Chapter 4
Air Quality

Environmental Setting

This section discusses federal, state, and local regulations related to air quality that would apply to the proposed project. It then describes existing air quality conditions in the project area.

Regulatory Setting

Federal

Federal air quality laws regulate air pollutants, primarily through industry-specific standards and planning requirements. The primary legislation that governs federal air quality regulations is the Clean Air Act Amendments of 1990. Federal air quality laws regulate criteria, toxic, and nuisance air pollutant emissions from industrial sources.

Criteria pollutants are substances for which the U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS), including carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone, particulate matter (PM), and lead.

Noncriteria air pollutants, also known as toxic air contaminants (TACs), are airborne substances capable of causing adverse health effects as a result of short-term (acute) or long-term (chronic) exposure.

Nuisance pollutants are substances that can result in complaints from the population about adverse impacts on quality of life. The nuisance pollutants regulated by the air districts are odors and visible plumes (smoke).

State

Criteria Pollutants

The California Air Resources Board (ARB), which is part of the California Environmental Protection Agency (Cal-EPA), develops air quality regulations at the state level. The state regulations mirror federal regulations by establishing industry-specific pollution controls for criteria, toxic, and nuisance pollutants. California also requires areas to develop plans and strategies for attaining California ambient air quality standards (CAAQS) as set forth in the California Clean Air Act of 1988. As described above, California has developed ambient standards for the criteria pollutants equal to or more stringent than the federal standards.

Air Toxics

State requirements specifically address air toxics issues through Assembly Bill (AB) 1807 (known as the Tanner Bill), which established the state air toxics program, and AB 2588, the Air Toxics Hot Spots Information and Assessment Act. The air quality regulations developed from these bills have been modified recently to incorporate the federal regulations associated with the federal Clean Air Act Amendments of 1990.

The Air Toxics Hot Spots Information and Assessment Act (AB 2588, 1987, Connelly) (Hot Spots Act) was enacted in September 1987. Under this bill, stationary sources of emissions are required to report the types and quantities of certain substances that their facilities routinely release into the air.

While AB 2588 applies primarily to stationary sources of air pollution, the Federal Highway Administration (FHWA) has developed guidance to evaluate releases of TACs from mobile sources (U.S. Department of Transportation 2006). In addition, Caltrans, in conjunction with the University of California, Davis, has developed air quality tools to implement the FHWA guidance for transportation projects located in California (California Department of Transportation 2008).

Greenhouse Gas Emissions and Global Climate Change

Several recent state-level actions have been taken to limit greenhouse gas (GHG) emissions implicated in global warming. Those actions are described below.

Executive Order S-3-05

On June 1, 2005, California Governor Arnold Schwarzenegger issued Executive Order S-3-05. It included the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80% below 1990 levels. To meet the targets, the governor directed several state agencies to cooperate in the

development of a climate action plan. The secretary of Cal-EPA leads the Climate Action Team (CAT), whose goal is to implement global warming emission reduction programs identified in the climate action plan and to report on the progress made toward meeting the emission reduction targets established in the executive order.

The first report to the governor and the legislature was released in March 2006 and will be issued bi-annually thereafter. The CAT report to the governor contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met (California Environmental Protection Agency 2006).

California Global Warming Solutions Act of 2006 (Assembly Bill 32)

In 2006, the California state legislature adopted the California Global Warming Solutions Act of 2006 (AB 32). AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, GHGs are defined as carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

AB 32 requires that ARB:

- adopt early action measures to reduce GHGs.;
- establish a statewide GHG emissions cap for 2020 based on 1990 emissions;
- adopt mandatory report rules for significant GHG sources;
- adopt a scoping plan indicating how emission reductions will be achieved via regulations, market mechanisms, and other actions; and
- adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs.

Senate Bill 97

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an important environmental issue that requires analysis under the California Environmental Quality Act (CEQA). The bill directs the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, by July 1, 2009. The California Resources Agency is required to certify or adopt those guidelines by January 1, 2010.

Actions Taken by the Governor's Office of Planning and Research

In June 2008, OPR issued a Technical Advisory on CEQA and Climate Change (Governor's Office of Planning and Research 2008). This document recommends that for projects subject to CEQA, emissions be calculated and mitigation measures be identified to reduce those emissions. The OPR report does not identify emission thresholds for GHGs, but instead recommends that each lead agency develop its own thresholds.

Actions Taken by California Attorney General's Office

The California Attorney General (AG) has filed comment letters under CEQA about a number of proposed projects. The AG has also filed several complaints and obtained settlement agreements for CEQA documents covering general plans and individual programs that the AG found either failed to analyze GHG emissions or failed to provide adequate GHG mitigation. The AG's office has prepared a report that lists measures that local agencies should consider under CEQA to offset or reduce global warming impacts. The AG's office also has prepared a chart of modeling tools to estimate GHG emissions impacts of projects and plans. Information on the AG's actions can be found on at the California Department of Justice Office of Attorney General web site (California Department of Justice 2008).

California Air Pollution Control Officers Association Guidance

The California Air Pollution Control Officers Association (CAPCOA) released a report in January 2008 that describes methods to estimate and mitigate GHG emissions from projects subject to CEQA. The CAPCOA report evaluates several GHG thresholds that could be used to evaluate the significance of a project's GHG emissions. The CAPCOA report, however, does not recommend any one threshold. Instead, the report is designed as a resource for public agencies as they establish agency procedures for reviewing GHG emissions from projects subject to CEQA (California Air Pollution Control Officers Association 2008).

