Air Quality and Greenhouse Gas Analysis Report
Sand Hill Avian Validation Project
Alameda County, California

Prepared for:
Tetra Tech, Inc.
17885 Von Karman Avenue
Irvine, CA 92614

Contact: Derrick Coleman, PhD, Senior Project Manager

Prepared by:
FirstCarbon Solutions | Michael Brandman Associates
2633 Camino Ramon, Suite 460
San Ramon, California 94583
559.246.3732

Contact: Dave Mitchell, Air Quality Services Manager

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
AB	Assembly Bill
AQMP	Air Quality Management Plan
BAAQMD	Bay Area Air Quality Management District
ARB	California Air Resources Board
CalEEMod	California Emissions Estimator Model
CEQA	California Environmental Quality Act
CO	carbon monoxide
CO_2	carbon dioxide
DPM	diesel particulate matter
EPA	Environmental Protection Agency
GHG	Greenhouse Gas
ISC	Industrial Source Complex Air Dispersion Model
LOS	Level of Service
MERV	Minimum Efficiency Reporting Value
$MTCO_2e$	metric tons of carbon dioxide equivalent
$MMTCO_2e$	million metric tons of carbon dioxide equivalent
NO_x	nitrogen oxides
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppm	parts per million
ppt	parts per trillion
ROG	reactive organic gases
SB	Senate Bill
SO_x	sulfur oxides
VOC	volatile organic compounds

SECTION 1: EXECUTIVE SUMMARY

1.1 - Purpose and Methods of Analysis

The following air quality and greenhouse gas (GHG) analysis was prepared to evaluate whether the estimated air pollutant emissions generated by the Sand Hill Avian Validation Project (project) would cause significant impacts to air resources in the project area. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000, et seq.).

The project is within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The BAAQMD publishes CEQA Guidelines to assist local jurisdictions and lead agencies in complying with the requirements of CEQA regarding potentially adverse impacts to air quality. These CEQA Guidelines were updated in June 2010 to include reference to thresholds of significance ("Thresholds") adopted by the BAAQMD Board on June 2, 2010. The Guidelines were further updated in May 2011. On March 5, 2012, the Alameda County Superior Court issued a judgment finding that the BAAQMD had failed to comply with CEQA when it adopted the Thresholds. The court did not determine whether the Thresholds were valid on the merits, but found that the adoption of the Thresholds was a project under CEQA. The court issued a writ of mandate ordering the BAAQMD to set aside the Thresholds and cease dissemination of them until the BAAQMD had complied with CEQA. The BAAQMD has appealed the Alameda County Superior Court's decision. The appeal is currently pending in the Court of Appeal of the State of California, First Appellate District.

In view of the court's order, the BAAQMD is no longer recommending that the Thresholds be used as a generally applicable measure of a project's significant air quality impacts. The BAAQMD released a new version of the Guidelines in May 2012 removing the Thresholds. The BAAQMD recommends that lead agencies determine appropriate air quality thresholds of significance based on substantial evidence in the record. Lead agencies may still rely on the BAAQMD's CEQA Guidelines (updated May 2011) for assistance in calculating air pollution emissions, obtaining information regarding the health impacts of air pollutants, and identifying potential mitigation measures. However, the County has independently reviewed the BAAQMD-proposed thresholds and determined that they are supported by substantial evidence and are appropriate for use in determining significance in the environmental review of this project. Specifically, the County has determined that the BAAQMD-proposed thresholds are well-grounded on air quality regulations, scientific evidence, and scientific reasoning concerning air quality and GHG emissions. Using these thresholds for the project also allows a rigorous standardized approach to determining whether the project will cause a significant air quality impact.

1.2 - Summary of Analysis Results

The following is a summary of the analysis results according to impact. The impact significance thresholds are drawn from Appendix G, Environmental Checklist, of the CEQA Guidelines.

Impact AIR-1: The project would not conflict with or obstruct implementation of the applicable air quality plan. ***Less than significant after mitigation.***

Impact AIR-2: The project would not violate air quality standards or contribute substantially to an existing or projected air quality violation. ***Less than significant after mitigation.***

Impact AIR-3: The project would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors). ***Significant and unavoidable.***

Impact AIR-4: The project would not expose sensitive receptors to substantial pollutant concentrations***. Less than significant.***

Impact AIR-5: The project would not create objectionable odors affecting a substantial number of people. ***Less than significant***.

Impact GHG-1: The project would generate direct and indirect GHG emissions; however, those emissions would not result in a significant impact on the environment. ***Less than significant.***

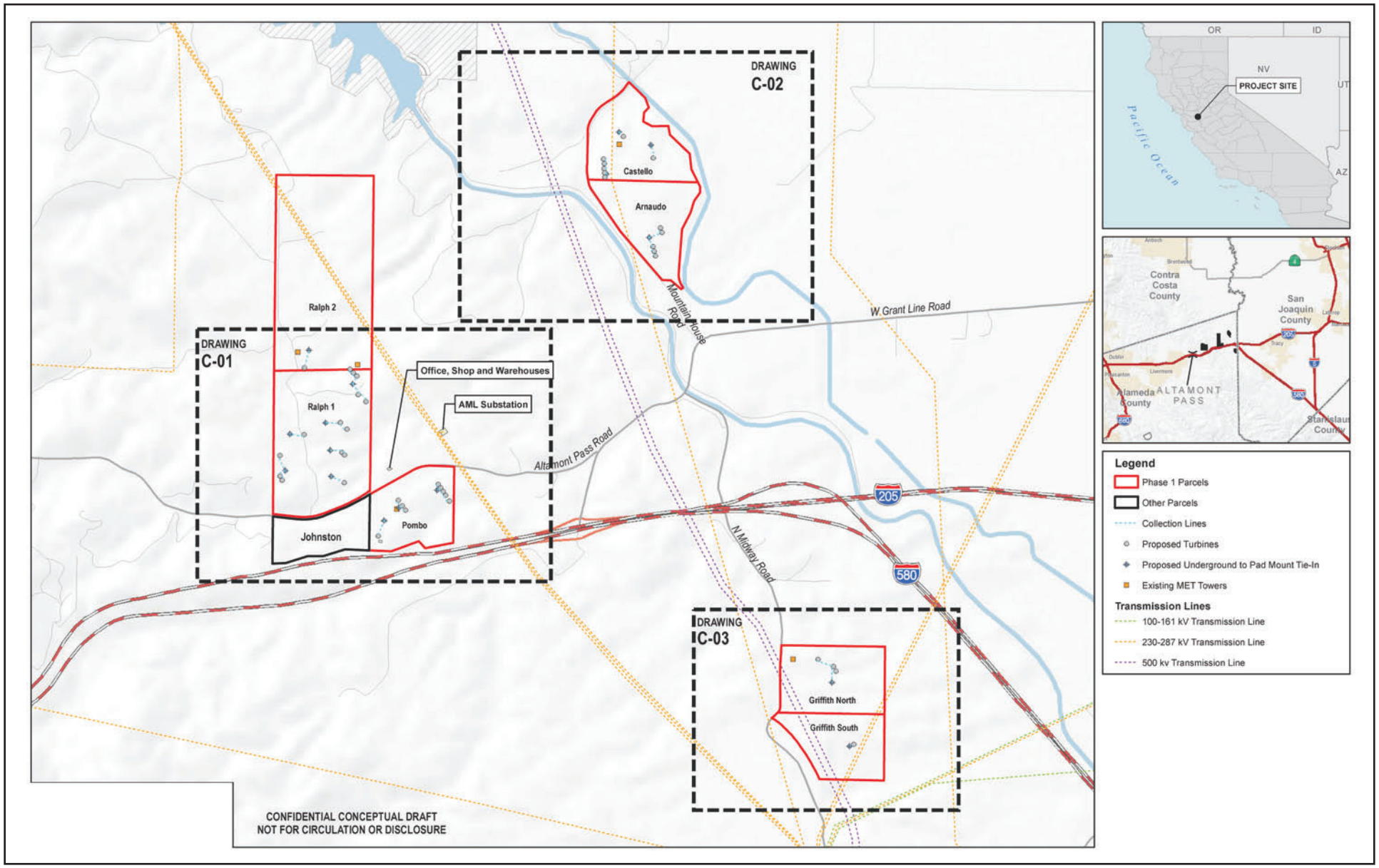
Impact GHG-2: The project would not conflict with any applicable plan, policy or regulation of an agency adopted to reduce the emissions of GHGs. ***Less than significant****.*

1.3 - Project Description and Location

The proposed project would involve the removal of existing wind turbines and installation of new turbines on multiple parcels located in the northeast corner of Alameda County. The project would involve repowering activities, which refer to the removal of older existing wind turbines and replacement with new wind turbines. This repowering would consist of the removal of 70 to 80 existing wind turbines equivalent to 4 megawatts (MW) and the installation of 40 new mixer-ejector wind turbines (MEWT) with a combined generating capacity of 4 MWs.

The first, 40-turbine phase of the repowering program will support an ongoing, 3-year study, commenced in April 2012 under the supervision of the Alameda County Scientific Review Committee. The study will evaluate the extent to which the shrouded turbine could reduce impacts to birds compared to the existing turbines. The assessment would consist of an avian validation study primarily funded by a Public Interest Energy Research (PIER) Grant from the California Energy Commission (Avian Study). Sand Hill would use the test results of the Avian Study and turbine performance data to inform its approach to repowering the remainder of the existing turbines in future phases.

The project is located within the Altamont Pass Wind Resources Area (APWRA) on Assessor's Parcel Numbers (APN) 099B-7750-006-00, 099B-6325-001-03, 099B-7375-001-07, 099B-7875-001-02, 099B-7875-001-03, 099B-7500-003-01, and 099B-7600-001-01. The project area is defined by 3 project sites, which will be referred to as C-01, C-02, and C-03. Exhibit 1 provides a regional vicinity map of the entire project site, while Exhibits 2, 3 and 4 show the three site construction areas within the project sites.



Source: Tetra Tech EC, Inc., October 2012.

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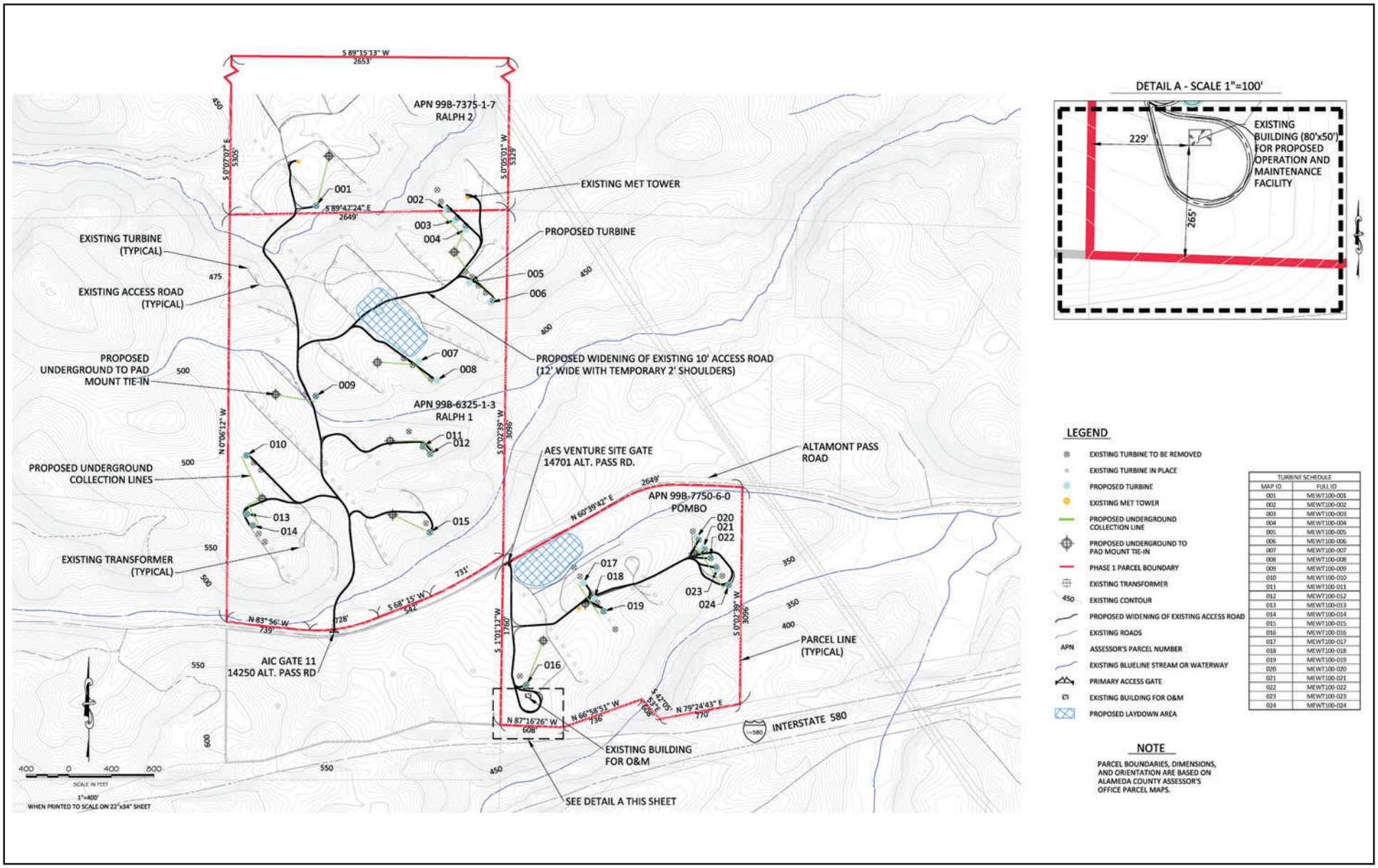
Exhibit 1
Vicinity Map



LEGEND

- EXISTING TURBINE TO BE REMOVED
- EXISTING TURBINE IN PLACE
- PROPOSED TURBINE
- EXISTING MET TOWER
- PROPOSED UNDERGROUND COLLECTION LINE
- PROPOSED UNDERGROUND TO PAD MOUNT TIE-IN
- PHASE 1 PARCEL BOUNDARY
- EXISTING TRANSFORMER
- EXISTING CONTOUR
- PROPOSED WIDENING OF EXISTING ACCESS ROAD
- EXISTING ROADS
- APN ASSESSOR'S PARCEL NUMBER
- EXISTING BLUELINE STREAM OR WATERWAY
- PRIMARY ACCESS GATE
- EXISTING BUILDING FOR O&M
- PROPOSED LAYDOWN AREA

TURBINE SCHEDULE

MAP ID	FULL ID
001	MEWT100-001
002	MEWT100-002
003	MEWT100-003
004	MEWT100-004
005	MEWT100-005
006	MEWT100-006
007	MEWT100-007
008	MEWT100-008
009	MEWT100-009
010	MEWT100-010
011	MEWT100-011
012	MEWT100-012
013	MEWT100-013
014	MEWT100-014
015	MEWT100-015
016	MEWT100-016
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018	MEWT100-018
019	MEWT100-019
020	MEWT100-020
021	MEWT100-021
022	MEWT100-022
023	MEWT100-023
024	MEWT100-024

NOTE

PARCEL BOUNDARIES, DIMENSIONS, AND ORIENTATION ARE BASED ON ALAMEDA COUNTY ASSESSOR'S OFFICE PARCEL MAPS.

Source: Tetra Tech, Inc., February, 2013.

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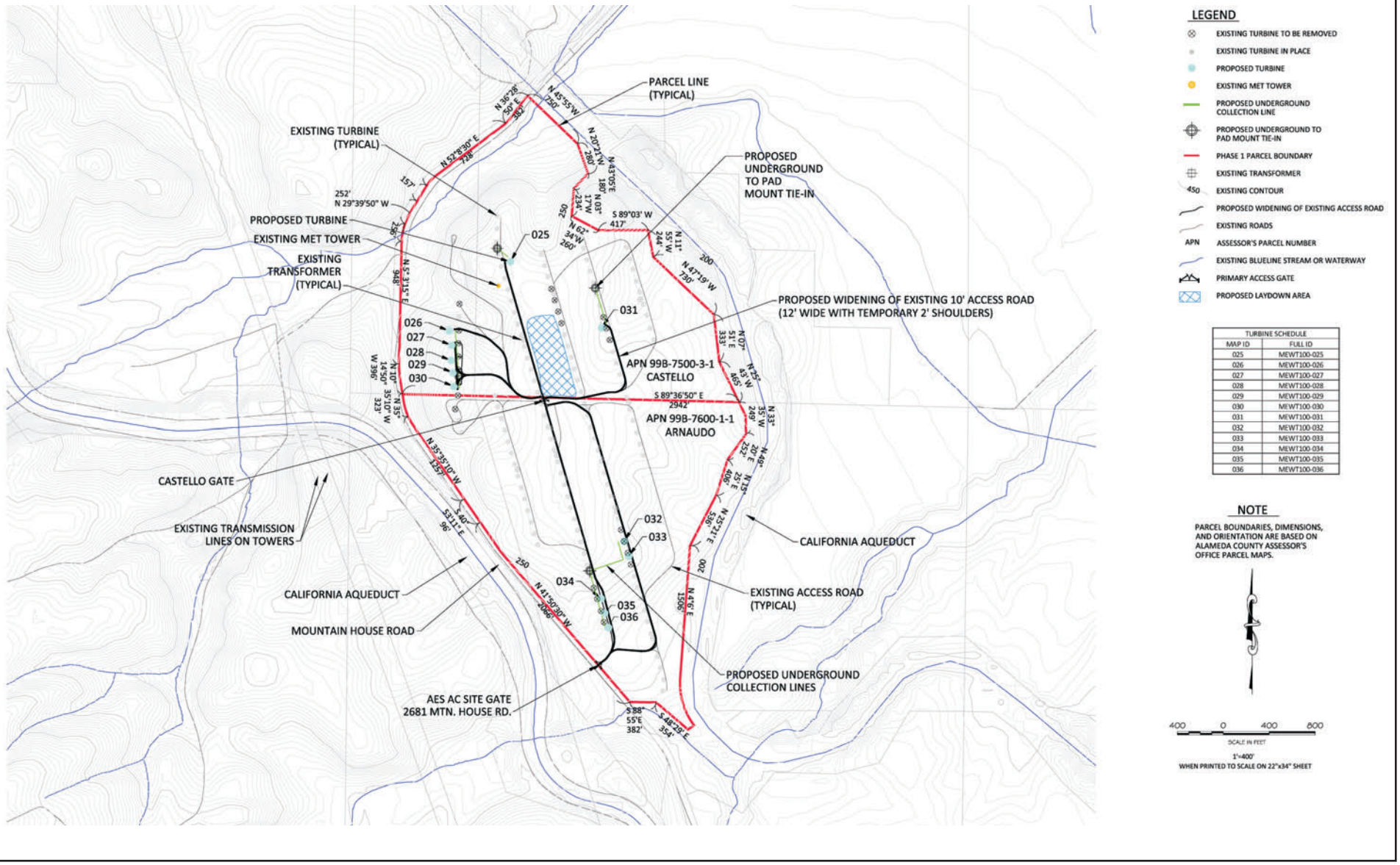
Exhibit 2
Site Plan – Ralph Pombo Parcels, Sand Hill Wind



Source: Tetra Tech, Inc., February, 2013.

