CHAPTER 4: AFFECTED ENVIRONMENT

4.1 AIR QUALITY

This section identifies existing air quality data and standards that apply to the SVRTC and discusses local and regional planning policies. Air pollutants of concern include carbon monoxide (CO), nitrogen oxides (NOX), nitrogen dioxide (NO2), sulfur oxides (SOX), sulfur dioxide (SO2), particulate matter 2.5 microns or less in diameter (PM2.5), and particulate matter 10 microns or less in diameter (PM10).

4.1.1 CLIMATE EFFECTS ON AIR QUALITY

Prevailing light to moderate winds from the northwest carry pollutants released by automobiles and industry from areas along the San Francisco peninsula toward the SVRTC, particularly during the summer months. The northwest winds are generated by air flowing from a high pressure system over the northern Pacific Ocean (the “Pacific High”).

Air quality generally worsens during periods of low wind speed, as more pollutants accumulate within a period of time. The accumulation of air pollutants can be compounded in valleys, which restrict the movement of air. In general, autumn is the calmest time of the year, and the relatively stable atmosphere allows air pollution to increase substantially. Occasionally, during the summer and autumn, a warm and dry wind from the northeast will blow when the Pacific High has positioned itself over the North American continent. This condition usually lasts about two to three weeks causing high temperatures and degrading ambient air quality.

In addition to low wind speeds, temperature inversions also contribute to the buildup of air pollution. The highest air pollutant concentrations in the Bay Area generally occur during inversions when higher temperatures occur at higher altitudes. Air close to the ground is prevented from mixing with the air above it and air pollutants are trapped near the ground. Summer inversions occur when an upper layer of warm air mass forms over the cool marine layer preventing air pollutants from dispersing upward. Additionally, hydrocarbons and NO2 react under strong sunlight creating pollution commonly referred to as smog. Light daytime winds predominantly from the northwest further aggravate the condition by driving air pollutants from upwind areas of the peninsula to the project area. During the summer, inversions are generally elevated above ground level but are present over 90 percent of the time in both the morning and afternoon. In the winter, surface-based inversions dominate in the morning hours but frequently dissipate by the afternoon.

During the fall and winter, air quality problems are created due to CO and NO2 emissions. CO concentrations are generally worse in the morning and late evening. Morning levels are relatively high due to the colder temperatures and large number of cars during the commute. The high levels during the late evenings are a result of stagnant atmospheric conditions trapping CO in the area. Since CO is produced almost entirely from automobiles, the highest CO concentrations in the Bay Area are associated with heavy traffic. NO2 levels are also generally higher during autumn or winter days. High levels of NO2 in the fall and winter usually occur on days with summer-like conditions.

4.1.2 AIR MONITORING DATA

The Bay Area Air Basin is classified as a federal and state nonattainment area for ozone. As of 2006, the Basin is a federal nonattainment area for 8-hour ozone. The Basin is a state nonattainment area for 1-hour ozone, annual and 24-hour PM10, and annual PM2.5. The Bay Area Air Quality Management District (BAAQMD) monitors air quality conditions at 31 locations throughout the Bay Area. The nearest air monitoring stations to the SVRTC are the San Jose Piedmont Road Monitoring Station, the San Jose Central Monitoring Station, and the Fremont Chapel Way Monitoring Station. Data from these monitoring stations were used to characterize existing conditions within the vicinity of the SVRTC and to establish a baseline for estimating future conditions. Table 4.1-1 presents data from these stations to demonstrate pollution trends from 2003 to 2006. Year 2007 data were not available at the time this analysis was completed. The table also indicates federal and state standards for these pollutants and where federal and state standards have been exceeded. The data presented in the table are summarized below.

San Jose Piedmont Road Monitoring Station

San Jose Piedmont Road Monitoring Station only monitored ozone concentrations from 2003 to 2006. Ozone concentrations did not exceed the 8-hour National Ambient Air Quality Standards (NAAQS) from 2003 to 2006. Ozone concentrations exceeded the 1-hour California Ambient Air Quality Standards (CAAQS) twice in 2003 and once in 2005. Additionally, ozone concentrations did not exceed the 8-hour CAAQS from 2003 to 2006.

