3.4 Air Quality

3.4.1 Setting

Climate and Meteorology

The project site is located in the north end of the Alexander Valley, or the Cloverdale Valley. The site lies within the boundaries of the North Coast Air Basin. This Basin includes Del Norte, Humboldt, Trinity, and Mendocino Counties, as well as, the northern portion of Sonoma County. The climate of Sonoma County is characterized by moderate temperature and precipitation.

Along the coast, temperatures remain cool throughout the summer and seldom drop below freezing during the winter. Inland areas have a wider temperature range, with high readings occasionally exceeding 100ºF and lows sometimes falling several degrees below freezing. Even during the warm period of the year, however, night temperatures usually drop into the lower 50's. Dominant winds also exhibit a seasonal pattern. During the summer, frequently strong north to northwesterly winds are common. In the winter, storms from the South Pacific increase the percentage of days with winds from the south.

In the river canyons that empty into the Pacific, the winter pattern often exhibits a diurnal pattern. Specifically, in the morning hours, cool air from higher elevations flows down the valleys. Later in the day, as the lower elevation air heats up, this pattern is reversed and the air flow heads up the canyon. These air flows can frequently be very strong. Offshore and onshore flows are also common along the coast and are associated with pressure systems in the area. Onshore flows frequently bring foggy cool weather to the coast, while offshore flows often bring sunny, warm days.

Air Quality Standards

Regulation of air quality is achieved through implementation of national and state ambient air quality (concentration) standards and enforcement of emissions limits for individual sources of air pollutants. The federal Clean Air Act required the U.S. Environmental Protection Agency (EPA) to identify National Ambient Air Quality Standards (national standards) to protect public health and welfare. National standards have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur oxide, suspended particulate matter (PM10 and PM2.5), and lead. These pollutants are called "criteria" air pollutants because the corresponding ambient standards satisfy criteria specified under the Clean Air Act. The State of California has established its own ambient air quality standards (state standards) which are generally more stringent, or health protective, than their national counterparts. **Table 3.4-1** presents both sets of ambient air quality standards (i.e., national and state) and provides a brief discussion of the related health effects and principal sources for each pollutant.

TABLE 3.4-1
STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS, EFFECTS, AND SOURCES

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 hour	0.09 ppm	---	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when reactive organic gases (ROG) and nitrogen oxides (NO_X) react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial / industrial mobile equipment.
	8 hours	0.07 ppm[1]	0.075 ppm		
Carbon Monoxide	1 hour	20 ppm	35 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm		
Nitrogen Dioxide	1 hour	0.18 ppm	0.100 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
	Annual Avg.	0.030 ppm	0.053 ppm		
Sulfur Dioxide	1 hour	0.25 ppm	75 ppb	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	3 hours	---	0.5 ppm		
	24 hours	0.04 ppm	0.14 ppm		
	Annual Avg.	---	0.03 ppm		
Respirable Particulate Matter (PM-10)	24 hours	50 □g/m^3	150 g/m^3	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	Annual Avg.	20 □g/m^3	---		
Fine Particulate Matter (PM-2.5)	24 hours	---	35 g/m^3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; Also, formed from photochemical reactions of other pollutants, including NO_X, sulfur oxides, and organics.
	Annual Avg.	12 □g/m^3	15 g/m^3		
Lead	Monthly Ave.	1.5 □g/m^3	---	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	Quarterly	---	1.5 g/m^3		
Hydrogen Sulfide	1 hour	0.03 ppm	No National Standard	Geothermal Power Plants, Petroleum Production and refining	Nuisance odor (rotten egg smell), headache and breathing difficulties (higher concentrations)
Sulfates	24 hour	25 □g/m^3	No National Standard	Produced by the reaction in the air of SO2.	Breathing difficulties, aggravates asthma, reduced visibility
Visibility Reducing Particles	8 hour	Extinction of 0.23/km; visibility of 10 miles or more	No National Standard	Reduces visibility, reduced airport safety, lower real estate value, and discourages tourism.	See PM2.5.

NOTE: ppm = parts per million; g/m^3 = micrograms per cubic meter.
1 This concentration was approved by the Air Resources Board on April 28, 2005 and became effective May 17, 2006.