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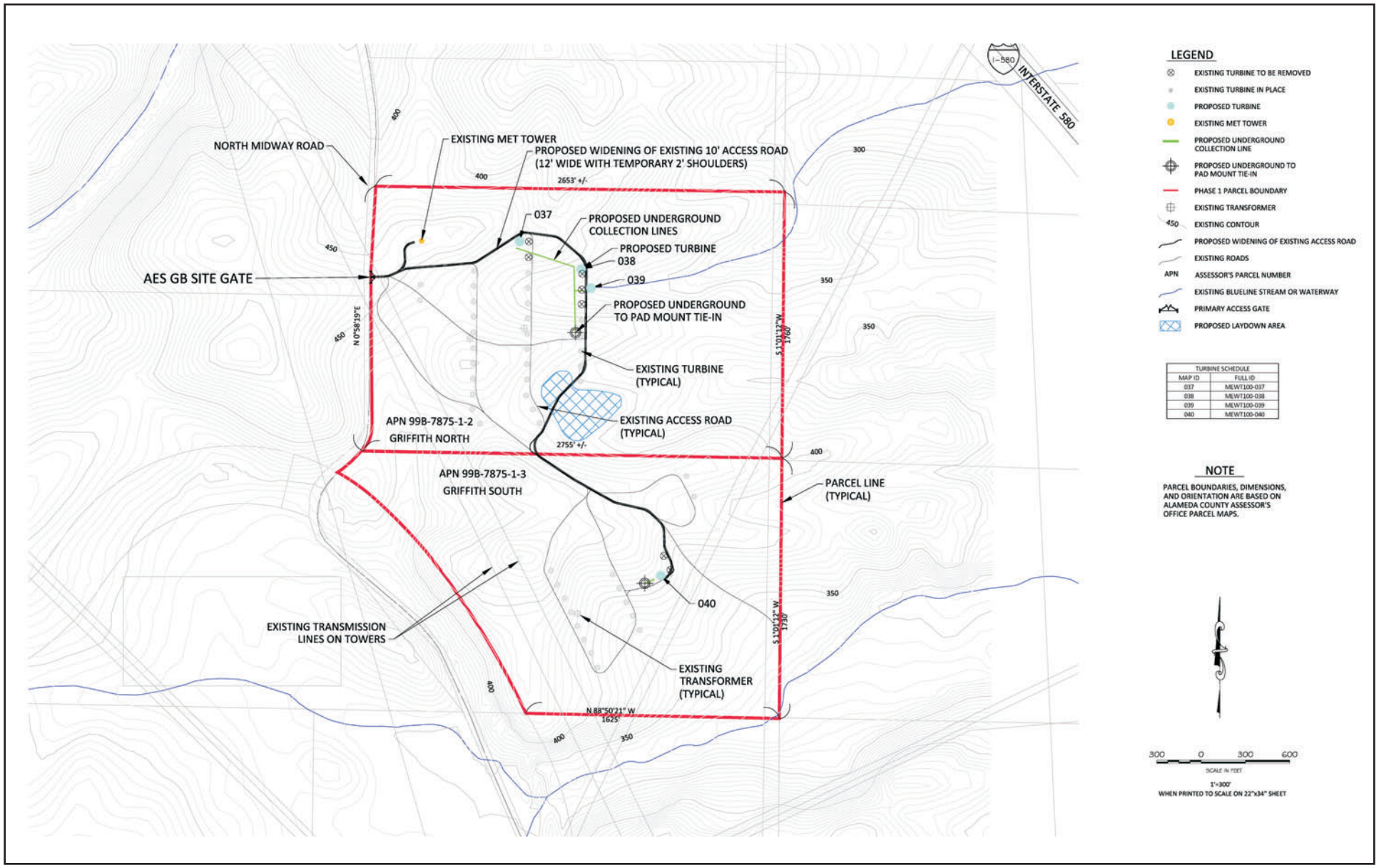
Exhibit 3
Site Plan – Castello Arnaudo Parcels, Sand Hill Wind



Source: Tetra Tech, Inc., February, 2013.

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Exhibit 4
Site Plan – Griffith Parcels, Sand Hill Wind

The full repowering phase would decommission all existing turbines remaining after the Initial Repower and replace them with up to 300 shrouded turbines to provide up to 30 MW of additional generating capacity (Full Repower). The Full Repower would take place after completion of the Initial Repower but before 2017 and would be subject to a separate conditional use permit. The Full Repower would occur within the same Project area as the Initial Repower, but would also include an additional 68 acres of existing facilities. The additional parcel is identified as APN 099B-6325-001-04.

1.4 - Mitigation Measures

MM AIR-3a The following Basic Construction Mitigation Measures, as put forth in the Bay Area Air Quality Management District's Air Quality Guidelines, shall be included in the project design and implemented during construction:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulation [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
8. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

MM AIR-3b The developer shall ensure that all off-road equipment used by construction contractors during all construction phases is certified to Tier 3 or higher emission standards. The developer shall provide a record of the equipment used during these phases indicating make, model, year, horsepower, and certification level to the County as verification of compliance.

SECTION 2: LOCAL AND REGIONAL ENVIRONMENTAL SETTING

2.1 - Existing Physical Setting

2.1.1 - Local Climate

The project is located in the northeast corner of Alameda County and is within the San Francisco Bay Area Air Basin (Basin). The Basin 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 Air Basin 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. The local agency with jurisdiction over air quality monitoring and planning in the Basin is the BAAQMD.

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 northwest 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 (a 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 that is approximately 80 miles wide. During July, the surface waters off San Francisco are 3 degrees Fahrenheit (°F) cooler than those off Vancouver, British Columbia, more than 900 miles to the 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 summer, the northwest winds to the west of the Pacific coastline are drawn into the interior through the gap in the western Coast Ranges, known as 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 southwest winds at Berkeley and northwest winds at San Jose; a branch curves eastward through the Carquinez Straits and into the Central Valley. Wind speeds may be locally strong in regions where air is channeled through a narrow opening such as the Golden Gate, the Carquinez Strait, 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 first be 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 2,000 feet in elevation.

In winter, the Air Basin experiences periods of storminess, 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.

A primary factor in air quality is the mixing depth (i.e., the vertical air column available for dilution of contaminant sources). Generally, the temperature of air decreases with height, creating a gradient from warmer air near the ground to cooler air at elevation. This is caused by most of the sun's energy being 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. Over the Air Basin, the frequent occurrence of temperature inversions limits mixing depth and, consequently, limits the availability of air for dilution.

2.1.2 - Local Air Quality

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features. Atmospheric conditions such as wind speed, wind direction, and air temperature inversions interact with the physical features of the landscape to determine the movement and dispersal of air pollutant emissions and, consequently, their effect on air quality.

The local air quality near the project area can be evaluated by reviewing relevant air pollution concentrations within the Basin. The BAAQMD operates several air monitoring stations within the Basin each measuring several different air pollutants. The closest BAAQMD air monitoring station to the project is located in the City of Livermore, approximately 10 miles west of the project site. Table 1 summarizes 2010 through 2012 air monitoring data published by the California Air Resources Board (ARB), which is the most recent time-period available. The Livermore monitoring station does not measure PM_{10} or carbon monoxide. The nearest carbon monoxide monitoring site is located in Fremont, approximately 24 miles southwest of the project site. The nearest PM_{10} monitoring site is operated by the San Joaquin Valley Air Pollution Control District located within the San Joaquin Valley Air Basin in the City of Tracy, approximately 9.5 miles southeast of the project site. Although this monitoring site is closer to the project site than the Livermore monitoring site, the Livermore monitoring data is assumed to be more representative of the project site as it is located within the

same Air Basin. The data shows that during the past few years, the project area has exceeded the state and/or federal ozone and $PM_{2.5}$ ambient air quality standards.

Table 1: Air Quality Monitoring Summary

Air Pollutant, Location	Averaging Time	Item	2010	2011	2012
Ozone	1 Hour	Max 1 Hour (ppm)	0.150	0.115	0.102
		Days > State Standard (0.09 ppm)	3	3	2
	8 Hour	Max 8 Hour (ppm)	0.098	0.085	0.090
		Days > State Standard (0.07 ppm)	6	9	4
		Days > National Standard (0.075 ppm)	3	2	3
Carbon Monoxide	8 Hour	Max 8 Hour (ppm)	0.94	ID	ID
		Days > State Standard (9.0 ppm)	0	ID	ID
		Days > National Standard (9 ppm)	0	ID	ID
Nitrogen Dioxide	Annual	Annual Average (ppm)	0.011	0.011	ID
	1 Hour	Max 1 Hour (ppm)	0.058	0.057	0.043
		Days > State Standard (0.18 ppm)	0	0	0
Inhalable coarse particles (PM_{10})	Annual	Annual Average ($\mu g/m^3$)	16.4	11.9	17.5
	24 Hour	24 Hour ($\mu g/m^3$)	55.3	28.5	110.8
		Days > State Standard (50 $\mu g/m^3$)	ID	ID	ID
		Days > National Standard (150 $\mu g/m^3$)	0	0	0
Fine particulate matter ($PM_{2.5}$)	Annual	Annual Average ($\mu g/m^3$)	7.6	ID	ID
	24 Hour	24 Hour ($\mu g/m^3$)	34.7	45.4	31.1
		Days > National Standard (35 $\mu g/m^3$)	0	2	0

Table 1 (cont.): Air Quality Monitoring Summary

Air Pollutant, Location	Averaging Time	Item	2010	2011	2012
Notes and Abbreviations: > = exceed ppm = parts per million $\mu g/m^3$ = micrograms per cubic meter ID = insufficient data ND = no data max = maximum State Standard = California Ambient Air Quality Standard National Standard = National Ambient Air Quality Standard Ozone, nitrogen dioxide, and $PM_{2.5}$ data from Livermore-793 Rincon Avenue Station. Carbon monoxide data from Fremont-Chapel Way Station. PM_{10} data from Tracy-Airport Station. Sources: California Air Resources Board 2013.					

Local Sources of Air Pollution

There are no permitted sources located within 1,000 feet of the project site boundaries. The nearest major roadway (as identified by the BAAQMD) is Interstate 580 (I-580), located south of the Pombo and Johnston parcels within approximately 500 feet of the southern boundaries of these parcels.

2.1.3 - Sensitive Receptors

The BAAQMD defines receptors to include residential dwellings including apartments, houses, and condominiums; schools, colleges, and universities; daycare centers and hospitals, and senior-care facilities. The nearest sensitive receptors consist of residences located approximately 1,000 feet north of site C-02. The project would not locate any new sensitive receptors.

2.1.4 - Attainment Status

The United States Environmental Protection Agency (EPA) and the ARB designate air basins where ambient air quality standards are exceeded 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 further designated as marginal, moderate, serious, severe, or extreme as a function of deviation from standards. Each standard has a different definition, or 'form' of what constitutes attainment, based on specific air quality statistics. For example, the federal 8-hour CO standard is not to be exceeded more than once per year; therefore, an area is in attainment of the CO standard if no more than one 8-hour ambient air monitoring values exceeds the threshold per year. In contrast, the Federal annual $PM_{2.5}$ standard is met if the three-year average of the annual average $PM_{2.5}$ concentration is less than or equal to the standard.

The current attainment designations for the Basin are shown in Table 2. The Basin is designated as nonattainment for the state and national ozone, PM_{10}, and $PM_{2.5}$, standards.

Table 2: San Francisco Bay Area Air Basin Attainment Status

Pollutant	State Status	National Status
Ozone	Nonattainment	Nonattainment
Carbon monoxide	Attainment	Attainment
Nitrogen dioxide	Attainment	Attainment
Sulfur dioxide	Attainment	Attainment
PM_{10}	Nonattainment	Unclassified
$PM_{2.5}$	Nonattainment	Nonattainment
Lead	Attainment	Attainment
Sulfates	Attainment	No federal standards
Hydrogen sulfide	Unclassified	
Visibility-reducing particles	Unclassified	
Source: Bay Area Air Quality Management District, 2011a.		

2.2 - Regulatory Setting

Air pollutants are regulated at the national, state, and air basin level; each agency has a different level of regulatory responsibility. The United States EPA regulates at the national level. The ARB regulates at the state level. The BAAQMD regulates at the air basin level.

2.2.1 - National and State

The EPA is responsible for 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, provides research and guidance for air pollution programs, and sets National Ambient Air Quality Standards, also known as federal standards. There are federal standards for six common air pollutants, called criteria air pollutants, which were identified from provisions of the Clean Air Act of 1970. The criteria pollutants are:

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

The federal standards were set to protect public health, including that of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants. Primary federal standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

A State Implementation Plan is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain federal standards. The State Implementation Plan for the State of California is administered by the ARB, which has overall

responsibility for statewide air quality maintenance and air pollution prevention. California's State Implementation Plan incorporates individual federal attainment plans for regional air districts—air district prepares their federal attainment plan, which sent to ARB to be approved and incorporated into the California State Implementation Plan. Federal attainment plans include the technical foundation for understanding air quality (e.g., emission inventories and air quality monitoring), control measures and strategies, and enforcement mechanisms.

The ARB also administers California Ambient Air Quality Standards (state standards) for the 10 air pollutants designated in the California Clean Air Act. The 10 state air pollutants are the six federal standards listed above as well as visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride.

The federal and State ambient air quality standards, relevant effects, properties, and sources of the pollutants are summarized in Table 3.

Asbestos is listed as a toxic air contaminant by ARB and as a Hazardous Air Pollutant by the EPA. Asbestos occurs naturally in surface deposits of several types of rock formations. 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. Crushing or breaking these rocks, through construction or other means, can release asbestoform fibers into the air. Asbestos emissions can result from the sale or use of asbestos-containing materials, road surfacing with such materials, grading activities, and surface mining. The risk of disease is dependent upon the intensity and duration of exposure. When inhaled, asbestos fibers may remain in the lungs and with time may be linked to such diseases as asbestosis, lung cancer, and mesothelioma. There is no asbestos in the immediate project area (U.S. Geological Survey 2011).

