Appendix B: Air Quality Analysis

Air Quality Analysis Report
San Ramon City Center
City of San Ramon, Contra Costa County, California

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SECTION 1: INTRODUCTION

1.1 - Purpose and Methods of Analysis

The following air quality analysis was prepared to evaluate whether the expected criteria air pollutant emissions generated from the proposed project would cause significant impacts to air resources in the project area. The analysis also provides an analysis of global warming impacts. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000, et seq.). The methodology follows the CEQA Air Quality Handbook prepared by the Bay Area Air Quality Management District (BAAQMD) for quantification of emissions and evaluation of potential impacts to air resources. URBEMIS2007 Version 9.2, which was developed and approved by the California Air Resources Control Board (CARB), was used to quantify some project-related emissions.

1.2 - Project Description and Location

The San Ramon City Center Project is located in the City of San Ramon in Contra Costa, California (Exhibits 1 and 2). As shown in Exhibit 3, the project site comprises four parcels totaling approximately 44 acres on all four quadrants of the intersection of Bollinger Canyon Road and Camino Ramon. Parcel 1A contains a parking lot and undeveloped land and occupies the southeastern quadrant. Parcel 1B contains a parking lot and occupies the southwest quadrant of the intersection. Parcel 2 contains the existing Bishop Ranch 2 office complex and occupies the northwestern quadrant. Parcel 3A contains undeveloped land and occupies the northeaster quadrant. The site is within the Bishop Ranch Business Park and adjacent to the Iron Horse Trail.

The City of San Ramon and Sunset Development Company, as co-applicants, are proposing to develop a 2.1 million square-foot mixed-use project, known as the San Ramon City Center Project (herein referred to as the project or proposed project). When existing entitlements are considered, the proposed project would result in a net increase of 1.6 million square feet. The project will be a new transit-oriented, mixed-use development for the City of San Ramon within the Bishop Ranch Business Park. Located at the crossroads of Camino Ramon and Bollinger Canyon Road, San Ramon City Center sits at the entrance to Bishop Ranch Business Park and is centrally located in the City, adjacent to Central Park and its community center. San Ramon City Center is an infill project that is pedestrian friendly, mixed use, and transit-oriented. The major components are residential; a lifestyle retail center including an arts cinema, restaurants, a premium “boutique” hotel, three Bishop Ranch Class A office buildings, a new City Hall with Council Chamber, and a library for San Ramon; and a transit hub. The project reflects the City’s desire for a downtown center that conforms with San Ramon’s General Plan, Zoning Ordinance, and Economic Development Strategic Plan.

Alternatives

Also considered in this analysis are the alternatives to the proposed project required by CEQA and described below.

Reduced Density - Option 1

This option consists of eliminating the Plaza District from the proposed project and developing only Bishop Ranch 1A and the City Hall and Transit Center. Bishop Ranch 1A and the City Hall and Transit Center would be identical in size, design, and use as envisioned by the proposed project. Under this alternative, Bishop Ranch 2 would be retained and Sunset Development and Parcel 3A would remain undeveloped. The net square footage of this alternative is 658,691.

Reduced Density - Option 2

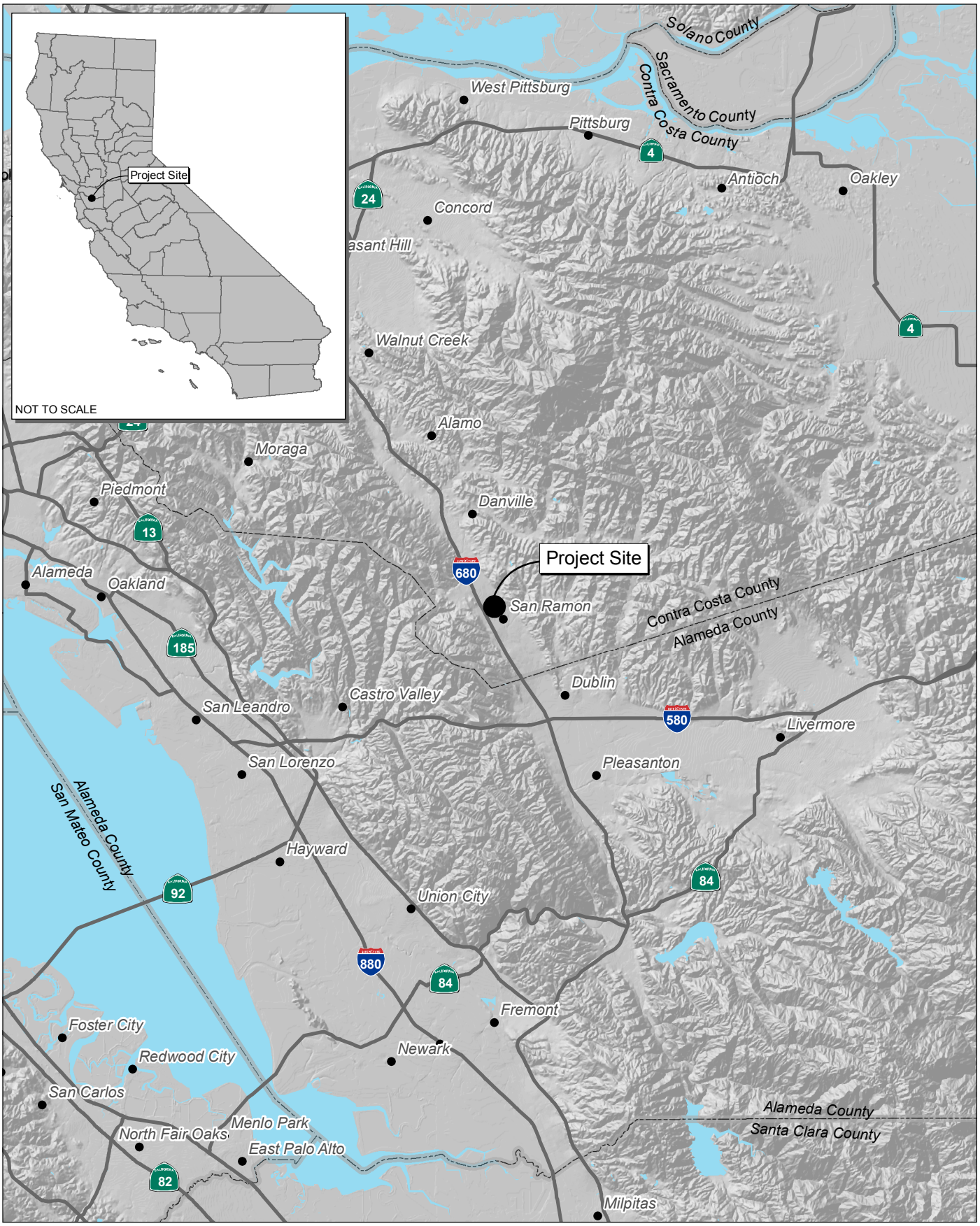
This option consists of eliminating the Bishop Ranch 1A and the City Hall and Transit Center components and developing only the Plaza District. The Plaza District would be identical in size, design, and use as envisioned by the proposed project. Under this alternative, Sunset Development would exercise its existing 328,220-square-foot office entitlement on Parcel 1A. The net square footage of this alternative is 1,509,775.

City Civic Center Alternative

This option consists of developing the project detailed in City Civic Center Environmental Impact Report (EIR), certified by the San Ramon City Council in December 2003 (State Clearinghouse No. 2003072022). The City Civic Center's air quality impacts were documented in that EIR.

No Project Alternative

Under the No Project Alternative, the project site would remain in its existing condition and the proposed project would not be developed. Under this alternative, Sunset Development would exercise its existing 328,220-square-foot office entitlement on Parcel 1A.



Source: Census 2000 Data, The CaSIL, MBA GIS 2007.

Michael Brandman Associates

NORTH

5 2.5 0 5 Miles

Exhibit 1
Regional Location Map

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CITY OF SAN RAMON • SAN RAMON CITY CENTER PROJECT
AIR QUALITY ANALYSIS REPORT

Source: Terraserver.