San Jose-Central Monitoring Station

Ozone concentrations exceeded the 8-hour NAAQS once in 2006. Ozone concentrations exceeded the state 1-hour standard four times in 2003, once in 2005, and five times in 2006. The state 8-hour ozone standard was exceeded once in 2005 and five times in 2006. The state PM10 standard was exceeded three times in 2003, four times in 2004, and two times each in 2005 and 2006. The federal PM2.5 standard was exceeded six times in 2006.

Table 4.1-1: Air Quality Standards, Ambient Measurements, and Violations at Air Monitoring Stations

Pollutant	Federal Standard	State Standard	Year	Maximum Level San Jose Piedmont Road	Maximum Level San Jose-Central	Maximum Level Fremont Chapel Way	Violation Days (Federal/State) San Jose Piedmont Road	Violation Days (Federal/State) San Jose-Central	Violation Days (Federal/State) Fremont Chapel Way
Ozone 1-hour	N/A	0.070 ppm	2003	0.10	0.12	0.12	N/A / 2	N/A / 4	N/A / 4
			2004	0.09	0.09	0.09	N/A / 0	N/A / 0	N/A / 0
			2005	0.11	0.11	0.11	N/A / 1	N/A / 1	N/A / 1
			2006	*	0.12	0.10	*	N/A / 5	N/A / 4
Ozone 8-hour	0.08 ppm	0.070 ppm	2003	0.07	0.08	0.09	0 / 0	0 / NA	1 / NA
			2004	0.07	0.07	0.07	0 / 0	0 / NA	0 / NA
			2005	0.07	0.08	0.08	0 / 0	0 / 1	0 / 1
			2006	*	0.09	0.07	*	1 / 5	0 / 3
Respirable Particulate Matter (PM10) 24-hour	150 µg/m3	50 µg/m3	2003	*	60	37	*	0 / 3	0 / 0
			2004	*	58	49	*	0 / 4	0 / 0
			2005	*	54	54	*	0 / 2	0 / 1
			2006	*	73	57	*	0 / 2	0 / 1
Fine Particulate Matter (PM2.5) 24-hour	35 µg/m3	N/A	2003	*	56	34	*	0 / N/A	0 / N/A
			2004	*	52	40	*	0 / N/A	0 / N/A
			2005	*	55	33	*	0 / N/A	0 / N/A
			2006	*	64	44	*	6 / N/A	2 / N/A
Carbon Monoxide (CO) 8-hour	9 ppm	9.0 ppm	2003	*	4.0	1.9	*	0 / 0	0 / 0
			2004	*	3.0	1.7	*	0 / 0	0 / 0
			2005	*	3.1	2.0	*	0 / 0	0 / 0
			2006	*	2.9	1.8	*	0 / 0	0 / 0
Nitrogen Dioxide (NO2)	0.053 ppm (annual)	0.18 ppm (1 hr)	2003	*	*	0.08	*	*	N/A / 0
			2004	*	0.07	0.06	*	N/A / 0	N/A / 0
			2005	*	0.07	0.07	*	N/A / 0	N/A / 0
			2006	*	0.07	0.06	*	N/A / 0	N/A / 0

Pollutant	Federal Standard	State Standard	Year	Maximum Level San Jose Piedmont Road	Maximum Level San Jose-Central	Maximum Level Fremont Chapel Way	Violation Days (Federal/State) San Jose Piedmont Road	Violation Days (Federal/State) San Jose-Central	Violation Days (Federal/State) Fremont Chapel Way
Sulfur Dioxide	0.14 ppm (24 hr)	0.25 ppm (1 hr)	2003 2004 2005 2006	* * * *	* * * *	* * * *	* * * *	* * * *	* * * *

Notes: * indicated the pollutant was not monitored. µg/m3 = micrograms per cubic meter. Violation days = # of days exceeding federal of state standard. N/A = not applicable.

Source: California Air Resources Board, Air Quality Data, 2003-2006.

Fremont Chapel Way Monitoring Station.

Ozone exceeded the 8-hour NAAQS once in 2003. Ozone exceeded the state 1-hour standard four times in 2003, once in 2005, and four times in 2006. The state 8-hour standard was exceeded once in 2005 and three times in 2006. The state PM10 standard was exceeded once in 2005 and 2006. The federal PM2.5 standard was exceeded two times in 2006.

