent a combination of the Appendix G criteria and professional judgment that considers current regulations, standards, and/or consultation with agencies, knowledge of the area, and the context and intensity of the environmental effects, as required pursuant to the National Environmental Policy Act. For the purposes of this analysis, an alternative would result in a potentially significant impact if it would result in any of the following:

1. Conflict with an applicable air quality plan, contribute substantially to an air quality violation, and/or result in a cumulatively considerable net increase of nonattainment pollutants.
2. Expose sensitive receptors to substantial pollutant concentrations.
3. Create objectionable odors affecting a substantial number of people.

The *CEQA Guidelines* for air quality in Appendix G indicate that, where available, the thresholds of significance established by the applicable air quality management or air pollution control district (APCD) may be relied upon to make the significance determinations.

Glenn County and Colusa County APCDs have not established CEQA air quality significance thresholds. Staff at these districts recommend use of thresholds established by a nearby air quality agency (Tehama County) as surrogates to evaluate potential local and regional impacts in the Primary Study Area[9] (Ledbetter, 2016; Gomez, 2016). The Tehama County Air Pollution Control District (TCAPCD) has developed specific air quality guidelines and criteria for compliance with CEQA (TCAPCD, 2015). TCAPCD has established recommended significance thresholds for Project construction and/or operation. Projects with the potential to have higher emission levels are subject to increasingly more stringent environmental review and mitigation requirements.

Projects with the potential to exceed ambient air quality standards and projects with the potential to emit toxic or hazardous air pollutants may be required to conduct dispersion modeling and/or a health risk assessment to evaluate modeled emission concentration values, or allow comparison to health-risk related thresholds. Emissions of toxic or hazardous air pollutants would be considered potentially significant if they result in ambient concentrations and human exposures that exceed acceptable levels or potentially

[9] The Glenn County Air Pollution Control District does not have CEQA guidelines for assessing air quality impacts; it would instead defer to the Tehama County guidelines, if necessary (Ledbetter, 2016). In addition, the Colusa County Air Pollution Control District does not have CEQA guidelines other than its New Source Review rules; thresholds developed by the Tehama County Air Pollution Control District would represent similar values (Gomez, 2016).

contribute significantly to the area's excess lifetime cancer risk values, cancer burden, or health hazard indices.

Glenn and Colusa counties have historical issues with ozone attainment and current issues with PM_{10} nonattainment. As a result, the pollutants of greatest concern in the Primary Study Area are ozone and the ozone precursors (NO_x and ROG) primarily from vehicle and equipment exhaust, and particulate matter (PM_{10}) from soil disturbance and wind erosion (fugitive dust). The significance thresholds established by the TCAPCD are mass-based[10] emission rates for these pollutants of concern.

The thresholds of significance for these pollutants of concern are presented in Table 24-6. General Conformity *de minimis* levels are not applicable in Primary Study Area because Glenn and Colusa counties are designated as unclassified or attainment for all NAAQS, and general conformity applies only to federal actions in areas designated as nonattainment or maintenance for any of the NAAQS.

Table 24-6
Tehama County Air Pollution Control District Thresholds of Significance for Criteria Pollutants of Concern

Pollutant	Level A[a]	Level B[b]	Level C[c]
NO_x	≤ 25 lbs/day	> 25 lbs/day	> 137 lbs/day
ROG	≤ 25 lbs/day	> 25 lbs/day	> 137 lbs/day
PM_{10}	≤ 80 lbs/day	> 80 lbs/day	> 137 lbs/day
LOS	Potentially Significant Impacts	Potentially Significant Impacts	Significant Impacts

[a]**Level A:** Any project that has the potential to emit the Level A thresholds would be subject to Standard Mitigation Measures (SMM). Guidelines are recommended to assist in reducing air quality impacts to a level of insignificance.

[b]**Level B: Greater than 25 pounds per day of ROG and/or NO_x and greater than 80 pounds per day of PM_{10} Emissions.** Projects that exceed Level B thresholds have the potential to cause potentially significant air quality impacts, and should be submitted to TCAPCD for review. Projects proponents can select as many Best Available Mitigation Measures (BAMM) as needed, in addition to the recommended list of SMM. If all feasible mitigation measures are incorporated into the Project and emissions are still greater than Level B, additional mitigation measures, including off-site mitigation, may be required.

[c]**Level C: Greater than 137 pounds per day of Emissions.** If emissions from a project would exceed the Level C thresholds, mitigation measures (BAMMs and SMMs), including off-site mitigation measures following the guidelines, may be required to reduce the overall air quality impacts of the project to a level of insignificance (TCAPCD, 2015).

Notes:

NO_x = nitrogen oxides
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
ROG = reactive organic gases

Source: TCAPCD, 2015.

24.3.3 Impact Assessment Assumptions and Methodology

Combinations of Project facilities were used to create Alternatives A, B, C, C_1, and D. In all resource chapters, the Sites Project Authority (Authority) and Reclamation described the potential impacts associated with the construction, operation, and maintenance of each of the Project facilities for each of the five action alternatives. Some Project features/facilities and operations (e.g., reservoir size, overhead

[10] The TCAPCD significance thresholds are in pounds per day, which are mass-based emission rates, rather than a concentration-based limit like an allowable change over an ambient air quality standard in micrograms per cubic meter or ppm over a specified averaging period (e.g., the Local Significance Thresholds established by the South Coast Air Quality Management District).

power line alignments, and provision of water for local uses) differ by alternative, and are evaluated in detail within each of the resource areas chapters. As such, the Authority has evaluated all potential impacts with each feature individually, and may choose to select or combine individual features as determined necessary.

24.3.3.1 Assumptions

The following assumptions were made regarding Project-related impacts (construction, operation, and maintenance impacts) to air quality:

- Direct Project-related construction, operation, and maintenance activities would occur in the Primary Study Area.
- Direct Project-related operational effects would occur in the Secondary Study Area.
- The only direct Project-related construction activity that would occur in the Secondary Study Area is the installation of two additional pumps into existing bays at the Red Bluff Pumping Plant.
- The only direct Project-related maintenance activity that would occur in the Secondary Study Area is the sediment removal and disposal at the two intake locations (i.e., GCID Main Canal Intake and Red Bluff Pumping Plant).
- No direct Project-related construction or maintenance activities would occur in the Extended Study Area.
- Direct Project-related operational effects that would occur in the Extended Study Area are related to San Luis Reservoir operation; increased reliability of water supply to agricultural, municipal, and industrial users; and the provision of an alternate Level 4 wildlife refuge water supply. Indirect effects to the operation of certain facilities that are located in the Extended Study Area, and indirect effects to the consequent water deliveries made by those facilities, would occur as a result of implementing the alternatives.
- The existing bank protection located upstream of the proposed Delevan Pipeline Intake/Discharge Facilities would continue to be maintained and remain functional.
- No additional channel stabilization, grade control measures, or dredging in the Sacramento River at or upstream of the Delevan Pipeline Intake/Discharge Facilities would be required.