Michael Brandman Associates

NORTH

630 315 0 630 Feet

Exhibit 2
Local Vicinity Map
Aerial Base

SECTION 2: SETTING

2.1 - Regulatory Setting

Air pollutants are regulated at the national, State, and air basin level; each agency has a different degree of control. The United States Environmental Protection Agency (EPA) regulates at the national level. The California Air Resources Board (CARB) regulates at the State level. The BAAQMD regulates at the air-basin level.

2.1.1 - Federal and State Regulatory Agencies

The EPA handles global, international, national, and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans (SIP), provides research and guidance in air pollution programs, and sets National Ambient Air Quality Standards (NAAQS), also known as federal standards. There are NAAQS for six common air pollutants, called criteria air pollutants, which were identified from provisions of the federal Clean Air Act (CAA) of 1970. The six criteria pollutants are:

- Ozone (O_3)
- Particulate matter (PM_{10} and $PM_{2.5}$)
- Nitrogen dioxide (NO_2)
- Carbon monoxide (CO)
- Lead
- Sulfur dioxide (SO_2)

The NAAQS were set to protect the health of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants.

CARB has overall responsibility for statewide air quality maintenance and air pollution prevention. The SIP for the State of California is administered by CARB. A SIP is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain NAAQS. CARB also administers California ambient air quality standards, or State standards, for the 10 air pollutants designated in the California Clean Air Act (CCAA). All of the national criteria pollutants are regulated by the State, but California adds four pollutants. The additional State air pollutants are:

- Visibility-reducing particulates
- Hydrogen sulfide
- Sulfates
- Vinyl chloride

The national and State ambient air quality standards and the most relevant effects are summarized in Table 1.

Table 1: Ambient Air Quality Standards

Air Pollutant	Averaging Time	California Standard	National Standard	Most Relevant Effects
Ozone	1 hour	0.09 ppm	—	(a) Pulmonary function decrements and localized lung edema in humans and animals; (b) risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) increased mortality risk; (d) risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (e) vegetation damage; (f) property damage
	8 hour	0.070 ppm	0.08 ppm	
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) impairment of central nervous system functions; (d) possible increased risk to fetuses
	8 hour	9.0 ppm	9 ppm	
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm*	—	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) contribution to atmospheric discoloration
	Mean	0.030 ppm*	0.053 ppm	
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	—	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
	24 hour	0.04 ppm	0.14 ppm	
	Mean	—	0.030 ppm	
Particulate Matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) declines in pulmonary function growth in children; (c) increased risk of premature death from heart or lung diseases in the elderly
	Mean	20 µg/m^3	—	
Particulate Matter ($PM_{2.5}$)	24 hour	—	35 µg/m^3	
	Mean	12 µg/m^3	15 µg/m^3	
Sulfates	24 hour	25 µg/m^3	—	(a) Decrease in ventilatory function; (b) aggravation of asthmatic symptoms; (c) aggravation of cardio-pulmonary disease; (d) vegetation damage; (e) degradation of visibility; (f) property damage
Lead	30-day	1.5 µg/m^3	—	(a) Learning disabilities; (b) impairment of blood formation and nerve conduction
	Quarter	—	1.5 µg/m^3	

Abbreviations:
ppm = parts per million µg/m^3 = micrograms per cubic meter
Mean = Annual Arithmetic Mean 30-day = 30-day average Quarter = Calendar quarter
* The nitrogen dioxide ambient air quality standard was amended on February 22, 2007. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected in 2007.
Source: CARB, Ambient Air Quality Standards, 2007.

2.1.2 - Bay Area Air Quality Management District

The project is in the San Francisco Bay Area Air Basin (Basin), which consists of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties; the western portion of Solano County; and the southern portion of Sonoma County. The local agency with jurisdiction over

air quality in the Basin is the Bay Area Air Quality Management District (BAAQMD or District). The BAAQMD—the State's first regional agency dealing with air pollution—was created by the California Legislature in 1955. The District is responsible for controlling and permitting industrial pollution sources (such as power plants, refineries, and manufacturing operations) and widespread area-wide sources (such as bakeries, dry cleaners, service stations, and commercial paint applicators) and for adopting local air quality plans and rules.

The latest air quality plan in the Basin is the Bay Area 2005 Ozone Strategy, which was prepared in cooperation with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) and was adopted on January 4, 2006. The Strategy shows "how the San Francisco Bay Area will achieve compliance with the State one-hour air quality standard for ozone as expeditiously as practicable and how the region will reduce transport of ozone and ozone precursors to neighboring air basins." (BAAQMD 2006)

2.1.3 - Local Government

Local government's responsibility for air quality increased significantly with the passage of the CCAA and the federal CAA 1990 amendments. Both pieces of legislation place new emphasis on reducing motor vehicle trips and vehicle miles traveled at the local level. Although the District is required to address air quality standards by way of transportation control measures (TCMs) and indirect source programs in its air quality attainment plans, cities and counties, through their Councils of Government, are responsible for much of the implementation.

The project is located in the City of San Ramon. San Ramon is located in southern Contra Costa County and is surrounded by the incorporated communities of Danville and Dublin, and unincorporated areas of Alameda and Contra Costa counties. The San Ramon General Plan 2020 (San Ramon 2002), voter-approved March 5, 2002, contains guiding and implementing policies that together articulate a vision for San Ramon and provides protection for the City's resources by establishing planning requirements, programs, standards, and criteria for project review. Listed below are policies and programs contained in the General Plan that are pertinent to the protection of air quality.

2.2 - Pollutants of Concern

Pollutants are generally classified as either criteria pollutants or non-criteria pollutants. Federal ambient air quality standards have been established for criteria pollutants, whereas no ambient standards have been established for non-criteria pollutants. For some criteria pollutants, separate standards have been set for different periods. Most standards have been set to protect public health. For some pollutants, standards have been based on other values (such as protection of crops, protection of materials, or avoidance of nuisance conditions). A summary of Federal ambient air quality standards (NAAQS) and State ambient air quality standards—or California Ambient Air

Quality Standards (CAAQS)—for criteria pollutants and the attainment status of the San Francisco Bay Area Air Basin is shown in Table 1.

For reasons described below, the criteria pollutants of greatest concern for the proposed project are ozone (O_3), inhalable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and carbon monoxide (CO). Other pollutants of concern are toxic air contaminants and asbestos.

2.2.1 - Ozone

Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include reactive organic gases (ROG) 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. Often, the effects of emitted ROG and NO_x are felt a distance downwind of the emission sources. Ozone is subsequently considered a regional pollutant. Ground-level 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 can irritate lung airways and cause inflammation much like a sunburn. Other symptoms include wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities. People with respiratory problems are most vulnerable, but even healthy people who are active outdoors can be affected when ozone levels are high. Chronic ozone exposure can induce morphological (tissue) changes throughout the respiratory tract, particularly at the junction of the conducting airways and the gas exchange zone in the deep lung. Anyone who spends time outdoors in the summer is at risk, particularly children and other people who are active outdoors. Even at very low levels, ground-level ozone triggers a variety of health problems, including aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.

Ozone also damages vegetation and ecosystems. It leads to reduced agricultural crop and commercial forest yields; reduced growth and survivability of tree seedlings; and increased susceptibility to diseases, pests, and other stresses such as harsh weather. In the United States alone, ozone is responsible for an estimated $500 million in reduced crop production each year. Ozone also damages the foliage of trees and other plants, affecting the landscape of cities, national parks and forests, and recreation areas. In addition, ozone causes damage to buildings, rubber, and some plastics.

Ozone is a regional pollutant, as the reactions forming it take place over time, and materializes downwind from the sources of the emissions. As a photochemical pollutant, ozone is formed only during daylight hours under appropriate conditions, but it is destroyed throughout the day and night. Thus, ozone concentrations vary depending upon both the time of day and the location. Even in pristine areas, there is some ambient ozone that forms from natural emissions that are not controllable. This is termed background ozone. The average background ozone concentrations near

sea level are in the range of 0.015 to 0.035 parts per million (ppm), with a maximum of about 0.04 ppm (CARB 2005).