SOURCE: CARB, 2001 and CARB, 2010

The federal Clean Air Act required the EPA to designate air basins, or portions thereof, as either "attainment" or "nonattainment" for each criteria air pollutant, based on whether or not the national standards have been achieved. The California Clean Air Act, patterned after the federal Clean Air Act, also required that areas be designated as "attainment" or "nonattainment", but with respect to the state standards rather than the national standards. A table summarizing federal and state attainment status for criteria air pollutants is included as **Table 3.4-2**.

TABLE 3.4-2
ATTAINMENT STATUS

	Designation/Classification	
Pollutant	**Federal Standards**	**State Standards**
NCAB[1]		
Ozone – one hour	No Federal Standard[2]	Attainment
Ozone – eight hour[3]	Unclassified/Attainment	Attainment
PM10	Unclassified	Non-attainment
PM2.5	Unclassified/Attainment	Unclassified
CO	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead	No Designation	Attainment
Hydrogen Sulfide	No Federal Standard	Attainment
BAAQMD		
Ozone – one hour	No Federal Standard	Nonattainment
Ozone – eight hour	Nonattainment	Nonattainment
PM10	Unclassified	Nonattainment
PM2.5	Non-Attainment	Nonattainment
CO	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead	No Designation	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified

1 The North Coast Air Basin includes both the Mendocino County Air Quality Management District (MCAQMD) and the Northern Sonoma County Air Pollution Control District (NSCAPCD)
2 Federal One Hour Ozone National Ambient Air Quality Standard was revoked on June 15, 2005
3 The State 8-hour ozone standard was approved by the ARB on April 28, 2005, and became effective May 17, 2006.

SOURCE: BAAQMD, 2011. *Ambient Air Quality Standards and Bay Area Attainment Status, http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm,* accessed March 9, 2011.
ARB 2010, http://www.arb.ca.gov/desig/adm/adm.htm, accessed March 9, 2011.

Regulatory Framework

General Conformity Rule

Federal projects are subject to either the Transportation Conformity Rule (40 CFR, Part 51, Subpart T), which applies to federal highway and transit projects, or the General Conformity Rule (40 CFR, Part 51, Subpart W), which applies to all other federal projects. Since the Tribe has not adopted their own air quality program, the thresholds of significance established in the federal General Conformity Rule would apply to the Proposed Action and alternatives. The General Conformity

Rule implements Section 176(c) of the federal Clean Air Act, which requires that a federal agency ensure conformity with an approved state implementation plan (SIP) for those air emissions that would be generated by an agency action. The Proposed Action is located in the Northern Sonoma County APCD. Project operation would generate criteria pollutant emissions in that district and also in two others, the Mendocino County APCD and the BAAQMD. Pollutant emissions generated in the Northern Sonoma County APCD and the Mendocino County APCD would not require review under the federal General Conformity Rule because both districts are designated attainment or unclassified for all criteria pollutants. However, the BAAQMD is currently designated nonattainment for Ozone and PM 2.5. To ensure compliance with the General Conformity Rule, emissions generated by the project within the BAAQMD have been evaluated to determine whether they would exceed applicable thresholds or be regionally significant.

Council on Environmental Quality Draft Guidance

On February 18, 2010, the Council on Environmental Quality issued a Memorandum to Federal Agencies regarding Draft National Environmental Policy Act (NEPA) Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. The draft guidance is intended to help explain how agencies of the Federal government should analyze the environmental effects of GHG emissions and climate change when they describe the environmental effects of a proposed agency action in accordance with NEPA. Regarding greenhouse gas emissions the draft guidance states:

> "Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO_2-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 25,000 metric tons of CO_2-equivalent, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis. CEQ does not propose this as an indicator of a threshold of significant effects, but rather as an indicator of a minimum level of GHG emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of GHGs."

In addition to the effects of greenhouse gases, the draft guidance recommends evaluation of the relationship of climate change effects to the proposed action or alternatives (increased risk of floods, wildfires, etc).