24.3.3.2 Methodology

Existing conditions and the future No Project/No Action alternatives were assumed to be similar in the Primary Study Area given the generally rural nature of the area and limited potential for growth and development in Glenn and Colusa counties within the 2030 study period used for this EIR/EIS as further described in Chapter 2 Alternatives Analysis. As a result, within the Primary Study Area, it is anticipated that the No Project/No Action Alternative would not entail material changes in conditions as compared to the existing conditions baseline.

With respect to the Extended and Secondary study areas, the effects of the proposed action alternatives would be primarily related to changes to available water supplies in the Extended and Secondary study areas and the Project's cooperative operations with other existing large reservoirs in the Sacramento watershed, and the resultant potential impacts and benefits to biological resources, land use, recreation,

socioeconomic conditions, and other resource areas. The California Department of Water Resources has projected future water demands through 2030 conditions that assume the vast majority of Central Valley Project and State Water Project (SWP) water contractors would use their total contract amounts, and that most senior water rights users also would fully use most of their water rights. This increased demand in addition to the projects currently under construction and those that have received approvals and permits at the time of preparation of the EIR/EIS would constitute the No Project/No Action Condition. As described in Chapter 2 Alternative Analysis, the primary difference in these projected water demands would be in the Sacramento Valley; and as of the time of preparation of this EIR/EIS, the water demands have expanded to the levels projected to be achieved on or before 2030.

Accordingly, existing conditions and the No Project/No Action alternatives are assumed to be the same for this EIR/EIS and as such are referred to as the Existing Conditions/No Project/No Action Condition, which is further discussed in Chapter 2 Alternatives Analysis. With respect to applicable reasonably foreseeable plans, projects, programs and policies that may be implemented in the future but that have not yet been approved, these are included as part of the analysis of cumulative impacts in Chapter 35 Cumulative Impacts.

Air quality impacts from implementation of the alternatives were evaluated in terms of how construction and operations of Project facilities would result in criteria pollutant, TAC, and odor emissions. The TCAPCD thresholds were used to evaluate the potential significance of Project-related air quality impacts because these values have been formally or informally adopted by other air districts in the area (i.e., Glenn County APCD and Colusa County APCD). Appendix 24A Methodology for Air Quality and GHG Emissions Calculations provides the methodology, assumptions, and information used to evaluate the potential air quality impacts associated with construction, and operations and maintenance, of the alternatives. In addition, Appendix 24A Methodology for Air Quality and GHG Emissions Calculations includes the detailed emission calculations, emission factors, and summary tables.

Emissions of criteria pollutants were estimated for combustion of fuels in construction equipment, vehicles, material transport trucks, and worker commutes. To calculate total equipment exhaust emissions for construction, equipment-specific hours of use were multiplied by equipment-specific load factors, horsepower ratings, and emission factors from the CalEEMod User's Guide, Appendix D (CAPCOA, 2016). Emissions from trucks operated within the construction area were estimated using the same methodology with off-highway truck emission factors from the CalEEMod User's Guide, Appendix D (CAPCOA, 2016). Emissions from on- and off-road vehicles, including material transport trucks and worker commute vehicles, were estimated by multiplying the number of vehicle roundtrips by the number of roundtrip miles and by an EMFAC2014 emission factor (in units of pounds per mile) (ARB, 2014). Similar methods were used to estimate emissions for operations and maintenance of Project facilities.

Construction of facilities would result in emissions of PM_{10} and $PM_{2.5}$ from fugitive dust, generated primarily during earthmoving activities. Fugitive dust emissions from soil disturbance (for example, grading activities) were estimated based on the average emission factor of 10 pounds per acre per day. It was assumed that areas with soil disturbance would be watered daily. Other sources of fugitive dust include vehicle travel on paved and unpaved roads, creation and management of quarries and borrow sites, concrete batch plants, and material handling, storage, and transport. Fugitive dust emissions from vehicle travel on unpaved and paved roads and concrete batch plant operations were estimated using USEPA-approved emission factors and methodology.

The Bay Area Air Quality Management District's (BAAQMD) *CEQA Guidelines* cite studies by ARB that show mobile source diesel PM emissions are typically reduced by 70 percent at a distance of approximately 500 feet from the source (BAAQMD, 2011). In addition, current models and methodologies for conducting health risk assessments for carcinogens such as diesel PM are associated with longer-term exposure periods of 25 to 30 years (OEHHA, 2015). These longer-term exposure periods assume continuous rates of exposure, and do not correlate well with the temporary and highly variable nature of Project construction activities. This results in difficulties with producing accurate estimates of health risks during construction (BAAQMD, 2011). As a result, professional judgement and the emission dispersal rate cited by BAAQMD were relied on to qualitatively evaluate potential impacts of mobile source diesel PM emissions to sensitive receptors in the Primary Study Area.

Impacts associated with odorous emissions from the alternatives were also evaluated on a qualitative basis.

24.3.4 Topics Eliminated from Further Analytical Consideration

No Project facilities or topics that are included in the significance criteria or assumptions listed above were eliminated from further consideration in this chapter.

24.3.5 Impacts Associated with Alternative A

24.3.5.1 Extended Study Area – Alternative A

Construction, Operation, and Maintenance Impacts

Agricultural Water Use, Municipal and Industrial Water Use, Wildlife Refuge Water Use, and San Luis Reservoir

Impact Air Qual-1: Conflict with an Applicable Air Quality Plan, Contribute Substantially to an Air Quality Violation, and/or Result in a Cumulatively Considerable Net Increase of Nonattainment Pollutants

No direct Project-related construction, operation, or maintenance activities would occur in the Extended Study Area, so there would be no direct Project-related emissions or impacts. Therefore, there would be **no impact** to air quality in the Extended Study Area, when compared to the Existing Conditions/No Project/ No Action Condition.

Impact Air Qual-2: Expose Sensitive Receptors to Substantial Pollutant Concentrations

No direct Project-related construction, operation, or maintenance activities would occur in the Extended Study Area, therefore, there would be **no impact** to exposure of sensitive receptors to substantial pollutant concentrations, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Air Qual-3: Create Objectionable Odors Affecting a Substantial Number of People

No direct Project-related construction, operation, or maintenance activities would occur in the Extended Study Area, therefore, there would be **no impact** to objectionable odors when compared to the Existing Conditions/No Project/No Action Condition.

24.3.5.2 Secondary Study Area – Alternative A

Construction, Operation, and Maintenance Impacts

Impact Air Qual-1: Conflict with an Applicable Air Quality Plan, Contribute Substantially to an Air Quality Violation, and/or Result in a Cumulatively Considerable Net Increase of Nonattainment Pollutants

The only Project-related construction that would occur in the Secondary Study Area is the installation of two additional pumps into existing concrete pump bays at the Red Bluff Pumping Plant, located on the Sacramento River. Construction would require limited operation of construction equipment, such as one mobile crane, and would not be expected to involve earthmoving or land disturbance. Air quality impacts from this minimal construction activity would be negligible. Therefore, when compared to the Existing Conditions/No Project/No Action Condition, the construction-related air quality impacts in the Secondary Study Area would result in a **less-than-significant impact**.