Table 3: Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Ozone	1 Hour	0.09 ppm	—	Irritate respiratory system; reduce lung function; breathing pattern changes; reduction of breathing capacity; inflame and damage cells that line the lungs; make lungs more susceptible to infection; aggravate asthma; aggravate other chronic lung diseases; cause permanent lung damage; some immunological changes; increased mortality risk; vegetation and property damage.	Ozone is a photochemical pollutant as it is not emitted directly into the atmosphere, but is formed by a complex series of chemical reactions between volatile organic compounds (VOC), NO_X, and sunlight. Ozone is a regional pollutant that is generated over a large area and is transported and spread by the wind.	Ozone is a secondary pollutant; thus, it is not emitted directly into the lower level of the atmosphere. The primary sources of ozone precursors (VOC and NO_x) are mobile sources (on-road and off-road vehicle exhaust).
	8 Hour	0.070 ppm	0.075 ppm			
Carbon monoxide (CO)	1 Hour	20 ppm	35 ppm	Ranges depending on exposure: slight headaches; nausea; aggravation of angina pectoris (chest pain) and other aspects of coronary heart disease; decreased exercise tolerance in persons with peripheral vascular disease and lung disease; impairment of central nervous system functions; possible increased risk to fetuses; death.	CO is a colorless, odorless, toxic gas. CO is somewhat soluble in water; therefore, rainfall and fog can suppress CO conditions. CO enters the body through the lungs, dissolves in the blood, replaces oxygen as an attachment to hemoglobin, and reduces available oxygen in the blood.	CO is produced by incomplete combustion of carbon-containing fuels (e.g., gasoline, diesel fuel, and biomass). Sources include motor vehicle exhaust, industrial processes (metals processing and chemical manufacturing), residential wood burning, and natural sources.
	8 Hour	9.0 ppm	9 ppm			
Nitrogen dioxide[b] (NO_2)	1 Hour	0.18 ppm	0.100 ppm	Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; contribution to atmospheric discoloration; increased visits to hospital for respiratory illnesses.	During combustion of fossil fuels, oxygen reacts with nitrogen to produce nitrogen oxides - NO_x (NO, NO_2, NO_3, N_2O, N_2O_3, N_2O_4, and N_2O_5). NO_x is a precursor to ozone, PM_{10}, and $PM_{2.5}$ formation. NO_x can react with compounds to form nitric acid and related small particles and result in PM related health effects.	NO_x is produced in motor vehicle internal combustion engines and fossil fuel-fired electric utility and industrial boilers. Nitrogen dioxide forms quickly from NO_x emissions. NO_2 concentrations near major roads can be 30 to 100 percent higher than those at monitoring stations.
	Annual	0.030 ppm	0.053 ppm			

Table 3 (cont.): Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Sulfur dioxide[c] (SO_2)	1 Hour	0.25 ppm	0.075 ppm	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient sulfur dioxide levels. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.	Sulfur dioxide is a colorless, pungent gas. At levels greater than 0.5 ppm, the gas has a strong odor, similar to rotten eggs. Sulfur oxides (SO_X) include sulfur dioxide and sulfur trioxide. Sulfuric acid is formed from sulfur dioxide, which can lead to acid deposition and can harm natural resources and materials. Although sulfur dioxide concentrations have been reduced to levels well below state and federal standards, further reductions are desirable because sulfur dioxide is a precursor to sulfate and PM_{10}.	Human caused sources include fossil-fuel combustion, mineral ore processing, and chemical manufacturing. Volcanic emissions are a natural source of sulfur dioxide. The gas can also be produced in the air by dimethylsulfide and hydrogen sulfide. Sulfur dioxide is removed from the air by dissolution in water, chemical reactions, and transfer to soils and ice caps. The sulfur dioxide levels in the State are well below the maximum standards.
	3 Hour	—	0.5 ppm			
	24 Hour	0.04 ppm	0.14 (for certain areas)			
	Annual	—	0.030 ppm (for certain areas)			
Particulate matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3	- Short-term exposure (hours/days): irritation of the eyes, nose, throat; coughing; phlegm; chest tightness; shortness of breath; aggravate existing lung disease, causing asthma attacks and acute bronchitis; those with heart disease can suffer heart attacks and arrhythmias. - Long-term exposure: reduced lung function; chronic bronchitis; changes in lung morphology; death.	Suspended particulate matter is a mixture of small particles that consist of dry solid fragments, droplets of water, or solid cores with liquid coatings. The particles vary in shape, size, and composition. PM_{10} refers to particulate matter that is between 2.5 and 10 microns in diameter, (1 micron is one-millionth of a meter). $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter, about one-thirtieth the size of the average human hair.	Stationary sources include fuel or wood combustion for electrical utilities, residential space heating, and industrial processes; construction and demolition; metals, minerals, and petrochemicals; wood products processing; mills and elevators used in agriculture; erosion from tilled lands; waste disposal, and recycling. Mobile or transportation related sources are from vehicle exhaust and road dust. Secondary particles form from reactions in the atmosphere.
	Mean	20 µg/m^3	—			
Particulate matter ($PM_{2.5}$)	24 Hour	—	35 µg/m^3			
	Annual	12 µg/m^3	12 µg/m^3			
Visibility-reducing particles	8 Hour	See note below[d]				

Table 3 (cont.): Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
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.	The sulfate ion is a polyatomic anion with the empirical formula SO_4^{2-}. Sulfates occur in combination with metal and/or hydrogen ions. Many sulfates are soluble in water.	Sulfates are particulates formed through the photochemical oxidation of sulfur dioxide. In California, the main source of sulfur compounds is combustion of gasoline and diesel fuel.
Lead[e]	30-day	1.5 µg/m^3	—	Lead accumulates in bones, soft tissue, and blood and can affect the kidneys, liver, and nervous system. It can cause impairment of blood formation and nerve conduction, behavior disorders, mental retardation, neurological impairment, learning deficiencies, and low IQs.	Lead is a solid heavy metal that can exist in air pollution as an aerosol particle component. Leaded gasoline was used in motor vehicles until around 1970. Lead concentrations have not exceeded state or federal standards at any monitoring station since 1982.	Lead ore crushing, lead-ore smelting, and battery manufacturing are currently the largest sources of lead in the atmosphere in the United States. Other sources include dust from soils contaminated with lead-based paint, solid waste disposal, and crustal physical weathering.
	Quarter	—	1.5 µg/m^3			
	Rolling 3-month average	—	0.15 µg/m^3			
Vinyl chloride[e]	24 Hour	0.01 ppm	—	Short-term exposure to high levels of vinyl chloride in the air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers.	Vinyl chloride, or chloroethene, is a chlorinated hydrocarbon and a colorless gas with a mild, sweet odor. In 1990, ARB identified vinyl chloride as a toxic air contaminant and estimated a cancer unit risk factor.	Most vinyl chloride is used to make polyvinyl chloride plastic and vinyl products, including pipes, wire and cable coatings, and packaging materials. It can be formed when plastics containing these substances are left to decompose in solid waste landfills. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites.
Hydrogen sulfide	1 Hour	0.03 ppm	—	High levels of hydrogen sulfide can cause immediate respiratory arrest. It can irritate the eyes and respiratory tract and cause headache, nausea, vomiting, and	Hydrogen sulfide (H_2S) is a flammable, colorless, poisonous gas that smells like rotten eggs.	Manure, storage tanks, ponds, anaerobic lagoons, and land application sites are the primary sources of hydrogen sulfide. Anthropogenic sources include the

Table 3 (cont.): Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
				cough. Long exposure can cause pulmonary edema.		combustion of sulfur containing fuels (oil and coal).
Volatile organic compounds (VOC)		There are no State or federal standards for VOCs because they are not classified as criteria pollutants.		Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of VOCs are suspected to cause eye, nose, and throat irritation; headaches; loss of coordination; nausea; and damage to the liver, the kidneys, and the central nervous system. Many VOCs have been classified as toxic air contaminants.	Reactive organic gases (ROGs), or VOCs, are defined as any compound of carbon—excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate—that participates in atmospheric photochemical reactions. Although there are slight differences in the definition of ROGs and VOCs, the two terms are often used interchangeably.	Indoor sources of VOCs include paints, solvents, aerosol sprays, cleansers, tobacco smoke, etc. Outdoor sources of VOCs are from combustion and fuel evaporation. A reduction in VOC emissions reduces certain chemical reactions that contribute to the formulation of ozone. VOCs are transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.

Notes:
ppm = parts per million (concentration) $\mu g/m^3$ = micrograms per cubic meter Annual = Annual Arithmetic Mean 30-day = 30-day average Quarter = Calendar quarter

[a] Federal standard refers to the primary national ambient air quality standard, or the levels of air quality necessary, with an adequate margin of safety to protect the public health. All standards listed are primary standards except for 3 Hour SO_2, which is a secondary standard. A secondary standard is the level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[b] To attain the 1-hour nitrogen dioxide national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 parts per billion (0.100 ppm).

[c] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

[d] Visibility reducing particles: In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

[e] The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Source of effects, properties, and sources: South Coast Air Quality Management District 2007; California Environmental Protection Agency 2002; California Air Resources Board 2009; U.S. Environmental Protection Agency 2003, 2009a, 2009b, 2010, and 2012; National Toxicology Program 2011a and 2011b.

State of California

Carl Moyer Memorial Air Quality Standards Attainment Program. Since 1998, the Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) has provided funding to encourage the voluntary purchase of cleaner engines, equipment, and emission reduction technologies. The Carl Moyer Program plays a complementary role to California's regulatory program by funding emission reductions that are surplus, i.e., early and/or in excess of what is required by regulation. The Carl Moyer Program accelerates the turnover of old highly polluting engines, speeds the commercialization of advanced emission controls, and reduces air pollution impacts on environmental justice communities. Emission reductions achieved through the Carl Moyer Program are an important component of the California State Implementation Plan.

Airborne Toxic Control Measure for Diesel Particulate Matter from Portable Engines Rated at 50 horsepower and Greater. Effective February 19, 2011, each fleet shall comply with weighted reduced particulate matter emission fleet averages by compliance dates listed in the regulation.

ARB Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling adopts new section 2485 within Chapter 10, Article 1, Division 3, title 13 in the California Code of Regulations. The measure limits the idling of diesel vehicles to reduce emissions of toxics and criteria pollutants. The driver of any vehicle subject to this section: (1) shall not idle the vehicle's primary diesel engine for greater than five minutes at any location; and (2) shall not idle a diesel-fueled auxiliary power system for more than five minutes to power a heater, air conditioner, or any ancillary equipment on the vehicle if it has a sleeper berth and the truck is located within 100 feet of a restricted area (homes and schools).

ARB Final Regulation Order, Requirements to Reduce Idling Emissions from New and In-Use Trucks, requires that new 2008 and subsequent model-year heavy-duty diesel engines be equipped with an engine shutdown system that automatically shuts down the engine after 300 seconds of continuous idling operation once the vehicle is stopped, the transmission is set to "neutral" or "park," and the parking brake is engaged. If the parking brake is not engaged, then the engine shutdown system shall shut down the engine after 900 seconds of continuous idling operation once the vehicle is stopped and the transmission is set to "neutral" or "park." Any project trucks manufactured after 2008 would be consistent with this rule, which would ultimately reduce air emissions.

ARB Regulation for In-Use Off-Road Diesel Vehicles. On July 26, 2007, the ARB adopted a regulation to reduce diesel particulate matter and NO_x emissions from in-use (existing) off-road heavy-duty diesel vehicles in California. Such vehicles are used in construction, mining, and industrial operations. The regulation limits idling to no more than five consecutive minutes, requires reporting and labeling, and requires disclosure of the regulation upon vehicle sale. The ARB is enforcing that part of the rule with fines up to $10,000 per day for each vehicle in violation. Performance requirements of the rule are based on a fleet's average NO_x emissions, which can be met by replacing older vehicles with newer, cleaner vehicles or by applying exhaust retrofits. The regulation was amended in 2010 to delay the original timeline of the performance requirements making the first compliance deadline January 1, 2014 for large fleets (over 5,000 horsepower), 2017 for medium fleets (2,501-5,000 horsepower), and 2019 for small fleets (2,500 horsepower or less).

Statewide Truck and Bus Rule. On December 12, 2008, the ARB approved a new regulation to significantly reduce emissions from existing on-road diesel vehicles operating in California. The regulation requires affected trucks and buses to meet performance requirements between 2011 and 2023. By January 1, 2023, all vehicles must have a 2010 model year engine or equivalent. The regulation applies to all on-road heavy-duty diesel-fueled vehicles with a gross vehicle weight rating greater than 14,000 pounds, agricultural yard trucks with off-road certified engines, and certain diesel fueled shuttle vehicles of any gross vehicle weight rating. Out-of-state trucks and buses that operate in California are also subject to the regulation.

ARB Airborne Toxic Control Measure. In July 2001, the ARB approved an Air Toxic Control Measure for construction, grading, quarrying and surface mining operations to minimize emissions of naturally occurring asbestos. The regulation requires application of best management practices to control fugitive dust in areas known to have naturally occurring asbestos and requires notification to the local air district prior to commencement of ground-disturbing activities. The measure establishes specific testing, notification and engineering controls prior to grading, quarrying or surface mining in construction zones where naturally occurring asbestos is located on projects of any size. There are additional notification and engineering controls at work sites larger than one acre in size. These projects require the submittal of a "Dust Mitigation Plan" and approval by the air district prior to the start of a project.

2.2.2 - Bay Area Air Quality Management District

The agency for air pollution control for the Basin is the BAAQMD. The BAAQMD is responsible for controlling emissions primarily from stationary sources and maintains air quality monitoring stations throughout the Basin. BAAQMD, in coordination with Metropolitan Transportation Commission and the Association of Bay Area Governments, is also responsible for developing, updating, and implementing the Bay Area Clean Air Plan for the Basin. A clean air plan is a plan prepared and implemented by an air pollution district for a county or region designated as nonattainment of the national and/or CAAQS. The term non-attainment area is used to refer to an air basin where one or more ambient air quality standards are exceeded. The clean air plan, once submitted to and approved by the ARB, becomes an integral part of the State Implementation Plan (SIP).

Current Air Quality Plans

A SIP is a federal requirement; each state prepares one to describe existing air quality conditions and measures that will be followed to attain and maintain the national ambient air quality standards. In addition in California, state ozone standards have planning requirements. However, state PM_{10} standards have no attainment planning requirements, but air districts must demonstrate that all measures feasible for the area have been adopted.

Ozone Plans

Because the Air Basin is nonattainment for the federal and state ozone standards, the District prepared an Ozone Attainment Demonstration Plan to satisfy the federal 1-hour ozone planning requirement and a Clean Air Plan to satisfy the state 1-hour ozone planning requirement. The EPA revoked the 1-hour ozone standard and adopted an 8-hour ozone standard. The District will address the new federal 8-hour ozone planning requirements once they are established.

On September 15, 2010, the District adopted the final Bay Area 2010 Clean Air Plan, and certified its Final Environmental Impact Report (EIR). The 2010 Clean Air Plan was prepared by the District in cooperation with the Metropolitan Transportation Commission and the Association of Bay Area Governments. The 2010 Clean Air Plan builds from and incorporates components of the District's 2005 Ozone Strategy, and identifies how the Air Basin will achieve compliance with the state 1-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. The 2010 Clean Air Plan serves to:

- Update the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone.
- Provide a control strategy to reduce ozone, particulate matter (PM), air toxics, and greenhouse gases in a single, integrated plan.
- Review progress in improving air quality in recent years.
- Establish emission control measures to be adopted or implemented in the 2010 to 2012 timeframe.

Particulate Matter Plans

The Air Basin is designated nonattainment for the state PM_{10} and $PM_{2.5}$ standards, but it is currently in attainment for the federal PM_{10} standard. The EPA lowered the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in 2006, and designated the Air Basin as nonattainment for the new $PM_{2.5}$ standard effective December 14, 2009.

On December 8, 2011, the ARB submitted a "clean data finding" request to the EPA on behalf of the Bay Area. If the clean data finding request is approved, then EPA guidelines provide that the region can fulfill federal $PM_{2.5}$ SIP requirements by preparing either a redesignation request and a $PM_{2.5}$ maintenance plan, or a "clean data" SIP submittal. Because peak $PM_{2.5}$ levels can vary from year to year based on natural, short-term changes in weather conditions, the BAAQMD believes that it would be premature to submit a redesignation request and $PM_{2.5}$ maintenance plan at this time. Therefore, the BAAQMD will prepare a "clean data" SIP to address the required elements, including:

- An emission inventory for primary $PM_{2.5}$, as well as precursors to secondary PM formation
- Amendments to the BAAQMD's New Source Review regulation to address $PM_{2.5}$

Rules

The BAAQMD establishes and administers a program of rules and regulations that are air plans, as described above, to attain and maintain state and national air quality standards. The rules and regulations that apply to this project include but are not limited to the following:

- **Regulation 2, Rule 2**. New Source Review. This rule requires any new source resulting in an increase of any criteria pollutant to be evaluated for adherence to Best Available Control Technology (BACT) control technologies. For compression internal combustion engines, BACT requires that the generator be fired on "California Diesel Fuel" (fuel oil with a sulfur content

less than 0.05 percent by weight and less than 20 percent by volume of aromatic hydrocarbons).
All stationary internal combustion engines larger than 50 horsepower must obtain a Permit to Operate. If the engine is diesel fueled, then it must also comply with the BAAQMD-administered Statewide Air Toxics Control Measure for Stationary Diesel Engines.

- **Regulation 2, Rule 5.** New Source Review of Toxic Air Contaminants. This rule applies to preconstruction review of new and modified sources of toxic air contaminants, contains project health risk limits, and requires Toxics Best Available Control Technology.
- **Regulation 8, Rule 3.** Architectural Coatings. This rule governs the manufacture, distribution, and sale of architectural coatings and limits the ROG content in paints and paint solvents. Although this rule does not directly apply to the project, it does dictate the ROG content of paint available for use during the construction.
- **Regulation 8, Rule 15.** Emulsified and Liquid Asphalts. Although this rule does not directly apply to the project, it does dictate the ROG content of asphalt available for use during the construction through regulating the sale and use of asphalt and limits the ROG content in asphalt.

BAAQMD manages a naturally occurring asbestos program that administers the requirements of ARB's naturally occurring asbestos ATCM, as discussed above. The BAAMQD provides an exemption application, notification form for road construction and maintenance operations, and asbestos dust mitigation plan applications for projects to submit prior to the start of construction, or upon discovery of asbestos, ultramafic rock, or serpentine during construction. Forms must be submitted to the BAAQMD in accordance with the procedures detailed in the BAAQMD Asbestos ATCM Inspection Guidelines Policies and Procedures.

SECTION 3: CLIMATE CHANGE SETTING

3.1 - Climate Change

Climate change is a change in the average weather of the earth that is measured by alterations in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change constructed several emission trajectories of GHG needed to stabilize global temperatures and climate change impacts. The Intergovernmental Panel on Climate Change predicted that global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1 degrees Celsius (°C) to 6.4°C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios (IPCC 2007a).

In California, climate change may result in consequences such as the following (from CCCC 2006 and Moser et al. 2009).