A Federal standard for ozone had been set for a 1-hour averaging time of 0.12 ppm but was officially revoked in June 2005.

Reactive Organic Gases

Reactive organic gases (ROG) are defined as any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participate in atmospheric photochemical reactions. ROG consist of nonmethane hydrocarbons and oxygenated hydrocarbons. Hydrocarbons are organic compounds that contain only hydrogen and carbon atoms. Nonmethane hydrocarbons are hydrocarbons that do not contain the unreactive hydrocarbon, methane. Oxygenated hydrocarbons are hydrocarbons with oxygenated functional groups attached.

It should be noted that there are no State or national ambient air quality standards for ROG because they are not classified as criteria pollutants. They are regulated, however, because a reduction in ROG emissions reduces certain chemical reactions that contribute to the formulation of ozone. ROG also are transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.

Nitrogen Oxides

During combustion of fossil fuels, oxygen reacts with nitrogen to produce nitrogen oxides or NO_x. This occurs primarily in motor vehicle internal combustion engines and fossil fuel-fired electric utility and industrial boilers. Whereas one form of NO_x, nitrogen dioxide (NO_2), is a criteria pollutant, NO_2 by itself is not a pollutant of concern in the Basin. Of concern is the property of NO_x as an ozone precursor, which means that when it is emitted into the atmosphere, it helps form or cause ozone to be formed. When NO_x and ROG are released in the atmosphere, they can chemically react with one another in the presence of sunlight to form ozone. NO_x can also be a precursor to PM_{10} and $PM_{2.5}$.

Because NO_x and ROG are ozone precursors, the health effects associated with ozone (as discussed above) are also indirect health effects associated with significant levels of NO_x and ROG emissions.

2.2.2 - Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter (PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

Particle pollution includes "inhalable coarse particles," with diameters larger than 2.5 micrometers and smaller than 10 micrometers and "fine particles," with diameters that are 2.5 micrometers and smaller. For reference, $PM_{2.5}$ is approximately one-thirtieth the size of the average human hair.

These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, known as primary particles, are emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks, or fires. Others form in complicated reactions in the atmosphere of chemicals such as sulfur dioxides and nitrogen oxides that are emitted from power plants, industries, and automobiles. These particles, known as secondary particles, make up most of the fine particle pollution in the country.

Particle exposure can lead to a variety of health effects. For example, numerous studies link particle levels to increased hospital admissions and emergency room visits—and even to death from heart or lung diseases. Both long- and short-term particle exposures have been linked to health problems. Long-term exposures, such as those experienced by people living for many years in areas with high particle levels, have been associated with problems such as reduced lung function and the development of chronic bronchitis, and even premature death. Short-term exposures to particles (hours or days) can aggravate lung disease, causing asthma attacks and acute bronchitis, and may increase susceptibility to respiratory infections. In people with heart disease, short-term exposures have been linked to heart attacks and arrhythmias. Healthy children and adults have not been reported to suffer serious effects from short-term exposures, although they may experience temporary minor irritation when particle levels are elevated.

In 2005, BAAQMD released a Staff Report (BAAQMD 2005) that analyzes the sources of PM in the Bay Area. Based on 2000–2003 ambient air monitoring data, BAAQMD and CARB estimated that the $PM_{2.5}$ fraction of total PM accounted for approximately 60 percent of PM_{10} during the winter and approximately 45 percent during the rest of the year. On days when the PM standards are exceeded, $PM_{2.5}$ can account for as much as 90 percent of PM_{10}. On an annual basis, CARB estimated that $PM_{2.5}$ constituted approximately 50 percent of the PM_{10} levels.

Based on the inventory data, BAAQMD has determined that combustion activities such as residential woodburning, construction/demolition activities, road dust, and emissions from on- and off-road engines were identified as significant sources of PM_{10} emissions in the Bay Area. However, while the inventory was helpful in determining potential PM_{10} sources in the region, it did not provide the full picture of the makeup of the region's PM. The nature of particulates is that larger, coarser particles

tend to settle out of the air closer to their emission source, while smaller particles, such as the size of $PM_{2.5}$, tend to remain suspended in the air longer and travel further.

BAAQMD's analysis showed that, for annual average $PM_{2.5}$, the largest source categories are on- and off-road motor vehicle exhaust and carbon from cooking and woodburning activities. These categories include both directly emitted PM and secondary PM, such as ammonium nitrate formed by atmospheric reactions of ammonia with nitrogen oxides from motor vehicles and other combustion sources. Geological dust was found to be a minor component of ambient PM.

Subsequently, it was determined that during the winter, residential wood smoke and cooking were major contributors to ambient PM. Combustion $PM_{2.5}$, which includes vehicle exhaust, was the second major component of $PM_{2.5}$ and a significant component of PM_{10}. Ammonium nitrate was also a principal component of ambient PM. Road dust and other dust-producing activities also contributed to ambient PM_{10} but not significantly to $PM_{2.5}$, and they had a more local impact.

2.2.3 - Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes about 56 percent of all CO emissions nationwide. Other non-road engines and vehicles (such as construction equipment and boats) contribute about 22 percent of all CO emissions nationwide. Higher levels of CO generally occur in areas with heavy traffic congestion. In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust. Other sources of CO emissions include industrial processes (such as metals processing and chemical manufacturing), residential woodburning, and natural sources such as forest fires. Woodstoves, gas stoves, cigarette smoke, and unvented gas and kerosene space heaters are sources of CO indoors. The highest levels of CO in the outside air typically occur during the colder months of the year when inversion conditions are more frequent. The air pollution becomes trapped near the ground beneath a layer of warm air.

CO is a public health concern because it combines readily with hemoglobin, reducing the amount of oxygen transported in the bloodstream. The health threat from lower levels of CO is most serious for those who suffer from such heart-related diseases as angina, clogged arteries, or congestive heart failure. For a person with heart disease, a single exposure to CO at low levels may cause chest pain and reduce that person's ability to exercise; repeated exposures may contribute to other cardiovascular effects. High levels of CO can affect even healthy people. People who breathe high levels of CO can develop vision problems, reduced ability to work or learn, reduced manual dexterity, and difficulty performing complex tasks. At extremely high levels, CO is poisonous and can cause death.

Motor vehicles are the dominant source of CO emissions in most areas. CO is described as having only a local influence because it dissipates quickly. High CO levels develop primarily during winter, when periods of light winds combine with the formation of ground-level temperature inversions

(typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Because CO is a product of incomplete combustion, motor vehicles exhibit increased CO emission rates at low air temperatures. High CO concentrations occur in areas of limited geographic size sometimes referred to as hot spots. Since CO concentrations are strongly associated with motor vehicle emissions, high CO concentrations generally occur in the immediate vicinity of roadways with high traffic volumes and traffic congestion, active parking lots, and in automobile tunnels. Areas adjacent to heavily traveled and congested intersections are particularly susceptible to high CO concentrations.

2.2.4 - Other Criteria Pollutants

The standards for the other criteria pollutants are either being met or are unclassified in Contra Costa County, and the latest pollutant trends suggest that these standards will not be exceeded in the foreseeable future.

2.2.5 - Other pollutants of concern

Toxic Air Contaminants

In addition to the criteria pollutants listed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Cars and trucks release at least forty different toxic air contaminants. The most important, in terms of health risk, are diesel particulates, benzene, formaldehyde, 1,3-butadiene, and acetaldehyde. Public exposure to TACs can result from emissions from normal operations as well as from accidental releases. Health effects of TACs include cancer, birth defects, neurological damage, and death.

Toxic air contaminants are less pervasive in the urban atmosphere than the criteria air pollutants but are linked to short-term (acute) or long-term (chronic or carcinogenic) adverse human health effects. There are hundreds of different types of toxic air contaminants, with varying degrees of toxicity. Sources of toxic air contaminants include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), and motor vehicle exhaust.

