AIR QUALITY IMPACT ANALYSIS FOR THE PROPOSED CLOVIS RESEACH AND TECHNOLOGY PARK EXPANSION PROJECT CITY OF CLOVIS

Prepared for:

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INTRODUCTION

This air quality impact study assesses the air quality impacts associated with proposed amendments to the City of Clovis General Plan and Herndon-Shepherd Specific Plan, in the northeastern portions of the City of Clovis. The proposed project would be an expansion of the Clovis Reseach & Technology Park, adding 153 acres to the existing 180-acre Research & Technology Park.

The proposed project is a modification of the planned land use and no specific development is currently proposed within the project site. The project is assumed to result in the development of nearly 1,000,000 sq. ft. of office park and 680,000 sq. ft. of light industrial uses over a 20+ year build out period.

This report was prepared using methodologies and assumptions recommended within the air quality impact assessment recommendations of the San Joaquin Valley Air Pollution Control District.[1] In keeping with these recommendations, the report describes existing air quality, construction-related impacts, direct and indirect emissions associated with the project, the impacts of these emissions on both the local and regional scale, and mitigation measures warranted to reduce or eliminate any identified significant impacts.

EXISTING CONDITIONS

Air Pollution Climatology

The project is located in the San Joaquin Valley air basin, which is defined by the Sierra Nevada in the east, the Coast Ranges in the west, and the Tehachapi mountains in the south. The surrounding topographic features restrict air movement through and out of the basin and, as a result, impede the dispersion of pollutants from the basin. Inversion layers are formed in the San Joaquin Valley air basin throughout the year. (An inversion layer is created when a mass of warm dry air sits over cooler air near the ground, preventing vertical dispersion of pollutants from the air mass below). During the summer, the San Joaquin Valley experiences daytime temperature inversions at elevations from 2,000 to 2,500 feet above the valley floor. During the winter months, inversions occur from 500 to 1,000 feet above the valley floor.[2]

The climate of the project area is typical of inland valleys in California, with hot dry summers and cool, mild winters. Daytime temperatures in the summer often exceed 100 degrees, with lows in the 60's. In winter daytime temperatures are usually in the 50's, with lows around 35 degrees. Radiation fog is common in the winter, and may persist for days. Winds are predominantly up-valley (from the north) in all seasons, but

[1] San Joaquin Valley Air Pollution Control District (SJVAPCD). 2002. *Guidance for Assessing and Mitigating Air Quality Impacts*.
[2] Ibid.

more so in the summer and spring months. Winds in the fall and winter are generally lighter and more variable in direction.[3]

The pollution potential of the San Joaquin Valley is very high. Surrounding elevated terrain in conjunction with temperature inversions frequently restrict lateral and vertical dilution of pollutants. Abundant sunshine and warm temperatures in summer are ideal conditions for the formation of photochemical oxidant, and the Valley is a frequent scene of photochemical pollution.

Ambient Air Quality Standards

Criteria Pollutants

Both the U. S. Environmental Protection Agency and the California Air Resources Board have established ambient air quality standards for common pollutants. These ambient air quality standards are levels of contaminants which represent safe levels that avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called "criteria" pollutants because the health and other effects of each pollutant are described in criteria documents.

The federal and California state ambient air quality standards are summarized in Table 1 for important pollutants. The federal and state ambient standards were developed independently with differing purposes and methods, although both processes attempted to avoid health-related effects. As a result, the federal and state standards differ in some cases. In general, the California state standards are more stringent. This is particularly true for ozone and particulate matter ($PM_{2.5}$ and PM_{10}).

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Cars and trucks release at least forty different toxic air contaminants. The most important, in terms of health risk, are diesel particulate, benzene, formaldehyde, 1,3-butadiene and acetaldehyde.

Public exposure to TACs can result from emissions from normal operations, as well as accidental releases. Health effects of TACs include cancer, birth defects, neurological damage and death.

The identification, regulation and monitoring of TACs is relatively recent compared to that for criteria pollutants. Unlike criteria pollutants, TACs are regulated on the basis of risk rather than specification of safe levels of contamination.

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[3] California Air Resources Board (CARB). 1974. *Climate of the San Joaquin Valley Air Basin*.