Local

At the local level, air quality is managed through land use and development planning practices. These practices are implemented in Butte County through its general planning processes. The Butte County Air Quality Management District (BCAQMD) is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws.

Existing Conditions

The proposed project is located within the Northern Sacramento Valley Air Basin (NSVAB). The NSVAB consists of Shasta, Tehama, Glenn, Butte, Colusa, Yuba, and Sutter Counties. This air basin is predominantly rural, with few major urban areas.

Climate and Topography

The proposed project would be built and operated in Butte County, located in the north-central portion of the Sacramento Valley, a broad, flat valley bounded by the Coast Ranges to the west and the Sierra Nevada to the east. The entire air basin is about 200 miles long in a north-south direction, and has a maximum

width of about 150 miles, although the valley floor averages only about 50 miles in width.

The climate of the project area is characterized by hot, dry summers and cool, wet winters. During the summer months from mid-April to mid-October, significant precipitation is unlikely and temperatures range from daily maxima approaching 100°F to evening lows in the 50s and low 60s. Winter conditions are characterized by occasional rainstorms interspersed with stagnant and sometimes foggy weather. Winter daytime temperatures average in the low 50s, and nighttime temperatures average in the upper 30s.

Wind direction is primarily up- and down-valley because of the channeling effect of the mountains to either side of the valley. During the summer months, surface air movement is from the south, particularly during the afternoon hours. During the winter months, wind direction is more variable.

Prevailing wind patterns control the dispersion rate of local emissions. Butte County experiences two types of inversion layers that affect air quality. The first type of inversion layer contributes to photochemical smog problems by confining pollution to a shallow layer near the ground. This occurs in summer, when sinking air forms a “lid” over the region. The second type of inversion occurs when the air near the ground cools while the air aloft remains warm. These inversions occur during winter nights and can cause localized air pollution “hotspots” near emission sources because of poor dispersion.

Air Pollutants and Ambient Air Quality Standards

Table 4-1 shows the NAAQS and CAAQS. Butte County is a nonattainment area for the federal ozone standards, and is an attainment/maintenance area for CO, PM 10 microns in diameter or less (PM10), and PM 2.5 microns in diameter or less (PM2.5). Because of several recent violations of the federal PM2.5 standards, Butte County is about to be reclassified as a PM2.5 nonattainment area (Williams pers. comm.). Butte County is also a nonattainment area for the state ozone and PM10 standards (Table 4-2). Butte County is in attainment for all other NAAQS and CAAQS.

The closest air quality monitoring station is in on Manzanita Avenue in Chico. Table 4-3 summarizes the three most recent years of monitoring data for the Manzanita Avenue monitoring station. Pollutant concentrations are typically expressed in terms of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$).

Table 4-1. Ambient Air Quality Standards Applicable in California

Pollutant	Averaging Time	CAAQS[a]	NAAQS[b]
Ozone (O_3)	1 hour	0.09 ppm	NA
	8 hours	0.070 ppm	0.075 ppm
Carbon monoxide (CO)	1 hour	20 ppm	35 ppm
	8 hours	9.0 ppm	9 ppm
Nitrogen dioxide (NO_2)	1 hour	0.18 ppm	NA
	Annual	0.030 ppm	0.053 ppm
Sulfur dioxide (SO_2)	1 hour	0.25 ppm	NA
	3 hours	NA	0.5 ppm
	24 hours	0.04 ppm	0.14 ppm
	Annual	NA	0.03 ppm
Inhalable particulate matter (PM10)	24 hours	50 µg/m^3	150 µg/m^3
	Annual	20 µg/m^3	NA
Fine particulate matter (PM2.5)	24 hours	NA	35 µg/m^3
	Annual	12 µg/m^3	15 µg/m^3
Sulfates	24 hours	25 µg/m^3	NA
Lead (Pb)	30 days	1.5 µg/m^3	NA
	Calendar quarter	NA	1.5 µg/m^3
Hydrogen sulfide	1 hour	0.03 ppm	NA
Vinyl chloride	24 hours	0.010 ppm	NA

Source: California Air Resources Board 2008a.

Note: NA = not applicable.

[a] The CAAQS for ozone, CO, SO_2 (1- and 24-hour), NO_2, PM10, and PM2.5 are values not to be exceeded. All other California standards shown are values not to be equaled or exceeded.

[b] The NAAQS, other than ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

Table 4-2. State and National Air Attainment Status Summary

Air Pollutant	Attainment Status – Butte County
Ozone (O_3)	Nonattainment for NAAQS 8–hour; nonattainment for CAAQS 1-hour and 8-hour
Carbon monoxide (CO)	Attainment/maintenance for federal standards; attainment for state standards
Nitrogen dioxide (NO_2)	Attainment
Sulfur dioxide (SO_2)	Attainment
Suspended particulate matter (PM10)	Attainment for NAAQS; nonattainment for CAAQS
Particulate matter (PM2.5)	Attainment for NAAQS; attainment for CAAQS
Sulfates	Unclassified
Lead (Pb)	Attainment
Hydrogen sulfide	Unclassified

Source: California Air Resources Board 2008b.

Table 4-3. Air Quality Monitoring Data Summary (2005–2007) for the Project Area (Chico – Manzanita Avenue Monitoring Station)

	Monitoring Data by Year		
Pollutant	2005	2006	2007
Ozone (O_3)			
Highest 1-hour average, ppm	0.083	0.090	0.094
Highest 8-hour average, ppm	**0.078**	**0.080**	**0.084**
Days > state 1-hour standard	0	0	0
Days > state 8-hour standard	10	19	10
Days > federal 8-hour standard[a]	0	0	3
Percent of year covered	95	98	99
Particulate Matter (PM10)			
Highest 24-hour average, µg/m^3	**76**	**81**	**66**
Days > state standard[b]	5	7	2
Days > federal standard	0	0	0
Percent of year covered	100	99	100
Particulate Matter (PM2.5)			
Highest 24-hour average, µg/m^3	67	67	54
Days > federal standard[b]	6	6	0
Percent of year covered	100	100	100

Source: California Air Resources Board 2008c.