4.1.3 REGULATORY CONSIDERATIONS

Federal, State, and Local Air Quality Standards

Air quality in the United States is governed by the federal Clean Air Act (CAA), which resulted in the adaptation of federal air quality standards for pollutants including CO, ozone, SO2, NOX, PM10, and PM2.5. These pollutants are referred to as criteria pollutants and are shown in Table 4.1-2. Health effects resulting from these pollutants are shown in Table 4.1-3. Although ambient air quality standards exist for criteria pollutants, ambient standards do not exist for toxic air contaminants (TACs) (also known as hazardous air pollutants [HAPs]) or greenhouse gases.

Air quality in the state is governed by the California CAA, which also resulted in the adoption of air quality standards. The state air quality standards are generally more stringent than the federal standards. The federal 1-hour ozone standard has been repealed and the state has adopted an 8-hour ozone standard (0.07 parts per million [ppm]). In addition, the state has adopted an annual PM2.5 standard (12 micrograms per cubic meter [µg/m3]). The current state air quality standards are shown in Table 4.1-2. Existing compliance within the greater project area (i.e., area “attainment”) with the NAAQS and CAAQS for criteria pollutants is discussed below, along with existing pollutant concentrations.

At the federal level, the CAA is administered by the United States Environmental Protection Agency (USEPA). In California, the CCAA is administered by the California Air Resources Board (CARB) at the state level and by the air pollution control districts or the air quality management districts at the regional and local levels. The SVRTC is located in the Bay Area Air Basin. The BAAQMD is the agency principally responsible for air pollution control in this basin.

A number of models were used to determine adverse effects to air quality. The USEPA-approved emissions factor model in California is EMFAC2007. EMFAC2007 estimates emission factors for motor vehicles (passenger cars, trucks, and buses) operating in California for calendar years 1970-2040. CAL3QHC is a microcomputer based model used to predict CO concentrations from motor vehicles at roadway intersections. This model includes a traffic algorithm for estimating vehicular queue lengths at signalized intersections. The model estimates total air pollution concentrations from both moving and idling vehicles. A third model, SCREEN3 is a Gaussian plume model used to provide maximum ground-level pollution concentrations for point, area, flare, and volume sources. SCREEN3 estimates maximum ground-level concentrations and the distance to the maximum concentrations. SCREEN3 applies a range of meteorological conditions, including stability classes and wind speeds, to determine maximum concentrations.

Table 4.1-2: Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	National Standards	California Standards
Ozone	1-hour 8-hour	N/A 0.08 ppm (157 µg/m3)	0.09 ppm (180 µg/m3) 0.07 ppm (137 µg/m3)
Carbon Monoxide (CO)	1-hour 8-hour	35 ppm (40 µg/m3) 9 ppm (10 µg/m3)	20 ppm (23 µg/m3) 9.0 ppm (10 µg/m3)
Nitrogen Oxides (NOX)	1-hour annual	--- 0.053 ppm (100 µg/m3)	0.18 ppm (338 µg/m3) ---
Sulfur Dioxide (SO2)	1-hour 24-hour annual	--- 0.14 ppm (365 µg/m3) 0.03 ppm (80 µg/m3)	0.25 ppm (655 µg/m3) 0.04 ppm (105 µg/m3) ---
Respirable Particulate Matter (PM10)	24-hour annual	150 µg/m3 ---	50 µg/m3 20 µg/m3
Fine Particulate Matter (PM2.5)	24-hour annual	35 µg/m3 15 µg/m3	--- 12 µg/m3

Notes: pm = parts per million. µg/m3 = micrograms per cubic meter

Source: California Air Resources Board, February 21, 2008.

Table 4.1-3: Health Effects of the Major Criteria Air Pollutants

Air Pollutant	Adverse Effects
Ozone	eye irritation respiratory function impairment
Carbon Monoxide	impairment of oxygen transport in the blood stream aggravation of cardiovascular disease impairment of central nervous system function fatigue, headache, confusion, dizziness can be fatal in the case of very high concentrations in enclosed places
Nitrogen Dioxide	risk of acute and chronic respiratory illness
Sulfur Dioxide	aggravation of chronic obstruction lung disease increased risk of acute and chronic respiratory illness
Lead	impairment of blood functions and nerve constriction behavioral and learning problems in children
Particulate Matter	may be inhaled and lodge in and irritate the lungs increased risk of chronic respiratory disease with long exposure altered lung function in children may produce acute illness with sulfur dioxide

Source: BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans, April 1996, revised December 1999.