Table 1
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Primary Standard	State Standard
Ozone	1-Hour 8-Hour	-- 0.075 ppm	0.09 ppm 0.07 ppm
Carbon Monoxide	8-Hour 1-Hour	9.0 ppm 35.0 ppm	9.0 ppm 20.0 ppm
Nitrogen Dioxide	Annual 1-Hour	0.05 ppm --	0.03 ppm 0.18 ppm
Sulfur Dioxide	Annual 24-Hour 1-Hour	0.03 ppm 0.14 ppm --	-- 0.05 ppm 0.25 ppm
PM_{10}	Annual 24-Hour	-- 150 ug/m^3	20 ug/m^3 50 ug/m^3
$PM_{2.5}$	Annual 24-Hour	15 ug/m^3 35 ug/m^3	12 ug/m^3 --
Lead	30-Day Avg. 3-Month Avg.	-- 1.5 ug/m^3	1.5 ug/m^3 --

Notes: ppm = parts per million; ug/m^3 = micrograms per cubic meter.

Source: California Air Resources Board. 2008. *Ambient Air Quality Standards (4/01/08)*. http://www.arb.ca.gov.aqs/aaqs2.pdf.

Health Effects of Pollutants

The primary air quality problems in the San Joaquin Valley Air Basin are ozone and particulate matter. Carbon monoxide has been a problem in the past within the San Joaquin Valley Air Basin in larger cities such as Fresno, Bakersfield, Modesto and Stockton. The following is a discussion of the health effects of these important pollutants.

Ozone

Ozone is produced by chemical reactions, involving nitrogen oxides (NOx) and reactive organic gases (ROG) that are triggered by sunlight. Nitrogen oxides are created during combustion of fuels, while reactive organic gases are emitted during combustion and evaporation of organic solvents. Since ozone is not directly emitted to the atmosphere, but is formed as a result of photochemical reactions, it is considered a secondary pollutant. In the San Joaquin Valley Air Basin ozone is a seasonal problem, occurring roughly from April through October.

Ozone is a strong irritant that attacks the respiratory system, leading to the damage of lung tissue. Asthma, bronchitis and other respiratory ailments as well as cardiovascular diseases are aggravated by exposure to ozone. A healthy person exposed to high concentrations may become nauseated or dizzy, may develop headache or cough, or may experience a burning sensation in the chest.

Research has shown that exposure to ozone damages the alveoli (the individual air sacs in the lung where the exchange of oxygen and carbon dioxide between the air and blood takes place). Research has shown that ozone also damages vegetation.

Suspended Particulate

Suspended particulate matter (PM) is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust. "Inhalable" PM consists of particles less than 10 microns in diameter, and is defined as "suspended particulate matter" or PM_{10}. Particles between 2.5 and 10 microns in diameter arise primarily from natural processes, such as wind-blown dust or soil.

Fine particles are less than 2.5 microns in diameter ($PM_{2.5}$). $PM_{2.5}$, by definition, is included in PM_{10}. Fine particles are produced mostly from combustion or burning activities. Fuel burned in cars and trucks, power plants, factories, fireplaces and wood stoves produces fine particles.

The level of fine particulate matter in the air is a public health concern because it can bypass the body’s natural filtration system more easily than larger particles, and can lodge deep in the lungs. The health effects vary depending on a variety of factors,

including the type and size of particles. Research has demonstrated a correlation between high PM concentrations and increased mortality rates. Elevated PM concentrations can also aggravate chronic respiratory illnesses such as bronchitis and asthma.

Carbon Monoxide

Carbon monoxide is a local pollutant in that high concentrations are found only very near the source. The major source of carbon monoxide, a colorless, odorless, poisonous gas, is automobile traffic. Elevated concentrations, therefore, are usually only found near areas of high traffic volumes.

Carbon monoxide's health effects are related to its affinity for hemoglobin in the blood. At high concentrations, carbon monoxide reduces the amount of oxygen in the blood, causing heart difficulties in people with chronic diseases, reduced lung capacity and impaired mental abilities.