Operation of the additional electric pumps at the Red Bluff Pumping Plant, as part of Alternative A, potentially would not significantly change the emissions that are currently generated at the plant. The only Project-related maintenance activity that would occur in the Secondary Study area is related to the removal of sediment from the existing GCID Main Canal and Red Bluff Pumping Plant intakes. The additional pumps at the Red Bluff Pumping Plant would not increase the frequency of existing maintenance activities at the pumping plant, and would not require additional personnel. More frequent dredging of the pumping plant forebay may be required, but this dredging and operation of the additional electric pump would not be expected to result in a substantial increase in emissions when compared to existing activities. When compared to the Existing Conditions/No Project/No Action Condition, Alternative A would result in negligible increases in emissions from operations and maintenance activities in the Secondary Study Area, resulting in a **less-than-significant impact** when compared to the Existing Conditions/No Project/No Action Condition. This conclusion is supported by the findings of the May 2008 FEIR/FEIS for the Red Bluff Pumping Plant, published by Tehama-Colusa Canal Authority (TCCA) and the Bureau of Reclamation, which determined that operation of the entire Red Bluff Diversion Dam project would result in air quality impacts that would be **less than significant**. The 2008 FEIR/FEIS found that 1) the project would not increase traffic flow to the area, and (2) the pumps would only be operated turned on at limited times, and (3) the pumps would be electrically powered with no associated direct emissions; therefore, no mitigation is required (TCCA, 2008).

Air quality impacts associated with systemwide increases in electrical use and decreases in net electrical generation would depend on how and where the replacement electricity is generated.[11] The electrical generating facilities producing the power would be subject to stringent air quality permitting and emission control requirements, and the systemwide incremental increase in emissions would occur over a large geographic area. For a further discussion of the power impacts, refer to Table 31-6 and Section 31.2.5 in Chapter 31 Power Production and Energy, and Section 25.4.2 in Chapter 25 Climate Change and Greenhouse Gas Emissions.

[11] As a result of the increased storage of Sites Reservoir, Central Valley Project and SWP water supply deliveries and exports from the Delta would be increased. There would be increased long-term average pumping at the SWP Banks Pumping Plant and related pump stations throughout the California Aqueduct. There would also be increased generation at system reservoirs and at Sites Reservoir, but the increase in pumping would be larger than the increase in generation, and therefore, the net generation would decrease for the action alternatives.

Impact Air Qual-2: Expose Sensitive Receptors to Substantial Pollutant Concentrations

The nearest sensitive receptor to the Red Bluff Pumping Plant is approximately 0.5 mile away (Shasta College). Installation and operation of an additional electric pump would not expose sensitive receptors to substantial pollutant concentrations therefore, there would be **no impact** to exposure of sensitive receptors to substantial pollutant concentrations, when compared to the Existing Conditions/No Project/ No Action Condition.

Impact Air Qual-3: Create Objectionable Odors Affecting a Substantial Number of People

The installation and operation of an additional electric pump at the Red Bluff Pumping Plant would not create objectionable odors affecting a substantial number of people therefore, there would be **no impact** to objectionable odors when compared to the Existing Conditions/No Project/No Action Condition.

24.3.5.3 Primary Study Area – Alternative A

Construction, Operation, and Maintenance Impacts

Construction and operation of Project facilities would result in criteria pollutant emissions. Emissions of NO_x, PM_{10}, $PM_{2.5}$, ROG, CO, sulfur oxides (SO_x), and CO_2[12] would result from combustion of fuels from construction equipment, vehicles, material transport trucks, and worker commutes. Construction of facilities would result in emissions of PM_{10} and $PM_{2.5}$ from fugitive dust, generated primarily during earthmoving activities. Other sources of fugitive dust include vehicle travel on paved and unpaved roads, creation and management of quarries and borrow sites, concrete batch plants, and material handling, storage, and transport. Similar emissions, at lower levels, may result from operation and maintenance of Project facilities.

Impact Air Qual-1: Conflict with an Applicable Air Quality Plan, Contribute Substantially to an Air Quality Violation, and/or Result in a Cumulatively Considerable Net Increase of Nonattainment Pollutants

Fuel combustion in construction equipment, vehicles, material delivery trucks, and construction worker vehicles would generate criteria air pollutant emissions as exhaust. Emissions of the ozone precursors, ROG and NO_x, from these emissions sources would temporarily contribute to regional atmospheric ozone problems during the proposed 9-year construction period, and fuel combustion in construction equipment would also result in emissions of PM_{10} and $PM_{2.5}$. Construction activities would generate fugitive dust (PM_{10} and $PM_{2.5}$) from sources such as vehicle travel on paved and unpaved roads, concrete batch plants, grading, and excavation. Stationary sources that would be needed to support construction activities, such as rock quarries, asphalt plants, and concrete batch plants, would be subject to local air district permitting programs. These permitting programs would keep emissions from permitted equipment within acceptable limits.

Table 24-7 presents the estimated construction emissions for Alternative A, providing average daily construction emissions by construction year, with comparison to significance thresholds established by TCAPCD (TCAPCD, 2015). A description of the methodology and assumptions, detailed calculation spreadsheets, and supporting documentation are provided in Appendix 24A Methodology for Air Quality and GHG Emissions Calculations.

[12] A discussion of greenhouse gases, such as CO_2, and related CEQA significance criteria and impacts, is presented in Chapter 25 Climate Change and Greenhouse Gas Emissions.

Table 24-7
Estimated Average Daily Unmitigated Emission Rates for Criteria Pollutants by Year for Construction of Alternative A Within the Primary Study Area

	Emissions (lbs/day)[a,d]					
	NO_x	PM_{10}	$PM_{2.5}$	ROG	CO	SO_x
Significance Threshold (lb/day)[c]	***137***	***137***	***-***	***137***	***-***	***-***
Anticipated Emissions of Criteria Pollutants by Construction Year						
2022	**881[b]**	**328**	65	84	620	2
2023	**1,549**	**680**	129	**151**	1,104	4
2024	**1,243**	**565**	109	122	897	3
2025	**1,260**	**569**	110	124	917	3
2026	**666**	**377**	69	67	501	2
2027	**206**	**203**	34	21	183	1
2028	**201**	**192**	33	21	172	1
2029	**167**	**174**	29	17	135	1
2030	33	19	3	4	37	0

[a]The average daily construction emission rates for each criteria pollutant (in lb/day) for each construction year are the sum of the average daily emission rates estimated for each of the Project features that would be constructed in the indicated construction year.

[b]**Bolded** values indicate an exceedance of the Significance Threshold.