Toxic Air Contaminants

Due to their potential to increase the risk of developing cancer or because of the acute or chronic health risks that may result from exposure to these substances, many pollutants are identified as TACs. For TACs that are known or are suspected carcinogens, CARB has found that there are no levels or thresholds below which exposure is risk-free. Individual TACs vary greatly in the risk they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another TAC. For certain TACs, a unit risk factor can be developed to evaluate cancer risk. For acute and chronic health risks, a factor called a Hazard Index is used to evaluate risk.

TACs are emitted during combustion of gasoline and diesel fuel by motor vehicles. Benzene, formaldehyde, 1,3-butadiene, and particulate matter are some of the TACs that are emitted in diesel exhaust. Particulate matter from diesel exhaust represents the greatest health risk. CARB formally identified particulate matter emitted by diesel-fueled engines as a TAC on August 27, 1998. Since the vast majority of diesel exhaust particles are very small (94 percent of their combined mass consists of particles less than 2.5 micrometers in diameter), they are easily inhaled into the lungs. The CARB action will lead to additional control by CARB of diesel exhaust in coming years. The USEPA has also begun an evaluation of both the cancer and non-cancer health effects of diesel exhaust.

BAAQMD has developed a methodology to evaluate the significance of TAC emissions from stationary sources, but their approach does not apply to mobile sources. Automobiles and trucks are mobile sources of TAC emissions in the Bay Area, and the quantity of TAC emissions from motor vehicles is directly correlated with the amount of vehicle miles traveled.

Greenhouse Gases

Greenhouse gases absorb heat in the atmosphere. Since the industrial revolution, concentrations of greenhouse gases in the earth's atmosphere have been gradually increasing. Many scientists believe that recently recorded increases in the earth's average temperature are the result of increases in concentrations of greenhouse gases. Naturally occurring greenhouse gases include water vapor, carbon dioxide (CO2), methane, nitrous oxide, and ozone. Human activities add to the levels of most of these naturally occurring gases. CO2 is released to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), wood and wood products are burned. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. CO2 and nitrous oxide are the greenhouse gases released in greatest quantities from mobile sources burning gasoline and diesel fuel.

4.1.4 AIR QUALITY CONFORMITY REQUIREMENTS

As amended in 1990, the federal CAA provides the current framework to ensure conformity of transportation projects with a State Implementation Plan (SIP) for air quality. The CAA defines conformity as follows:

> "Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards."

Section 176 of the CAA specifies that no federal agency may approve, support, or fund an activity that does not conform to the applicable implementation plan. In late 1993, the USEPA promulgated final rules for determining conformity of transportation plans, programs, and projects. These federal conformity rules, contained in 40 CFR Part 93, were updated in July 2004 to include criteria and procedures for the 8-hour ozone and PM2.5 national ambient air quality standards. Since the adaptation of the new conformity requirements, federal agencies have issued new technical guidance. The USEPA has published Transportation Conformity Guidance for Qualitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas (March 2006). In addition, the California Department of Transportation and the U.S. Federal Highway Administration have jointly issued *Particulate Matter and Transportation Projects, An Analysis Protocol (February 2005)*.

BAAQMD, in coordination with the Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG), is responsible for preparing air quality plans pursuant to the federal and California acts. Under the federal CAA, SIPs are required for areas that are designated as nonattainment for ozone, CO, NO2, SO2, PM2.5, or PM10. For the Bay Area Air Basin, a SIP is required for ozone since the region is currently designated as a federal nonattainment area for this pollutant. The current SIP is called the Bay Area 2001 Ozone Attainment Plan, which was adopted by MTC, ABAG, and BAAQMD in October 2001. CARB adopted this plan in November 2001, and USEPA approved the associated emissions budget in February 2002.