Carbon monoxide concentrations are highly seasonal, with the highest concentrations occurring in the winter. This is partly due to the fact that automobiles create more carbon monoxide in colder weather and partly due to the very stable atmospheric conditions that exist on cold winter evenings when winds are calm. Concentrations typically are highest during stagnant air periods within the period November through January.

Ambient Air Quality

The San Joaquin Valley Air Pollution Control District operates monitoring sites in a number of locations within Fresno County, including one located in Clovis. A summary of air quality data from this monitoring site is shown in Table 2. Table 2 shows that the federal/state standards for ozone PM_{10}, and $PM_{2.5}$ are frequently exceeded in the project area.

Attainment Status

Federal and state air quality laws require identification of areas not meeting the ambient air quality standards. These areas must develop regional air quality plans to eventually attain the standards. Under both the federal and state Clean Air Acts the San Joaquin Valley Air Basin is a non-attainment area (standards have not been attained) for ozone and particulate matter (PM_{10} and $PM_{2.5}$). The air basin is either attainment or unclassified for other ambient standards.

Sensitive Receptors

"Sensitive receptors" are defined as facilities where sensitive population groups(children, the elderly, the acutely ill and the chronically ill) are likely to be located. These land uses include residences, schools, playgrounds, child care centers, retirement homes, convalescent homes, hospitals and medical clinics. There are 16

Table 2
CLOVIS AMBIENT AIR QUALITY

Pollutant/Standard	Year	Days Exceeding Standard at Clovis Monitoring Site
Ozone/State 1-Hour	2005	32
	2006	37
	2007	14
Ozone/State 8-Hour	2005	56
	2006	66
	2007	58
Ozone/Fed. 8-Hour	2005	15
	2006	20
	2007	11
Carbon Monoxide/State-Fed. 8-Hour	2005	0
	2006	0
	2007	0
Nitrogen Dioxide/State 1-Hour	2005	0
	2006	0
	2007	0
PM_{10}/State-Hour	2005	11
	2006	12
	2007	8
PM_{10}/Federal 24-Hour	2005	0
	2006	0
	2007	0
$PM_{2.5}$/Federal 24-Hour	2005	2
	2006	1
	2007	0

Source: California Air Resources Board. 2008. Data Analysis and Management (ADAM). (http: //www.arb.ca.gov./adam/cgi-bin/adamtop/d2wstart)

owner-occupied parcels within the site boundaries that would be considered sensitive receptors. There are also several existing residences near the northern boundary of the project. The SR 168 freeway abuts the project site to the southeast.

Thresholds of Significance

The San Joaquin Valley Air Pollution Control District (SJVAPCD) has established the following standards of significance:[4]

(1) A project results in estimated carbon monoxide concentrations exceeding the California Ambient Air Quality Standard of 9 parts per million averaged over 8 hours and 20 ppm for 1-hour.

(2) A project results in new direct or indirect emissions of ozone precursors (ROG or NO_x) in excess of 10 tons per year.

(3) A project has the potential to frequently expose members of the public to objectionable odors will be deemed to have a significant impact.

(4) A project has the potential to expose sensitive receptors (including residential areas) or the general public to substantial levels of toxic air contaminants would be deemed to have a potentially significant impact.

While San Joaquin Valley Air Pollution Control District CEQA guidance recognizes that particulate matter (PM_{10} and $PM_{2.5}$) is a major air quality issue in the basin, it has to date not established numerical thresholds for significance for these pollutants. For the purposes of this analysis, a PM_{10} emission of 15 tons per year (82 pounds per day) was used as a significance threshold. This emission is the SJVAPCD threshold level at which new stationary sources requiring permits from the District must provide emissions "offsets". This threshold of significance for PM_{10} is consistent with the District's ROG and NO_x thresholds of ten tons per year, which are also the offset thresholds established in SJVAPCD Rule 2201 New and Modified Stationary Source Review Rule. SJVAPCD Rule 2201 does not establish separate offset thresholds for $PM_{2.5}$. For this analysis, $PM_{2.5}$ impacts would be considered significant if project emissions of PM_{10} exceed 82 pounds per day.