Note: Underlined values represent those in excess of applicable NAAQS. **Bold values** represent those in excess of the applicable CAAQS.

[a] The number of days exceeding the federal 8-hour ozone standard is based on the previous federal 8-hour ozone standard of 0.08 ppm because the more stringent 0.075-ppm standard (adopted on March 12, 2008) was not yet in effect.

[b] Particulate matter is usually measured every sixth day (rather than continuously like the other pollutants).

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. Ozone is a severe eye, nose, and throat irritant. Ozone also attacks synthetic rubber, textiles, plants, and other materials; it causes extensive damage to plants, such as leaf discoloration and cell damage.

State standards for ozone have been set for a 1-hour averaging time. The state 1-hour ozone standard is 0.09 ppm, not to be exceeded. EPA recently replaced the 1-hour federal ozone standard with an 8-hour standard of 0.075 ppm, while ARB recently enacted a state 8-hour standard of 0.07 ppm.

Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors, including reactive organic gases (ROGs) and oxides of nitrogen (NO_x), react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the

intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. ROG and NO_x are emitted by mobile sources and stationary combustion equipment.

The monitoring results in Table 4-3 show several violations of the state and federal ozone standards during the most recent three years of monitoring.

Carbon Monoxide

CO is essentially inert to plants and materials but can significantly affect human health. CO is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches and nausea to death.

State and federal CO standards have been set for both 1- and 8-hour averaging times. The state 1-hour standard is 20 ppm, and the federal 1-hour standard is 35 ppm. Both the state and federal standards for the 8-hour averaging period are 9 ppm.

No violations of either the state or federal CO standards were recorded during the most recent years of monitoring.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when light winds combine with the formation of ground-level temperature inversions (typically from evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

Oxides of Nitrogen

NO_x contribute to smog and can injure plants and animals and affect human health. NO_x also contribute to acidic deposition and react with ROGs in the presence of sunlight to form photochemical smog. NO_x concentrations result in a brownish color because they absorb into the blue-green area of the visible spectrum, greatly affecting visibility.

The state NO_x standard is 0.25 ppm on a 1-hour average. The federal NO_x standard is 0.053 ppm on an annual average.

NO_x are emitted primarily by combustion sources, including both mobile and stationary sources. NO_x also are emitted by a variety of area sources, ranging from wildfires and prescribed fires to water-heating and space-heating systems powered by fossil fuels.

PM10 and PM2.5

Health concerns associated with suspended PM focus on those particles small enough to reach the lungs when inhaled. PM can damage human health and retard plant growth, as well as reduce visibility, soil buildings and other structures, and corrode materials.

The state PM10 standards are 50 µg/m^3 as a 24-hour average and 20 µg/m^3 as an annual geometric mean. The federal PM10 standard is 150 µg/m^3 as a 24-hour average. The federal annual PM10 standard of 50 µg/m^3 was recently dropped.

The federal PM2.5 standards are 35 µg/m^3 as a 24-hour average and 15 µg/m^3 as an annual average. The state PM2.5 standard equals 12 µg/m^3 on an annual average.

PM10 and PM2.5 emissions are generated by a wide variety of sources, including agricultural activities, industrial emissions, dust suspended by vehicle traffic, and secondary aerosols formed by reactions in the atmosphere.

Table 4-3 shows 14 violations of the California PM10 standards during the past 3 years of monitoring. No violations have been recorded of the federal PM10 standards. Also, there were 12 monitored violations of the PM2.5 standards during the past 3 years. Because of the PM2.5 violations, Butte County is slated to be reclassified as a federal PM2.5 nonattainment area by the end of 2008.

Sulfur Dioxide

The major health concerns associated with exposure to high concentrations of SO_2 include effects on breathing, respiratory illness, alterations in pulmonary defenses, and aggravation of existing cardiovascular disease. Children, the elderly, and people with asthma, cardiovascular disease, or chronic lung diseases—such as bronchitis or emphysema—are most susceptible to adverse health effects associated with exposure to SO_2. SO_2 is a precursor to sulfates, which are associated with acidification of lakes and streams, accelerated corrosion of buildings and monuments, reduced visibility, and other adverse health effects.

EPA's health-based NAAQS for SO_2 is 0.03 ppm measured as an annual arithmetic mean concentration, 0.14 ppm measured over a 24-hour period, and 0.5 ppm measured over a 3-hour average period. California's SO_2 standard is 0.04 ppm measured over a 24-hour average period. There are no SO_2 monitoring stations in the project area.

SO_2 belongs to the family of gases called sulfur oxides (SO_x). These gases are formed when fuel containing sulfur (mainly coal and oil) is burned, and also during metal smelting and other industrial processes.

Sensitive Receptors

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emission sources, or duration of exposure to air pollutants. For CEQA purposes, a sensitive receptor is generically defined as a location where human populations, especially children, seniors, or sick persons, are found, and there is reasonable expectation of continuous human exposure according to the averaging period for the ambient air quality standard (e.g., 24 hours, 8 hours, 1 hour). These typically include residences, hospitals, and schools. Locations of sensitive receptors may or may not correspond with the location of a source's maximum off-site concentration (Butte County Air Quality Management District 2008).