[c]Significance Threshold is from TCAPCD Level C: Greater than 137 pounds per day of emissions. If emissions from a project would exceed the Level C thresholds, all feasible mitigation measures, including Suggested Mitigation Measures (SMMs), Best Available Mitigation Measures (BAMMs), and off-site mitigation measures, may be required to reduce the overall air quality impacts of the project to a level of insignificance (TCAPCD, 2015).

[d]Fugitive dust emissions from grading were assumed to include daily watering of disturbed areas to control dust, and vehicles traveling on unpaved roads were assumed to be limited to 15 miles per hour.

Notes:

CO = carbon monoxide
lb/day = pounds per day
NO_x = nitrogen oxides
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
ROG = reactive organic gases
SO_x = sulfur oxides

Alternative A would involve construction, operation, and maintenance of a 1.3-million-acre-foot (MAF) reservoir, Sites and Golden Gate dams, and seven saddle dams. Construction equipment utilization for dam construction was assumed to be directly related to the volume of materials used for the dams (Barnes pers. comm., 2011), and fugitive dust emissions were assumed to be directly related to the areas of disturbance.

When compared to the Existing Conditions/No Project/No Action Condition, estimated construction-related emissions for Alternative A would be **potentially significant**, because they would exceed thresholds of significance for NO_x, PM_{10}, and ROG established by TCAPCD (TCAPCD, 2015).

Operation and maintenance of Alternative A would include activities that must occur to operate and maintain each proposed facility. These activities and their associated impacts would be long-term and permanent. Operation activities would include those related to the use of roads during operations and maintenance activities, recreation activities, the movement of water, and the generation and transmission of electricity.

Emissions associated with operation and maintenance of the Alternative A proposed facilities would depend on the size and type of facility, the number of employees and types of equipment, the increased traffic on the local and regional roadway network (including additional haul trucks and workers), and the level of operations activities. Emissions similar to those expected during construction, but at lower levels, would likely result from facility operations and maintenance. For example, operational sources of fugitive dust would primarily be maintenance equipment and truck movement over paved and unpaved surfaces. Stationary sources, such as electrical generators, would be subject to permitting requirements to limit emissions. Required mitigation and operating conditions would be reflected in needed permits and approvals for the Project.

Implementation of Alternative A would provide increased opportunities for recreational uses in the Primary Study Area. For a further discussion of impacts associated with recreational uses, refer to Chapter 21 Recreation Resources. The expected increase in recreational opportunities and the estimated 200,000 recreation visitor days would generate additional vehicle trips to and from the area. These recreation-related vehicle trips have been estimated and added to the potentially significant emissions and impacts estimated for operation and maintenance of Alternative A facilities.

Table 24-8 presents the estimated daily emissions for operation and maintenance of the Alternative A proposed facilities, with comparison to significance thresholds established by TCAPCD (TCAPCD, 2015). As shown, average daily emissions would exceed the TCAPCD Level A and Level B thresholds for NOx and PM_{10}, and would therefore be subject to both Standard Mitigation Measures and Best Available Mitigation Measures, as applicable (TCAPCD, 2015). Detailed calculation spreadsheets and supporting documentation are provided in Appendix 24A Methodology for Air Quality and GHG Emissions Calculations.

Table 24-8
Estimated Total Average Daily Unmitigated Emission Rates for Operation and Maintenance of Proposed Facilities Within the Primary Study Area Under All Alternatives (lb/day)

TCAPCD Threshold (lb/day)	NO_x	PM_{10}	$PM_{2.5}$	ROG	CO	SO_x
Level A	< 25	< 80	-	< 25	-	-
Level B	> 25	> 80	-	> 25	-	-
Level C	> 137	> 137	-	> 137	-	-
Total Average Daily Emissions (lb/day)	**26** *	**89**	3	4	102	0.3

***Bolded** values indicate an exceedance of the Significance Threshold.

Notes:

It was assumed that sedans/pickups would travel at a speed of 15 mph which equates to 3 roundtrips per hour at a distance of 5 miles per roundtrip.

An estimated total of 60 employees would support operations and maintenance work at all facilities.

Values include emissions for up to 200,000 recreational visitors per year. Assumes no off-road recreation.

CO = carbon monoxide
lb/day = pounds per day
NO_x = nitrogen oxides
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
ROG = reactive organic gases
SO_x = sulfur oxides
TCAPCD = Tehama County Air Pollution Control District

When compared to the Existing Conditions/No Project/No Action Condition in the Primary Study Area, emissions and air quality impacts associated with long-term operations and maintenance of Alternative A would result in a **potentially significant impact**. This finding is based on the CEQA guidance, thresholds of significance, and attainment plans for the TCAPCD (TCAPCD, 2015). Additional exceedances of significance thresholds could occur when other operational or maintenance activities occur, e.g., the proposed Holthouse Reservoir would be dredged to remove sediment periodically during the Project duration, resulting in additional emissions for 167 days, during dredging years. Periodic dredging would also occur at the proposed TRR and Delevan Pipeline Intake/Discharge Facilities, and at the existing Tehama-Colusa Canal and GCID Main Canal intakes. As an example of the level of emissions associated with periodic dredging activities, average daily emissions estimated for dredging of the Holthouse Reservoir are presented in Table 24-9.

Table 24-9
Estimated Total Average Daily Unmitigated Emission Rates for Periodic Holthouse Reservoir Sediment Removal Within the Primary Study Area Under All Alternatives (lb/day for 167 days)[a]

TCAPCD Threshold (lb/day)	NO_x	PM_{10}[b]	$PM_{2.5}$	ROG	CO	SO_x
Level A	< 25	< 80	-	< 25	-	-
Level B	> 25	> 80	-	> 25	-	-
Level C	> 137	> 137	-	> 137	-	-
Total Average Daily Emissions (lb/day)	**255**[c]	25	11	23.5	170	0

[a]The average daily construction emission rates for each criteria pollutant (in lb/day) for each periodic sediment removal activity are the sum total of the estimated emission rates for the equipment that would be used over the period of the activity divided by the duration in days.

[b]Fugitive dust emissions from grading were assumed to include daily watering of disturbed areas to control dust, and vehicles traveling on unpaved roads were assumed to be limited to 15 miles per hour.

[c]**Bolded** values indicate an exceedance of the Significance Threshold.

Notes:

CO = carbon monoxide
lb/day = pounds per day
NO_x = nitrogen oxides
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
ROG = reactive organic gases
SO_x = sulfur oxides

Impact Air Qual-2: Expose Sensitive Receptors to Substantial Pollutant Concentrations

Construction-related activities for Alternative A would require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, backhoes, and concrete mixing and pumping trucks. Haul trucks would be used to move borrow and/or spoils and other materials. Emissions of CO and TACs could result from fuel combustion to support site preparation, and asbestos emissions may result from construction and demolition activities required for the Project. Health impacts from human exposure to localized CO emissions and TACs from construction are dependent on the magnitude of the concentrations that receptors may be exposed to, the duration of exposure, and the relative toxicities of the individual pollutants.