SJVAPCD CEQA guidance does not recommend quantitative analysis of construction emissions. The SJVAPCD significance threshold for construction dust impacts is based on the appropriateness of construction dust controls. The SJVAPCD guidelines provide feasible control measures for construction emission of PM_{10} beyond that required by district regulations. If the appropriate construction controls are to be implemented, then

[4] San Joaquin Valley Air Pollution Control District (SJVAPCD). 2002. G*uidance for Assessing and Mitigating Air Quality Impacts*.

air pollutant emissions for construction activities would be considered less than significant.

PROJECT IMPACTS AND MITIGATION MEASURES

Impact 1: Implementation of the proposed project would result in temporarily increased Particulate Matter levels at various times and locations over the buildout period of the project. This impact would be less than significant.

Construction would result in numerous activities that would generate dust. The fine, silty soils in the project area and often strong afternoon winds exacerbate the potential for dust, particularly in the summer months. Grading, leveling, earthmoving and excavation are the activities that generate the most particulate emissions. Impacts would be localized and variable. Construction impacts would last for a period of several months at any one location. Construction dust impacts are considered to be potentially significant on a localized basis. The potential for dust nuisance would exist during early stages of construction when disturbance of soil is greatest.

To control dust emissions generated during construction of the proposed project, the following San Joaquin Valley Unified Air Pollution Control District (SJVAPCD) Regulation VIII Control Measures for construction emissions of PM_{10} are required to be implemented (SJVUAPCD Rule 8021). They include the following:

- Watering-for the purpose of dust control, carry-out, and tracking control-shall be conducted during construction in accordance with the City of Clovis's Storm Water Management Plan (SWMP) and the project Storm Water Pollution Prevention Plan (SWPPP).

- All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, covered with a tarp or other suitable cover or vegetative ground cover.

- All onsite unpaved roads and offsite unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.

- All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.

- With the demolition of buildings up to six stories in height, all exterior surfaces of the building shall be wetted during demolition.

- When materials are transported off site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least 2 feet of freeboard space from the top of the container shall be maintained.

- All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. (The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the. visible dust emissions.) (Use of blower devices is expressly forbidden.)

- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.

The San Joaquin Valley Unified Air Pollution Control District regulates construction dust emissions through its Regulation VIII. Regulation VIII requires that a Dust Control Plan be prepared and approved by the air district. The Dust Control Plan will implement Best Available Control Measures for construction, demolition and earthmoving activities, windblown dust from construction and demolition activities, handling of bulk materials, unpaved roads, carryout and trackout on paved roads, disturbance of open areas and unpaved vehicle and equipment parking areas. Regulation VII also requires the completion of a Dust Control Training Class by at least one individual representing an owner/operator of a construction site project. Violations of the requirements of Regulation VIII are subject to enforcement action.

Compliance with the District's Regulation VIII and local municipal code would reduce construction particulate matter impacts to levels that are considered less than significant.

Impact 2: Implementation of the proposed project would result in temporarily increased ozone precursor emissions at various times and locations over the buildout period of the project. This impact would be less than significant.

Construction equipment and vehicles would also generate exhaust emissions during active construction. Although operated temporarily at construction sites, construction equipment is a substantial source category within the San Joaquin Valley Air Basin, generating ozone precursors as well as particulate matter. Since construction equipment is normally considered part of the existing inventory of sources quantification of this emission is not recommended by the SJVAPCD except for very large projects.

To comply with guidance from the SJVAPCD, the City will incorporate or require the developer to incorporate, the following measures into the construction specifications and project performance specifications for the proposed Project.

1. The construction contractor will ensure that all diesel engines are shut off when not in use on the premises to reduce emissions from idling.

2. The construction contractor will comply with SJVAPCD Rules 8011 to 8081 (Fugitive Dust), 4102 (Nuisance), 4601 (Architectural Coatings), and 4641 (Paving and Maintenance Activities).

3. The construction contractor will use off-road trucks that are equipped with on-road engines, when possible.

4. The construction contractor will use light duty cars and trucks that use alternative fuel or are hybrids, if feasible.

In addition to the above City performance standards, the SJVAPCD has an Indirect Source Rule (ISR) affecting construction operations. The purpose of the Indirect Source Rule (Rule 9510) and the Administrative ISR Fee Rule (Rule 3180) is to reduce emissions of NOx and PM_{10} from new development projects during both construction and operations. Projects that meet the applicability criteria must file an ISR Application (also known as an Air Impact Assessment (AIA) Application). The requirements of the ISR for construction emissions are a demonstration that constructions will be reduced by:

-20% for NO_x exhaust emissions, and
-45% for PM_{10} exhaust emissions.