Land uses along the project corridor vary from offices and businesses near SR 99 to offices and residences farther east. Land between SR 99 and El Monte Avenue is generally developed with residences on the north and offices, commercial uses, and residences to the south. East of El Monte Avenue, residences back up to SR 32, with backyard fences and landscaping separating residences from the highway. Land between El Monte Avenue and Yosemite Drive along the project corridor is generally undeveloped, with the exception of an office and residential development on the north side of SR 32 between Bruce Road and Yosemite Drive.

Impact Analysis

Approach and Methodology

State CEQA Guidelines Section 15382 defines a "significant effect on the environment" as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including… air." BCAQMD has established four separate categories of evaluation for determining the significance of project impacts.

1. Comparison of calculated project emissions to BCAQMD emission thresholds.
2. Consistency with the most recent air quality attainment plan (AQAP) for Butte County.
3. Comparison of predicted ambient pollutant concentrations resulting from the project to state and federal health standards, when applicable.
4. Evaluation of special conditions that apply to certain projects, such as public exposure to TACs (Butte County Air Quality Management District 2008).

Full disclosure of the potential air pollutant emissions from a project is needed for these evaluations, as required by CEQA. The thresholds and methodology for each of these evaluations are described below.

Thresholds of Significance

Comparison to District Thresholds

The project's emissions were compared to the BCAQMD significance thresholds, expressed in pounds per day (ppd), shown in Table 4-4 (Butte County Air Quality Management District 2008). The thresholds were applied to both project construction and operation.

Table 4-4. BCAQMD Significance Thresholds (Pounds/Day)

Pollutant	Level A	Level B	Level C
NO_x	<= 25	> 25	>137
ROG	<= 25	> 25	>137
PM10	<= 80	> 80	>137
Level of significance	Potentially significant	Potentially significant	Significant
Level of significance after implementation of feasible mitigation	Less than significant	Less than significant	Significant

Consistency with BCAQMD Air Quality Attainment Plan

The proposed project was also evaluated to ensure that it is consistent with BCAQMD's most recent AQAP and state implementation plan (SIP). The AQAP is designed to bring Butte County into attainment with the state ambient standards, while the SIP is designed to meet the federal ambient standards.

Evaluation of consistency with the AQAP and SIP is a qualitative evaluation. For this evaluation, the project was considered consistent with the AQAP and SIP if it is included in the Butte County Association of Government's (BCAG's) most recent federal transportation improvement program (FTIP) that has been show to meet regional air quality conformity requirements.

Comparison to Standards

For the proposed project, a quantitative CO modeling analysis was used to estimate the project's potential to cause CO hotspots. In addition, a qualitative PM10/PM2.5 hotspot evaluation was conducted to assess the project's potential to cause elevated PM10/PM2.5 concentrations.

Special Conditions

Mobile sources release TACs, also known as mobile source air toxics (MSATs). The most predominant include diesel PM10, formaldehyde, benzene, 1,3 butadiene, xylene, and ethylbenzene. The project's potential to release MSATs

was evaluated qualitatively. Also, this air analysis evaluated the project's potential to release asbestos during project construction.

Demolition activities have potential negative air quality impacts, including the release of asbestos-containing materials (ACMs). Asbestos is listed as a TAC by both ARB and EPA. Demolition of ACMs may be subject to various regulatory requirements, including the National Emission Standard for Hazardous Air Pollutants (NESHAP) (40 Code of Federal Regulations [CFR] 61[M]). If a project contains involves demolition of ACMs, the project is subject to the requirements stipulated in the NESHAP. Butte County is a non-delegated air district for NESHAP, meaning that applicants must comply with requirements established by ARB.

In addition to demolition of asbestos containing materials, naturally occurring asbestos (NOA) in serpentine and ultramafic rocks is common throughout California. Under ARB's air toxic control measures (ATCMs) for construction, grading, quarrying, and surface mining operations, prior to any grading activities at a project site located in a candidate area, a geologic evaluation is required to determine whether NOA is present. If NOA is found at the site, the applicant must comply with all requirements of ARB's ATCMs.

Construction Emissions

Construction emissions would be generated as exhaust from diesel combustion equipment and as fugitive dust from equipment operating over exposed earth. These emissions were quantified using the Road Construction Emissions Model, version 6.3 (Sacramento Metropolitan Air Quality Management District 2008).

Operational Emissions

Criteria Pollutant Emissions

Operation of the proposed project would generate emissions of ozone precursors (ROG and NO_x), CO, and PM10. Emissions associated with each scenario were estimated as follows. Each scenario's total vehicle miles traveled (VMT) was multiplied by the appropriate emission factor. Emission factors were based on average daily speed for that scenario. A memorandum prepared by the traffic consultant was used to determine daily VMT and speed (Fehr & Peers 2008).

The traffic memorandum shows the VMT and speed for the eastern section of Chico, roughly bounded by Big Chico Creek to the north, Park Avenue/Main Street to the west, Skyway to the south, and the foothills to the east. The vehicle miles travelled (VMT), vehicle hours traveled (VHT), and average speed data were calculated by extracting a sub-area from the BCAG travel demand forecasting model runs (Fehr & Peers 2008). Emission factors were estimated using the EMFAC2007 emission factor model developed by ARB (2006).

Carbon Monoxide Concentrations

Project concentrations from local traffic were evaluated by modeling roadside CO concentrations. The modeling was conducted for intersections on SR 32 where there would be a combination of the highest traffic volumes and high levels of traffic congestion. Congested intersections with a large volume of traffic have the greatest potential to cause high localized concentrations of CO. The analysis compared the estimated impacts to the 1- and 8-hour state and federal CO ambient standards.