According to the 2005 California Almanac of Emissions and Air Quality (CARB 2005), the majority of the estimated health risk from TACs can be attributed to relatively few compounds, the most important of which is diesel particulate matter (DPM). DPM is a subset of $PM_{2.5}$ because the size of diesel particles are typically 2.5 microns and smaller. The identification of DPM as a toxic air contaminant in 1998 led CARB to adopt the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles (Plan) in September 2000. The Plan's goals are a 75-percent reduction in DPM by 2010 and an 85-percent reduction by 2020 from the 2000 baseline. Diesel engines emit a complex mixture of air pollutants, composed of gaseous and solid material. The visible emissions in diesel exhaust—particulate matter or PM—include carbon particles or

"soot." Diesel exhaust also contains a variety of harmful gases and over 40 other cancer-causing substances. California's identification of DPM as a toxic air contaminant was based on its potential to cause cancer, premature deaths, and other health problems. Exposure to DPM is a health hazard, particularly to children whose lungs are still developing and to the elderly who may have other serious health problems. Overall, diesel engine emissions are responsible for the majority of California's potential airborne cancer risk from combustion sources (CARB 2000).

Asbestos

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are chrysotile, amosite, and crocidolite. Chrysotile, also known as white asbestos, is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90–95 percent of all asbestos contained in buildings in the United States.

Project construction sometimes requires the demolition of existing buildings where construction occurs. Buildings often include materials containing asbestos. Most demolitions and many renovations are subject to an asbestos inspection prior to start of activity. The demolition, renovation, or removal of asbestos-containing building materials is subject to the limitations of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations as listed in the Code of Federal Regulations requiring notification, inspection, and compliance with local air district regulations (in this case, BAAQMD Regulation 11, Rule 2: Hazardous Materials; Asbestos Demolition, Renovation and Manufacturing).

In addition, asbestos is found in a natural state. Exposure and disturbance of rock and soil that naturally contain asbestos can result in the release of fibers to the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present.

To address some of the health concerns associated with exposure to asbestos from these activities, CARB has adopted two Airborne Toxic Control Measures (ATCMs). CARB has an ATCM for construction, grading, quarrying, and surface mining operations requiring the implementation of mitigation measures to minimize emissions of asbestos-laden dust. This ATCM applies to road construction and maintenance, construction and grading operations, and quarries and surface mines when the activity occurs in an area where naturally occurring asbestos is likely to be found. Areas are subject to the regulation if they are identified on maps published by the Department of Conservation as ultramafic rock units or if the APCO or owner/operator has knowledge of the presence of

ultramafic rock, serpentine, or NOA on the site. The ATCM also applies if ultramafic rock, serpentine, or asbestos is discovered during any operation or activity.

In addition, CARB has an ATCM for surfacing applications. This ATCM applies to any person who produces, sells, supplies, offers for sale or supply, uses, applies, or transports any (1) aggregate material extracted from property where any portion of the property is located in a geographic ultramafic rock unit or (2) aggregate material extracted from property that is NOT located in a geographic ultramafic rock unit, if the material has been evaluated at the request of the Air Pollution Control Officer (APCO) and has been determined to be ultramafic rock or serpentine; tested at the request of the APCO and determined to have an asbestos content of 0.25 percent or greater; or determined by the owner/operator of a facility to be ultramafic rock, serpentine, or material that has an asbestos content of 0.25 percent or greater. The ATCM prohibits person from using, applying, selling, supplying, or offering for sale or supply any restricted material for surfacing unless it has been tested and determined to have an asbestos content that is less than 0.25 percent.

2.2.6 - Greenhouse Gases

Constituent gases of the Earth's atmosphere called atmospheric greenhouse gases (GHG) play a critical role in the Earth's radiation budget by trapping infrared radiation emitted from the Earth's surface, which would otherwise have escaped into space. Prominent GHG contributing to this process include carbon dioxide (CO_2), methane (CH_4), ozone, water vapor, nitrous oxide (N_2O), and chlorofluorocarbons (CFCs). This phenomenon, known as the "Greenhouse Effect," is responsible for maintaining a habitable climate. Anthropogenic emissions of these GHG in excess of natural ambient concentrations are responsible for the enhancement of the Greenhouse Effect and have led to a trend of unnatural warming of the Earth's natural climate, known as global warming or climate change. Emissions of these gases that induce global warming are attributable to human activities associated with industrial/manufacturing, utilities, transportation, residential, and agricultural sectors (CEC 2006a). Transportation is responsible for 41 percent of the State's GHG emissions, followed by electricity generation (CEC 2006a). Emissions of CO_2 and NO_x are by-products of fossil fuel combustion. Methane, a potent GHG, results from off-gassing associated with agricultural practices and landfills. Sinks of CO_2 include uptake by vegetation and dissolution into the ocean.

Global warming is a global problem, and GHGs are global pollutants, unlike criteria air pollutants and TACs, which are pollutants of regional and local concern. Worldwide, California is the 12th to 16th largest emitter of CO_2 and is responsible for approximately 2 percent of the world's CO_2 emissions (CEC 2006a, 2006b). In 2004, California produced 492 million gross metric tons of carbon dioxide-equivalent (CEC 2006a).

Various local and statewide initiatives to reduce the State's contribution to GHG emissions have raised awareness that, even though the possible outcomes and feedback mechanisms associated with climate change are not yet fully understood, global warming is already upon us, and the potential for environmental, social, and economic disaster over the long term is great. Cooperation on a global

scale will be required to reduce GHG emissions to a level that will slow the warming trend, and the direct air quality impact of increasing GHG emissions into the global system is incrementally cumulative.

In September 2006, California's governor, Arnold Schwarzenegger, signed Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. AB 32 established regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions, and it is the first of its kind worldwide (ARB 2006b). AB 32 applies to major stationary sources of emissions only but acknowledges the urgency of this potential threat to the environment.

At the time of writing, no air districts within California, including BAAQMD, have a recommended emission threshold for determining significance associated with GHGs from development projects.

Direct and Indirect Aerosol Effects

Aerosols, including particulate matter, reflect sunlight back to space. As attainment designations for particulate matter are met and fewer particulate matter emissions occur, the cooling effect of anthropogenic aerosols would be reduced, and, instead, the greenhouse effect would be further enhanced. Similarly, aerosols act as cloud condensation nuclei to aid in cloud formation and increase cloud lifetime. Clouds efficiently reflect radiation back to space.

The indirect effect of aerosols on clouds and precipitation efficiency would be reduced, amplifying the greenhouse effect again.

The Cloud Effect

As global temperature rises, the ability of the air to hold moisture increases, and facilitation of cloud formation occurs. If the increase in cloud cover occurs at low or middle altitudes, resulting in clouds with greater liquid water path such as stratus or cumulus clouds, more radiation would be reflected back to space, resulting in a negative feedback, wherein the side effect of global warming acts to balance itself. If cloud formation occurs at higher altitudes in the form of cirrus clouds, these clouds actually allow more light to pass through than they reflect and, ultimately, act as GHG themselves, resulting in a positive feedback wherein the side effect of global warming acts to enhance the process. This feedback mechanism, known as the Cloud Effect, is poorly understood.

Other Feedback Mechanisms

As global temperature continues to rise, methane gas, which is trapped in permafrost, would be released into the atmosphere. Methane is approximately 20 times as efficient a GHG as CO_2. This phenomenon would accelerate and enhance the warming trend. As polar and sea ice extent continues to diminish, the Earth's albedo, or reflectivity, would decrease simultaneously. More incoming solar radiation would be absorbed by the Earth rather than being reflected back to space, in turn, further enhancing the Greenhouse Effect and associated global warming. These and other competing

feedback mechanisms are still in the process of being coupled and forecast by the scientific community. It is not known at this time how the ultimate balance between all the variables will be equated to a particular temperature increment. Regardless, there is no longer debate within the scientific community that anthropogenic GHG emissions are linked to a trajectory of unnatural warming of the planet.