The reductions are to be accomplished through a combination of on-site measures and off-site mitigation. Off site mitigation is accomplished through the payment of fees that are used by the SJVAPCD to create an offset by reducing emissions elsewhere within the District.

Compliance with the District's Indirect Source Rule and local municipal performance standards would ensure that construction ozone precursor emission impacts would be less than significant.

Impact 3: Project traffic would result in an increase in carbon monoxide concentrations. This impact would be less than significant.

Project traffic would increase concentrations of carbon monoxide along streets providing access to the project. Carbon monoxide is a local pollutant (i.e., high concentrations are normally only found very near sources). The major source of carbon monoxide, a colorless, odorless, poisonous gas, is automobile traffic. Elevated concentrations, therefore, are usually only found near areas of high traffic volume and congestion.

The SJVAPCD's *Guide for Assessing and Mitigation Air Quality Impacts* provides the following criteria to identify situations where modeling is warranted:

- The Level of Service (LOS) on one or more streets or at one or more intersections in the project vicinity will be reduced to LOS E or F, and

- The project will substantially worsen an already existing LOS F on one or more streets or at one or more intersections in the project vicinity.

Although not stated implicitly, the above criteria are to be applied to signal controlled intersections rather than stop sign controlled intersections. The project would, under

cumulative year 2030 conditions, affect two signalized intersections projected to operate at at LOS E or F.

The CALINE-4 program for estimating carbon monoxide concentrations was applied to the Temperance/SR 168 EB ramps and Temperance/Herndon intersections. The modeling procedures contained in *Transportation Project-Level Carbon Monoxide Protocol* were utilized.[5] The CALINE-4 computer model was used to predict worst-case concentrations of carbon monoxide at receptors located near the intersections. The results are shown in Table 3. A description of the modeling procedure is included in Appendix 1.

Existing concentrations are well below the state/federal standards. Predicted concentrations would remain below the state/federal standards with the addition of project and cumulative traffic. As the project would not cause a violation of either ambient air quality standard, nor contribute substantially to an existing violation, the impact of the project on local carbon monoxide concentrations is considered to be less than significant.

Impact 4: The project could result in construction of new sources of Toxic Air Contaminants, and the site is exposed to mobile-source TACs from the SR 168 freeway. TAC exposure impacts could be potentially significant, unless mitigated.

The project site currently contains no sources of Toxic Air Contaminants. However, the project site is bounded on the south by the SR 168 freeway. Freeways are considered to be sources of Toxic Air Contaminants, primarily diesel particulate.

The California Air Resources Board recently published an air quality/land use handbook[6] The handbook was developed in response to recent studies that have demonstrated a link between exposure to poor air quality and respiratory illnesses, both cancer and non-cancer related. The CARB handbook recommends that planning agencies strongly consider proximity to these sources when finding new locations for "sensitive" land uses such as homes, medical facilities, daycare centers, schools and playgrounds.

Air pollution sources of concern include:

[5] Garza, Vincente J.; Peter Granly; Daniel Sperling. 1997. *Transportation Project-Level Carbon Monoxide Protocol*. Institute of Transportation Studies, University of California, Davis, Report UCD-ITS-RR-97-21.

[6] California Air Resources Board. 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*.

Table 3
PREDICTED WORST-CASE CARBON MONOXIDE CONCENTRATIONS, IN PPM

Intersection	Existing		Existing+ Project		Cumulative + Project (2030)	
	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
Temperance/ SR168 EB Ramps	5.6	3.9	6.6	4.6	4.2	2.9
Temperance/ Herndon	5.3	3.7	5.8	4.1	4.3	3.0
Most Stringent Standard	20.0	9.0	20.0	9.0	20.0	9.0

Notes: ppm = parts per million.