- A reduction in the quality and supply of water from the Sierra snowpack. If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate water supplies. It can also lead to a potential reduction in hydropower.
- Increased risk of large wildfires**.** If rain increases as temperatures rise, wildfires in the grasslands and chaparral ecosystems of southern California are estimated to increase by approximately 30 percent toward the end of the 21st century because more winter rain will stimulate the growth of more plant "fuel" available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.
- Reductions in the quality and quantity of certain agricultural products. The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- Exacerbation of air quality problems. If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range.
- A rise in sea levels resulting in the displacement of coastal businesses and residences. During the past century, sea levels along California's coast have risen about seven inches. If heat-trapping emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the

century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.

- Damage to marine ecosystems and the natural environment.
- An increase in infections, disease, asthma, and other health-related problems.
- A decrease in the health and productivity of California's forests.

3.2 - Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as GHGs. The effect is analogous to the way a greenhouse retains heat. Common GHGs include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Natural processes and human activities emit GHGs. The presence of GHGs in the atmosphere affects the earth's temperature. It is believed that emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations.

Climate change is driven by forcings and feedbacks. Radiative forcing is the difference between the incoming energy and outgoing energy in the climate system. Positive forcing tends to warm the surface while negative forcing tends to cool it. Radiative forcing values are typically expressed in watts per square meter. A feedback is a climate process that can strengthen or weaken a forcing. For example, when ice or snow melts, it reveals darker land underneath which absorbs more radiation and causes more warming. The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere. The global warming potential of a gas is essentially a measurement of the radiative forcing of a greenhouse gas compared with the reference gas, carbon dioxide.

Individual greenhouse gas compounds have varying global warming potential and atmospheric lifetimes. Carbon dioxide, the reference gas for global warming potential, has a global warming potential of one. The calculation of the carbon dioxide equivalent is a consistent methodology for comparing greenhouse gas emissions since it normalizes various greenhouse gas emissions to a consistent metric. Methane's warming potential of 21 indicates that methane has a 21 times greater warming affect than carbon dioxide on a molecule per molecule basis. A carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its global warming potential.

GHGs as defined by AB 32 include the following gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHGs as defined by AB 32 are summarized in Table 4.

Table 4: Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Nitrous oxide	Nitrous oxide is also known as laughing gas and is a colorless greenhouse gas. It has a lifetime of 114 years. Its global warming potential is 310.	Microbial processes in soil and water, fuel combustion, and industrial processes.
Methane	Methane is a flammable gas and is the main component of natural gas. It has a lifetime of 12 years. Its global warming potential is 21.	Methane is extracted from geological deposits (natural gas fields). Other sources are landfills, fermentation of manure, decay of organic matter, and cattle.
Carbon dioxide	Carbon dioxide (CO_2) is an odorless, colorless, natural greenhouse gas. Carbon dioxide's global warming potential is 1. The concentration in 2005 was 379 parts per million (ppm), which is an increase of about 1.4 ppm per year since 1960.	Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.
Chlorofluorocarbons	These are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. They are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). Global warming potentials range from 3,800 to 8,100.	Chlorofluorocarbons were synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone. The Montreal Protocol on Substances that Deplete the Ozone Layer prohibited their production in 1987.
Hydrofluorocarbons	Hydrofluorocarbons are a group of GHGs containing carbon, chlorine, and at least one hydrogen atom. Global warming potentials range from 140 to 11,700.	Hydrofluorocarbons are synthetic manmade chemicals used as a substitute for chlorofluorocarbons in applications such as automobile air conditioners and refrigerants.
Perfluorocarbons	Perfluorocarbons have stable molecular structures and only break down by ultraviolet rays about 60 kilometers above Earth's surface. Because of this, they have long lifetimes, between 10,000 and 50,000 years. Global warming potentials range from 6,500 to 9,200.	Two main sources of perfluorocarbons are primary aluminum production and semiconductor manufacturing.
Sulfur hexafluoride	Sulfur hexafluoride is an inorganic, odorless, colorless, and nontoxic, nonflammable gas. It has a lifetime of 3,200 years. It has a high global warming potential, 23,900.	This gas is manmade and used for insulation in electric power transmission equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas.
Sources: Compiled from a variety of sources, primarily IPCC 2007a and IPCC 2007b.		

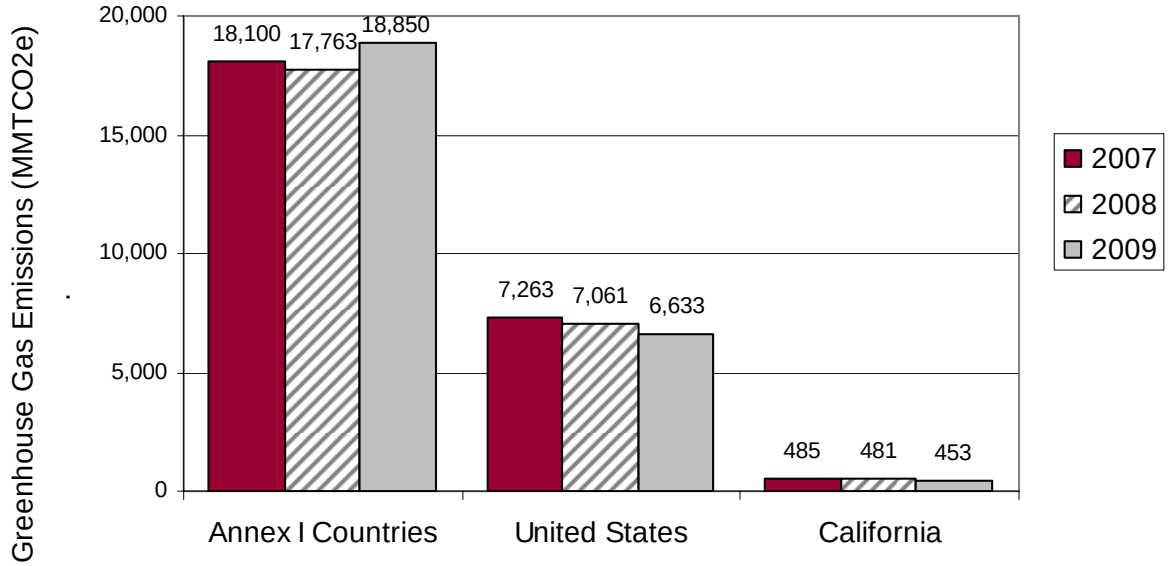
GHGs not defined by AB 32 include water vapor, ozone, and aerosols. Water vapor is an important component of our climate system and is not regulated. Ozone and aerosols are short-lived GHGs; global warming potentials for short-lived GHGs are not defined by the IPCC. Aerosols can remain suspended in the atmosphere for about a week and can warm the atmosphere by absorbing heat and cool the atmosphere by reflecting light. Black carbon is a type of aerosol that can also cause warming from deposition on snow.

There are no adverse health effects from the concentration of GHGs in the atmosphere at the current levels, with the exception of ozone and aerosols (particulate matter). The potential health effects of ozone and particulate matter are discussed in criteria pollutant analyses. At very high concentrations, carbon dioxide, methane, sulfur hexafluoride, and some chlorofluorocarbons can cause suffocation as the gases can displace oxygen (NIOSH 2005, OSHA 2003).

3.2.1 - Emissions Inventories

Emissions worldwide were approximately 49,000 million metric tons of carbon dioxide equivalents ($MMTCO_2e$) in 2004 (IPCC 2007b). Greenhouse gas emissions in 2007, 2008, and 2009 are shown in Figure 1. Annex I parties refer to countries that joined the United Nations Framework Convention on Climate Change.

Figure 1: Greenhouse Gas Emissions Trends



Prepared by Michael Brandman Associates using the following data sources:
California Air Resources Board 2011
U.S. Environmental Protection Agency 2011
United Nations Framework Convention on Climate Change 2010

3.3 - Regulatory Environment

3.3.1 - National

Greenhouse Gas Endangerment. *Massachusetts v. EPA* (Supreme Court Case 05-1120) was argued before the United States Supreme Court on November 29, 2006, in which it was petitioned that the EPA regulate four greenhouse gases, including carbon dioxide, under Section 202(a)(1) of the Clean Air Act. A decision was made on April 2, 2007, in which the Supreme Court found that greenhouse gases are air pollutants covered by the Clean Air Act. The Court held that the Administrator must determine whether emissions of greenhouse gases from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases—carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

Clean Vehicles. Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the Department of Transportation's National Highway Safety Administration announced a joint final rule establishing a national program that would reduce greenhouse gas emissions and improve fuel economy for new cars and trucks sold in the United States.

The first phase of the national program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards would cut carbon dioxide emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016). The EPA and the National Highway Safety Administration are working on a second-phase joint rulemaking to establish national standards for light-duty vehicles for model years 2017 and beyond.

On October 25, 2010, the EPA and the U.S. Department of Transportation proposed the first national standards to reduce greenhouse gas emissions and improve fuel efficiency of *heavy-duty trucks and buses*. For combination tractors, the agencies are proposing engine and vehicle standards that begin in the 2014 model year and achieve up to a 20 percent reduction in carbon dioxide emissions and

fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10 percent reduction for gasoline vehicles and 15 percent reduction for diesel vehicles by 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the agencies are proposing engine and vehicle standards starting in the 2014 model year, which would achieve up to a 10-percent reduction in fuel consumption and carbon dioxide emissions by 2018 model year.

Mandatory Reporting of Greenhouse Gases. The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory greenhouse gas reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires reporting of greenhouse gas emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of greenhouse gas emissions are required to submit annual reports to the EPA.

New Source Review. The EPA issued a final rule on May 13, 2010 that establishes thresholds for greenhouse gases that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these Clean Air Act permitting programs to limit which facilities will be required to obtain Prevention of Significant Deterioration and Title V permits. In the preamble to the revisions to the federal code of regulations, EPA states:

> This rulemaking is necessary because without it the Prevention of Significant Deterioration and Title V requirements would apply, as of January 2, 2011, at the 100 or 250 tons per year levels provided under the Clean Air Act, greatly increasing the number of required permits, imposing undue costs on small sources, overwhelming the resources of permitting authorities, and severely impairing the functioning of the programs. EPA is relieving these resource burdens by phasing in the applicability of these programs to greenhouse gas sources, starting with the largest greenhouse gas emitters. This rule establishes two initial steps of the phase-in. The rule also commits the agency to take certain actions on future steps addressing smaller sources, but excludes certain smaller sources from Prevention of Significant Deterioration and Title V permitting for greenhouse gas emissions until at least April 30, 2016.

The EPA estimates that facilities responsible for nearly 70 percent of the national greenhouse gas emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest greenhouse gas emitters—power plants, refineries, and cement production facilities.

3.3.2 - California

Pavley Regulations. California AB 1493, enacted on July 22, 2002, required the ARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. The regulation was stalled by automaker lawsuits and by the EPA's denial of an implementation waiver. On January 21, 2009, the ARB requested that the EPA reconsider its previous waiver denial. On January 26, 2009, President Obama directed that the EPA assess whether the denial of the waiver was appropriate. On June 30, 2009, the EPA granted the waiver request.

The first standards implementing AB 1493, referred to as Pavley I, will be phased in during the 2009 through 2016 model years. When fully phased in, the near term (2009–2012) standards will result in about a 22-percent reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards will result in about a 30-percent reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant. Pavley II was incorporated into Amendments to the Low-Emission Vehicle Program referred to as LEV III. The amendments, effective August 7, 2012, apply to vehicles for model years 2017 through 2025. The regulation will reduce greenhouse gases from new cars by 34 percent from 2016 levels by 2025.

Executive Order S-3-05. Former California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following reduction targets for greenhouse gas emissions:

- By 2010, reduce greenhouse gas emissions to 2000 levels.
- By 2020, reduce greenhouse gas emissions to 1990 levels.
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

The 2050 reduction goal represents what scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be an aggressive, but achievable, mid-term target. Because this is an executive order, the goals are not legally enforceable for local governments or the private sector.

Low Carbon Fuel Standard - Executive Order S-01-07. The Governor signed Executive Order S-01-07 on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. In particular, the executive order established a Low Carbon Fuel Standard and directed the Secretary for Environmental Protection to coordinate the actions of the California Energy Commission, the ARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by California Energy Commission on December 24, 2007) and was submitted to ARB for consideration as an "early action" item under AB 32. The ARB adopted the Low Carbon Fuel Standard on April 23, 2009. The Low Carbon Fuel Standard was challenged in the United States

District Court in Fresno in 2011. The court's ruling issued on December 29, 2011 included a preliminary injunction against ARB's implementation of the rule. The Ninth Circuit Court of Appeals stayed the injunction on April 23, 2012 pending final ruling on appeal, allowing the ARB to continue to implement and enforce the regulation.

SB 97 and the CEQA Guidelines Update. Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

The CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of greenhouse gas emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

A new section, CEQA Guidelines Section 15064.4, was added to assist agencies in determining the significance of greenhouse gas emissions. The new section allows agencies the discretion to determine whether a quantitative or qualitative analysis is best for a particular project. However, little guidance is offered on the crucial next step in this assessment process—how to determine whether the project's estimated greenhouse gas emissions are significant or cumulatively considerable.

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts respectively. Greenhouse gas mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze greenhouse gas emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable, however it does not answer the question of when emissions are cumulatively considerable.

Section 15183.5 permits programmatic greenhouse gas analysis and later project-specific tiering, as well as the preparation of Greenhouse Gas Reduction Plans. Compliance with such plans can support a determination that a project's cumulative effect is not cumulatively considerable, according to proposed Section 15183.5(b).

In addition, the amendments revised Appendix F of the CEQA Guidelines, which focuses on Energy Conservation. The sample environmental checklist in Appendix G was amended to include greenhouse gas questions.

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the

year 2020. "Greenhouse gases" as defined under AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. ARB is the state agency charged with monitoring and regulating sources of greenhouse gases. AB 32 states the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

The ARB Board approved the 1990 greenhouse gas emissions level of 427 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) on December 6, 2007 (ARB 2007). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 $MMTCO_2e$. Emissions in 2020 in a "business as usual" scenario are estimated to be 596 $MMTCO_2e$.

Under AB 32, the ARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California. Discrete early action measures are currently underway or are enforceable by January 1, 2010. The ARB has 44 early action measures that apply to the transportation, commercial, forestry, agriculture, cement, oil and gas, fire suppression, fuels, education, energy efficiency, electricity, and waste sectors. Of these early action measures, nine are considered discrete early action measures, as they are regulatory and enforceable by January 1, 2010. The ARB estimates that the 44 recommendations are expected to result in reductions of at least 42 $MMTCO_2e$ by 2020, representing approximately 25 percent of the 2020 target.

The ARB's Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 (ARB 2008). The Scoping Plan identifies recommended measures for multiple greenhouse gas emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 greenhouse gas target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables 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 greenhouse gas 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; and
- 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.

In addition, the Scoping Plan differentiates between "capped" and "uncapped" strategies. "Capped" strategies are subject to the proposed cap-and-trade program. The Scoping Plan states that the inclusion of these emissions within the cap-and trade program will help ensure that the year 2020 emission targets are met despite some degree of uncertainty in the emission reduction estimates for any individual measure. Implementation of the capped strategies is calculated to achieve a sufficient amount of reductions by 2020 to achieve the emission target contained in AB 32. "Uncapped" strategies that will not be subject to the cap-and-trade emissions caps and requirements are provided as a margin of safety by accounting for additional greenhouse gas emission reductions.

On March 17, 2011, the San Francisco Superior Court issued a final decision in Association of Irritated Residents v. California Air Resources Board (Case No. CPF-09-509562). While the Court upheld the validity of the ARB Scoping Plan for the implementation of AB 32, the Court enjoined ARB from further rulemaking under AB 32 until ARB amends its CEQA environmental review of the Scoping Plan to address the flaws identified by the Court. On May 23, 2011, ARB filed an appeal. On June 24, 2011, the Court of Appeal granted ARB's petition staying the trail court's order pending consideration of the appeal. In the interest of informed decision-making, on June 13, 2011, ARB released the expanded alternatives analysis in a draft Supplement to the AB 32 Scoping Plan Functional Equivalent Document. The ARB Board approved the Scoping Plan and the CEQA document on August 24, 2011.

SB 375. Passing the Senate on August 30, 2008, SB 375 was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of greenhouse gas emissions, which emits over 40 percent of the total greenhouse gas emissions in California. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: it (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing greenhouse gas emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies.

Renewable Electricity Standards. On September 12, 2002, Governor Gray Davis signed SB 1078 requiring California to generate 20 percent of its electricity from renewable energy by 2017. SB 107 changed the due date to 2010 instead of 2017. On November 17, 2008, Governor Arnold Schwarzenegger signed Executive Order S-14-08, which established a Renewable Portfolio Standard target for California requiring that all retail sellers of electricity serve 33 percent of their load with renewable energy by 2020. Governor Schwarzenegger also directed the ARB (Executive Order S-21-09) to adopt a regulation by July 31, 2010, requiring the state's load serving entities to meet a 33-

percent renewable energy target by 2020. The ARB approved the Renewable Electricity Standard on September 23, 2010 by Resolution 10-23.

Executive Order S-13-08. Executive Order S-13-08 indicates that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the order, the 2009 California Climate Adaptation Strategy (California Natural Resources Agency 2009) was adopted, which is the " . . . first statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

3.3.3 - Regional

Bay Area Air Quality Management District

The BAAQMD has established a Climate Action Program in 2005 to integrate climate protection activities into existing BAAQMD programs. As part of this program, the BAAQMD developed the Climate Action Web Portal for local governments to access tools and resources for climate change activities, including best practices, case studies, and news and events from local governments. In addition, the BAAQMD prepared a greenhouse gas emissions inventory for the area under its jurisdiction, along with a county-level breakdown of greenhouse gas emissions in the basin.