CO concentrations were modeled using traffic volumes, emissions, meteorology, and the roadway/receptor geometry. The analysis used the CALINE4 line source dispersion model and procedures developed by Caltrans and approved by EPA) (Garza et al. 1997). For this assessment, the analysis used meteorological conditions most conducive to high CO concentrations in the Central Valley. In addition, the analysis used traffic conditions showing the highest levels of service and emission factors generated by ARB's EMFAC2007 emission factor model (Fehr & Peers 2006). Meteorological conditions included in the model were a worst-case wind speed of 0.5 meter per second, "F" atmospheric stability, worst-case wind angle search, sigma theta (wind fluctuation) of 10 degrees, and a winter ambient temperature of 40°F.

To be conservative, receptors were placed near the edge of the roadway, regardless of the land use. The traffic volumes were based on volumes for 2010 and 2030 conditions (Fehr & Peers 2006). Emission factors for all road links were based on the 1 mile-per-hour emission rates generated for 2010 and 2030 using the EMFAC2007 model.

Background CO concentrations were added to the 1-hour concentrations estimated using CALINE4 to determine maximum 1-hour concentrations. Eight-hour concentrations were multiplied by a persistence factor of 0.7 to estimate 8-hour concentrations (Garza et al. 1997). A background CO concentration was then added to the 8-hour concentration to determine the maximum 8-hour concentration.

PM10/PM2.5 Hotspots

PM10/PM2.5 hotspots are primarily a problem in areas that are classified as nonattainment for PM10 and/or PM2.5. Even though the BCAQMD is classified as attainment for the federal PM10 and PM2.5 standards, recent monitoring data indicate several violations of the federal PM2.5 standard (Table 4-3). Butte County is slated to be reclassified as a PM2.5 nonattainment area by the end of 2008. Consequently, the EPA/FHWA PM10/PM2.5 guidance was used to evaluate the significance of the project's PM10/PM2.5 impacts (U.S. Environmental Protection Agency and U.S. Department of Transportation 2006). Although EPA's guidance was developed to evaluate project impacts in PM10 and PM2.5 nonattainment areas, it is used here to evaluate the potential for PM10 and PM2.5 hotspots.

The EPA/FHWA guidance lists the following project types as projects of air quality concern (POAC) and that consequently merit more in-depth review:

(i) New or expanded highway projects that have a significant number of or a significant increase in diesel vehicles;

(ii) Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;

(iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

(iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and

(v) Projects in or affecting locations, areas, or categories of sites which are identified in the PM2.5 or PM10 applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The project was reviewed against these five criteria to determine significance.

Toxic Air Contaminants

TACs are divided into two categories: asbestos-related issues and MSATs. Each of these is described below.

Asbestos

Asbestos can be generated by demolition of asbestos-containing structures and by disturbance of soils containing NOA. The project's potential to release asbestos from these two activities is evaluated in this report.

Mobile Source Air Toxics

MSAT emissions associated with the project were evaluated using the FHWA methodology (U.S. Department of Transportation 2006). MSATs refer to emissions generated by diesel and gasoline fuel combustion. FHWA's guidance lists three project types with respect to MSATs:

- **Exempt projects or projects with no meaningful MSAT impacts:** Exempt projects typically include those with no effects on traffic volume or vehicle mix.
- **Projects with low potential MSAT effects:** These projects have average annual daily trips less than 140,000 per day and for which the project does not add substantially to the number of trips. These projects are usually evaluated qualitatively.
- **Projects with higher potential MSAT effects:** These projects typically are those that have average annual daily trips exceeding 140,000 per day and that have the potential to significantly increase diesel particulate matter exhaust. These projects require a quantitative evaluation.

The proposed SR 32 widening project falls into the second category. It has a low potential for MSAT effects. Consequently, the project is evaluated qualitatively using FHWA's methodology.

Greenhouse Gas Emissions

Although BCAQMD has not established significance thresholds for GHG, it has requested that GHG emissions be estimated and that all feasible GHG measures be implemented (Butte County Air Quality Management District 2008). In addition, OPR has also suggested that GHG emissions be quantified and, if necessary, mitigated (Governor's Office of Planning and Research 2008).

Both construction and operation of the proposed project would generate emissions of GHGs, primarily CO_2. The latest version of the Sacramento Metropolitan Air Quality Management District's Road Construction Model allows the user to generate CO_2 emissions. Consequently, the Road Construction Model was used to estimate construction-related CO_2 emissions for this project.

CO_2 emissions associated with each operational scenario were estimated as follows. Each scenario's VMT was multiplied by the CO_2 emission factor. The emission factor was based on average daily speed for that scenario. A memorandum prepared by the project traffic consultant was used to determine daily VMT and speed (Fehr & Peers 2008). This traffic memorandum estimates VMT and speed for the eastern section of Chico, roughly bounded by Big Chico Creek to the north, Park Avenue/Main Street to the west, Skyway to the south, and the foothills to the east. The VMT, VHT, and average speed data were calculated by extracting a sub-area from the BCAG travel demand forecasting model runs. Emission factors were estimated using the EMFAC2007 model.

Impacts and Mitigation Measures of Proposed Project and Alternatives

This section first describes the impacts on air quality that would result from the proposed project, including its significance, and then the measures to mitigate each identified significant impact. Construction (short-term) and operation (long-term) impacts are discussed separately.