CO hot spots are not expected to result from construction-related changes in traffic patterns, due to the rural nature of most of the Project construction activities. There are very few sensitive receptors within

0.5 mile of any of the construction activities (one residence is approximately 680 feet west of the proposed headgate structure at the TRR, and one residence is approximately 100 feet southwest of the proposed railroad siphon replacement at the GCID Main Canal).

TACs that could be generated by the combustion of fuels include benzene, formaldehyde, acrolein, and other products of incomplete combustion. Proposed land disturbance activities are not expected to result in asbestos emissions, because ultramafic rocks likely to contain naturally occurring asbestos are not found within the Primary Study Area or in the watersheds draining into the Primary Study Area (see Chapter 16 Geology, Minerals, Soils, and Paleontology for more details).

Preparation of the proposed Sites Reservoir Inundation Area for filling would involve demolition of several structures. To avoid adverse Project-related air quality impacts, construction contractors conducting demolition and disposal of asbestos-containing material (ACM) must comply with various regulatory requirements, such as the Asbestos National Emission Standard for Hazardous Air Pollutants (40 CFR 61, Subpart M), and State and local Airborne Toxic Control Measures for ACM (see Appendix 4A Environmental Compliance).

Diesel PM from diesel-fueled on-road haul trucks and off-road equipment would be the primary TAC of concern for Project construction activities. Because the construction activities vary in time and location, the generation of TAC emissions and exposure of human receptors would be temporary or intermittent, in most cases.

Most of the proposed construction activities and exhaust emissions from equipment would occur in rural areas, typically more than 1,000 feet from sensitive receptors. Diesel-fueled construction equipment would operate only a limited period of time at any given location, and would be subject to stringent regulatory requirements. Because mobile source diesel PM emissions are typically reduced by 70 percent at a distance of approximately 500 feet from the source (BAAQMD, 2011), such emissions would be expected to be well dispersed beyond 1,000 feet from the source. Diesel-fueled mobile sources would be subject to ARB emission standards and Airborne Toxic Control Measures. When compared to the Existing Conditions/No Project/No Action Condition, sensitive receptors would not be exposed to substantial pollutant concentrations from Project-related construction equipment exhaust emissions, and the associated impacts would be **less than significant**.

Emission sources similar to those expected during Project construction, but at greatly reduced levels, would likely result from operations and maintenance of the Project. Activities associated with operations and maintenance of the Project facilities would occur intermittently and generate emissions sporadically over the lifetime of the Project. In addition, particulate matter emissions are anticipated to occur over 0.5 mile away from sensitive receptors and at levels well below the TCAPCD thresholds of significance (Table 24-9). It is assumed that CO and TAC emissions from stationary sources would be subject to air district permitting requirements to limit exposure to sensitive receptors. In addition, mobile sources would be subject to ARB emission standards and Airborne Toxic Control Measures. Therefore, when compared to the Existing Conditions/No Project/No Action Condition, sensitive receptors would not be exposed to substantial pollutant concentrations and the impact would be **less than significant**.

Impact Air Qual-3: Create Objectionable Odors Affecting a Substantial Number of People

Odors may result from construction and operation of the Project, if activities would result in anaerobic decomposition of organic materials. Alternative A operations would result in water level fluctuations in the proposed Sites Reservoir. Under very low reservoir elevations, algal growth may contribute to

localized odors. The reservoir would be located in a rural area with few permanent residents living near the water's edge. In addition, it is unlikely that many recreationists would visit the reservoir during periods when drawn down is at a very low level (see Chapter 21 Recreation Resources).

Odors may be generated through exhaust emissions from diesel equipment, but the emission sources would not remain in one location for long periods of time, and the emissions would be intermittent and would dissipate from the source rapidly. In addition, the types of land uses that typically result in odor problems include agriculture, wastewater treatment plants, food processing and rendering plants, chemical plants, landfills, composting facilities, and dairies, and Alternative A does not include construction or operation of any of these land use activities or any similar land uses. This qualitative analysis indicates that any odor impacts would be limited, and if odors did occur, they would only occur in areas where the people that would be exposed would be few in number. Therefore, when compared to the Existing Conditions/No Project/No Action Condition, construction and operation of Alternative A would not generate objectionable odors affecting a substantial number of people, and the impact would be **less than significant**.

24.3.6 Impacts Associated with Alternative B

24.3.6.1 Extended and Secondary Study Areas – Alternative B

Construction, Operation, and Maintenance Impacts

The impacts associated with Alternative B, as they relate to compliance with air quality standards (**Impact Air Qual-1**), substantial pollutant concentrations (**Impact Air Qual-2**), and objectionable odors (**Impact Air Qual-3**), would be the same as those described for Alternative A for the Extended and Secondary study areas.

24.3.6.2 Primary Study Area – Alternative B

Construction, Operation, and Maintenance Impacts

With the exceptions noted below, almost all of the Project facilities in the Primary Study Area are the same in both Alternative A and Alternative B. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore, result in the same construction, operation, and maintenance impacts to air quality.

Alternative B includes the construction of a proposed 1.8-MAF Sites Reservoir, rather than the 1.3-MAF reservoir in Alternative A. The increased reservoir size would require a larger footprint for the proposed Sites and Golden Gate dams and necessitate the construction of nine saddle dams, rather than seven saddle dams in Alternative A. As indicated previously, construction equipment utilization for dam construction was assumed to be directly related to the volume of materials used for the dams (Barnes pers. comm., 2011), and fugitive dust emissions were assumed to be directly related to the areas of disturbance.

The proposed Alternative B Sites/Delevan Overhead Power Line would differ from that for Alternative A. There would be no overhead power line alignment between the Sacramento River and the Pacific Gas and Electric Company (PG&E) or Western Area Power Administration (WAPA) transmission line. The Alternative B overhead power line would be approximately 3 miles long, from the proposed Sites Electrical Switchyard to the PG&E or WAPA transmission line located west of the proposed TRR. There would be no sensitive receptors located within 0.5 mile of this construction area.

The proposed Alternative B Road Relocations and South Bridge would differ slightly from those described for Alternative A. The lengths of the saddle dam access roads included in Alternative A would be reduced in Alternative B because the dams would be larger and would be located closer to the main roads. In addition, an extension of an access road would be constructed for Alternative B to provide access from Saddle Dam 3 to Saddle Dams 1 and 2. However, there would be no sensitive receptors located within 0.5 mile of these portions of the road relocations.

Alternative B would replace the proposed Delevan Pipeline Intake/Discharge Facilities with the smaller proposed Delevan Pipeline Discharge Facilities. The proposed Delevan Pipeline would be operated as a release-only pipeline, so the associated Delevan Pipeline Discharge Facility would not include a fish screen or any of the facilities needed for the pumping and generating operations described for Alternative A.