In 2008, the BAAQMD approved a fee on stationary air pollution sources in its jurisdiction to help defray the costs associated with the BAAQMD's climate protection activities and programs, including environmental review, air pollution regulations, and emissions inventory development. Industrial facilities and businesses that are currently required to submit an air quality permit to operate will have a fee of 4.4 cents per metric ton of greenhouse gas emissions added to their permit bill.

In addition, the BAAQMD updated its California Environmental Quality Act Air Quality Guidelines in 2010 to include both numeric and qualitative greenhouse gas thresholds and recommended assessment methodologies for project- and plan-level analyses. However, an Alameda Superior Court ruled in January 2012 in *California Building Industry Association v. Bay Area Air Quality Management District*, that the BAAQMD had violated CEQA by adopting thresholds without appropriate CEQA review and documentation. The Court ruled that the new thresholds (including new thresholds for toxic air contaminants and $PM_{2.5}$) are considered a "project" under CEQA, and thus the BAAQMD should have prepared the required CEQA review and documentation. This ruling does not prohibit the application of the BAAQMD's recommended thresholds but requires BAAQMD to undertake due CEQA review of the thresholds.

Alameda County

Alameda County (Unincorporated Areas) Community Climate Action Plan

The Alameda County (Unincorporated Areas) Community Climate Action Plan was approved by the County Board of Supervisors in June 2011 but is not in effect pending completion of environmental review that is currently in process. The Community Climate Action Plan outlines a course of action to reduce greenhouse gas emissions generated within the unincorporated areas of Alameda County,

and sets targeted GHG emissions reductions of 15 percent below 2005 levels by 2020. The Plan sets goals and actions in six areas: transportation, land use, building energy, water, waste, and green infrastructure.

SECTION 4: MODELING PARAMETERS AND ASSUMPTIONS

4.1 - Model Selection

Air pollutant emissions can be estimated by using emission factors and a level of activity. Emission factors represent the rate of pollutant emission given an activity; for example, grams of NO_x per horsepower per hour or grams of NO_x per vehicle mile traveled. Activity levels would include the horsepower of a piece of equipment or the miles traveled in a day. The ARB has published emission factors for on-road mobile vehicles/trucks in the EMFAC mobile source emission model and emission factors for off-road equipment and vehicles in the OFFROAD emission model.

The activity for offroad equipment is based on the horsepower and load factors of the equipment. In general, the horsepower is the power of an engine—the greater the horsepower, the greater the power. The load factor is the average power of a given piece of equipment while in operation compared to its maximum rated horsepower. A load factor of 1.0 indicates that a piece of equipment continuously operates at its maximum operating capacity. An air emissions model (or calculator) combines the emission factors and the various levels of activity and outputs the emissions for the various pieces of equipment.

The California Emissions Estimator Model (CalEEMod) version 2011.1.1 was developed in cooperation with the South Coast Air Quality Management District and other air districts throughout the state. CalEEMod is designed as a uniform platform for government agencies, land use planners and environmental professionals to quantify potential criteria pollutant and greenhouse gas emissions associated with construction and operation from a variety of land uses.

Emission factors are often updated and there is a normal lag time between the development of new emission factors and the integration of the new emissions factors into the appropriate models. CalEEMod uses OFFROAD2007 and EMFAC2007 emission factors and will not be updated with the new OFFROAD2011 and EMFAC2011 factors until after the release of this analysis.

4.2 - Construction

Initial Repower

Project construction would consist of removal of existing turbines, pad construction, roadway improvements, and tower construction and installation. Construction would take place in 2014 and last approximately 6 months. The project includes three construction sites located north and south of I-580. Each site includes one or two common assembly pads (total of 5) and four 5-acre laydown areas that will be used to store turbine components, construction equipment, and construction materials. The common areas are used to minimize soil disturbance during construction. Construction activities at all sites are assumed to occur simultaneously. For the purposes of this analysis, these activities are categorized into two main phases of site preparation and tower construction. Detailed assumptions of these construction activities and durations are presented below.

Site Preparation Phasing

Site preparation would include activities such as pad construction, roadway improvements, and trenching. These activities were grouped in to phases based on estimated construction and equipment schedules. Phase durations for the site preparation phases are shown in Table 5. Phase activities and durations were obtained from forecasted project construction scheduling.

Table 5: Site Preparation Phase Durations and Activities

Phase	Activities	Duration (days)	Months
Site Preparation 1	Road and pad construction, compaction, dust control, trenching	65	1, 2, 3
Site Preparation 2	Hauling demolition and construction materials	85	1, 2, 3, 4
Site Preparation 3	Compaction, erosion, and dust control	130	1, 2, 3, 4, 5, 6

The construction equipment lists for these phases are shown in Table 6. Equipment population and activity are based on the forecasted project construction scheduling. This analysis uses the equipment load factors presented in an ARB Staff Report updating the emission inventory for in-use off-road equipment (ARB 2010).

Table 6: Site Preparation Equipment Assumptions

Activity	Equipment	Number	Hours per day	Horse-power	Load Factor
Site Preparation 1	Graders	2	12	162	0.41
	Plate Compactors	1	12	232	0.40
	Rollers	2	12	84	0.38
	Rubber Tired Dozers	3	12	358	0.40
	Tractors/Loaders/Backhoes	1	12	75	0.37
Site Preparation 2	Off-Highway Trucks (Water)	3	12	381	0.57
Site Preparation 3	Off-Highway Trucks (Water)	2	12	381	0.57
Source: CalEEMod and FirstCarbon Solutions | Michael Brandman Associates.					

Offsite emissions would be generated by mobile sources related to worker, vendor, and hauling trips occurring during project construction. CalEEMod default values for fleet mix, trip length, and trip generation rates were used to calculate emissions from worker and vendor trips. The haul trips include a total of 850 cement deliveries from local sources. This amounts to approximately 6 truck deliveries or 12 round trips per day during a peak day of activity. The hauling trips were added based on the forecasted project construction schedule, with an assumed trip length of 10 miles. The phase trip generation rates used in this analysis are shown in Table 7.

Table 7: Site Preparation Offsite Trip Rate Assumptions

Activity	Trips per day		
	Worker	Vendor	Hauling
Site Preparation 1	23	0	12
Site Preparation 2	8	0	0
Site Preparation 3	5	0	0
Source: CalEEMod and FirstCarbon Solutions | Michael Brandman Associates.			

Tower Construction Phasing

Site preparation would include activities such as pad construction, roadway improvements, and trenching. These activities were grouped in to phases based on estimated construction and equipment schedules. Phase durations for the tower construction phases are shown in Table 8. Phase activities and durations were obtained from forecasted project construction scheduling.

Table 8: Tower Construction Phase Durations and Activities

Phase	Activities	Duration (days)	Months
Site Preparation 1	Road and pad construction, compaction, dust control, trenching	65	1, 2, 3
Site Preparation 2	Hauling demolition and construction materials	85	1, 2, 3, 4
Site Preparation 3	Compaction, erosion, and dust control	130	1, 2, 3, 4, 5, 6
Tower Construction 1	Foundation construction, removal of existing foundation	65	1, 2, 3
Tower Construction 2	Removal of existing turbines, construction and installation of new turbines	130	1, 2, 3, 4, 5, 6
Tower Construction 3	Foundation pouring, construction and installation of new turbines	105	2, 3, 4, 5, 6

The construction equipment lists for these phases are shown in Table 9. Equipment population and activity are based on the forecasted project construction scheduling. Updated equipment load factors for off-road equipment were used in this analysis (ARB 2010).

Table 9: Tower Construction Equipment Assumptions

Activity	Equipment	Number	Hours per day	Horse-power	Load Factor
Tower Construction 1	Excavators	2	12	157	0.38
Tower Construction 2	Cranes	2	12	200	0.29
	Forklifts	7	12	149	0.20
	Rubber Tired Loaders	2	12	87	0.36
Tower Construction 3	Cranes	1	12	287	0.29
	Excavators	2	12	157	0.38
	Cranes	2	12	200	0.29
Source: CalEEMod and FirstCarbon Solutions | Michael Brandman Associates.					

Offsite emissions would be generated by mobile sources related to worker, vendor, and hauling trips occurring during project construction. CalEEMod default values for fleet mix, trip length, and trip generation rates were used to calculate emissions from worker and vendor trips. Additional worker trips were added to represent light duty vehicles that would be available for general use and minor hauling. Hauling trips during these phases are assumed to involve a total of 850 delivery trips for concrete from local sources and 240 long distance delivery trips for turbine parts. This amounts to approximately 10 local truck deliveries (20 round trips) per day and 3 long distance truck deliveries (6 round trips) per day during a peak day of activity. Hauling trip rates were added based on the forecasted project construction schedule, with assumed trip lengths of 10 miles for local deliveries and 40 miles for long distance deliveries. The trip generation rates for each phase of construction are shown in Table 10.

Table 10: Tower Construction Offsite Trip Rate Assumptions

Activity	Trips per day		
	Worker	Vendor	Hauling
Tower Construction 1	66	26	0
Tower Construction 2	156	26	0
Tower Construction 3	66	26	26
Source: CalEEMod and FirstCarbon Solutions | Michael Brandman Associates.			

Equipment Tiers and Emission Factors

Equipment tiers refer to a generation of emission standards established by the EPA and ARB that apply to diesel engines in off-road equipment. The "tier" of an engine depends on the model year and horsepower rating; generally, the newer a piece of equipment is, the greater the tier it is likely to have. Excluding engines greater than 750 horsepower, Tier 1 engines were manufactured generally

between 1996 and 2003. Tier 2 engines were manufactured between 2001 and 2007. Tier 3 engines were manufactured between 2006 and 2011 and will continue to be produced until Tier 4 engines are completely phased in. Tier 4 engines are the newest and some incorporate hybrid electric technology; they began phase in of small engines (less than 75 hp) in 2008. Larger equipment is phased in between 2012 and 2014 with an increasing percentage of equipment required to meet the new standards (South Coast Air Quality Management District 2011). Tier 4 equipment is not currently widely available in all equipment types and sizes due to its recent introduction to the contractor construction fleets and long life of construction equipment.

CalEEMod contains an inventory of construction equipment that incorporates estimates of the number of equipment, their age, their horsepower, and equipment tier from which rates of emissions are developed. The CalEEMod default tier mix was used in this analysis for the estimation of emissions from onsite construction equipment for the unmitigated scenario.

CalEEMod's off-road emission factors are based on the equipment populations from the OFFROAD2007 model. For the unmitigated scenario, emission factors for each phase's applicable construction year were used.

Full Power Construction Assumptions

The analysis examined the impacts of decommissioning all existing turbines remaining after the Initial Repower and replacing them with up to 300 shrouded turbines providing up to 30 MW of generating capacity. The project objective is to replace the remaining turbines by the end of 2016.

The Full Repower analysis utilizes the same assumptions as the Initial Repower. The same approach used for the Initial Repower for construction staging and management is anticipated for the remaining turbines. The modeling results from the Initial Repower were applied to the Full Repower, but scaled up to reflect the additional turbines that will be decommissioned and replaced. The Initial Repower assumes a 6-month schedule for 4 MW of turbines. The Full Repower analysis assumes that 30 MW of turbines would be installed during a 9-month period. This pace would require more installation sites to have concurrent construction activities. The Full Repower would increase the pace of activity by a factor of five, which would also increase daily emissions by a factor of five. The total emissions generated by the project would increase by a factor of 7.5 (30 MW/4 MW) compared with the Initial Repower project.

4.3 - Operation

Operational emissions are those emissions that occur during operation of the project. The project involves the repowering of 4 MWs of existing wind generation turbines with new MEWTs equivalent to 4 MWs of generating capacity. Operation of the new MEWTs is not expected to result in an increase of direct or indirect emissions compared to the existing conditions. Therefore, the project is not expected to result in any net change in operational emissions and no new impact to air quality or greenhouse gas emissions will occur under the Initial Repower and the Full Repower scenarios.

SECTION 5: AIR QUALITY IMPACT ANALYSIS

This section calculates the estimated impacts from the construction and operation of the project and assesses these impacts in relation to the State of California CEQA Guidelines and BAAQMD CEQA Air Quality Guidelines.

5.1 - Thresholds of Significance

According to Appendix G, Environmental Checklist, of the CEQA Guidelines, air quality and greenhouse gas emissions impacts resulting from the implementation of the proposed project would be considered significant if the project would:

> Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.
>
> 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 projected 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?
>
> e.) Create objectionable odors affecting a substantial number of people?
>
> f.) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
>
> g.) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

5.2 - Impact Analysis

Consistency with Air Quality Management Plan

Impact AIR-1: **The project would not conflict with or obstruct implementation of the applicable air quality plan.**

Impact Analysis

According to the BAAQMD CEQA Air Quality Guidelines, the BAAQMD recommends applying three criteria for determining whether a project is consistent with all applicable air quality plans. These criteria are discussed below.

Criterion 1: Does the project support the primary goals of the Air Quality Plan, which are to attain air quality standards, reduce population exposure, protect public health in the Bay Area; and reduce greenhouse gas emissions and protect the climate.

Based on the analyses contained in discussion of Impact AIR-2 and Impact AIR-3 below, operation of the project would not exceed the BAAQMD screening levels for criteria pollutants, the significance thresholds for risk and health hazards, or the significance threshold for local carbon monoxide levels. Project construction emissions would exceed the threshold for NO_x, which may conflict with applicable Air Quality Plans. Based on these analysis results, the project does not meet Criterion 1.

Criterion 2: Does the project include applicable control measures from the applicable Air Quality Plan.

The project would comply with all applicable rules and regulations during construction and operation. Additionally, Mitigation Measure AIR-3a would require the project to implement the BAAQMD's basic construction mitigation measures for construction dust control. The project meets Criterion 2.

Criterion 3: Does the project disrupt or hinder implementation of any Air Quality Plan control measures.

The project would not exceed any significance thresholds during operation. Construction-related emissions would exceed the regional NO_x significance threshold, as shown in Impact AIR-3. Implementation of Mitigation Measures AIR-3a and AIR-3b would reduce the emissions of NO_x, but emissions after mitigation would also exceed the regional NO_x threshold temporarily. The project is required to mitigate cumulative NO_x emissions during construction based on exceeding the NO_x threshold. The project includes a mitigation measure to use equipment certified to Tier 3 standards that will substantially reduce this impact and therefore does not disrupt or hinder implementation of any Air Quality Plan control measures.

The Full Repower project would not exceed any operational threshold. However, temporary construction emissions would exceed BAAQMD thresholds for ROG, NO_x, PM_{10}, and $PM_{2.5}$. Therefore, the Full Repower project would also require implementation of Mitigation Measures AIR-3a and AIR-3b to reduce this impact to less than significant.

Level of Significance Before Mitigation
Potentially significant impact.

Mitigation Measures
Implement Mitigation Measures AIR-3a and AIR-3b.

Level of Significance After Mitigation
Less than significant impact.

Potential for Air Quality Standard Violation

Impact AIR-2:	**The project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation.**

Impact Analysis
To assist in the analysis of impacts, the BAAQMD has identified screening criteria to provide lead agencies and project applicants with a conservative indication of whether the project could result in potentially significant impacts. The screening criteria serve as the first step in the project's significance determination. If all of the screening criteria were met by the project, then the lead agency would not need to perform a detailed impact assessment. In this case, the impacts would be less than significant and mitigation of project impacts would not be required. Otherwise, a more detailed assessment would be necessary and/or mitigation measures proposed to reduce impacts to less than significant levels, which is the next level of significance testing. Project impacts are discussed below.

Construction Localized Dust Emissions
As stated in the Guidelines, PM_{10} and $PM_{2.5}$ emissions from the generation of construction dust are evaluated separately from PM_{10} and $PM_{2.5}$ resulting from the generation of construction equipment exhaust emissions. For construction dust, the Guidance requires the implementation of Best Management Practices (BMPs) as the fugitive dust significance threshold. The project description does not explicitly incorporate these BMPs, therefore construction dust impacts are potentially significant. While the Guidelines do not specify what constitutes BMPs, this analysis considers them to consist of the BAAQMD's list of eight basic construction mitigation measures recommended for all proposed projects. This mitigation measure is discussed in Impact AIR-3 and is referenced as Mitigation Measure AIR-3a. After the application of these basic measures, the construction localized dust emission impacts are less than significant.

Operational Carbon Monoxide Hotspot
Localized high levels of carbon monoxide (CO hotspot) are associated with traffic congestion and idling or slow moving vehicles. The BAAQMD recommends a screening analysis to determine if a project has the potential to contribute to a CO hotspot. The screening criteria identify when site-specific CO dispersion modeling is not necessary. The project would result in a less than significant impact to air quality for local CO if the following screening criteria were met:

- Project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.
- The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

The project is not expected to result in a net change in traffic volume or cause significant impacts to intersection LOS during project operation. Therefore, CO hotspot modeling is not necessary, and impacts are less than significant.

The Full Repower project would result in same impacts as the Initial Repower project. No change in operational emissions is anticipated. The project would mitigate construction impacts from fugitive dust through implementation of Mitigation Measure AIR-3a. The Full Repower would not result in an air quality violation or substantially contribute to a violation with mitigation incorporated.

Level of Significance Before Mitigation
Potentially significant impact.

Mitigation Measures
Implement Mitigation Measure AIR-3a.

Level of Significance After Mitigation
Less than significant impact.