Construction Impacts

Impact AIR-1: PM10 Dust Impacts Would Exceed BCAQMD's Significance Threshold (Less than Significant with Mitigation Incorporated)

Table 4-5 shows unmitigated emissions associated with the proposed project. Construction of the Timber Barrier Alternative would result in emissions similar to those shown in Table 4-5. ROG and NO_x emissions would exceed BCAQMD's Level B thresholds, but would be less than the Level C thresholds. However, PM10 emissions would exceed BCAQMD's Level C significance threshold of 137 ppd. This is a significant impact.

Table 4-5. Construction-Related Road Widening Emissions (Unmitigated) (Pounds/Day)

Project Phase	ROG	CO	NO_x	PM10	PM2.5	CO_2
Grubbing/land clearing	9.8	39.2	71.3	193.3	42.6	6,476.4
Grading/excavation	9.7	38.6	63.1	193.7	42.9	6,097.1
Drainage/utilities/sub-grade	7.1	24.6	41.1	192.6	41.9	3,746.2
Paving	8.5	26.3	40.6	3.6	3.3	3,574.8
Maximum (ppd)	9.8	39.2	71.3	193.7	42.9	6,476.4

Notes: Emission estimates assume a project start year of 2010, a project length of 12 months, a total project area of 38 acres, and that a maximum of 10 acres will be disturbed per day. The estimates also assume 25 cubic yards imported/exported per day and 3,000 cubic yards over the construction period (Brogan pers. comm.).

Table 4-6 shows emissions after implementation of Mitigation Air-1. Compared to unmitigated emissions, PM10 emissions would be reduced to less than the Level C significance thresholds. ROG and NO_x emissions in Table 4-6 are slightly higher than unmitigated, primarily because the mitigation assumes operation of water trucks, which generate ROG and NO_x emissions. However, with use of the water trucks, emissions of ROG, NO_x, and PM10 are less than the Level C thresholds, and consequently all construction emissions are considered to be less than significant.

Table 4-6. Construction-Related Road Widening Emissions (Mitigated) (Pounds/Day)

Project Phase	ROG	CO	NO_x	PM10	PM2.5	CO_2
Grubbing/land clearing	10.2	42.0	76.4	98.5	23.0	7,130.3
Grading/excavation	10.1	41.4	68.2	98.9	23.3	6,751.0
Drainage/utilities/sub-grade	7.2	25.3	42.4	97.7	22.2	3,909.7
Paving	8.5	26.3	40.6	3.6	3.3	3,574.8
Maximum (ppd)	10.2	42.0	76.4	98.9	23.3	7,130.3

Notes: Emission estimates assume a project start year of 2010, a project length of 12 months, a total project area of 38 acres, and that a maximum of 10 acres will be disturbed per day. The estimates also assume 25 cubic yards imported/exported per day and 3,000 cubic yards over the construction period. Mitigated emissions assume the use of water trucks, which reduce fugitive dust but also increase exhaust emissions (Brogan pers. comm.).

Mitigation Measure AIR-1a

The following measures from BCAQMD's CEQA Air Quality Handbook (2008) shall be implemented by the contractor to reduce Impact Air-1:

- Water shall be applied by means of trucks, hoses, and/or sprinklers as needed prior to any land clearing or earth movement to minimize emissions.
- Haul vehicles transporting soil into or out of the site shall be covered.
- A water truck shall be on-site at all times. Water shall be applied to disturbed areas a minimum of two times per day or more as necessary.

- On-site vehicles limited to speeds that prevent dust generation on unpaved areas.
- Post a publicly visible sign 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 BCAQMD shall also be visible to ensure compliance with BCAQMD Rule 200 (Nuisance) and Rule 205 (Fugitive Dust Emissions).
- All visible dry disturbed soil surface areas of operation shall be watered to minimize dust emissions.
- All visible dry disturbed unpaved surfaces shall be watered to minimize dust emissions.
- Construction workers shall park in designated parking areas to help reduce dust emissions.
- Soil pile surfaces shall be moistened if dust is being emitted from the piles. Adequately secured tarps, plastic, or other material may be required to further reduce dust emissions.

Impact AIR-2: No Emissions of Naturally Occurring Asbestos (Less than Significant)

Based on input from BCAQMD, NOA is not expected to occur in the project area because NOA is not shown in the Index of Topographic Maps for Geographic Ultramafic Rock Units for Butte County (Williams pers. comm.). This is a less-than-significant impact, and no mitigation is required.

Impact AIR-3: Release of Asbestos during Demolition (Less than Significant)

Construction of the proposed project would involve demolition of the Dead Horse Slough Diversion Channel Bridge. The initial site assessment (ISA) prepared for the project site noted that no asbestos-containing building materials were observed on this structure during an inspection of this bridge in 2006 (Taber Consultants 2006). This is a less-than-significant impact, and no mitigation is required.

Operational Impacts

Ozone Precursor, PM10, and CO Emissions

Impact AIR-4: Increase in NO_x, PM10, and CO Emissions (Less than Significant)

Table 4-7 compares the proposed project's criteria pollutant emissions for each project scenario. Emissions associated with the Timber Barrier Alternative would be similar to those shown in Table 4-7.

Table 4-7 shows that, compared to existing conditions, emissions of all criteria pollutants would decrease or remain the same, despite an increase in daily VMT. Compared to the 2010 no-project scenario, the 2010 with-project scenario results in ROG emissions that do not change, NO_x emissions that increase by 10 ppd, PM10 emissions that increase by 1 ppd, and CO emissions that increase by 7 ppd. Compared to the 2030 no-project scenario, the 2030 with-project scenario results in ROG emissions that decrease by 1 ppd, NO_x that decreases by 3 ppd, PM10 that decreases by 1 ppd, and CO that decreases by 14 ppd.