2.3 - Physical Setting

2.3.1 - Local Climate

The project is located in the City of San Ramon in Contra Costa County. This region is located within the Bay Area Air Basin (Basin). Regional and local air quality is impacted by dominant airflows, topography, atmospheric inversions, location, season, and time of day.

Large Scale Influences

A semi-permanent, high-pressure area centered over the northeastern Pacific Ocean dominates the summer climate of the West Coast. Because this high-pressure cell is quite persistent, storms rarely affect the California coast during the summer. Thus, the conditions that persist along the coast of California during summer are a northwesterly airflow and negligible precipitation. A thermal low-pressure area from the Sonoran-Mojave Desert also causes air to flow onshore over the San Francisco Bay Area much of the summer.

The steady northwesterly flow around the eastern edge of the Pacific high-pressure cell exerts stress on the ocean surface along the west coast. This induces upwelling of cold water from below. Upwelling produces a band of cold water off San Francisco approximately 80 miles wide. During July, the surface waters off San Francisco are 3 degrees Fahrenheit (°F) cooler than those off Vancouver, more than 700 miles farther north. Air approaching the California coast, already cool and moisture-laden from its long trajectory over the Pacific, is further cooled as it flows across this cold bank of water near the coast, thus accentuating the temperature contrast across the coastline. This cooling is often sufficient to produce condensation—a high incidence of fog and stratus clouds along the Northern California coast in summer.

In winter, the Pacific High weakens and shifts southward, upwelling ceases, and winter storms become frequent. Almost all of the Bay Area's annual precipitation takes place in the November through April period. During the winter rainy periods, inversions are weak or nonexistent, winds are often moderate, and air pollution potential is very low. During some periods in winter when the Pacific high becomes dominant, inversions become strong and often are surface-based; winds are light and pollution potential is high. These periods are characterized by winds that flow out of the Central Valley into the Bay Area.

Topography

The San Francisco Bay Area is characterized by complex terrain consisting of coastal mountain ranges, inland valleys, and bays. Elevations of 1,500 feet are common in the higher terrain of this area. Normal wind flow over the area is distorted in the lowest levels. This is particularly true when the air mass is stable and the wind velocity is not strong. With stronger winds and unstable air masses moving over the area, this distortion is reduced. The distortion is greatest when low-level inversions are present with the surface air beneath the inversion, flowing independently of the air above the inversion. This latter condition is very common in the summer, the surface air mass being the sea breeze.

Winds

In summer, the northwesterly winds to the west of the Pacific coastline are drawn into the interior through the Golden Gate and over the lower portions of the San Francisco Peninsula. Immediately to the south of Mount Tamalpais, the northwesterly winds accelerate considerably and come more nearly from the west as they stream through the Golden Gate. This channeling of the flow through the Golden Gate produces a jet that sweeps eastward but widens downstream producing southwesterly winds at Berkeley and northwesterly winds at San Jose; a branch curves eastward through the Carquinez Strait and into the Central Valley. Wind speeds may be locally strong in regions where air is channeled through a narrow opening such as the Carquinez Strait, the Golden Gate, or San Bruno Gap. For example, the average wind speed at San Francisco International Airport from 3 a.m. to 4 p.m. in July is about 20 miles per hour (mph), compared with only about 8 mph at San Jose and less than 7 mph at the Farallon Islands.

The sea breeze between the coast and the Central Valley commences near the surface along the coast in late morning or early afternoon; it may be first observed only through the Golden Gate. Later in the day, the layer deepens and intensifies while spreading inland. As the breeze intensifies and deepens, it flows over the lower hills farther south along the Peninsula. This process frequently can be observed as a bank of stratus clouds “rolling over” the coastal hills on the west side of the Bay. The depth of the sea breeze depends in large part upon the height and strength of the inversion. The generally low elevation of this stable layer of air prevents marine air from flowing over the coastal hills. It is unusual for the summer sea breeze to flow over terrain exceeding 2000 feet in elevation.

In winter, the Bay Area experiences periods of storminess and moderate-to-strong winds and periods of stagnation with very light winds. Winter stagnation episodes are characterized by outflow from the Central Valley, nighttime drainage flows in coastal valleys, weak onshore flows in the afternoon, and otherwise light and variable winds.

Temperature

In summer, the distribution of temperature near the surface over the Bay Area is determined in large part by the effect of differential heating between land and water surfaces. This process produces a large-scale gradient between the coast and the Central Valley, as well as small-scale, local gradients

along the shorelines of the ocean and bays. The temperature contrast between coastal ocean water and land surfaces 15 to 20 miles inland reaches 35°F or more on many summer afternoons. At night, this contrast usually decreases to less than 10°F.

The winter mean temperature maxima and minima reverse the summer relationship in that daytime variations are small while mean minimum (nighttime) temperatures show large differences and strong gradients. The moderating effect of the ocean influences warmer minimums along the coast and penetrating the Bay. Coldest temperatures are in the sheltered valleys, implying strong radiation inversions and very limited vertical diffusion. An anomaly of warmer temperatures in the Santa Clara Valley over San Jose is clearly an urban "heat island" effect, most pronounced on winter nights. Such heat islands are proportional to structure density and appear over San Francisco and Oakland.

Inversions

A primary factor in air quality is the mixing depth (i.e., the vertical dimension available for dilution of contaminant sources near the ground). Over the Bay Area, the frequent occurrence of temperature inversions limits mixing depth and, consequently, limits the availability of air for dilution. A temperature inversion may be described as a layer of warmer air over cooler air.

On most days, higher altitudes mean lower air temperatures. This is because most of the sun's energy is converted to sensible heat at the ground, which in turn warms the air at the surface. The warm air rises in the atmosphere, where it expands and cools. Sometimes, however, the temperature of air actually increases with height. This condition is known as temperature inversion, because the temperature profile of the atmosphere is inverted from its usual state. There are two major types of temperature inversion: surface inversions, which occur near the Earth's surface, and aloft inversions, which occur higher above the ground than surface inversions. Surface inversions are the most important in the study of air quality.

For the most part, surface inversion patterns correlate with seasonality. The strong inversions typical of summer are formed by subsidence, the heating of downward-moving air in the high-pressure anticyclone over the western Pacific. The surface inversions typical of winter are formed by radiation as air is cooled in contact with the Earth's cold surface at night. While these seasonal correlations are most prevalent, both inversion mechanisms may operate at any time of the year. At times, surface inversions formed by radiational cooling may reinforce the subsidence inversion aloft, particularly in fall and winter. The thick, strong inversion resulting in this case is especially effective in trapping pollutants.

The vertical temperature structure over the Bay Area is taken by the National Weather Service (NWS) twice daily, at 4 a.m. and 4 p.m., at Oakland International Airport. NWS reports that the inversion types found vary widely in seasonal patterns and over a 24-hour period. Localized inversion variations resulting from the numerous terrain types within the Bay Area have also been observed.

In the morning, the seasonal variations are most dramatic. From June through September, there are only two days per year, on average, with no inversion below 5,000 feet. March and April have fewer morning inversions. The occurrence of surface inversions is highest from October through January, when the characteristic radiation inversion predominates. A wide cluster of cases between 500 to 2,500 feet dominates from May through September, when the summer subsidence inversion over the marine layer dominates. There is substantial day-to-day variability in the depth of the marine layer.

In the afternoon data, two differences from the morning data are most striking and significant. First is the frequent disappearance of the surface radiation inversion that dominates the winter nights. In these months, a surface inversion observed in the morning persists through the afternoon less than 20 percent of the time. However, a corresponding afternoon increase may be noted in the cases from 500 to 2,500 feet. Thus, the inversion is frequently raised and perhaps weakened, but not destroyed. Second is the afternoon lowering of the marine inversion that dominates the summer months. In July and August, the afternoon inversions are frequently in the 500- to 1,000-foot interval, compared with the 1,000- to 1,500-foot interval in the morning.