State Greenhouse Gas Standards

Executive Order S-3-05

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emission of greenhouse gas (GHG) would be progressively reduced, as follows:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

Assembly Bill 32 (AB 32)

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, Sections 38500, et seq., or AB 32), which requires the California Air Resources Board (CARB) to design and implement emission limits, regulations, and other measures, such that statewide GHG emissions will be reduced to 1990 levels by 2020.

In December 2007, CARB approved the 2020 emission limit of 427 million metric tons of CO_2 equivalents of GHGs. The 2020 target of 427 million metric tons of CO_2 equivalent (CO_2E) requires the reduction of 169 million metric tons of CO_2E, or approximately 30 percent, from the state's projected 2020 emissions of 596 million metric tons of CO_2E (business-as-usual).

Also in December 2007, CARB adopted mandatory reporting and verification regulations pursuant to AB 32. The mandatory reporting regulations require reporting for certain types of facilities that make up the bulk of the stationary source emissions in California. The regulation language identifies major facilities as those that generate more than 25,000 metric tons/year of CO_2E. Cement plants, oil refineries, electric-generating facilities/providers, cogeneration facilities, and hydrogen plants and other stationary combustion sources that emit more than 25,000 metric tons/year CO_2E, make up 94 percent of the point source CO_2E emissions in California (CARB, 2007).

In June, 2008, CARB published its *Climate Change Draft Scoping Plan* (CARB, 2008a). The *Climate Change Draft Scoping Plan* reported that CARB met the first milestones set by AB 32 in 2007: developing a list of early actions to begin sharply reducing GHG emissions; assembling an inventory of historic emissions; and establishing the 2020 emissions limit. After consideration of public comment and further analysis, CARB released the *Climate Change Proposed Scoping Plan* in October, 2008 (CARB, 2008b). The Proposed Scoping Plan proposes a comprehensive set of actions designed to reduce overall carbon emissions in California. Key elements of the Proposed Scoping Plan include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards
- Achieving a statewide renewable energy mix of 33 percent
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets
- Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation (CARB, 2008b)

The *Climate Change Proposed Scoping Plan* notes that "[a]fter Board approval of this plan, the measures in it will be developed and adopted through the normal rulemaking process, with public input" (CARB, 2008b).

The *Climate Change Proposed Scoping Plan* states that local governments are "essential partners" in the effort to reduce GHG emissions, and that they have "broad influence and, in some cases, exclusive jurisdiction" over activities that contribute to GHG emissions. The plan acknowledges that local governments have broad influence and, in some cases, exclusive authority over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Many of the proposed measures to reduce GHG emissions rely on local government actions. The plan encourages local governments to reduce GHG emissions by approximately 15 percent from current levels by 2020 (CARB, 2008b).

AB 32 Recommended Actions by Sector

In October 2008, CARB approved a list of thirty-nine Recommended Actions to reduce GHG emissions to meet the AB 32 Goals, and is currently in the process of developing regulations and programs based on these measures. Regulations implementing the Discrete Early Action measures must be adopted and in effect by January 1, 2010 (HSC §38560.5 (b)). All the Recommended Actions are included in **Table 3.4-3** below.

TABLE 3.4-3
LIST OF AB 32 RECOMMENDED ACTIONS TO REDUCE GHG EMISSIONS BY SECTOR

Measure No.	Measure Description	GHG Reductions (Million Metric Tons per year of CO_2E)
Transportation		
T-1	Pavley I and II – Light Duty Vehicle Greenhouse Gas Standards	31.7
T-2	Low Carbon Fuel Standard (Discrete Early Action)	15
T-3[1]	Regional Transportation-Related Greenhouse Gas Targets	5
T-4	Vehicle Efficiency Measures	4.5
T-5	Ship Electrification at Ports (Discrete Early Action)	0.2
T-6	Goods Movement Efficiency Measures. • Ship Electrification at Ports • System-Wide Efficiency Improvements	3.5
T-7	Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure – Aerodynamic Efficiency (Discrete Early Action)	0.93
T-8	Medium- and Heavy-Duty Vehicle Hybridization	0.5
T-9	High Speed Rail	1
Electricity and Natural Gas		
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) • Increased Utility Energy Efficiency Programs • More Stringent Building & Appliance Standards Additional Efficiency and Conservation Programs	15.2
E-2	Increase Combined Heat and Power Use by 30,000 GWh (Net reductions include avoided transmission line loss)	6.7
E-3	Renewables Portfolio Standard (33% by 2020)	21.3
E-4	Million Solar Roofs (including California Solar Initiative, New Solar Homes Partnership and solar programs of publicly owned utilities) • Target of 3000 MW Total Installation by 2020	2.1