Whereas the SIP is prepared pursuant to the federal CAA, the Bay Area Ozone Strategy was prepared in 2005 to meet the requirements of the CCAA. The 2005 Bay Area Ozone Strategy explains how the Bay Area plans to achieve state 1-hour ozone standard planning requirements and also discusses related air quality issues of interest, including climate change, fine particulate matter, the BAAQMD's Community Air Risk Evaluation program, local benefits of ozone control measures, the environmental review process, federal ozone standards, and photochemical modeling.

MTC is responsible for establishing that the Regional Transportation Plan (RTP) and Bay Area Regional Transportation Improvement Program (TIP) conform to the SIP. An RTP conformity analysis has been completed. A final conformity analysis was adopted by MTC in March 2002 following USEPA's approval of the Bay Area mobile source emissions budget.

Transportation projects are obligated to comply with federal, state, regional, and local air quality management goals as established in the planning documents described above. In general, the BEP and SVRTP alternatives would comply with all applicable policies. As previously discussed, the BEP and SVRTP alternatives are located in an area that is in nonattainment for ozone, PM10, and PM2.5. As required by both federal and state law, the BAAQMD has developed a SIP to address the Air Basin's nonconformity with these standards. Federal law requires that federally funded or approved transportation plans, programs, and projects demonstrate conformity with the SIPs or other applicable air quality management plans created to attain the NAAQS. Transportation projects in federally listed nonattainment areas must be found to conform to the current SIP. The RTP established by MTC, contains a long-range plan for transportation projects, including emissions budgets that conform to the SIP. Projects included in the RTP are included in a SIP mandated air quality analysis, demonstrating that the RTP is in compliance with the SIPs.

4.1.5 LOCAL DEVELOPMENT PLANS AND POLICIES

Applicable air quality goals and policies from the cities of Fremont and San Jose are described below by jurisdiction.

City of Fremont General Plan

The City of Fremont General Plan, adopted in May 1991, sets forth many of the city's goals, including improving air quality through transportation alternatives. The following goals were taken from the City of Fremont General Plan:

- GOAL T 2: Convenient alternatives to the automobile to conserve energy, reduce congestion, improve air quality and provide a variety of transportation choices to meet a variety of needs.

- GOAL NR 12: Air quality meeting State standards.

- Policy NR12.1.7: Reduce particulate emissions.

The BEP and SVRTP alternatives would provide an alternative means of transportation and would have the potential to improve air quality. Section 3.7, Vehicular Traffic, of the Final EIS documents the traffic effects associated with the BEP and SVRTP Alternatives. While several intersections and freeway segments would be adversely affected, particularly near the proposed BART stations, the overall vehicle miles traveled would be reduced under the BEP and SVRTP alternatives when compared to the No Build Alternative, as discussed in Section 5.1, Air Quality. Section 5.1 provides an analysis of the long-term effects of the project alternatives with regards to air quality. As stated on pages 5.1-16 and 5.1-17, the BEP and SVRTP alternatives would result in reduced air pollutant emissions from mobile sources, specifically automobiles and associated vehicle miles traveled. Both the BEP and SVRTP alternatives would result in 0.13 and 0.22 percent less vehicle miles traveled, respectively, when compared to the No Build Alternative. Thus, the BEP and SVRTP alternatives would result in fewer vehicle miles traveled and reduced emissions of toxic air contaminants. Further, the BEP and SVRTP alternatives would result in a reduction of particulate matter emissions, demonstrating a beneficial air quality operational benefit.

The BEP and SVRTP alternatives would meet federal and BAAQMD emissions standards, and thus State standards. Therefore, the build alternatives would remain consistent with the City of Fremont General Plan goals and policies.

City of San Jose General Plan

The City of San Jose General Plan sets forth many of the city's goals, including minimizing the air pollution produced by new developments. The following goals and policies were taken from the Environmental Element of the City of San Jose General Plan:

- Goal: Maintain acceptable levels of air quality for the residents of San Jose and minimize the air pollution produced by new development.
- Policy 2: Expansion and improvement of public transportation services and facilities should be promoted, where appropriate, to both encourage energy conservation and reduce air pollution.

As implementation of the BEP and SVRTP alternatives would involve the expansion and improvement of a regional public transportation system, these alternatives would maintain consistency with the goals and policies set forth in the City of San Jose General Plan.