Precipitation

Moderately wet winters and dry summers characterize the San Francisco Bay Area climate. Winter rains (December through March) account for about 75 percent of the average annual rainfall; about 90 percent of the annual total rainfall is received in the November–April period; and between 15 June15 and September 22, normal rainfall is typically less than 0.10 inch.

Annual precipitation amounts show great differences in short distances. Annual totals exceed 40 inches in the mountains and are less than 15 inches in the sheltered or “shadowed” valleys. The frequency of winter rain is more uniform, however, with 10 days per month (December through March) being typical.

During rainy periods, ventilation and vertical mixing are usually high; consequently, pollution levels are low. However, there are frequent winter dry periods lasting over a week. It is during some of these periods that CO and particulate pollution episodes develop.

Climate in the Diablo and San Ramon Valleys

In the Bay Area, the California Coast Range splits into a western and eastern range, with the San Francisco Bay between the two ranges. East of the eastern Coast Range lies the Diablo and San Ramon valleys, which have a northwest to southeast orientation. The northern portion is known as Diablo Valley and the southern portion as San Ramon Valley. The east side of the valleys is bordered by the Black Diamond Hills and Mt Diablo.

The Diablo Valley is a broad valley, approximately 5 miles wide and 10 miles long. The Carquinez Strait is at its north end; in the south, it tapers into the San Ramon Valley. Major cities in the Diablo

Valley are Concord and Walnut Creek. Martinez at the north end is better characterized by the Carquinez Strait region.

San Ramon Valley continues south from the Diablo Valley, extending from south of Walnut Creek to Dublin. The valley is long and narrow, approximately 12 miles long and 1 mile wide. At its southern end, it opens to the Amador Valley. Its major towns are Danville and San Ramon.

The Coast Range on the west side of these valleys is 1,500 to 2,000 feet high. This is sufficiently high to block much of the marine air from reaching the valleys. During the daytime, there are two weakly predominant flow patterns: up-valley flow and westerly flow across the lower elevations of the Coast Range. On clear nights, a surface inversion sets up and separates the surface flow from the upper layer flow. When this happens, the terrain channels the flow down-valley toward the Carquinez Straits. This down-valley drainage pattern can be observed all the way to Martinez at the end of the valley.

Wind speeds in these valleys rank as some of the lowest in the Bay Area. For example, in the middle of the Diablo Valley, the District station in Concord reports annual average wind speeds of 4.7 mph, and Danville in the middle of the San Ramon Valley reports annual average wind speeds of 5 mph. However, winds can pick up in the afternoon near the town of San Ramon because it is located at the eastern end of the Crow Canyon gap. Through this gap, polluted air from cities near the bay is able to travel across Hayward to the valley during the summer months.

Air temperatures are cooler in the winter and warmer in the summer because these valleys are further from the moderating effect of large water bodies and because the Coast Range blocks marine air flow. In the Diablo Valley during the winter, Concord records daily maximum temperatures in the mid 50s. During the summer, average daily maximum temperatures are in the high 80s to 90 degrees. Average minimum temperatures in winter are in the low- to mid-40s. Temperatures in the San Ramon Valley would be similar to temperatures in Concord.

These valleys rarely experience fog during the summer. In the winter, however, tule fogs are common at night. This phenomenon is named after the tule grass wetlands (*tulares*) of the Central Valley. Tule fogs form on cold, clear nights when winds are light and there is abundant moisture on the ground, as happens after a rainstorm. Alternatively, the tule fog can be advected from the Central Valley through the Carquinez Strait and Livermore Valley. These fogs usually burn off during the day but occasionally can last for a week or two before being dissipated by the next storm.

Shielded by the Coast Range to the west, rainfall amounts in the Diablo Valley are relatively low. For example, Martinez in the north reports an annual average of 18.5 inches, while Walnut Creek reports 19 inches. Rainfall in the San Ramon Valley is expected to be similar because of the similar orientation of the terrain.

2.3.2 - Local Air Quality

Emission Sources

California is a diverse state with many sources of air pollution. To estimate the sources and quantities of pollution, CARB, in cooperation with local air districts and industry, maintains an inventory of California emission sources. Sources are subdivided into four major emission categories: stationary sources, area-wide sources, mobile sources, and natural sources. Stationary source emissions are based on estimates made by facility operators and local air districts. Emissions from specific facilities can be identified by name and location. CARB and local air district staffs estimate area-wide emissions. Emissions from area-wide sources may be either from small individual sources, such as residential fireplaces, or from widely distributed sources that cannot be tied to a single location, such as consumer products and dust from unpaved roads. CARB staff estimates mobile source emissions with assistance from districts and other government agencies. Mobile sources include on-road cars, trucks, and buses and other sources such as boats, off-road recreational vehicles, aircraft, and trains. CARB staff and the air districts also estimate natural sources. These sources include geogenic (e.g., petroleum seeps) and biogenic (vegetation) sources, and wildfires.

Table 2 summarizes estimated 2005 emissions of key criteria air pollutants from major categories of air pollutant sources. For each pollutant, estimated emissions are presented for Contra Costa County. No further spatial refinement is available (CARB, 2007).

Table 2: Contra Costa County 2005 Emissions Inventory (tons/day)

Emission Category	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Fuel combustion	1.95	14.36	21.90	3.27	3.24
Waste disposal	0.44	0.01	0.11	0	0
Cleaning and surface coatings	2.87	0	0	0	0
Petroleum production and marketing	14.24	12.30	0.72	0.59	0.54
Industrial processes	3.11	0.94	2.26	1.94	1.33
Solvent evaporation	10.73	0	0	0	0
Miscellaneous processes	2.37	25.00	2.89	23.97	7.80
On-road motor vehicles	22.51	224.95	39.48	1.39	0.93
Other mobile sources	8.91	68.98	27.39	1.82	1.64
Natural sources	11.35	0.12	0	0.01	0.01
TOTAL	**78.48**	**346.66**	**94.75**	**32.99**	**15.49**

Notes:
All values in tons per day. 2005 is estimated from a base year inventory for 2004 based on growth and control factors available from CARB. The sum of values may not equal total shown, due to rounding.
Source: CARB, 2007.

Contra Costa County is similar to many other portions of California and the United States in general in that a large portion of the CO emissions comes from on-road mobile sources (65 percent), with the majority coming from passenger cars and trucks. NO_x is also dominated by on-road mobile sources but to a lesser degree, 42 percent come from passenger cars and trucks; but heavy-duty diesel trucks supply a larger portion (26 percent) of that on-road total. Other significant NO_x sources in Contra Costa County include off-road equipment primarily from construction (19 percent) and petroleum refining combustion (13 percent). In Contra Costa County, almost 30 percent of the ROG emissions come from on-road motor vehicles, 15 percent from biogenic sources, and 9 percent from consumer products. PM_{10} primarily comes from an emissions category called miscellaneous processes, which includes a variety of subcategories. In terms of Contra Costa County's emissions, these subcategories are primarily paved road dust, construction and demolition, and residential fuel combustion. Even though the majority of $PM_{2.5}$ also comes from the same subcategories, another significant source is combustion (21 percent), primarily from petroleum refineries.

Monitoring Data

Meteorology acts on the emissions released into the atmosphere to produce pollutant concentrations. These airborne pollutant concentrations are measured throughout California at air quality monitoring sites. CARB operates a statewide network of monitors. Data from this network are supplemented with data collected by local air districts, other public agencies, and private contractors. There are more than 250 criteria pollutant monitoring sites in California. Each year, more than ten million air quality measurements from all of these sites are collected and stored in a comprehensive air quality database maintained by CARB.

Existing levels of ambient air quality and historical trends and projections of air quality in the project area are best documented from measurements made near the project site. The air quality monitoring station closest to the site is located in Hayward on La Mesa Drive, approximately 8 miles south-southwest of the project. The only pollutant measured at this station is ozone. The nearest monitoring station measuring particulate matter, carbon monoxide, and nitrogen dioxide is located in Livermore on Rincon Avenue, approximately 11 miles east-southeast of the project. Table 3 summarizes 2004–2006 published monitoring data. The data shows that no federal standards were violated at any of the nearest air monitoring stations. The State standard for ozone during a 1-hour average was violated only in year 2006 at the Hayward station, and the State standard for PM_{10} during a 24-hour period and as an annual average was violated only in 2006. The data shows that no exceedances of State or federal standards were observed in 2004 and 2005.