These changes in facility design would result in similar construction-, operation-, and maintenance-related impacts to sensitive receptors from substantial pollutant concentrations **(Impact Air Qual-2)** and objectionable odors **(Impact Air Qual-3)** as described for Alternative A. Emissions associated with construction, operation, and maintenance of Alternative B would be greater than those estimated for Alternative A, due primarily to the larger reservoir and dams, as well as other Project design features included in Alternative B that would differ from Alternative A (refer to above discussion). The estimated emissions are presented and discussed below.

Impact Air Qual-1: Conflict with an Applicable Air Quality Plan, Contribute Substantially to an Air Quality Violation, and/or Result in a Cumulatively Considerable Net Increase of Nonattainment Pollutants

Table 24-10 presents the results for emission calculations for construction of Alternative B, C, and C_1 providing average daily construction emissions by construction year, with comparison to significance thresholds established by TCAPCD (TCAPCD, 2015). Detailed calculation spreadsheets and supporting documentation are provided in Appendix 24A Methodology for Air Quality and GHG Emissions Calculations. As indicated in Table 24-10, emissions estimated for construction of Alternatives B, C, and C_1 would be the same because there are only minor differences between the three alternatives with regard to overall construction requirements. For example, Alternative B does not include construction of the proposed Sites/Delevan Overhead Power Line from the PG&E or WAPA transmission line to the Sacramento River, and the proposed Alternative C Delevan Pipeline Intake/Discharge Facilities would be replaced by the smaller proposed Alternative B Delevan Pipeline Discharge Facilities. These differences in required construction activities are not expected to result in substantial differences in the estimated construction emissions.

When compared to the Existing Conditions/No Project/No Action Condition in the Primary Study Area, impacts associated with temporary construction-related emissions of criteria air pollutants and precursors for Alternative B would be **potentially significant**.

When compared to the Existing Conditions/No Project/No Action Condition in the Primary Study Area, emissions and air quality impacts associated with long-term operation and maintenance of Alternative B would result in a **potentially significant impact**.

Table 24-10
Estimated Average Daily Unmitigated Emission Rates for Criteria Pollutants by Year for Construction of Alternatives B, C, and C_1

	Emissions (lbs/day)[a,d]					
	NO_x	**PM_{10}**	**$PM_{2.5}$**	**ROG**	**CO**	**SO_x**
Significance Threshold (lb/day)[c]	***137***	***137***	***-***	***137***	***-***	***-***
Anticipated Daily Unmitigated Emissions of Criteria Pollutants by Construction Year						
2022	**881[b]**	**328**	65	84	620	2
2023	**1,668**	**778**	144	**163**	1,191	4
2024	**1,361**	**664**	124	134	984	4
2025	**1,378**	**668**	125	136	1,004	4
2026	**785**	**475**	84	79	588	2
2027	**324**	**301**	49	33	270	1
2028	**319**	**290**	48	33	259	1
2029	**286**	**272**	44	29	222	1
2030	33	19	3	4	37	0

[a]The average daily construction emission rates for each criteria pollutant (in lb/day) for each construction year are the sum of the average daily emission rates estimated for each of the Project features that would be constructed in the indicated construction year.

[b]**Bolded** values indicate an exceedance of the Significance Threshold.

[c]Significance Threshold is from TCAPCD Level C: Greater than 137 pounds per day of emissions. If emissions from a project would exceed the Level C thresholds, all feasible mitigation measures, including Suggested Mitigation Measures (SMMs), Best Available Mitigation Measures (BAMMs), and off-site mitigation measures, may be required to reduce the overall air quality impacts of the project to a level of insignificance (TCAPCD, 2015).

[d]Fugitive dust emissions from grading were assumed to include daily watering of disturbed areas to control dust, and vehicles traveling on unpaved roads were assumed to be limited to 15 miles per hour.

Notes:

CO = carbon monoxide
lb/day = pounds per day
NO_x = nitrogen oxides
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
ROG = reactive organic gases
SO_x = sulfur oxides
TCAPCD = Tehama County Air Pollution Control District

24.3.7 Impacts Associated with Alternative C

24.3.7.1 Extended and Secondary Study Areas – Alternative C

Construction, Operation, and Maintenance Impacts

The impacts associated with Alternative C, as they relate to compliance with air quality standards (**Impact Air Qual-1**), substantial pollutant concentrations (**Impact Air Qual-2**), and objectionable odors (**Impact Air Qual-3**), would be the same as those described for Alternative A for the Extended and Secondary study areas.

24.3.7.2 Primary Study Area – Alternative C

Construction, Operation, and Maintenance Impacts

With the noted exceptions, almost all of the Project facilities in the Primary Study Area are the same in Alternatives A, B, and C. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore, result in the same construction, operation, and maintenance impacts to air quality.

For Alternative C, the design of the proposed Sites/Delevan Overhead Power Line and Delevan Pipeline Intake/Discharge Facilities is the same as that described for Alternative A. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore, result in the same construction, operation, and maintenance impacts to air quality as described for Alternative A.

Like Alternative B, Alternative C proposes the construction of a 1.8-MAF Sites Reservoir, rather than the 1.3-MAF reservoir in Alternative A. The increased reservoir size would require a larger footprint for the proposed Sites and Golden Gate dams and necessitate the construction of nine saddle dams, rather than six saddle dams in Alternative A. The design of the proposed Sites Reservoir Inundation Area and Dams and Road Relocations and South Bridge is the same as described for Alternative B. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore result in the same construction, operation, and maintenance impacts to air quality as described for Alternative B.

Alternative C would, therefore, result in similar construction-, operation-, and maintenance-related impacts to an applicable air quality plan, air quality violation, or net increase of nonattainment pollutants **(Impact Air Qual-1)** as described for Alternative B; and sensitive receptors from substantial pollutant concentrations **(Impact Air Qual-2)** and objectionable odors **(Impact Air Qual-3)** as described for Alternative A.

24.3.8 Impacts Associated with Alternative C_1

24.3.8.1 Extended and Secondary Study Areas – Alternative C_1

Construction, Operation, and Maintenance Impacts

The impacts associated with Alternative C_1, as they relate to compliance with air quality standards (**Impact Air Qual-1**), substantial pollutant concentrations (**Impact Air Qual-2**), and objectionable odors (**Impact Air Qual-3**), would be the same as those described for Alternative A for the Extended and Secondary study areas.

24.3.8.2 Primary Study Area – Alternative C_1

Construction, Operation, and Maintenance Impacts

With the noted exceptions, almost all of the Project facilities in the Primary Study Area are the same in Alternatives A, B, C, and C_1. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore, result in the same construction, operation, and maintenance impacts to air quality.

The facilities for Alternative C_1 would not include the Holthouse Reservoir complex, but rather would involve modifications to the existing Funks reservoir. There would be no hydropower generation or related overhead power line facilities associated with Alternative C_1.

The Alternative C_1 design of the proposed Sites/Delevan Overhead Power Line and Delevan Pipeline Intake/Discharge Facilities is the same as described for Alternative A. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore, result in the same construction, operation, and maintenance impacts to air quality as described for Alternative A.