Cumulative Impacts

Impact AIR-3:	**The project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors).**

Impact Analysis

The non-attainment pollutants of concern for this impact are ozone, PM_{10} and $PM_{2.5}$. Ozone is not emitted directly into the air, but is a regional pollutant formed by a photochemical reaction in the atmosphere. Ozone precursors, ROG and NO_x, react in the atmosphere in the presence of sunlight to form ozone. Therefore, the BAAQMD does not have a recommended ozone threshold, but has regional thresholds of significance for project-emitted NO_x and ROG.

BAAQMD has determined that a project-level exceedance of the thresholds presented in Table 11 would have significant adverse impact on the air quality in the Basin by jeopardizing the Basin's attainment of the federal standards. Therefore, projects within the Basin with construction or

operational emissions in excess of any of the thresholds in Table 11 are considered to have a significant regional air quality impact.

Table 11: BAAQMD Project-Level Mass Thresholds

Pollutant	Construction-Related	Operational-Related
Reactive organic gases (ROG)	54 lbs per day	54 lbs per day, and 10 tons per year
Nitrogen oxides (NO_x)	54 lbs per day	54 lbs per day, and 10 tons per year
PM_{10} (Exhaust)	80 lbs per day	82 lbs per day, and 15 tons per year
$PM_{2.5}$ (Exhaust)	54 lbs per day	54 lbs per day, and 10 tons per year
$PM_{10}/PM_{2.5}$ (Fugitive Dust)	Best Management Practices	—
Note: Abbreviation: lbs = pounds Source: BAAQMD 2011b		

BAAQMD's 2011 Guidance states the following:

> In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary. The analysis to assess project-level air quality impacts should be as comprehensive and rigorous as possible.

Therefore, if the project's emissions were below the BAAQMD thresholds or the screening criteria, then the project's cumulative impact would be less than significant.

Construction Regional Emissions

Construction-related emissions were calculated using the methods and assumptions described in Section 4, Modeling Parameters and Assumptions. The results of this analysis are presented in Table 12. The forecasted project construction schedule assumes overlap of phases in various months; with all phase activity overlapping in months 2 and 3 (see Section 4). The maximum daily emissions rate therefore reflects this worst-case scenario, and the maximum daily emissions from all phases summed. As shown in the table, the BAAQMD threshold for NO_x is exceeded. Therefore, impacts are potentially significant.

Table 12: Unmitigated Construction Air Pollutant Emissions

Source		Maximum Daily Emissions (pounds per day)			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
Site Preparation	Site Preparation 1	12.17	95.81	33.88	19.62
	Site Preparation 2	7.48	57.35	2.15	2.04
	Site Preparation 3	4.99	38.23	1.43	1.36
Tower Construction	Tower Construction 1	2.67	17.74	2.11	0.94
	Tower Construction 2	7.42	49.80	5.20	2.73
	Tower Construction 3	7.57	49.20	3.99	2.31
Maximum Daily Emissions		**42.30**	**308.13**	**48.76**	**29.00**
Significance Threshold		54	54	82	54
Significant Impact?		No	Yes	No	No

Notes:
The maximum daily emissions refer to the maximum emissions that would occur in one day. Proposed construction phasing allows overlap of all phases during months 2 and 3 of construction. Therefore, maximum daily emissions reflect the scenario that all phases overlap.
ROG = reactive organic gases NO_x = nitrogen oxides CO = carbon monoxide
SO_X = sulfur oxides PM_{10} and $PM_{2.5}$ = particulate matter
Source of emissions: Appendix A: CalEEMod Output.
Source of thresholds: BAAQMD 2011b.

Implementation of Mitigation Measure AIR-3a would require project construction to adhere to all Basic Construction Mitigation Measures put forth by the BAAQMD. The Basic Construction Mitigation Measures, as listed in the BAAQMD Air Quality Guidelines, and associated measures in CalEEMod are displayed in Table 13.

Table 13: BAAQMD Basic Construction Mitigation Measures

Best Available Control Measure[1]	Associated Measure in CalEEMod[2]
a. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.	Water exposed areas two times per day.
b. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.	N/A
c. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.	Clean paved roads.
d. All vehicle speeds on unpaved roads shall be limited to 15 mph.	Vehicle speed on unpaved roads 15 mph.

Table 13 (cont.): BAAQMD Basic Construction Mitigation Measures

Best Available Control Measure[1]	Associated Measure in CalEEMod[2]
e. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.	N/A
f. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulation [CCR]). Clear signage shall be provided for construction workers at all access points.	Along with Measure 7, accounts for a 5 percent reduction in NO_x, PM_{10}, and $PM_{2.5}$ emissions (applied outside of CalEEMod).
g. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.	See Measure 6.
h. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.	N/A
Sources: [1] BAAQMD 2011b. [2] Appendix A.	

Mitigation Measure AIR-3b would require all off-road equipment used during all site preparation and tower construction phases to be rated Tier 3 or higher.

Table 14 shows construction emissions after the incorporation of these mitigation measures. After mitigation, the maximum daily emission rate of NO_x exceeds the BAAQMD significance threshold.

Table 14: Mitigated Construction Air Pollutant Emissions

Source		Maximum Daily Emissions (pounds per day)			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
Site Preparation	Site Preparation 1	7.62	49.43	16.72	10.04
	Site Preparation 2	6.95	44.83	2.70	2.59
	Site Preparation 3	4.63	29.89	1.80	1.73

Table 14 (cont.): Mitigated Construction Air Pollutant Emissions

Source		Maximum Daily Emissions (pounds per day)			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
Tower Construction	Tower Construction 1	2.12	12.65	2.07	0.90
	Tower Construction 2	5.82	32.39	4.94	2.47
	Tower Construction 3	7.19	40.36	4.10	2.42
Maximum Daily Emissions		**34.33**	**209.55**	**32.33**	**20.15**
Basic Construction Mitigation Measure Reductions (Idling and Maintenance)		—	*-10.48*	*-1.62*	*-1.01*
Maximum Daily Emissions		**34.33**	**199.07**	**30.71**	**19.14**
Significance Threshold		54	54	82	54
Significant Impact?		No	Yes	No	No

Notes:
The maximum daily emissions refer to the maximum emissions that would occur in one day. Proposed construction phasing allows overlap of all phases during months 2 and 3 of construction. Therefore, maximum daily emissions reflect the scenario that all phases overlap.
Basic Construction Mitigation Measure Reductions: 5% reduction in NO_x, PM_{10}, and $PM_{2.5}$.from idling and maintenance measures. Reduction applies to all phases, but only shown here for the maximum daily emissions.
ROG = reactive organic gases NO_x = nitrogen oxides CO = carbon monoxide
SO_X = sulfur oxides PM_{10} and $PM_{2.5}$ = particulate matter
Source of emissions: Appendix A: CalEEMod Output.
Source of thresholds: BAAQMD 2011b.

The analysis assessed the impacts of decommissioning the turbines remaining after Initial Repower. The Full Repower project would replace the remaining turbines with up to 300 shrouded turbines providing up to 30 MW of generating capacity. The analysis utilized the same modeling assumptions that were used for the Initial Repower but scaled up the emissions to reflect increased construction activity required to decommission the larger numbers of existing turbines and replace them with new shrouded turbines. The results of the Full Repower construction analysis are presented in Table 15.

Table 15: Full Repower Construction Air Pollutant Emissions

Source	Maximum Daily Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions Full Repower	171.65	995.35	153.55	95.7
Basic Construction Mitigation Measure Reductions (Idling and Maintenance)	—	-49.77	-7.68	-4.79
Maximum Daily Emissions Full Repower w/basic Mitigation Measures	**171.65**	**945.58**	**145.87**	**90.82**

Table 15 (cont.): Full Repower Construction Air Pollutant Emissions

Source	Maximum Daily Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Significance Threshold	54	54	82	54
Significant Impact?	Yes	Yes	Yes	Yes
Note: Full power emissions were increased by a factor of five to complete repower of larger number of turbines within the desired nine month timeframe. Source of emissions: Appendix A: CalEEMod Output and emission spreadsheet.				

The Full Repower construction activities would result in emissions that exceed BAAQMD daily construction thresholds. The Full Repower project would exceed ROG, NO_x, PM_{10}, and $PM_{2.5}$ thresholds after the application of all feasible mitigation measures. The suggested mitigation measures applicable to the project are provided below.

The BAAQMD does not have annual thresholds for construction emissions; however, for disclosure purposes the total emissions generated during construction activities for the Initial Repower and the Full Repower were estimated. Total project emissions are provided in Table 16.

Table 16: Total Project Construction Air Pollutant Emissions

Source	Maximum Daily Emissions (tons)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Total Emissions Initial Repower	1.67	10.09	1.38	0.87
Total Emissions Full Repower	12.51	75.67	10.34	6.49
Total Emissions with Initial and Full Repower Projects	**14.18**	**85.76**	**11.72**	**7.36**
Notes: Source of emissions: Appendix A: CalEEMod Output and Emission Spreadsheet.				

Operational Regional Emissions

As discussed in Section 4, the project would not result in a net change in operational emissions. Therefore, impacts from operational emissions are less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Mitigation Measures

MM AIR-3a The following Basic Construction Mitigation Measures, as put forth in the Bay Area Air Quality Management District's Air Quality Guidelines, shall be included in the project design and implemented during construction:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulation [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
8. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

MM AIR-3b The developer shall ensure that all off-road equipment used by construction contractors during demolition and grading phases is certified to Tier 3 or higher emission standards. The developer shall provide a record of the equipment used during these phases indicating make, model, year, horsepower, and certification level to the County as verification of compliance.

Level of Significance After Mitigation

Significant and unavoidable impact.

Sensitive Receptors

Impact AIR-4:	**The project would not expose sensitive receptors to substantial pollutant concentrations.**

Impact Analysis

This discussion addresses whether the project would expose sensitive receptors to substantial pollutant concentrations of carbon monoxide, diesel particulate matter, or other toxic air contaminants of concern. A health risk is the probability that exposure to a given toxic air contaminant under a given set of conditions will result in an adverse health effect. The health risk is affected by several factors, such as the amount, toxicity, and concentration of the contaminant; meteorological conditions; distance from the emission sources to people; the distance between the

emission sources; the age, health, and lifestyle of the people living or working at a location; and the length of exposure to the toxic air contaminant.

Two scenarios have the potential for exposing sensitive receptors to toxic air contaminants. The first is when a project includes a new or modified source of toxic air contaminants and would be located near an existing or proposed sensitive receptor. The second scenario involves a residential or other sensitive receptor development locating near an existing or planned source of toxic air contaminants.

The project is not considered a sensitive receptor, as it does not fit the criteria discussed above. Undeveloped communities are located adjacent to the project site, and contain residences that may be considered sensitive receptors. The nearest residence lies approximately 1,000 feet north of site C-02.

To address potential risk and hazard impacts, the BAAQMD has developed individual project and cumulative thresholds of significance for air toxics evaluations (BAAQMD 2011b). The individual project thresholds are as follows:

- An increased cancer risk level of more than 10 in one million
- An increased non-cancer (chronic or acute) hazard index greater than 1.0
- An incremental increase of greater than 0.3 $\mu g/m^3$ annual average $PM_{2.5}$

The cumulative thresholds are as follows:

- A cancer risk level of more than 100 in one million from all local sources
- A chronic non-cancer hazard index greater than 10.0 from all local sources
- An annual average $PM_{2.5}$ concentration greater than 0.8 $\mu g/m^3$ from all local sources

Toxic Air Contaminants (TACs)
The project is not anticipated to be a source of TACs during operation. Although construction of the project would involve the use of diesel-fueled vehicles, the construction phase would occur over a limited duration. While operational emissions are ongoing, the construction phase emissions are short-term. The California Office of Environmental Health Hazard Assessment (OEHHA) provides exposure variants for 9-, 30-, and 70-year exposures in its Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2002). These exposures are chosen to coincide with the EPA's estimates of the average (9 years), high-end estimates (30 years) of residence time, and a typical lifetime (70 years). OEHHA states its support for the use of cancer potency factors for estimating cancer risk for these exposure durations. However, as the exposure duration decreases, the uncertainties introduced by applying cancer potency factors derived from very-long-term studies increases. Short-term high exposures are not necessarily equivalent to longer-term lower exposures, even when the total dose is the same. OEHHA therefore does not support the use of current cancer potency factor to evaluate cancer risk for exposures of less than 9 years (refer to page 8-4 of OEHHA 2002).

Construction phase risks would be considered acute health risks as opposed to cancer risks, which are long-term. OEHHA has yet to define acute risk factors for diesel particulates that would allow

the calculation of a hazards risk index; thus, evaluation of this impact would be speculative and no further discussion is necessary.

Naturally Occurring Asbestos
Construction in areas of rock formations that contain naturally occurring asbestos could release asbestos in to the air and pose a health hazard. As described in the Regulatory Setting, BAAQMD enforces ARB's air toxic control measures (ATCMs) at sites that contain ultramafic rock. The ATCM for Construction, Grading, Quarrying and Surface Mining Operations was signed into state law on July 22, 2002, and became effective in the Air Basin in November 2002. The purpose of this regulation is to reduce public exposure to naturally occurring asbestos. A review of the map containing areas more likely to have rock formations containing naturally occurring asbestos in California indicates that there is no asbestos in the immediate project area (U.S. Geological Survey 2011). Therefore, it can be reasonably concluded that the project would not expose sensitive receptors to naturally occurring asbestos. Impacts would be less than significant.

Full Repower Project

The Full Repower project would take place in the same area as the Initial Repower project with the exception of a 68-acre parcel identified by APN 099B-6325-001-04. This parcel is located between I-580 and Altamont Road in the same general vicinity as the other parcels and is not near any sensitive receptors. Therefore, no significant impacts to sensitive receptors would occur due to the Full Repower project.

Level of Significance Before Mitigation
Less than significant impact.

Mitigation Measures
No mitigation is required.

Level of Significance After Mitigation
Less than significant impact.

Objectionable Odors

Impact AIR-5	**The project would not create objectionable odors affecting a substantial number of people.**

Analysis
Thresholds of Significance
Odor impacts on residential areas and other sensitive receptors, such as hospitals, day-care centers, schools, etc., warrant the closest scrutiny, but consideration could also be given to other land uses where people may congregate, such as recreational facilities, worksites, and commercial areas.

Two circumstances have the potential to cause odor impacts:

1) A source of odors is proposed to be located near existing or planned sensitive receptors, or
2) A sensitive receptor land use is proposed near an existing or planned source of odor.

The BAAQMD Air Quality Guidance provides odor-screening distances for a variety of land uses and operations. Projects that would site a new receptor farther than the applicable screening distances from an existing odor source would not likely to have a significant impact. These types are shown in Table 17.

Table 17: Screening Levels for Potential Odor Sources

Odor Generator	Distance
Wastewater Treatment Plant	2 miles
Wastewater Pumping Facilities	1 mile
Sanitary Landfill	1 mile
Transfer Station	1 mile
Compositing Facility	1 mile
Petroleum Refinery	2 miles
Asphalt Batch Plant	2 miles
Chemical Manufacturing	2 miles
Fiberglass Manufacturing	1 mile
Painting/Coating Operations (e.g., auto body shop)	1 mile
Rendering Plant	2 miles
Coffee Roaster	1 mile
Food Processing Facility	1 mile
Confined Animal Facility/Feed Lot/Dairy	1 mile
Green Waste and Recycling Operations	1 mile
Metal Smelting Plants	2 miles
Source: BAAQMD 2011b.	

For projects within the screening distances, the BAAQMD has the following threshold for project operations:

> An odor source with five (5) or more confirmed complaints per year averaged over three years is considered to have a significant impact on receptors within the screening distance shown in Table 3-3 [of the BAAQMD's guidance].

Project Analysis

The Initial Repower project would not add new sensitive receptors and is not a typical source of objectionable odors during operation. The BAAQMD does not have a recommended odor threshold for construction activities. Diesel exhaust and VOCs would be emitted during period of the construction of the project, which are objectionable to some; however, such odorous emissions would disperse rapidly from the project site and therefore should not reach an objectionable level at nearby residences. Impacts would be less than significant.

The Full Repower project includes the same activities as the Initial Repower project and would not add new sensitive receptors and is not a typical source of objectionable odors during operation. Therefore, the Full Repower project would not result in significant odor impacts.

Level of Significance Before Mitigation
Less than significant impact.

Mitigation Measures
No mitigation is necessary.

Level of Significance After Mitigation
Less than significant impact.

SECTION 6: GREENHOUSE GAS IMPACT ANALYSIS

6.1 - CEQA Guidelines

CEQA Guidelines define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in the environment." To determine if a project would have a significant impact on greenhouse gases, the type, level, and impact of emissions generated by the project must be evaluated.

The following greenhouse gas significance thresholds are contained in Appendix G of the CEQA Guidelines, which were amendments adopted into the Guidelines on March 18, 2010, pursuant to SB 97. A significant impact would occur if the project would:

(a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

(b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

6.2 - Impact Analysis

Greenhouse Gas Inventory

Impact GHG-1:	**The project would generate direct and indirect greenhouse gas emissions; however, these emissions would not result in a significant impact on the environment.**

Impact Analysis

Thresholds of Significance for this Project

The BAAQMD does not have an adopted threshold of significance for construction-related GHG emissions. The BAAQMD still recommends that the emissions be quantified and disclosed, and significance should be determined based on the impact construction GHG emissions may have in relation to AB 32 GHG reduction goals.

The BAAQMD has established three significance thresholds for GHGs that are applicable to the operational phase of the project. These thresholds are:

- Compliance with a qualified greenhouse gas reduction strategy, or
- 1,100 $MTCO_2e$ per year emission level, or
- 4.6 $MTCO_2e$/service population per year (residents plus employees).