Table 3: Ambient Air Monitoring Data (2004–2006)

Air Pollutant, Averaging Time (Units)	2004	2005	2006
Ozone (Hayward)			
Max 1 Hour (ppm) Days > CAAQS (0.09 ppm)	0.088 0	0.093 0	**0.101** 2
Max 8 Hour (ppm) Days > CAAQS (0.07 ppm) Days > NAAQS (0.08 ppm)	0.070 ND 0	0.070 ND 0	0.071 ND 0
Particulate Matter (PM_{10}) (Livermore)			
Mean (µg/m^3)	20.0	18.8	**21.8**
24 Hour (µg/m^3) Days > CAAQS (50 µg/m^3) Days > NAAQS (150 µg/m^3)	48.8 0 0	49.4 0 0	**69.2** 3 0
Particulate Matter ($PM_{2.5}$) (Livermore)			
Mean (µg/m^3)	10.2	9.0	ID
24 Hour (µg/m^3) Days > NAAQS (35 µg/m^3)	40.8 0	32.1 0	50.8 0
Carbon Monoxide (Livermore)			
Max 8 Hour (ppm) Days > CAAQS (9.0 ppm) Days > NAAQS (9.0 ppm)	1.81 0 0	1.79 0 0	1.79 0 0
Nitrogen Dioxide (Livermore)			
Mean (ppm)	0.014	0.014	0.014
Max 1 Hour (ppm) Days > CAAQS (0.25 ppm)	0.063 0	0.072 0	0.064 0

Abbreviations:
> = exceed ppm = parts per million µg/m^3 = micrograms per cubic meter
ID = insufficient data ND = no data max = maximum
CAAQS = California Ambient Air Quality Standard NAAQS = National Ambient Air Quality Standard Mean = Annual Arithmetic Mean
Source: CARB Air Quality Data/Statistics/Top 4 Summary, May 7, 2007.

2.3.3 - Sensitive Receptors

The location of a development project is a major factor in determining whether it will result in localized air quality impacts. The potential for adverse air quality impacts increases as the distance between the source of emissions and members of the public decreases. Impacts on sensitive receptors are of particular concern. For purposes of CEQA, the BAAQMD identifies sensitive receptors as facilities that house or attract children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, convalescent facilities, and residential areas are examples of sensitive receptors. Commercial and industrial facilities are not included in the definition because employees do not typically remain onsite for 24 hours. However, when assessing the impact of pollutants with 1-hour or 8-hour standards (such as nitrogen dioxide and carbon

monoxide), commercial and/or industrial facilities would be considered sensitive receptors for those purposes.

The nearest sensitive receptors to the proposed project are listed below:

- Residence Inn: 1071 Market Place, approximately 180 feet east of Parcel 1A
- Reflections Condominiums: 205 Reflections Drive, approximately 210 feet east of Parcel 1A
- Iron Horse Middle School: 12601 Alcosta Boulevard, approximately 2,000 feet northeast of Parcel 3A

2.3.4 - Attainment Status

Air basins where ambient air quality standards are exceeded are referred to as "nonattainment" areas. If standards are met, the area is designated as an "attainment" area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered "unclassified." National nonattainment areas are considered severe, serious, or moderate as a function of deviation from standards.

As shown in Table 4, the Bay Area is in nonattainment for the national and State 1-hour ozone standard and the State PM_{10} standard. As shown in the table, the Bay Area is in nonattainment for the State 1-hour ozone standard, national 8-hour ozone standard, State 24-hour and annual PM_{10} standards, and the State annual $PM_{2.5}$ standard. This means that the area experiences poor air quality at times.

Table 4: Bay Area Air Basin Attainment Status

Pollutant	Averaging Time	State Status	National Status
Ozone	1-hour	Nonattainment	Not Applicable [1]
	8-hour	Unclassified	Nonattainment [2]
Carbon monoxide	1-hour and 8-hour	Attainment	Attainment [3]
Nitrogen dioxide	1-hour	Attainment	No federal standard
	Annual	No State standard	Attainment
Sulfur dioxide	24-hour; 1-hour	Attainment	Attainment
PM_{10}	24-hour	Nonattainment	Unclassified
	Annual	Nonattainment	No federal standard [4]
$PM_{2.5}$	24-hour	No State standard	Unclassified
	Annual	Nonattainment	Attainment

Notes:
[1] The national 1-hour ozone standard was revoked by EPA on June 15, 2005.
[2] In June 2004, the Bay Area was designated as a marginal nonattainment area of the national 8-hour ozone standard.
[3] In April 1998, the Bay Area was redesignated to attainment for the national 8-hour carbon monoxide standard.
[4] EPA revoked the annual PM_{10} standard on September 21, 2006.
Source: BAAQMD, 2007

SECTION 3: THRESHOLDS OF SIGNIFICANCE

3.1 - CEQA Guidelines

For the purpose of this analysis, the following thresholds of significance, derived from the State CEQA Guidelines (Appendix G) and advisory CEQA thresholds suggested by BAAQMD, have been used to determine whether implementation of the project or alternatives under consideration would result in significant air quality impacts.

Based on Appendix G of the State CEQA Guidelines, an air quality impact is considered significant if implementation of the proposed project or alternatives under consideration would do any of the following. Would the project:

a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Violate any air quality standard or contribute substantially to an existing or protected air quality violation;

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

d) Expose sensitive receptors to substantial pollutant concentrations; or

e) Create objectionable odors affecting a substantial number of people.

CEQA guidelines define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in the environment." To determine if a proposed project would have a significant impact on air quality, the type, level, and impact of emissions generated by the proposed project must be evaluated. While the final determination of whether or not a project is significant is within the purview of the lead agency pursuant to Section 15064(b) of the State CEQA Guidelines, SCAQMD recommends that its quantitative air pollution thresholds be used to determine the significance of project emissions. If the lead agency finds that the proposed project has the potential to exceed these air pollution thresholds, the project should be considered to have significant air quality impacts.

3.2 - Regional Significance Thresholds

As stated in Appendix G, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the above determinations. These thresholds are primarily based on the BAAQMD CEQA Guidelines (BAAQMD 1999). However, the District is in the process of updating these Guidelines, and, therefore, practical modifications of some of the published thresholds are being recommended in practice (Greg Tholan,

May 3, 2007, pers. comm.). Where a difference is recommended, it will be so noted. The BAAQMD suggests that an air quality impact is considered significant if implementation of the proposed project or alternatives under consideration would cause any of the following impacts.

Construction Impacts

Construction-related emissions are generally short-term in duration but may still cause adverse air quality impacts. The BAAQMD historically considered PM_{10} the pollutant of greatest concern with respect to construction activities. PM_{10} emissions can result from a variety of construction activities, including excavation, grading, demolition, vehicle travel on paved and unpaved surfaces, and vehicle and equipment exhaust. The District is concerned that construction-related emissions can cause substantial increases in localized concentrations of PM_{10} and can lead to adverse health effects, as well as nuisance concerns such as reduced visibility and soiling of exposed surfaces.

Historically, the District had identified a set of feasible PM_{10} control measures for construction activities that were considered the determining factor of significance for construction activities. However, the District is increasingly recognizing the importance PM_{10} and $PM_{2.5}$ from construction activities and the emissions of carbon monoxide and ozone precursors from construction equipment. Therefore, the District no longer recommends that quantification of construction emissions is not necessary.

Since the BAAQMD have not yet officially set specific thresholds of significance for construction activities but would like analyses to assign it greater importance, this report will use the threshold established by the BAAQMD for operational emissions. Therefore, an air quality impact is considered significant if implementation of the proposed project or alternatives under consideration would generate construction-related emissions that exceed 80 lb/day for NO_x, ROG, or PM_{10}.