TABLE 3.4-3
LIST OF AB 32 RECOMMENDED ACTIONS TO REDUCE GHG EMISSIONS BY SECTOR

Measure No.	Measure Description	GHG Reductions (Million Metric Tons per year of CO_2E)
CR-1	Energy Efficiency (800 Million Therms Reduced Consumptions) • Utility Energy Efficiency Programs • Building and Appliance Standards • Additional Efficiency and Conservation Programs	4.3
CR-2	Solar Water Heating (AB 1470 goal)	0.1
Green Buildings		
GB-1	Green Buildings	26
Water		
W-1	Water Use Efficiency	1.4†
W-2	Water Recycling	0.3†
W-3	Water System Energy Efficiency	2.0†
W-4	Reuse Urban Runoff	0.2†
W-5	Increase Renewable Energy Production	0.9†
W-6	Public Goods Charge (Water)	TBD†
Industry		
I-1	Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	TBD
I-2	Oil and Gas Extraction GHG Emission Reduction	0.2
I-3	GHG Leak Reduction from Oil and Gas Transmission	0.9
I-4	Refinery Flare Recovery Process Improvements	0.3
I-5	Removal of Methane Exemption from Existing Refinery Regulations	0.01
Recycling and Water Management		
RW-1	Landfill Methane Control (Discrete Early Action)	1
RW-2	Additional Reductions in Landfill Methane • Increase the Efficiency of Landfill Methane Capture	TBD†
RW-3	High Recycling/Zero Water • Commercial Recycling • Increase Production and Markets for Compost • Anaerobic Digestion • Extended Producer Responsibility • Environmentally Preferable Purchasing	9†
Forests		
F-1	Sustainable Forest Target	5
High Global Warming Potential (GWP) Gases		
H-1	Motor Vehicle Air Conditioning Systems: Reduction of Refrigerant Emissions from Non-Professional Servicing (Discrete Early Action)	0.26
H-2	SF_6 Limits in Non-Utility and Non-Semiconductor Applications (Discrete Early Action)	0.3
H-3	Reduction of Perfuorocarbons in Semiconductor Manufacturing (Discrete Early Action)	0.15
H-4	Limit High GWP Use in Consumer Products Discrete Early Action (Adopted June 2008)	0.25
H-5	High GWP Reductions from Mobile Sources • Low GWP Refrigerants for New Motor Vehicle Air Conditioning Systems • Air Conditioner Refrigerant Leak Test During Vehicle Smog Check • Refrigerant Recovery from Decommissioned Refrigerated Shipping Containers • Enforcement of Federal Ban on Refrigerant Release during Servicing or Dismantling of Motor Vehicle Air Conditioning Systems	3.3
H-6	High GWP Reductions from Stationary Sources • High GWP Stationary Equipment Refrigerant Management Program:	10.9

TABLE 3.4-3
LIST OF AB 32 RECOMMENDED ACTIONS TO REDUCE GHG EMISSIONS BY SECTOR

Measure No.	Measure Description	GHG Reductions (Million Metric Tons per year of CO_2E)
	○ Refrigerant Tracking/Reporting/Repair Deposit Program ○ Specifications for Commercial and Industrial Refrigeration Systems • Foam Recovery and Destruction Program • SF_6 Leak Reduction and Recycling in Electrical Applications • Alternative Suppressants in Fire Protection Systems • Residential Refrigeration Early Retirement Program	
H-7	Mitigation Fee on High GWP Gases	5
Agriculture		
A-1	Methane Capture at Large Dairies	1.0†

1 This is not the SB 375 regional target. CARB will establish regional targets for each MPO region following the input of the regional targets advisory committee and a consultation process with MPO's and other stakeholders per SB 375
† GHG emission reduction estimates are not included in calculating the total reductions needed to meet the 2020 target

SOURCE: CARB, October 2008

California Air Resources Board

CARB, California's state air quality management agency, regulates mobile emissions sources and oversees the activities of Air Pollution Control Districts and Air Quality Management Districts. CARB indirectly regulates local air quality by having established state ambient air quality standards and vehicle emission standards, by conducting research activities, and by planning and coordinating activities.