The small emission increases are less than the significance thresholds established by BCAQMD. Consequently, this impact is less than significant, and no mitigation is required.

Table 4-7. Criteria Pollutant Emissions

Project Scenario	Daily VMT	Average Daily Speed (Miles per Hour)	ROG	NO_x	PM10	CO
Existing Conditions	369,333	41	223	1,359	58	4,735
2010 No Project	388,918	43	188	1,237	57	4,105
2010 With Project	391,442	44	188	1,247	58	4,112
2030 No Project	584,768	36	64	316	54	1,363
2030 With Project	591,339	38	63	313	53	1,349

Note: Pollutant concentrations expressed in ppd.

Carbon Monoxide Concentrations

Impact AIR-5: Increase in CO Concentrations (Less than Significant)

A CO modeling analysis was conducted for the construction completion year of 2010 and the design year of 2030. A summary of the modeling results for the proposed project, along with the modeling output, is included in Tables 4-8 and 4-9. The maximum 1-hour 2010 concentration was 8 ppm, and the maximum 8-hour 2010 concentration estimated was 5.3 ppm. These maximum concentrations were estimated for a receptor located near the intersection of SR 32 and Bruce Road. However, both the 1- and 8-hour concentrations are substantially less than the ambient standards.

The Timber Barrier Alternative would shift the SR 32 road alignment north approximately 3 feet closer to sensitive receptors located north of each intersection and 3 feet farther from receptors located south of each intersection. As a result, the Timber Barrier Alternative would result in a slight increase in CO concentrations for receptors located north of each intersection and a slight decrease in CO concentrations for receptors located south of the project. However, these changes in concentrations would be slight and would not differ substantially from the CO concentrations modeled for the preferred alternative.

Table 4-8. Carbon Monoxide Concentrations in 2010

Location	SR 99 SB On-Ramp	SR 99 SB On-Ramp	SR 99 SB On-Ramp	SR 99 SB On-Ramp	Fir Street @ 9th	Fir Street @ 9th	Fir Street @ 9th	Fir Street @ 9th	Forest Avenue	Forest Avenue	Forest Avenue	Forest Avenue	Bruce Road	Bruce Road	Bruce Road	Bruce Road
Alternative	No Project	No Project	Plus Project	Plus Project	No Project	No Project	Plus Project	Plus Project	No Project	No Project	Plus Project	Plus Project	No Project	No Project	Plus Project	Plus Project
Averaging Period	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours
Concentration (ppm)	2.8	1.96	2.8	1.96	2.5	1.75	2.5	1.75	3.4	2.38	3.6	2.52	2.9	2.03	3.7	2.59
Background (ppm)	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7
Total (ppm)	7.1	4.66	7.1	4.66	6.8	4.45	6.8	4.45	7.7	5.08	7.9	5.22	7.2	4.73	8	5.29
Ambient Standard (ppm)	20	9	20	9	20	9	20	9	20	9	20	9	20	9	20	9
Exceeds Standard?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Note: Maximum 1-hour concentration based on highest monitored 1-hour concentration of 4.3 ppm over the past 3 years (2005–2008), and highest monitored 8-hour concentration of 2.7 ppm over the same period.

Table 4-9. Carbon Monoxide Concentrations in 2030

Location	SR 99 SB On-Ramp	SR 99 SB On-Ramp	SR 99 SB On-Ramp	SR 99 SB On-Ramp	Forest Avenue	Forest Avenue	Forest Avenue	Forest Avenue	Bruce Road	Bruce Road	Bruce Road	Bruce Road
Alternative	No Project	No Project	Plus Project	Plus Project	No Project	No Project	Plus Project	Plus Project	No Project	No Project	Plus Project	Plus Project
Averaging Period	1 hour	8 hours	1-hour	8 hours	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours	1 hour	8 hours
Concentration (ppm)	0.5	0.35	0.5	0.35	0.7	0.49	0.7	0.49	0.6	0.42	0.7	0.49
Background (ppm)	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7	4.3	2.7
Total (ppm)	4.8	3.05	4.8	3.05	5	3.19	5	3.19	4.9	3.12	5	3.19
Ambient Standard (ppm)	20	9	20	9	20	9	20	9	20	9	20	9
Exceed Standard	No	No	No	No	No	No	No	No	No	No	No	No

Note: Maximum 1-hour concentration based on highest monitored 1-hour concentration of 4.3 ppm over the past 3 years (2005–2008), and highest monitored 8-hour concentration of 2.7 ppm over the same period.

The results indicate that neither the proposed project nor the Timber Barrier Alternative would cause or contribute to any violations of the CO standards. The impact is less than significant, and no mitigation is required.

Mobile Source Air Toxic Emissions

Impact AIR-6: Increase in Mobile Source Air Toxic Emissions (Less than Significant)

Using FHWA's MSAT criteria, both the proposed project and the Timber Barrier Alternative have a low potential to cause significant MSAT effects. The project would not result in any meaningful changes in traffic volumes, vehicle mix, location, or any other factor that would cause a substantial increase in MSATs relative to the No-Project Alternative.

Furthermore, EPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly over the next 20 years. Even after accounting for a 60% increase in VMT, FHWA predicts that MSATs will decline from 57% to 87% between 2000 and 2020, based on regulations now in effect. This will reduce both the background level of MSATs and the contribution of MSATs from increases in VMT (U.S. Department of Transportation 2006).

Consequently, both the proposed project and the Timber Barrier Alternative would not result in a significant contribution to MSAT emissions. Therefore, this impact is considered to be less than significant, and no mitigation is required.