Project Evaluation

Greenhouse gas emissions for the project were quantified using the methods and assumptions described in Section 4, Modeling Parameters and Assumptions. Additional modeling details are provided in the following subsections for construction and operational emissions.

This analysis is restricted to greenhouse gases identified by AB 32, which include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The project would generate a variety of greenhouse gases during construction and operation, including several defined by AB 32 such as carbon dioxide, methane, and nitrous oxide.

The project may also emit greenhouse gases that are not defined by AB 32. For example, the project may generate aerosols. Aerosols are short-lived particles, as they remain in the atmosphere for about one week. Black carbon is a component of aerosol. Studies have indicated that black carbon has a high global warming potential; however, the Intergovernmental Panel on Climate Change states that it has a low level of scientific certainty (IPCC 2007a). Water vapor could be emitted from evaporated water used for landscaping, but this is not a significant impact because water vapor concentrations in the upper atmosphere are primarily due to climate feedbacks rather than emissions from project-related activities. The project would emit nitrogen oxides and volatile organic compounds, which are ozone precursors. Ozone is a greenhouse gas; however, unlike the other greenhouse gases, ozone in the troposphere is relatively short-lived and can be reduced in the troposphere on a daily basis. Stratospheric ozone can be reduced through reactions with other pollutants.

Certain greenhouse gases defined by AB 32 would not be emitted by the project. Perfluorocarbons and sulfur hexafluoride are typically used in industrial applications, none of which would be used by the project. Therefore, it is not anticipated that the project would emit perfluorocarbons or sulfur hexafluoride.

An upstream emission source (also known as life cycle emissions) refers to emissions that were generated during the manufacture of products to be used for construction of the project. Upstream emission sources for the project include but are not limited to emissions from the manufacture of cement, emissions from the manufacture of steel, and/or emissions from the transportation of building materials to the material wholesaler. The upstream emissions were not estimated because they are not within the control of the project and to do so would be speculative. Additionally, the California Air Pollution Control Officers Association White Paper on CEQA and Climate Change supports this conclusion by stating, “The full life-cycle of GHG [greenhouse gas] emissions from construction activities is not accounted for . . . and the information needed to characterize [life-cycle emissions] would be speculative at the CEQA analysis level” (CAPCOA 2008). Therefore, pursuant to CEQA Guidelines Sections 15144 and 15145, upstream /life cycle emissions are speculative and no further discussion is necessary.

Construction

The project would emit greenhouse gases from upstream emission sources and direct sources (combustion of fuels from worker vehicles and construction equipment). For assumptions used in estimating these emissions, please refer to Section 4 of this report. Unmitigated greenhouse gas emissions from project construction equipment and worker vehicles are shown in Table 18. The BAAQMD does not have thresholds for construction-related GHG emissions, and any construction-related emissions would occur prior to the year 2020, which is the year the State is required to reduce its greenhouse gas emissions to 1990 levels under AB 32. Therefore, any construction-related emissions would be less than significant.

Table 18: Initial Repower Construction Greenhouse Gas Emissions

Phase		Emissions (pounds CO_2e per day)			Days	Total $MTCO_2e$
		Onsite	Offsite	Subtotal		
Site Preparation	Site Preparation 1	9,846	760	10,606	65	345
	Site Preparation 2	9,800	85	9,885	85	420
	Site Preparation 3	6,533	53	6,587	130	428
Tower Construction	Tower Construction 1	1,796	1,410	3,206	65	104
	Tower Construction 2	5,828	2,369	8,196	130	533
	Tower Construction 3	4,396	3,238	7,634	105	401
Project Total		—	—	—	—	2,231

Note:
$MTCO_2e$ = metric tons of carbon dioxide equivalents = pounds per day x days x 0.0005.
Source: Appendix A.

The analysis includes an estimate of greenhouse gas emissions during the construction of the Full Repower project and the total emissions from the Initial Repower and the Full Repower projects. The Full Repower project emissions are based on the same modeling assumptions and results as those identified for the Initial Repower project described above, but scaled to address the larger number of turbines decommissioned and constructed for the full project. The greenhouse gas emissions are provided in Table 19.

Table 19: Full Repower and Total Construction Greenhouse Gas Emissions

Phase	Total $MTCO_2e$
Site Preparation	8,948
Tower Construction	7,785
Full Repower Project Total	16,733
Initial Repower Project Total	2,231
Total for Initial and Full Repower Project	**18,694**
Source Appendix A.	

Operation

As discussed in Section 4, the project would replace 4 MWs of existing wind turbines with newer technology wind turbines equivalent to 4 MWs of generating capacity. The GHG emissions offset by the project would not differ substantially from the emissions offset by the current wind turbines, as the generating capacity would remain unchanged. Therefore, operational greenhouse gas impacts would be less than significant.

Level of Significance Before Mitigation
Less than significant impact.

Mitigation Measures
No mitigation is necessary.

Level of Significance After Mitigation
Less than significant impact.

Greenhouse Gas Reduction Plans

Impact GHG-2:	**The project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.**

Impact Analysis
Alameda County (Unincorporated Areas) Community Climate Action Plan
As discussed in Section 3, Alameda County has prepared a Community Climate Action Plan (CAP) that is currently awaiting environmental review. Project consistency with the CAP may be evaluated by considering the extent in which the project supports the actions identified in the CAP, the project consistency with the Association of Bay Area Governments (ABAG) population growth projections, and the extent to which the project would interfere with the actions identified in the CAP.

The project would involve the repowering of wind turbines, which is consistent with the CAP's Renewable Energy Strategies and Measures. The CAP measures under this strategy area focus on solar power measures, but the use of wind power as a renewable energy source is consistent with the CAP's Renewable Energy Strategies. The project is not anticipated to be growth inducing, and therefore, would be consistent with ABAG population projections. The project would be consistent with the CAP and impacts would be less than significant.

AB 32 Scoping Plan
The California State Legislature adopted AB 32 in 2006. AB 32 focuses on reducing greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) to 1990 levels by the year 2020. Pursuant to the requirements in AB 32, the ARB adopted the Climate Change Scoping Plan (Scoping Plan) in 2008, which outlines actions recommended to obtain that goal.

The Scoping Plan contains a variety of strategies to reduce the State's emissions. Scoping Plan Measure 4 (Renewable Portfolio Standard) may be applicable to the project. The project would involve the repowering of wind turbines for energy generation; however, this would not add additional renewable energy generating capacity. As shown in Table 20, the remainder of the strategies are not applicable to the project.

Table 20: Inapplicable Scoping Plan Reduction Measures

Scoping Plan Reduction Measure	Reason Why Not Applicable
1. California Cap-and-Trade Program Linked to Western Climate Initiative. Implement a broad-based California Cap-and-Trade program to provide a firm limit on emissions. Link the California cap–and-trade program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic benefits for California. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms.	When this cap-and-trade system begins, products or services (such as electricity) would be covered and the cost of the cap-and-trade system would be transferred to the consumers.
2. California Light-Duty Vehicle Greenhouse Gas Standards. Implement adopted standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals.	This is a statewide measure that cannot be implemented by a project applicant or lead agency.
3. Energy Efficiency. Maximize energy efficiency building and appliance standards; pursue additional efficiency including new technologies, policy, and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California.	This is a measure for the state to increase its energy efficiency standards and cannot be implemented by the project applicant.
4. Renewable Portfolio Standard. Achieve 33 percent renewable energy mix statewide. Renewable energy sources include (but are not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.	This is a statewide measure that cannot be implemented by a project applicant or lead agency. Pacific Gas and Electric obtains 19 percent of its power supply from renewable sources such as geothermal.
5. Low Carbon Fuel Standard. Develop and adopt the Low Carbon Fuel Standard.	This is a statewide measure that cannot be implemented by a project applicant or lead agency. When this measure is initiated, the standard would be applicable to the fuel used by vehicles that would access the project site.
6. Regional Transportation-Related Greenhouse Gas Targets. Develop regional greenhouse gas emissions reduction targets for passenger vehicles. This measure refers to SB 375.	The project is not related to developing greenhouse gas emission reduction targets.
7. Vehicle Efficiency Measures. Implement light-duty vehicle efficiency measures.	When this measure is initiated, the standards would be applicable to the light-duty vehicles that would access the project site.
8. Goods Movement. Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.	The project does not propose any changes to maritime, rail, or intermodal facilities or forms of transportation.

Table 20 (cont.): Inapplicable Scoping Plan Reduction Measures

Scoping Plan Reduction Measure	Reason Why Not Applicable
9. Million Solar Roofs Program. Install 3,000 MW of solar-electric capacity under California's existing solar programs.	This measure is to increase solar throughout California, which is being done by various electricity providers and existing solar programs.
10. Medium/Heavy-Duty Vehicles. Adopt medium and heavy-duty vehicle efficiency measures.	This is a statewide measure that cannot be implemented by a project applicant or lead agency. When this measure is initiated, the standards would be applicable to the vehicles that access the project site.
11. Industrial Emissions. Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce greenhouse gas emissions and provide other pollution reduction co-benefits. Reduce greenhouse gas emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.	This measure would apply to the direct greenhouse gas emissions at major industrial facilities emitting more than 500,000 $MTCO_2e$ per year.
12. High Speed Rail. Support implementation of a high-speed rail system.	This is a statewide measure that cannot be implemented by a project applicant or lead agency.
13. Green Building Strategy. Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.	The state is to increase the use of green building practices. The project would not result in the construction of new buildings.
14. High Global Warming Potential Gases. Adopt measures to reduce high global warming potential gases.	When this measure is initiated, it would be applicable to the high global warming potential gases.
15. Recycling and Waste. Reduce methane emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero-waste.	The project would not contain a landfill. The State is to help increase waste diversion.
16. Sustainable Forests. Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation.	No forested lands exist onsite.
17. Water. Continue efficiency programs and use cleaner energy sources to move and treat water.	This is a measure for state and local agencies.
18. Agriculture. In the near-term, encourage investment in manure digesters and at the five-year Scoping Plan update determine if the program should be made mandatory by 2020.	No grazing, feedlot, or other agricultural activities that generate manure occur onsite or are proposed to be implemented by the project.
Source of ARB Scoping Plan Reduction Measure: California Air Resources Board 2008. Source of Project Consistency or Applicability: FirstCarbon Solutions | Michael Brandman Associates.	

Level of Significance Before Mitigation
Less than significant impact.

Mitigation Measures
No mitigation is necessary.

Level of Significance After Mitigation
Less than significant impact.

After Mitigation
Less than significant impact.

SECTION 7: REFERENCES

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Appendix A:
CalEEMod Output and Emission Spreadsheet

Sand Hill Wind Project - Daily Construction - Site Preparation

Alameda County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
User Defined Industrial	1	User Defined Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**		**Utility Company**	Pacific Gas & Electric Company
Climate Zone	4		2.2		
		Precipitation Freq (Days)			
			63		

1.3 User Entered Comments

Project Characteristics - Sand Hill Wind Project daily construction emissions during site preparation phases.

Land Use - User defined land category used. Project specific information available for construction activity.

Construction Phase - Site preparation activities grouped based on project specific schedule. Only one day modeled per phase to calculate daily emissions.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Trips and VMT - Site Preparation 1: Anticipated 12 additional hauling trips per day carrying aggregate material. Aggregate material assumed to be hauled from local cities, 10 mile trip length.

On-road Fugitive Dust -

Grading -

Vehicle Trips - No operational emissions calculated

Construction Off-road Equipment Mitigation - BAAQMD Best Management Practices. Tier 3 engines for all equipment.

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	12.16	95.80	56.83	0.10	29.19	4.69	33.88	14.93	4.69	19.61	0.00	10,618.63	0.00	1.08	0.00	10,641.33
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	7.61	49.43	54.72	0.10	13.41	3.31	16.72	6.73	3.31	10.05	0.00	10,618.63	0.00	1.08	0.00	10,641.33
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation 1 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					28.69	0.00	28.69	14.90	0.00	14.90						0.00
Off-Road	11.71	92.29	53.58	0.09		4.58	4.58		4.58	4.58		9,824.07		1.05		9,846.13
Total	**11.71**	**92.29**	**53.58**	**0.09**	**28.69**	**4.58**	**33.27**	**14.90**	**4.58**	**19.48**		**9,824.07**		**1.05**		**9,846.13**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.29	3.36	1.54	0.00	0.16	0.10	0.26	0.02	0.10	0.12		519.87		0.01		520.17
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.17	0.16	1.71	0.00	0.34	0.01	0.35	0.01	0.01	0.02		274.68		0.02		275.03
Total	**0.46**	**3.52**	**3.25**	**0.00**	**0.50**	**0.11**	**0.61**	**0.03**	**0.11**	**0.14**		**794.55**		**0.03**		**795.20**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					12.91	0.00	12.91	6.70	0.00	6.70						0.00
Off-Road	7.16	45.91	51.47	0.09		3.20	3.20		3.20	3.20	0.00	9,824.07		1.05		9,846.13
Total	**7.16**	**45.91**	**51.47**	**0.09**	**12.91**	**3.20**	**16.11**	**6.70**	**3.20**	**9.90**	**0.00**	**9,824.07**		**1.05**		**9,846.13**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.29	3.36	1.54	0.00	0.16	0.10	0.26	0.02	0.10	0.12		519.87		0.01		520.17
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.17	0.16	1.71	0.00	0.34	0.01	0.35	0.01	0.01	0.02		274.68		0.02		275.03
Total	**0.46**	**3.52**	**3.25**	**0.00**	**0.50**	**0.11**	**0.61**	**0.03**	**0.11**	**0.14**		**794.55**		**0.03**		**795.20**

3.3 Site Preparation 2 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	7.42	57.29	22.04	0.09		2.03	2.03		2.03	2.03		9,786.22		0.65		9,799.96
Total	**7.42**	**57.29**	**22.04**	**0.09**	**0.00**	**2.03**	**2.03**	**0.00**	**2.03**	**2.03**		**9,786.22**		**0.65**		**9,799.96**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.06	0.05	0.59	0.00	0.12	0.00	0.12	0.00	0.00	0.01		95.54		0.01		95.66
Total	**0.06**	**0.05**	**0.59**	**0.00**	**0.12**	**0.00**	**0.12**	**0.00**	**0.00**	**0.01**		**95.54**		**0.01**		**95.66**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	6.89	44.77	44.77	0.09		2.58	2.58		2.58	2.58	0.00	9,786.22		0.65		9,799.96
Total	**6.89**	**44.77**	**44.77**	**0.09**	**0.00**	**2.58**	**2.58**	**0.00**	**2.58**	**2.58**	**0.00**	**9,786.22**		**0.65**		**9,799.96**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.06	0.05	0.59	0.00	0.12	0.00	0.12	0.00	0.00	0.01		95.54		0.01		95.66
Total	**0.06**	**0.05**	**0.59**	**0.00**	**0.12**	**0.00**	**0.12**	**0.00**	**0.00**	**0.01**		**95.54**		**0.01**		**95.66**

3.4 Site Preparation 3 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	4.95	38.19	14.69	0.06		1.35	1.35		1.35	1.35		6,524.14		0.44		6,533.31
Total	**4.95**	**38.19**	**14.69**	**0.06**	**0.00**	**1.35**	**1.35**	**0.00**	**1.35**	**1.35**		**6,524.14**		**0.44**		**6,533.31**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.04	0.03	0.37	0.00	0.07	0.00	0.08	0.00	0.00	0.01		59.71		0.00		59.79
Total	**0.04**	**0.03**	**0.37**	**0.00**	**0.07**	**0.00**	**0.08**	**0.00**	**0.00**	**0.01**		**59.71**		**0.00**		**59.79**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	4.59	29.85	29.85	0.06		1.72	1.72		1.72	1.72	0.00	6,524.14		0.44		6,533.31
Total	**4.59**	**29.85**	**29.85**	**0.06**	**0.00**	**1.72**	**1.72**	**0.00**	**1.72**	**1.72**	**0.00**	**6,524.14**		**0.44**		**6,533.31**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.04	0.03	0.37	0.00	0.07	0.00	0.08	0.00	0.00	0.01		59.71		0.00		59.79
Total	**0.04**	**0.03**	**0.37**	**0.00**	**0.07**	**0.00**	**0.08**	**0.00**	**0.00**	**0.01**		**59.71**		**0.00**		**59.79**

Sand Hill Wind Project - Daily Construction - Site Preparation

Alameda County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
User Defined Industrial	1	User Defined Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**		**Utility Company**	Pacific Gas & Electric Company
Climate Zone	4		2.2		
		Precipitation Freq (Days)			
			63		

1.3 User Entered Comments

Project Characteristics - Sand Hill Wind Project daily construction emissions during site preparation phases.

Land Use - User defined land category used. Project specific information available for construction activity.

Construction Phase - Site preparation activities grouped based on project specific schedule. Only one day modeled per phase to calculate daily emissions.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Trips and VMT - Site Preparation 1: Anticipated 12 additional hauling trips per day carrying aggregate material. Aggregate material assumed to be hauled from local cities, 10 mile trip length.

On-road Fugitive Dust -

Grading -

Vehicle Trips - No operational emissions calculated

Construction Off-road Equipment Mitigation - BAAQMD Best Management Practices. Tier 3 engines for all equipment.