Project Operations

For many types of land use development, such as office parks, shopping centers, residential subdivisions and other indirect sources, motor vehicles traveling to and from the projects represent the primary source of air pollutant emissions associated with project operations. Significance thresholds established by the BAAQMD are discussed below and address the impacts of these indirect source emissions on local and regional air quality. Thresholds are also provided for other potential impacts related to project operations, such as odors and toxic air contaminants.

Total Emissions

Total emissions from project operations should be compared to the thresholds provided in Table 5. Total operational emissions evaluated under this threshold should include all emissions from motor vehicle use associated with the project. A project that generates criteria air pollutant emissions in excess of the annual or daily thresholds in Table 5 would be considered to have a significant air quality impact.

Table 5: BAAQMD Operational Significance Thresholds

Pollutant	Operation (pounds per day)
Oxides of nitrogen (NO_x)	80
Reactive organic gases (ROG)	80
Particulate matter (PM_{10})	80
Source: BAAQMD CEQA Guidelines, 1999.	

Local Carbon Monoxide Concentrations

Localized carbon monoxide concentrations should be estimated for projects in which (1) vehicle emissions of CO would exceed 550 pounds per day; (2) project traffic would significantly impact intersections or roadway links operating at Level of Service (LOS) D, E or F or would cause LOS to decline to D, E or F; or (3) project traffic would increase traffic volumes on nearby roadways by 10 percent or more unless the increase in traffic volume is less than 100 vehicles per hour. A project contributing to CO concentrations exceeding the CAAQS of 9 ppm averaged over 8 hours and 20 ppm for 1 hour would be considered to have a significant impact.

Odors

While offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and the District. Any project with the potential to frequently expose members of the public to objectionable odors would be deemed to have a significant impact.

Greenhouse Gases

The BAAQMD is one of the most progressive air districts in the State concerning GHGs and climate change issues. In 2005, the Bay Area Air District initiated a Climate Protection Program, and on June 1, 2005, the District Board of Directors adopted a resolution establishing a Climate Protection Program, acknowledging the link between climate protection and programs to reduce air pollution in the Bay Area. A central element of the District's climate protection program is the integration of climate protection activities into existing District programs. In addition, the District's climate protection program emphasizes collaboration with ongoing climate protection efforts at the local and State levels, public education and outreach, and technical assistance to cities and counties. In November 2006, the District prepared a District-wide Source Inventory of Bay Area Greenhouse Gas Emissions.

While neither the California Appendix G Guidelines, nor any judicial decision, CEQA regulation, or statute require an evaluation of a project's impact on greenhouse gases, consistent with the public policy rationale underlying AB 32, this report does, in fact, fully analyze the project's impacts on greenhouse gas emissions. As defined under AB 32, greenhouse gas emissions include the following:

carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Global Warming Potential

Greenhouse gases have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere; it is the "cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas." (EPA 2006d) One teragram of carbon dioxide equivalent (Tg CO_2 Eq.) is essentially the emissions of the gas multiplied by the GWP. One teragram is equal to one million metric tons. The carbon dioxide equivalent is a good way to assess emissions because it gives weight to the GWP of the gas. Atmospheric lifetime and GWP of selected gases, summarized in Table 6, shows that GWP ranges from 1 to 23,900.

Table 6: Global Warming Potentials

Greenhouse Gas	Global Warming Potential (100 year time horizon)
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310
HFC-23	11,700
HFC-134a	1300
HFC-152a	140
PFC: Tetrafluoromethane (CF_4)	6,500
PFC: Hexafluoroethane (C_2F_6)	9,200
Sulfur hexafluoride (SF_6)	23,900
Source: EPA 2006k	

Regarding GHG, the BAAQMD has not identified a significance threshold to use in CEQA documents. Further, it appears that no other air district in California has generated a significance threshold pertaining to GHG. The State has identified statewide emissions in the year 1990 as a goal through adoption of AB 32. If this goal were attained, California would generate less GHG than it does today. It is recognized, though, that there is no simple measure available to determine if a single project would advance toward or away from this goal. Because GHG are global, a project that shifts the location of where someone lives or works, by itself, may or may not contribute new GHG. For example, someone may move from Southern California (and from the South Coast Air Quality Management District) to the project site, and while this would likely increase emissions within the Basin, it is not conclusive that this would result in generation of more GHG globally. In fact, if a person moves from one location, where they have long commutes and a land use pattern that requires substantial energy use, to a project that promotes shorter and fewer vehicle trips, more walking and

less energy use, it could be argued that the new project would result in a potential reduction in generation of global GHG.

The California Environmental Protection Agency (CalEPA) Climate Action Team (CAT) developed a report that "proposes a path to achieve the Governor's targets that will build on voluntary actions of California businesses, local government and community actions, and State incentive and regulatory programs" (CAT 2006) needed to reduce activities which contribute to global climate change . There are no adopted thresholds to assess the significance of project impacts. The report indicates that the strategies will reduce California's emissions to the levels proposed in Executive Order S-3-05.

The California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires CARB, the State agency charged with regulating statewide air quality, to adopt rules and regulations that by 2020 would achieve a reduction in greenhouse gas emissions equivalent to the statewide inventory levels of 1990. On or before June 30, 2007, CARB is required to publish a list of discrete greenhouse gas emission reduction measures that can be implemented. On April 20, 2007, CARB published its proposed early actions (CARB 2007) that include discrete early action measures, additional greenhouse gas reduction strategies, and criteria and toxic control measures.

The basis for these greenhouse gas reduction goals that California has adopted into law is provided in the United Nations Intergovernmental Panel on Climate Change climate models that predict the climate stabilizing at approximately 2 degrees Celsius rise in average temperatures long-term.

Given this information, it can be argued that the AB 32, Executive Order S-3-05, and the CAT report constitute substantial evidence as defined in CEQA that development projects need to reduce greenhouse gas emissions to the target levels by adopting the reduction measures in order to find that the project's incremental contribution to global climate change impacts are not significant.

If the project is not consistent with those strategies that the Lead Agency deems are feasible, then a project could potentially be deemed to have a significant impact concerning global climate change.

Cumulative Impacts

The BAAQMD has set the threshold for cumulative significance, as any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact. Additionally, for any project that does not individually have significant operational air quality impacts, the determination of significant cumulative impact should be based on an evaluation of the consistency of the project with the local general plan and of the general plan with the regional air quality plan.

If a project is proposed in a city or county with a general plan that is consistent with the Clean Air Plan and the project is consistent with that general plan (i.e., it does not require a general plan amendment), then the project will not have a significant cumulative impact (provided, of course, the

project does not individually have any significant impacts). No further analysis regarding cumulative impacts is necessary.

In a jurisdiction with a general plan consistent with the Clean Air Plan, a project may be proposed that is not consistent with that general plan because it requires a general plan amendment (GPA). In such instances, the cumulative impact analysis should consider the difference(s) between the project and the original (pre-GPA) land use designation for the site with respect to motor vehicle use and potential land use conflicts. A project would not have a significant cumulative impact if (1) vehicle miles traveled (VMT) from the project would not be greater than the VMT that would be anticipated under the original land use designation and (2) the project would not result in sensitive receptors being close to sources of objectionable odors, toxics, or accidental releases of hazardous materials.

For a project in a city or county with a general plan that is not consistent with the Clean Air Plan, the cumulative impact analysis should consider the combined impacts of the proposed project and past, present, and reasonably anticipated future projects. ("Reasonably anticipated future projects" should include, at a minimum, projects of which the Lead Agency is aware based on applications for permits and other land use entitlements, environmental documents, and discussions with probable future developers.) A project would have a significant cumulative impact if these combined impacts would exceed any of the thresholds established above for project operations. A quantitative analysis of past, present, and future projects would be required as part of this determination. The analysis should also address how the project and past, present, and future projects would influence population and vehicle use projections.