Northern Sonoma County Air Pollution Control District

The Northern Sonoma County Air Pollution Control District (NSCAPCD) is the regional agency empowered to regulate air pollution emissions from stationary sources in the southern portion of the North Coast Air Basin. NSCAPCD regulates air quality through its permit authority over most types of stationary emissions and through its planning and review activities. Off-site impacts associated with the Proposed Action would be within the NSCAPCD's jurisdiction.

Mendocino County Air Pollution Control District

The MCAQMD is the regional agency empowered to regulate air pollution emissions from stationary sources in the central portion of the North Coast Air Basin. MCAPCD regulates air quality through its permit authority over most types of stationary emissions and through its planning and review activities. Some off-site operational impacts associated with the Proposed Action and alternatives (vehicles travelling to and from the site) would be within the MCCAPCD's jurisdiction.

Bay Area Air Quality Management District

The BAAQMD is the regional agency empowered to regulate air pollution emissions from stationary sources in the San Francisco Bay Basin. BAAQMD regulates air quality through its permit authority over most types of stationary emissions and through its planning and review activities. Some off-

site operational impacts associated with the Proposed Action and alternatives (vehicles travelling to and from the site) would be within the BAAQMD's jurisdiction.

Climate Change

Intergovernmental Panel on Climate Change

The Third Intergovernmental Panel on Climate Change (IPCC) report indicates that the average global temperature is likely to increase between 3.6 and 8.1 degrees Fahrenheit by the year 2100, with larger increases possible but not likely (IPCC, 2001). Temperature increases are expected to vary widely in specific locations depending on a variety of factors. The increase in temperature is expected to lead to higher temperature extremes, precipitation extremes leading to increased flooding and droughts, ocean acidification from increase carbon content, and rising sea levels. Because the effects of warming are likely to include making dry areas drier, and rising sea levels may inundate coastal areas, subtropical and low-lying regions are expected to be the areas most affected by climate change.

Changes in the Climates of Western United States and California

Climate models indicate that if GHG emissions continue to proceed at a medium or high rate, temperatures in California are expected to increase by 4.7 to 10.5 degrees Fahrenheit by the end of the century.[3] Lower emission rates would reduce the projected warming to 3 to 5.6 degrees Fahrenheit. Almost all climate scenarios include a continuing warming trend through the end of the century given the vast amounts of GHGs already released and the difficulties associated with reducing emissions to a level that would stabilize the climate. According to the 2006 California Climate Action Team Report (CCAT, 2006), the following climate change effects are predicted in California over the course of the next century:

- A diminishing Sierra snowpack declining by 70% to 90%, threatening the state's water supply.
- Increasing temperatures from 8 to 10.4 degrees F under higher emission scenarios, leading to a 25 to 35% increase in the number of days that ozone pollution levels are exceeded in most urban areas.
- Coastal erosion along the length of California and sea water intrusion. This would exacerbate flooding in already vulnerable regions.
- Increased vulnerability of forests due to pest infestation and increased temperatures.
- Increased challenges for the state's important agriculture industry from limited water supplies, increasing temperatures, and saltwater intrusion.
- Increased electricity demand, particularly in the hot summer months.

Based on this information, temperature increases would lead to environmental impacts in a wide variety of areas, including: reduced snowpack resulting in changes to the existing water resources, increased risk of wildfires, changing weather expectations for farmers and ranchers, and public health hazards associated with higher peak temperatures, heat waves, and decreased air quality.