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	12.19	95.79	57.09	0.10	29.19	4.69	33.88	14.93	4.69	19.62	0.00	10,583.06	0.00	1.08	0.00	10,605.76
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	7.64	49.41	54.98	0.10	13.41	3.32	16.73	6.73	3.32	10.05	0.00	10,583.06	0.00	1.08	0.00	10,605.76
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation 1 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					28.69	0.00	28.69	14.90	0.00	14.90						0.00
Off-Road	11.71	92.29	53.58	0.09		4.58	4.58		4.58	4.58		9,824.07		1.05		9,846.13
Total	**11.71**	**92.29**	**53.58**	**0.09**	**28.69**	**4.58**	**33.27**	**14.90**	**4.58**	**19.48**		**9,824.07**		**1.05**		**9,846.13**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.31	3.33	1.92	0.00	0.16	0.10	0.26	0.02	0.10	0.12		514.34		0.01		514.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.18	0.17	1.59	0.00	0.34	0.01	0.35	0.01	0.01	0.02		244.65		0.02		244.97
Total	**0.49**	**3.50**	**3.51**	**0.00**	**0.50**	**0.11**	**0.61**	**0.03**	**0.11**	**0.14**		**758.99**		**0.03**		**759.63**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					12.91	0.00	12.91	6.70	0.00	6.70						0.00
Off-Road	7.16	45.91	51.47	0.09		3.20	3.20		3.20	3.20	0.00	9,824.07		1.05		9,846.13
Total	**7.16**	**45.91**	**51.47**	**0.09**	**12.91**	**3.20**	**16.11**	**6.70**	**3.20**	**9.90**	**0.00**	**9,824.07**		**1.05**		**9,846.13**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.31	3.33	1.92	0.00	0.16	0.10	0.26	0.02	0.10	0.12		514.34		0.01		514.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.18	0.17	1.59	0.00	0.34	0.01	0.35	0.01	0.01	0.02		244.65		0.02		244.97
Total	**0.49**	**3.50**	**3.51**	**0.00**	**0.50**	**0.11**	**0.61**	**0.03**	**0.11**	**0.14**		**758.99**		**0.03**		**759.63**

3.3 Site Preparation 2 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	7.42	57.29	22.04	0.09		2.03	2.03		2.03	2.03		9,786.22		0.65		9,799.96
Total	**7.42**	**57.29**	**22.04**	**0.09**	**0.00**	**2.03**	**2.03**	**0.00**	**2.03**	**2.03**		**9,786.22**		**0.65**		**9,799.96**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.06	0.06	0.55	0.00	0.12	0.00	0.12	0.00	0.00	0.01		85.10		0.01		85.21
Total	**0.06**	**0.06**	**0.55**	**0.00**	**0.12**	**0.00**	**0.12**	**0.00**	**0.00**	**0.01**		**85.10**		**0.01**		**85.21**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	6.89	44.77	44.77	0.09		2.58	2.58		2.58	2.58	0.00	9,786.22		0.65		9,799.96
Total	**6.89**	**44.77**	**44.77**	**0.09**	**0.00**	**2.58**	**2.58**	**0.00**	**2.58**	**2.58**	**0.00**	**9,786.22**		**0.65**		**9,799.96**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.06	0.06	0.55	0.00	0.12	0.00	0.12	0.00	0.00	0.01		85.10		0.01		85.21
Total	**0.06**	**0.06**	**0.55**	**0.00**	**0.12**	**0.00**	**0.12**	**0.00**	**0.00**	**0.01**		**85.10**		**0.01**		**85.21**

3.4 Site Preparation 3 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	4.95	38.19	14.69	0.06		1.35	1.35		1.35	1.35		6,524.14		0.44		6,533.31
Total	**4.95**	**38.19**	**14.69**	**0.06**	**0.00**	**1.35**	**1.35**	**0.00**	**1.35**	**1.35**		**6,524.14**		**0.44**		**6,533.31**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.04	0.04	0.35	0.00	0.07	0.00	0.08	0.00	0.00	0.01		53.18		0.00		53.25
Total	**0.04**	**0.04**	**0.35**	**0.00**	**0.07**	**0.00**	**0.08**	**0.00**	**0.00**	**0.01**		**53.18**		**0.00**		**53.25**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.00	0.00	0.00	0.00	0.00	0.00						0.00
Off-Road	4.59	29.85	29.85	0.06		1.72	1.72		1.72	1.72	0.00	6,524.14		0.44		6,533.31
Total	**4.59**	**29.85**	**29.85**	**0.06**	**0.00**	**1.72**	**1.72**	**0.00**	**1.72**	**1.72**	**0.00**	**6,524.14**		**0.44**		**6,533.31**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Worker	0.04	0.04	0.35	0.00	0.07	0.00	0.08	0.00	0.00	0.01		53.18		0.00		53.25
Total	**0.04**	**0.04**	**0.35**	**0.00**	**0.07**	**0.00**	**0.08**	**0.00**	**0.00**	**0.01**		**53.18**		**0.00**		**53.25**

Sand Hill Wind Project - Daily Construction - Tower Construction

Alameda County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
User Defined Industrial	1	User Defined Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**		**Utility Company**	Pacific Gas & Electric Company
Climate Zone	4		2.2		
		Precipitation Freq (Days)			
			63		

1.3 User Entered Comments

Project Characteristics - Sand Hill Wind Project daily construction emissions from tower construction phases.

Land Use - User defined land category used. Project specific information available for construction activity.

Construction Phase - Tower construction activities grouped based on project specific schedule. Only one day modeled per phase to calculate daily emissions.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Trips and VMT - TC2: 80 light duty truck and 10 light duty vehicle trips/day added for general use. TC3: 20 hauling trips/day added for concrete trucks (10 mi), 6 hauling trips/day added for semi-trailer trucks (40 mi) - weighted avg haul trip length of 16.9 mi.

On-road Fugitive Dust -

Vehicle Trips - No operational emissions calculated.

Construction Off-road Equipment Mitigation - BAAQMD Best Management Practices. Tier 3 engines for all equipment.

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	7.47	49.73	43.05	0.09	2.58	2.62	5.19	0.12	2.62	2.72	0.00	8,392.34	0.00	0.65	0.00	8,405.98
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	7.09	40.36	48.10	0.09	2.58	2.36	4.93	0.12	2.36	2.46	0.00	8,392.34	0.00	0.65	0.00	8,405.98
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Tower Construction 1 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.81	13.29	10.63	0.02		0.73	0.73		0.73	0.73		1,792.28		0.16		1,795.66
Total	**1.81**	**13.29**	**10.63**	**0.02**		**0.73**	**0.73**		**0.73**	**0.73**		**1,792.28**		**0.16**		**1,795.66**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.33	3.98	2.01	0.01	0.24	0.12	0.36	0.02	0.12	0.14		712.60		0.02		712.94
Worker	0.48	0.45	4.91	0.01	0.99	0.03	1.02	0.04	0.03	0.07		788.22		0.05		789.20
Total	**0.81**	**4.43**	**6.92**	**0.02**	**1.23**	**0.15**	**1.38**	**0.06**	**0.15**	**0.21**		**1,500.82**		**0.07**		**1,502.14**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.26	8.20	11.67	0.02		0.69	0.69		0.69	0.69	0.00	1,792.28		0.16		1,795.66
Total	**1.26**	**8.20**	**11.67**	**0.02**		**0.69**	**0.69**		**0.69**	**0.69**	**0.00**	**1,792.28**		**0.16**		**1,795.66**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.33	3.98	2.01	0.01	0.24	0.12	0.36	0.02	0.12	0.14		712.60		0.02		712.94
Worker	0.48	0.45	4.91	0.01	0.99	0.03	1.02	0.04	0.03	0.07		788.22		0.05		789.20
Total	**0.81**	**4.43**	**6.92**	**0.02**	**1.23**	**0.15**	**1.38**	**0.06**	**0.15**	**0.21**		**1,500.82**		**0.07**		**1,502.14**

3.3 Tower Construction 2 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.86	44.68	29.44	0.06		2.43	2.43		2.43	2.43		5,816.67		0.52		5,827.65
Total	**5.86**	**44.68**	**29.44**	**0.06**		**2.43**	**2.43**		**2.43**	**2.43**		**5,816.67**		**0.52**		**5,827.65**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.33	3.98	2.01	0.01	0.24	0.12	0.36	0.02	0.12	0.14		712.60		0.02		712.94
Worker	1.13	1.07	11.60	0.02	2.34	0.07	2.41	0.09	0.07	0.16		1,863.07		0.11		1,865.39
Total	**1.46**	**5.05**	**13.61**	**0.03**	**2.58**	**0.19**	**2.77**	**0.11**	**0.19**	**0.30**		**2,575.67**		**0.13**		**2,578.33**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.26	27.27	34.50	0.06		2.17	2.17		2.17	2.17	0.00	5,816.67		0.52		5,827.65
Total	**4.26**	**27.27**	**34.50**	**0.06**		**2.17**	**2.17**		**2.17**	**2.17**	**0.00**	**5,816.67**		**0.52**		**5,827.65**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.33	3.98	2.01	0.01	0.24	0.12	0.36	0.02	0.12	0.14		712.60		0.02		712.94
Worker	1.13	1.07	11.60	0.02	2.34	0.07	2.41	0.09	0.07	0.16		1,863.07		0.11		1,865.39
Total	**1.46**	**5.05**	**13.61**	**0.03**	**2.58**	**0.19**	**2.77**	**0.11**	**0.19**	**0.30**		**2,575.67**		**0.13**		**2,578.33**

3.4 Tower Construction 3 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.74	33.66	18.87	0.04		1.67	1.67		1.67	1.67		4,385.03		0.51		4,395.80
Total	**5.74**	**33.66**	**18.87**	**0.04**		**1.67**	**1.67**		**1.67**	**1.67**		**4,385.03**		**0.51**		**4,395.80**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.93	11.12	4.81	0.02	0.57	0.36	0.93	0.06	0.36	0.42		1,839.21		0.05		1,840.15
Vendor	0.33	3.98	2.01	0.01	0.24	0.12	0.36	0.02	0.12	0.14		712.60		0.02		712.94
Worker	0.48	0.45	4.91	0.01	0.99	0.03	1.02	0.04	0.03	0.07		788.22		0.05		789.20
Total	**1.74**	**15.55**	**11.73**	**0.04**	**1.80**	**0.51**	**2.31**	**0.12**	**0.51**	**0.63**		**3,340.03**		**0.12**		**3,342.29**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.36	24.82	23.16	0.04		1.78	1.78		1.78	1.78	0.00	4,385.03		0.51		4,395.80
Total	**5.36**	**24.82**	**23.16**	**0.04**		**1.78**	**1.78**		**1.78**	**1.78**	**0.00**	**4,385.03**		**0.51**		**4,395.80**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.93	11.12	4.81	0.02	0.57	0.36	0.93	0.06	0.36	0.42		1,839.21		0.05		1,840.15
Vendor	0.33	3.98	2.01	0.01	0.24	0.12	0.36	0.02	0.12	0.14		712.60		0.02		712.94
Worker	0.48	0.45	4.91	0.01	0.99	0.03	1.02	0.04	0.03	0.07		788.22		0.05		789.20
Total	**1.74**	**15.55**	**11.73**	**0.04**	**1.80**	**0.51**	**2.31**	**0.12**	**0.51**	**0.63**		**3,340.03**		**0.12**		**3,342.29**

Sand Hill Wind Project - Daily Construction - Tower Construction

Alameda County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric
User Defined Industrial	1	User Defined Unit

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**		**Utility Company**	Pacific Gas & Electric Company
Climate Zone	4		2.2		
		Precipitation Freq (Days)			
			63		

1.3 User Entered Comments

Project Characteristics - Sand Hill Wind Project daily construction emissions from tower construction phases.

Land Use - User defined land category used. Project specific information available for construction activity.

Construction Phase - Tower construction activities grouped based on project specific schedule. Only one day modeled per phase to calculate daily emissions.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Off-road Equipment - Equipment information based on project specific schedule.

Trips and VMT - TC2: 80 light duty truck and 10 light duty vehicle trips/day added for general use. TC3: 20 hauling trips/day added for concrete trucks (10 mi), 6 hauling trips/day added for semi-trailer trucks (40 mi) - weighted avg haul trip length of 16.9 mi.

On-road Fugitive Dust -

Vehicle Trips - No operational emissions calculated.

Construction Off-road Equipment Mitigation - BAAQMD Best Management Practices. Tier 3 engines for all equipment.

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	7.57	49.81	42.72	0.09	2.58	2.62	5.20	0.12	2.62	2.73	0.00	8,182.63	0.00	0.64	0.00	8,196.16
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	7.19	40.35	47.78	0.09	2.58	2.36	4.94	0.12	2.36	2.46	0.00	8,182.63	0.00	0.64	0.00	8,196.16
Total	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

3.0 Construction Detail

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Tower Construction 1 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.81	13.29	10.63	0.02		0.73	0.73		0.73	0.73		1,792.28		0.16		1,795.66
Total	**1.81**	**13.29**	**10.63**	**0.02**		**0.73**	**0.73**		**0.73**	**0.73**		**1,792.28**		**0.16**		**1,795.66**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.35	3.95	2.48	0.01	0.24	0.12	0.36	0.02	0.12	0.14		706.61		0.02		706.97
Worker	0.51	0.50	4.57	0.01	0.99	0.03	1.02	0.04	0.03	0.07		702.04		0.04		702.96
Total	**0.86**	**4.45**	**7.05**	**0.02**	**1.23**	**0.15**	**1.38**	**0.06**	**0.15**	**0.21**		**1,408.65**		**0.06**		**1,409.93**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.26	8.20	11.67	0.02		0.69	0.69		0.69	0.69	0.00	1,792.28		0.16		1,795.66
Total	**1.26**	**8.20**	**11.67**	**0.02**		**0.69**	**0.69**		**0.69**	**0.69**	**0.00**	**1,792.28**		**0.16**		**1,795.66**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.35	3.95	2.48	0.01	0.24	0.12	0.36	0.02	0.12	0.14		706.61		0.02		706.97
Worker	0.51	0.50	4.57	0.01	0.99	0.03	1.02	0.04	0.03	0.07		702.04		0.04		702.96
Total	**0.86**	**4.45**	**7.05**	**0.02**	**1.23**	**0.15**	**1.38**	**0.06**	**0.15**	**0.21**		**1,408.65**		**0.06**		**1,409.93**

3.3 Tower Construction 2 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.86	44.68	29.44	0.06		2.43	2.43		2.43	2.43		5,816.67		0.52		5,827.65
Total	**5.86**	**44.68**	**29.44**	**0.06**		**2.43**	**2.43**		**2.43**	**2.43**		**5,816.67**		**0.52**		**5,827.65**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.35	3.95	2.48	0.01	0.24	0.12	0.36	0.02	0.12	0.14		706.61		0.02		706.97
Worker	1.21	1.17	10.80	0.02	2.34	0.07	2.41	0.09	0.07	0.16		1,659.36		0.10		1,661.54
Total	**1.56**	**5.12**	**13.28**	**0.03**	**2.58**	**0.19**	**2.77**	**0.11**	**0.19**	**0.30**		**2,365.97**		**0.12**		**2,368.51**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	4.26	27.27	34.50	0.06		2.17	2.17		2.17	2.17	0.00	5,816.67		0.52		5,827.65
Total	**4.26**	**27.27**	**34.50**	**0.06**		**2.17**	**2.17**		**2.17**	**2.17**	**0.00**	**5,816.67**		**0.52**		**5,827.65**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00
Vendor	0.35	3.95	2.48	0.01	0.24	0.12	0.36	0.02	0.12	0.14		706.61		0.02		706.97
Worker	1.21	1.17	10.80	0.02	2.34	0.07	2.41	0.09	0.07	0.16		1,659.36		0.10		1,661.54
Total	**1.56**	**5.12**	**13.28**	**0.03**	**2.58**	**0.19**	**2.77**	**0.11**	**0.19**	**0.30**		**2,365.97**		**0.12**		**2,368.51**

3.4 Tower Construction 3 - 2014

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.74	33.66	18.87	0.04		1.67	1.67		1.67	1.67		4,385.03		0.51		4,395.80
Total	**5.74**	**33.66**	**18.87**	**0.04**		**1.67**	**1.67**		**1.67**	**1.67**		**4,385.03**		**0.51**		**4,395.80**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.97	11.09	5.62	0.02	0.57	0.37	0.94	0.06	0.37	0.43		1,827.22		0.05		1,828.21
Vendor	0.35	3.95	2.48	0.01	0.24	0.12	0.36	0.02	0.12	0.14		706.61		0.02		706.97
Worker	0.51	0.50	4.57	0.01	0.99	0.03	1.02	0.04	0.03	0.07		702.04		0.04		702.96
Total	**1.83**	**15.54**	**12.67**	**0.04**	**1.80**	**0.52**	**2.32**	**0.12**	**0.52**	**0.64**		**3,235.87**		**0.11**		**3,238.14**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.36	24.82	23.16	0.04		1.78	1.78		1.78	1.78	0.00	4,385.03		0.51		4,395.80
Total	**5.36**	**24.82**	**23.16**	**0.04**		**1.78**	**1.78**		**1.78**	**1.78**	**0.00**	**4,385.03**		**0.51**		**4,395.80**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.97	11.09	5.62	0.02	0.57	0.37	0.94	0.06	0.37	0.43		1,827.22		0.05		1,828.21
Vendor	0.35	3.95	2.48	0.01	0.24	0.12	0.36	0.02	0.12	0.14		706.61		0.02		706.97
Worker	0.51	0.50	4.57	0.01	0.99	0.03	1.02	0.04	0.03	0.07		702.04		0.04		702.96
Total	**1.83**	**15.54**	**12.67**	**0.04**	**1.80**	**0.52**	**2.32**	**0.12**	**0.52**	**0.64**		**3,235.87**		**0.11**		**3,238.14**