High traffic freeways and roads
Distribution centers
Rail yards
Ports
Refineries
Chrome plating facilities
Dry cleaners
Large gasoline dispensing facilities

The above sources are either direct sources of TAC emissions or attract diesel vehicles. In general, the above types of heavy-industrial facilities would not be permittable within the Research and Technology Park. However, manufacturing and other uses could utilize relatively small amounts of TACs. Any new sources of Toxic Air Contaminants would be subject to the permitting procedures and risk assessment requirements of the SJUAPCD.

While the project as a whole would not be considered a sensitive receptor, live/work units would be permittable within portions of the project, and child day-care facilities are an allowable secondary use within the zoning district.

A key recommendation in the CARB handbook is to siting new, sensitive land uses within 500 feet of a freeway. Should live/work units, child daycare, or other senstive receptors be proposed within 500 feet of SR 168, a potentially significant, air quality related land use conflict could exist.

Mitigation Measure

Should live/work units, child daycare, or other senstive receptors be proposed within 500 feet of SR 168, a health risk analysis should be performed as part of the environmental review to determine if the proposed sensitive use has an adequate set-back from the freeway. The factors that determine minimum setbacks include the nature of the sensitive receptor, the level of diesel truck traffic on SR 168 and the prevailing wind patterns.

Impact 4: Development of the project would result in increases in emission of both ozone precursors and particulate matter. **This impact would be significant.**

Table 4 shows the new auto and area source emissions of regional pollutants that would result from the proposed project, based upon output from the URBEMIS-2007 computer program. The modeling methodology and assumptions are described in Appendix 2. Also shown are the San Joaquin Valley Unified Air Pollution Control District's thresholds of significance.

The San Joaquin Valley Unified Air Pollution Control District has established a threshold of significance for ozone precursors of 10 tons per year, and 15 tons per year has been

assumed to represent a significant impact for PM_{10}. Project-related emissions exceed the thresholds of significance for ozone precursors and PM_{10}, so project impacts on regional air quality would be significant for ozone precursors, PM_{10} and $PM_{2.5}$.

Mitigation Measure

The City of Clovis will require all projects and development within the expanded Research and Technology Park to fulfill the requirements of the San Joaquin Valley Air Pollution Control District Indirect Source Rule (ISR). The Indirect Source Rule (Rule 9510) and the Administrative ISR Fee Rule (Rule 3180) are currently applicable to any development project, or any portions thereof, which upon full build-out will include any one of the following:

- 50 residential units
- 2,000 square feet of commercial space
- 25,000 square feet of light industrial space
- 100,000 square feet of heavy industrial space
- 20,000 square feet of medical office space
- 39,000 square feet of general office space
- 9,000 square feet of educational space
- 10,000 square feet of government space
- 20,000 square feet of recreational space
- 9,000 square feet of space not identified above

The purpose of the District's Indirect Source Review (ISR) Program is to reduce emissions of NO_x and PM_{10} from new development projects during both construction and operations. Projects that meet the applicability criteria must file an ISR Application (also known as an Air Impact Assessment (AIA) Application). The requirements of the ISR for operational emissions are that the following emission reductions are to be obtained for a period of 10 years:

-33% for operational NO_x emissions, and
-50% for operational PM_{10} emissions.

The reductions are to be accomplished through a combination of on-site measures and off-site mitigation. Off site mitigation is accomplished through the payment of fees that are used by the SJVAPCD to create an offset by reducing emissions elsewhere within the District.

By requiring all development proposals to be subject to ISR, regardless of size, project impacts for NO_x would be reduced by 33% and project PM_{10} emissions would be reduced by 55%, to levels below the SJVAPCD thresholds of significance. Because control programs for NO_x also reduce ROG emissions, the above measure is expected to reduce ROG emissions by the 13% that would be needed to reach the SJVAPCD threshold of significance. After mitigation, this impact would be less than significant.

Table 4
Project Regional Emissions in Tons Per Year

	ROG	NOx	PM_{10}
Project Buildout (2030)	11.29	11.76	20.98
Significance Threshold	10.00	10.00	15.00

ROG = Reactive Organic Gases
NOx = Nitrogen Oxides
PM_{10} = Particulate Matter, 10 microns

APPENDIX 1: CALINE-4 MODELING

The CALINE-4 program for estimating carbon monoxide concentrations was applied to intersections identified by Level of Service as being worst-case intersections. The modeling procedures contained in *Transportation Project-Level Carbon Monoxide Protocol* were utilized.[7] The CALINE-4 computer model was used to predict worst-case concentrations of carbon monoxide at receptors located near the intersection. Receptors were located at the four corners of the intersections and 10 meters in either direction from the corner, for a total of 12 receptors. These receptors were located 3 meters from the road edge.