Water Resources

Depending on the climate model, precipitation is predicted to increase or decrease slightly. However, the form in which precipitation occurs could change substantially. Warmer winters would lead to less snow and more rain. As a result, the Sierra snowpack would be reduced and would melt earlier. Changes in Sierra snowpack would not affect the Russian River, and runoff from the Russian River is not substantially dependent upon snowmelt. However, the Russian River watershed could experience an increased frequency and/or intensity of major storm events, including flood events. This change could lead to increased flood risks as more water flows into reservoirs and rivers during the winter rainy period. Increased temperatures would also lead to a rise in the sea level, from both thermal expansion and the melting of land-based glaciers.

During the past century, sea levels along the California coast have risen by approximately seven inches. Climate forecasts indicate the sea level would rise by 7 to 23 inches over the next 100 years, depending on the climate model. Substantial melting of either the Greenland or Antarctic ice sheets would lead to an even greater increase; however, IPCC models do not indicate that this would occur within the next 100 years, which is the boundary of most climate models. Longer forecast periods are inherently less reliable as they require more assumptions, and tend to compound the effects of assumptions that may be incorrect. Increases in sea level could lead to increased coastal flooding, salt water intrusion into aquifers, and disrupt wetlands and estuaries.

Wildfires

Increased temperatures would lead to increases in evapotranspiration. The summers would likely be drier, and vegetation would also be more likely to dry out, causing increasingly more flammable forests and wildlands. In addition, warmer temperatures could lead to the expansion of pests that kill and weaken trees, leading to increases in the amount of highly flammable dead trees, increasing the risk of large forest fires.

Weather Extremes

The temperature increases presented in climate change models are yearly averages. Within those averages is the potential for substantially hotter summers and/or colder winters. As a result of global climate change, the weather is expected to become more variable, with larger extremes. In California, the increase in temperatures is expected to lead to more days with temperatures in excess of 95 degrees. More days of extreme heat have implications for public health as Californians would face greater risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat. In addition, increased temperatures have implications for agricultural crops, particularly long-term crops such as grapes and fruit trees that are planted in particular locations to take advantage of micro-climates.

Uncertainty Regarding Global Climate Change

The scientific community has largely agreed that the earth is warming, and that humans are contributing to that change. However, the earth's climate is composed of many complex mechanisms, including ocean currents, cloud cover, as well as the jet-stream and other pressure/temperature

weather guiding systems. These systems are in turn influenced by changes in ocean salinity, changes in the evapotranspiration of vegetation, the reflectivity (albedo) of groundcover, and numerous other factors. Some changes have the potential to reduce climate change, while others could form a feedback mechanism that would speed the warming process beyond what is currently projected. While the climate system is inherently dynamic, the overall consensus appears to be towards a gradually warming planet.

3.4.2 Existing Conditions

Given that the prevailing winds in the northern portion of Sonoma County serve to concentrate pollutants northward into narrow valleys, the air pollution potential of this area would be high if there were significant sources of pollution. However, with the exception of some processing of agricultural goods, such as cheese and wine manufacturing, there is little industry in the valleys and only minor local sources of air pollution.

Definitions

The following definitions are provided as background to the existing conditions discussion.

Ozone

Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Ozone, the main component of photochemical smog, is primarily a summer and fall pollution problem. Ozone is not emitted directly into the air but is formed through a complex series of chemical reactions involving other compounds that are directly emitted. These directly emitted pollutants (also known as ozone precursors) include reactive organic gases (ROG) and nitrogen oxides (NOx). The time period required for ozone formation allows the reacting compounds to spread over a large area, producing a regional pollution problem. Ozone problems are the cumulative result of regional development patterns rather than the result of a few significant emission sources.

Once formed, ozone remains in the atmosphere for one or two days. Ozone is then eliminated through reaction with chemicals on the leaves of plants, attachment to water droplets as they fall to earth ("rainout") and absorption by water molecules in clouds that later fall to earth with rain ("washout").

Carbon Monoxide

Ambient carbon monoxide concentrations normally are considered a local effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic. Wind speed and atmospheric mixing also influence carbon monoxide concentrations. Under inversion conditions, carbon monoxide concentrations may be distributed more uniformly over an area that may extend some distance from vehicular sources. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition

is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia, as well as for fetuses.