PM10/PM2.5 Hot Spots

Impact AIR-7: Increase in PM10/PM2.5 Hot Spots (Less than Significant)

The proposed project would not result in a significant number of diesel vehicles, and it would not affect any level of service (LOS) D, E, or F intersections with a significant number of diesel vehicles. Consequently, the proposed project would not be considered a POAC as defined in the FHWA guidance (U.S. Department of Transportation 2006). Using the FHWA guidance, the Timber Barrier Alternative would also not be considered a POAC. Consequently, neither the proposed project nor the Timber Barrier Alternative would result in significant PM10/PM2.5 hotspot impacts. This impact is less than significant, and no mitigation is required.

Greenhouse Gas Emissions

Impact AIR-8: Increase in GHG Emissions (Less than Significant)

Table 4-10 summarizes CO_2 emissions. Table 4-10 shows that compared to existing conditions, emissions of CO_2 would increase in 2010 and 2030 as VMT

increases. In 2010, the with-project condition would increase CO_2 emissions by 281 metric tons per year. By 2030, the with-project condition would reduce CO_2 emissions compared to the 2030 no-project condition by 972 metric tons per year.

Because the project would result in a reduction of CO_2 at full build-out as compared to the 2030 without-project condition, GHG impacts are considered to be less than significant, and no mitigation is required.

The Timber Barrier Alternative would result in GHG emissions similar to the proposed project (Table 4-10). Consequently, the Timber Barrier Alternative's GHG impacts are considered to be less than significant. The Timber Barrier Alternative would result in an additional minor benefit as compared to the proposed project, which would result from the tree plantings in the Timber Barrier Alternative traffic circles. Because trees remove CO_2 emissions from the atmosphere, the Timber Barrier Alternative would remove a minor amount of additional CO_2 as compared to the proposed project.

Table 4-10. Carbon Dioxide Emissions (Metric Tons/Year)

Condition	Daily VMT	Daily Speed	CO_2
Existing Conditions	369,333	41	66,056
2010 No Project	388,918	43	69,445
2010 With Project	391,442	44	69,726
2030 No Project	584,768	36	110,282
2030 With Project	591,339	38	109,310

Consistency and Conformity

Impact AIR-9: Project Meets Regional and Project-Specific Conformity Requirements (Less than Significant)

The project is included in BCAG's 2009 FTIP (Butte County Association of Governments 2008). The associated conformity determination shows that the FTIP, which includes the SR 32 widening project, is a conforming plan. Consequently, the project is consistent with BCAG's 2009 FTIP and meets regional conformity requirements. Also, the project would not cause or contribute to violations of the federal or state CO, PM10, or PM2.5 ambient standards. Therefore, the project also meets the project-specific conformity requirements. The impact is less than significant.

The Timber Barrier Alternative is also considered to meet conformity requirements. It is similar enough to the proposed project to be considered consistent with BCAG's 2009 FTIP and therefore meets regional conformity requirements. The Timber Barrier Alternative also would not result in any significant CO, PM10, or PM2.5 hotspot issues and therefore would meet the project-specific conformity requirements. The impact is less than significant, and no mitigation is required.

No-Project Alternative

The No-Project Alternative would generate no construction-related emissions.

For 2010, the No-Project Alternative's operational emissions (in pounds per day) of ROG and PM10 would be similar to the with-project condition. The 2010 No-Project Alternative would result in slightly higher emissions of NO_x and CO (Table 4-7). For 2030, the No-Project Alternative's operational emissions of ROG, NO_x, PM10, and CO would be slightly higher than the with-project condition. However, the emissions differences between no-project and with-project conditions in both 2010 and 2030 are minor.

Modeled carbon monoxide concentrations associated with the No-Project Alternative did not find any violations of the state or federal ambient air quality standards.

The No-Project Alternative would result in lower VMT as compared to the with-project alternatives. Since MSAT and PM10/PM2.5 emissions are a direct function of VMT, the No-Project Alternative would have the lowest emissions of MSATs and PM10/PM2.5 of all the alternatives.

In 2010, the No-Project Alternative would result in slightly lower GHG emissions as compared to the with-project condition (Table 4-10). In 2030, the No-Project Alternative would result in higher GHG emissions (increase of 972 metric tons CO_2/year) as compared to the with-project alternative. This slight increase in CO_2 emissions is considered minor.

Cumulative Impacts

The air analysis compares construction emissions to the BCAQMD's impact thresholds. The BCAQMD's guidance states that if project emissions are less than the significance thresholds, then they would have a less-than-significant cumulative impact (Butte County Air Quality Management District 2008). Since the project's mitigated construction emissions are less than the significance thresholds, project construction would have a less-than-significant cumulative impact.

The operational emissions analyses were based on an evaluation of cumulative conditions. For example, the air analysis used VMT and average daily speeds to estimate criteria pollutant emissions (Table 4-7). VMT and speeds were based on a regional traffic modeling analysis that extracted a sub-area from the BCAG travel demand forecasting model. Using the regional VMT and speeds, the operational emission estimates found that emission impacts would be less than significant. Similarly, the CO modeling analysis was based on cumulative traffic in the project region; the MSAT and PM10/PM2.5 hot spots analyses were based on cumulative traffic conditions; and the CO_2 emissions analysis was based on cumulative VMT in the project subarea (Table 4-10). These analyses concluded that impacts would be less than significant.

Finally, the evaluation of the project's conformity with BCAG's 2009 FTIP is inherently a cumulative analysis. Since the project is part of the FTIP, and because the FTIP is a conforming transportation plan, the project meets regional conformity requirements.