The assumptions made in running the program were:

Windspeed: 0.5 meter per second
Wind Direction: Worst Case
Roughness: 100 cm
Sigma Theta: 5 degrees
Temperature: 30 degrees Fahrenheit

A 1-hour background concentration of 3.3 Parts Per Million (PPM) was used. This was based on the highest measured concentration at the Clovis monitoring site during the period 2005-2007.

The EMFAC-2007 program was utilize to estimate carbon monoxide emission factors for a Fresno County vehicle population in the year 2008 and 2030. Worst-case winter emission rates at an ambient temperature of 30 degrees F were used.

The CALINE-4 program procedure provides a worst-case estimate of 1-hour concentrations of carbon monoxide generated by vehicles. To calculate 8-hour concentrations, the 1-hour projections were multiplied by a persistence factor of 0.7.

[7] Garza, Vincente J.; Peter Granly; Daniel Sperling. 1997. *Transportation Project-Level Carbon Monoxide Protocol.* Institute of Transportation Studies, University of California, Davis, Report UCD-ITS-RR-97-21.

APPENDIX 2: URBEMIS-2007 MODELING

Estimates operational emissions generated by project traffic and area sources were made using a program called URBEMIS2007, Version 9.2.4.[8] URBEMIS2007 is a program that estimates the emissions that result from various land use development projects. Land use project can include residential uses such as single-family dwelling units, apartments and condominiums, and nonresidential uses such as shopping centers, office buildings, and industrial parks. URBEMIS2007 contains default values for much of the information needed to calculate emissions. However, project-specific, user-supplied information can also be used when it is available.

Inputs to the URBEMIS2007 program include trip generation rates, vehicle mix, average trip length by trip type and average speed. Trip generation rates for proposed project land uses and development were provided by the project transportation consultant. Fresno County average trip lengths and vehicle mixes were used. Average speed for all types of trips was assumed to be 35 MPH.

The URBEMIS2007 program was run to calculate annual emissions. Analysis year was 2030. The URBEMIS2007 output is attached.

[8] Jones and Stokes Associates. 2007. *Software User's Guide: URBEMIS2007 for Windows*, *Version 9.2*.

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\Don Ballanti\Application Data\Urbemis\Version9a\Projects\clovisrtprojectoperation.urb924

Project Name: Clovis RTP No Project Operation

Project Location: Fresno County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	8.55	2.06	25.57	0.08	3.84	3.70	2,657.45

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	7.83	9.00	82.69	0.20	18.07	3.90	21,481.59

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	16.38	11.06	108.26	0.28	21.91	7.60	24,139.04

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.12	1.59	0.84	0.00	0.00	0.00	2,000.56
Hearth	2.59	0.46	23.54	0.08	3.84	3.70	654.93
Landscape	0.19	0.01	1.19	0.00	0.00	0.00	1.96
Consumer Products	4.79						
Architectural Coatings	0.86						
TOTALS (tons/year, unmitigated)	8.55	2.06	25.57	0.08	3.84	3.70	2,657.45

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 0% to 29%

Percentage of residences with natural gas fireplaces changed from 0% to 71%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Single family housing	1.29	1.43	13.44	0.03	2.88	0.62	3,441.07
Apartments low rise	2.09	2.23	20.96	0.05	4.49	0.97	5,367.18
Regnl shop. center	4.45	5.34	48.29	0.12	10.70	2.31	12,673.34
TOTALS (tons/year, unmitigated)	7.83	9.00	82.69	0.20	18.07	3.90	21,481.59

Operational Settings:

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Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2030 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Single family housing	75.33	9.57	dwelling units	226.00	2,162.82	18,491.46
Apartments low rise	31.38	6.72	dwelling units	502.00	3,373.44	28,841.90
Regnl shop. center		42.94	1000 sq ft	216.71	9,305.53	68,795.76
					14,841.79	116,129.12