The Alternative C_1 design of the proposed Sites Reservoir Inundation Area and Dams and Road Relocations and South Bridge is the same as described for Alternatives B and C. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore result in the same construction, operation, and maintenance impacts to air quality as described for Alternatives B and C. One possible exception would be slightly reduced emissions for maintenance due to the omission of the Holthouse Reservoir complex.

Alternative C_1 would, therefore, result in similar construction- and maintenance-related impacts to an applicable air quality plan, air quality violation, or net increase of nonattainment pollutants **(Impact Air Qual-1)** as described for Alternative B; and to sensitive receptors from substantial pollutant concentrations **(Impact Air Qual-2)** and objectionable odors **(Impact Air Qual-3)** as described for Alternative A.

24.3.9 Impacts Associated with Alternative D

24.3.9.1 Extended and Secondary Study Areas – Alternative D

Construction, Operation, and Maintenance Impacts

The impacts associated with Alternative D, as they relate to compliance with air quality standards (**Impact Air Qual-1**), substantial pollutant concentrations (**Impact Air Qual-2**), and objectionable odors (**Impact Air Qual-3**), would be the same as those described for Alternative A for the Extended and Secondary study areas.

24.3.9.2 Primary Study Area – Alternative D

Construction, Operation, and Maintenance Impacts

With the noted exceptions, almost all of the Project facilities in the Primary Study Area are the same in Alternatives A, B, C, C_1, and D. These facilities would require the same construction methods and operation and maintenance activities regardless of alternative, and would, therefore, result in similar construction, operation, and maintenance impacts to air quality. A different schedule to expedite construction was developed for construction of Alternative D (Herrin, 2017, pers. comm.), and that schedule was used in the emissions estimates for this alternative.

In Alternative D, the TRR Reservoir would be 1,200 acre feet (af), as opposed to 2,000 af in the other alternatives. In addition to a boat ramp day use area, there would be only 2 recreation areas, Stone Corral and Peninsula Hills, rather than the 5 recreation areas in the other alternatives. The design of the proposed Delevan Pipeline Intake/Discharge Facilities is the same for Alternative D as that described for Alternative A; however, it would be located approximately 50 to 150 feet south of the alignment for

Alternatives A, B, C, and C1; however, these facilities would require the same construction methods as previously described.

The Alternative D design would include a North-South Delevan Overhead Power Line along SR 45. The route would extend approximately 10 miles south from the Delevan Pipeline Intake/Discharge Facilities, and would connect to a new substation west of the City of Colusa. The overhead power line would primarily be located within an existing PG&E electrical transmission corridor; however, it would require installation of new poles along the length of the alignment, which may require an expanded right-of-way. The north-south alignment within the existing SR 45 corridor would pass a limited number of rural residences and businesses, including the Colusa Casino, the Colusa Indian Wellness Center, and the Colusa Indian Health Clinic; however, the southern end of the proposed alignment would deviate west of SR 45, as it nears the proposed new substation, potentially traversing properties in a housing development west of the City of Colusa.

The proposed Alternative D South Bridge and TRR Pipeline Road would differ slightly from those described for Alternative A. The lengths of the saddle dam access roads included in Alternative D would be similar to Alternative B. There are no sensitive receptors located within 0.5 mile of these portions of the road relocations.

These changes in facility design would result in similar construction-, operation-, and maintenance-related impacts to sensitive receptors from substantial pollutant concentrations **(Impact Air Qual-2)** and objectionable odors **(Impact Air Qual-3)** as described for Alternative A. Average daily emissions associated with Alternative D would be more than those estimated for Alternative A, with the exception of slightly less NO_x emissions during the second year of construction. Average daily emissions associated with Alternative D would be more than those estimated for Alternatives B, C, and C1, in some years, and less in other years. These differences result from changes in the construction schedule for Alternative D, and Project design features in Alternative D that would differ from those in the other alternatives (refer to above discussion). The emissions estimates for Alternative D are presented and discussed below.

Impact Air Qual-1: Conflict with an Applicable Air Quality Plan, Contribute Substantially to an Air Quality Violation, and/or Result in a Cumulatively Considerable Net Increase of Nonattainment Pollutants

Table 24-11 presents the estimated construction emissions for Alternative D, providing average daily construction emissions by construction year, with comparison to significance thresholds established by TCAPCD (TCAPCD, 2015). Detailed calculation spreadsheets and supporting documentation are provided in Appendix 24A Methodology for Air Quality and GHG Emissions Calculations. Operation and maintenance activities would be the same as Alternatives A, B, C, and C_1, and would, therefore, result in the same operation and maintenance impacts to air quality as described for Alternative A.

As indicated in Table 24-11, emissions estimated for construction of Alternative D would be different from the emissions estimated for the other alternatives, because of differences in the proposed construction schedule and Project features. There are only minor differences between the five alternatives with regard to overall construction requirements. For example, Alternative D does not include construction of the proposed Delevan Overhead Power Line from the PG&E or WAPA transmission line to the Sacramento River but does include a North-South Delevan Overhead Power Line along SR 45, and the proposed Alternative C Delevan Pipeline Intake/Discharge Facilities would be replaced by the smaller proposed Alternative B Delevan Pipeline Discharge Facilities.

When compared to the Existing Conditions/No Project/No Action Condition in the Primary Study Area, impacts associated with temporary construction-related emissions of criteria air pollutants and precursors for Alternative D would be **potentially significant**.

When compared to the Existing Conditions/No Project/No Action Condition in the Primary Study Area, emissions and air quality impacts associated with long-term operation and maintenance of Alternative D would result in a **potentially significant impact,** similar to that for Alternative A. Refer to Tables 24-7, 24-8, and 24-9, and the discussion for **Impact Air Qual-1** for Alternative A in the Primary Study Area.

Table 24-11
Estimated Average Daily Unmitigated Emission Rates for Criteria Pollutants by Year for Construction of Alternative D Within the Primary Study Area

	Emissions (lbs/day)[a,d]					
	NO_x	PM_{10}	$PM_{2.5}$	ROG	CO	SO_x
Significance Threshold (lb/day)[c]	***137***	***137***	**-**	***137***	**-**	**-**
Anticipated Daily Unmitigated Emissions of Criteria Pollutants by Construction Year						
2022	**1,427[b]**	**830**	148	**141**	1,047	4
2023	**1,492**	**860**	154	**147**	1,097	4
2024	**1,307**	**742**	132	129	964	4
2025	**1,288**	**725**	130	127	945	4
2026	**959**	**634**	109	96	713	3
2027	**741**	**544**	91	74	557	2
2028	**339**	137	26	34	275	1
2029	21	13	2	2	29	0
2030	21	13	2	2	29	0

[a]The average daily construction emission rates for each criteria pollutant (in lb/day) for each construction year are the sum of the average daily emission rates estimated for each of the Project features that would be constructed in the indicated construction year.