Carbon monoxide concentrations have declined dramatically in California due to existing controls and programs and most areas of the state, including the Station Area Plan region, have no problem meeting the carbon monoxide state and federal standards. CO measurements and modeling were important in the early 1980's when CO levels were regularly exceeded throughout California. In more recent years, CO measurements and modeling have not been a priority in most California air districts due to the retirement of older polluting vehicles, less emissions from new vehicles and improvements in fuels. The clear success in reducing CO levels is evident in the first paragraph of the executive summary of CARB's *2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for Ten Federal Planning Areas* (CARB, 2004), shown below:

"The dramatic reduction in carbon monoxide (CO) levels across California is one of the biggest success stories in air pollution control. CARB requirements for cleaner vehicles, equipment and fuels have cut peak CO levels in half since 1980, despite growth. All areas of the State designated as non-attainment for the federal 8-hour CO standard in 1991 now attain the standard, including the Los Angeles urbanized area. Even the Calexico area of Imperial County on the congested Mexican border had no violations of the federal CO standard in 2003. Only the South Coast and Calexico continue to violate the more protective State 8-hour CO standard, with declining levels beginning to approach that standard."

Respirable Particulate Matter (PM10 and PM2.5)

Respirable Particulate Matter (PM10 and PM2.5) consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. A micron is one-millionth of a meter. PM10 and PM2.5 represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Some sources of particulate matter, such as wood burning in fireplaces, demolition, and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. PM2.5 is mostly produced by combustion sources, such as automobiles, trucks, and other vehicle exhaust. In general, particulate matter from fugitive dust is primarily composed of PM10 with a relatively small fraction of PM2.5; alternatively, particulate matter from combustion sources is primarily composed of PM2.5 with a small fraction of PM10. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility. Large dust particles (diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This large dust is of more concern as a soiling nuisance rather than a health hazard. The remaining fraction, PM10 and PM2.5, are a health concern particularly at levels above the federal and state ambient air quality standards. PM2.5 (including diesel exhaust particles) is thought to have greater effects on health, because these particles are so small and thus, are able to penetrate to the deepest parts of the lungs. Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Recent studies have shown

an association between morbidity and mortality and daily concentrations of particulate matter in the air. Children are more susceptible to the health risks of PM10 and PM2.5 because their immune and respiratory systems are still developing.

Mortality studies since the 1990s have shown a statistically significant direct association between mortality (premature deaths) and daily concentrations of particulate matter in the air. Despite important gaps in scientific knowledge and continued reasons for some skepticism, a comprehensive evaluation of the research findings provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health (Dockery and Pope, 2006). CARB has estimated that achieving the ambient air quality standards for PM10 could reduce premature mortality rates by 6,500 cases per year (CARB, 2002).

Nitrogen Dioxide

NO_2 is a reddish brown gas that is a by-product of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, nitrogen dioxide can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as a coloring component of a brown cloud on high pollution days, especially in conjunction with high ozone levels.

Toxic Air Contaminants (TACs)

TACs are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including particulate emissions from diesel-fueled engines.

Diesel particulate matter (DPM) is the most complex of diesel emissions. Diesel particulates, as defined by most emission standards, are sampled from diluted and cooled exhaust gases. This definition includes both solids and liquid material that condenses during the dilution process. The basic fractions of DPM are elemental carbon, heavy hydrocarbons derived from the fuel and lubricating oil and hydrated sulfuric acid derived from the fuel sulfur. DPM contains a large portion of the polycyclic aromatic hydrocarbons (PAH) found in diesel exhaust. Diesel particulates include small nuclei mode particles of diameters below 0.04µm and their agglomerates of diameters up to 1µm. Ambient exposures to diesel particulates in California are significant fractions of total TAC levels in the State.

Odorous Emissions

Though offensive odors from stationary sources rarely cause any physical harm, they still remain unpleasant and can lead to public distress generating citizen complaints to local governments. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source, wind speed and direction, and the sensitivity of receptors.

Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere, similar to a greenhouse. The accumulation of GHGs has been implicated as a driving force for Global Climate Change. Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth's climate caused by natural fluctuations and the impact of human activities that alter the composition of the global atmosphere. Both natural processes and human activities emit GHGs.

The major concern is that increases in GHGs are causing Global Climate Change. Global Climate Change is a change in the average weather on earth that can be measured by wind patterns, storms, precipitation and temperature. Although there is disagreement as to the speed of global warming and the extent of the impacts attributable to human activities, the vast majority of the scientific community now agrees that there is a direct link between increased emission of GHGs and long-term global temperature. Potential global warming impacts in California may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CARB, 2009). Secondary effects are likely to include a global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.

The accumulation of GHGs in the atmosphere regulates the earth's temperature; however, emissions from human activities such as electricity production and motor vehicles have elevated the concentration of GHGs in the atmosphere. This accumulation of GHGs has contributed to an increase in the temperature of the earth's atmosphere and contributed to Global Climate Change. The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and water vapor (H_2O). Carbon dioxide is the reference gas for climate change because it gets the most attention and is considered the most important GHG. To account for the warming potential of GHGs, GHG emissions are often quantified and reported as CO_2 equivalents (CO_2E). The effects of GHG emission sources (i.e., individual projects) are reported in metric tons/year of CO_2E.

Existing Air Quality and Monitoring Data

The CARB and local air districts collect ambient air quality data through a network of air pollutant monitoring stations. **Table 3.4-4** provides a three-year summary of ambient concentrations of ozone, PM10, and carbon monoxide at monitoring stations in the site vicinity for the years 2005 to 2007.

TABLE 3.4-4
AIR QUALITY DATA SUMMARY (2007–2009) FOR THE STUDY AREA

Pollutant	Standard	Monitoring Data by Year 2007	2008	2009
Ozone – Healdsburg Municipal Airport Station				
Highest 1-hour average, ppm [a]		0.070	0.080	0.070
Days over State Standard	0.09	0	0	0
Highest 8-hour average, ppm [a]	0.075	0.067	0.065	0.063
Days over National Standard		0	0	0
Particulate Matter (PM10) – Cloverdale				
Highest 24-hour average, µg/m^3 [a]		29	81	24
Measured days above National Standard [b]	150	0	1	0
Measured days above State Standard [b]	50	0	0	0
Particulate Matter (PM2.5) - 5th St., Santa Rosa Station				
Highest 24-hour average, µg/m^3 [a]		32	30.8	29
Measured days above National Standard [b]	65	0	0	0
State Annual Average	12	7.6	NA	7.6
Carbon Monoxide – 5th St., Santa Rosa Station				
Highest 8-hour average, ppm [a]		1.71	1.49	1.34
Days over National Standard	9	0	0	0
Days over State Standard	9.0	0	0	0

NOTES:
a ppm = parts per million; µg/m^3 = micrograms per cubic meter.
b Particulate is usually measured every sixth day (rather than continuously like the other pollutants). Measured days counts the days that a measurement was greater than the standard. Estimated days mathematically estimates how many days concentrations would be greater than the level of the standard had each day been monitored.
NA = Not Available

SOURCE: CARB, 2011

Data for ozone were collected at the Healdsburg Municipal Airport monitoring station, approximately four miles southwest of the site. Data for PM10 were collected at the monitoring station in Cloverdale. Both stations are in Sonoma County and within the North Coast Air Basin. The closest monitoring station to the site that monitors for carbon monoxide and PM2.5 is the Santa Rosa/5th Street monitoring station, approximately 22 miles south of the site. Although in Sonoma County, this station is in the San Francisco Bay Area Air Basin.

Sensitive Receptors

Some receptors are considered more sensitive than others to air pollutants. Reasons for greater sensitivity include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Schools, hospitals and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people and the infirm are more susceptible to respiratory infections and other air quality-related health problems than the general public. Residential areas are also sensitive to poor air quality because people usually stay home for extended periods of time. The nearest sensitive receptor to the project site is a residence approximately 250 feet away on Santana Drive. There are also residences located across Highway

101, the nearest being approximately 500 feet on Otto Boni Drive. The nearest school is located approximately 1,500 feet east of the project site on South Cloverdale Blvd.

3.4.3 References

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