[b]**Bolded** values indicate an exceedance of the Significance Threshold.

[c]Significance Threshold is from TCAPCD Level C: Greater than 137 pounds per day of emissions. If emissions from a project would exceed the Level C thresholds, all feasible mitigation measures, including Suggested Mitigation Measures (SMMs), Best Available Mitigation Measures (BAMMs), and off-site mitigation measures, may be required to reduce the overall air quality impacts of the project to a level of insignificance (TCAPCD, 2015).

[d]Fugitive dust emissions from grading were assumed to include daily watering of disturbed areas to control dust, and vehicles traveling on unpaved roads were assumed to be limited to 15 miles per hour.

Notes:

CO = carbon monoxide
lb/day = pounds per day
NO_x = nitrogen oxides
PM_{10} = Particulate matter consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7 the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs, where they may be deposited and result in adverse health effects. PM_{10} emissions also cause visibility reduction.
$PM_{2.5}$ = Includes particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.
ROG = reactive organic gases
SO_x = sulfur oxides

24.4 Mitigation Measures

Mitigation measures are provided below and summarized in Table 24-12 for the impacts that have been identified as potentially significant for construction, operation, and maintenance of the Project facilities under all of the build alternatives.

Table 24-12
Summary of Mitigation Measures for Potential Project Impacts to Air Quality

Impact	Associated Project Facility	LOS Before Mitigation	Mitigation Measure	LOS[a] After Mitigation
Impact Air Qual-1: Conflict with an Applicable Air Quality Plan, Contribute Substantially to an Air Quality Violation, and/or Result in a Cumulatively Considerable Net Increase of Nonattainment Pollutants	All Primary Study Area Project Facilities (construction)	Potentially Significant	Mitigation Measure Air Qual-1a: Develop and Implement a Fugitive Dust Control Plan	Significant and Unavoidable for Emissions of PM_{10}
			Mitigation Measure Air Qual-1b: Implement Measures to Reduce Equipment and Vehicle Exhaust Emissions	Significant and Unavoidable for Emissions of NO_x, PM_{10}, and ROG Less than Significant for Emissions of SO_x, CO, and $PM_{2.5}$
	All Primary Study Area Project Facilities (operation and maintenance)[b]	Potentially Significant	Mitigation Measure Air Qual-1a: Develop and Implement a Fugitive Dust Control Plan	Less than Significant for PM_{10}
			Mitigation Measure Air Qual-1b: Implement Measures to Reduce Equipment and Vehicle Exhaust Emissions	Less than Significant for NO_x, PM_{10}, ROG, SO_x, CO, and $PM_{2.5}$

[a]LOS = Level of Significance

[b]Approaches and mitigation measures to address the electricity-related emissions associated with SWP and Central Valley Project operational changes are discussed in Chapter 25 Climate Change and Greenhouse Gas Emissions.

Mitigation Measure Air Qual-1a: Develop and Implement a Fugitive Dust Control Plan

The Fugitive Dust Control Plan to be developed and implemented during construction, operations, and maintenance of the Project shall include the following information and measures to reduce fugitive PM_{10} and $PM_{2.5}$ emissions:

- Name(s), address(es), and phone number(s) of person(s) responsible for the preparation, submission, and implementation of the plan.
- Description and location of construction activities.
- Listing of all fugitive dust emissions sources.

Land Clearing/Earth Moving:

- 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 emissions.
- Haul vehicles transporting soil into or out of the property shall be covered.
- Water shall be applied to disturbed areas a minimum of two times per day or more as necessary.

- A publicly visible sign shall be posted with the telephone number and person to contact regarding dust complaints. This person shall respond and take corrective action within 24 hours. The telephone number of the local air district shall also be included and visible on the sign.
- All excavation, grading, and/or earth moving activities shall be suspended when average wind speeds exceed 25 mph.

Visibly Dry Disturbed Soil Surface Areas:

- All visibly dry disturbed soil surface areas of operation shall be treated with a dust palliative agent and/or watered to minimize dust emissions.

Paved Road Track-out:

- Existing roads and streets adjacent to the Project shall be cleaned at least once per day unless conditions warrant a greater frequency.

Visibly Dry Disturbed Unpaved Roads:

- All visibly dry disturbed unpaved road surface areas of operation shall be watered to minimize dust emissions.
- Unpaved roads shall be graveled to reduce dust emissions, to the extent feasible.
- Water shall be applied to disturbed areas a minimum of two times per day or more as necessary.
- On-site vehicles shall be limited to a speed of 15 miles per hour on unpaved roads.
- 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.

Vehicles Entering/Exiting Construction Area:

- Vehicles entering or exiting the construction area shall travel at a speed which minimizes dust emissions.

Employee Vehicles:

- Construction workers shall park in designated parking areas(s) to help reduce dust emissions.

Soil Piles:

- 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. This includes materials stored in piles for use in the concrete batch plant.

Mitigation Measure Air Qual-1b: Implement Measures to Reduce Equipment and Vehicle Exhaust Emissions

Measures to reduce equipment and vehicle exhaust emissions to be implemented during construction, operation, and maintenance of the Project shall include the following to reduce NOx, PM_{10}, and ROG emissions:

- All construction-type equipment shall be maintained according to manufacturer's specifications.

- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California Airborne Toxics Control Measure, codified in Title 13, Section 2485 of the California Code of Regulations [CCR]).
- During all activities, diesel-fueled portable equipment with maximum power greater than 25 horsepower shall be registered under the ARB's Statewide Portable Equipment Registration Program.
- All fleets of diesel-fueled off-road vehicles and equipment shall comply with emissions standards and requirements pursuant to CCR Title 13, Section 2449. To the extent feasible, operate off-road construction vehicles and equipment with engines certified to the Tier 3 or higher emissions standards. If off-road construction vehicles and equipment with engines that meet Tier 3 or 4 standards is not available, the best available emissions control technology shall be used.
- All diesel-fueled on-road trucks shall be operated in compliance with the emission standards per CCR Title 13, Section 2025. To the extent feasible, operate on-road trucks with engines certified to the 2012 model year or newer heavy-duty diesel engine emissions standards.
- To the extent feasible, electric equipment shall be operated.
- Alternatively fueled equipment shall be used, to the extent feasible, such as compressed natural gas, liquefied natural gas, propane, or biodiesel.
- Electricity used to power facilities and equipment shall be generated by renewable energy sources with state-of-the-art emissions control systems, to the extent feasible.

Implementation of **Mitigation Measures Air Qual-1a** and **Air Qual-1b** would reduce the LOS of potential Project impacts to air quality to **less than significant** for emissions during operation and maintenance.

Implementation of **Mitigation Measures Air Qual-1a** and **Air Qual-1b** would lessen the effects of Project-related NO_x, PM_{10}, and ROG emissions on air quality from Project construction, but impacts would remain **potentially significant and unavoidable**.

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