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	44.4	0.0	100.0	0.0
Light Truck < 3750 lbs	10.7	0.0	99.1	0.9
Light Truck 3751-5750 lbs	22.0	0.0	100.0	0.0
Med Truck 5751-8500 lbs	12.1	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.8	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.4	0.0	21.4	78.6
Heavy-Heavy Truck 33,001-60,000 lbs	2.0	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name:

Project Name: Clovis RTP Project Operation

Project Location: Fresno County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	1.90	1.35	1.42	0.00	0.00	0.00	1,623.73

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	9.39	10.41	97.06	0.24	20.98	4.55	25,027.13

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	11.29	11.76	98.48	0.24	20.98	4.55	26,650.86

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.10	1.35	1.14	0.00	0.00	0.00	1,623.22
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscape	0.02	0.00	0.28	0.00	0.00	0.00	0.51
Consumer Products	0.00						
Architectural Coatings	1.78						
TOTALS (tons/year, unmitigated)	1.90	1.35	1.42	0.00	0.00	0.00	1,623.73

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Office park	6.51	7.33	68.30	0.17	14.77	3.20	17,615.00
General light industry	2.88	3.08	28.76	0.07	6.21	1.35	7,412.13
TOTALS (tons/year, unmitigated)	9.39	10.41	97.06	0.24	20.98	4.55	25,027.13

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2030 Season: Annual

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Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Office park		11.42	1000 sq ft	990.99	11,317.11	94,859.98
General light industry		6.97	1000 sq ft	679.53	4,736.32	39,903.53
					16,053.43	134,763.51

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	44.4	0.0	100.0	0.0
Light Truck < 3750 lbs	10.7	0.0	99.1	0.9
Light Truck 3751-5750 lbs	22.0	0.0	100.0	0.0
Med Truck 5751-8500 lbs	12.1	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.1	0.0	81.0	19.0
Lite-Heavy Truck 10,001-14,000 lbs	0.8	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.4	0.0	21.4	78.6
Heavy-Heavy Truck 33,001-60,000 lbs	2.0	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.5	34.3	65.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.8	0.0	87.5	12.5

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Office park				48.0	24.0	28.0
General light industry				50.0	25.0	25.0

CLIMATE CHANGE

Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHG's has been implicated as a driving force for global climate change. Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth's climate caused by natural fluctuations and anthropogenic activities which alter the composition of the global atmosphere.

Individual projects contribute to the cumulative effects of climate change by emitting GHGs during construction and operational phases. The principal GHGs are carbon dioxide, methane, nitrous oxide, ozone, and water vapor. While the presence of the primary GHGs in the atmosphere are naturally occurring, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are largely emitted from human activities, accelerating the rate at which these compounds occur within earth's atmosphere. Carbon dioxide is the "reference gas" for climate change, meaning that emissions of GHGs are typically reported in "carbon dioxide-equivalent" measures. Emissions of carbon dioxide are largely by-products of fossil fuel combustion, whereas methane results from off-gassing associated with agricultural practices and landfills. Other GHGs, with much greater heat-absorption potential than carbon dioxide, include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, and are generated in certain industrial processes.

There is international scientific consensus that human-caused increases in GHGs have and will continue to contribute to global warming, although there is uncertainty concerning the magnitude and rate of the warming. Potential global warming impacts in California may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years.[1] Secondary effects are likely to include a global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.

The California Energy Commission (CEC) estimated that in 2004 California produced 500 million gross metric tons (about 550 million U.S. tons) of carbon dioxide-equivalent

[1] California Air Resources Board (ARB), 2006, Climate Change website. (http://www.arb.ca.gov/cc/120106workshop/intropres12106.pdf).

GHG emissions.[2] The CEC found that transportation is the source of 38 percent of the State's GHG emissions, followed by electricity generation (both in-state and out-of-state) at 23 percent and industrial sources at 13 percent.

Statewide Actions

in 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emission of greenhouse gases (GHG) would be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.[3]

In 2006, California passed the California Global Warming Solutions Act of 2006 (AB 32), which requires the California Air Resources Board (CARB) to design and implement emission limits, regulations, and other measures, such that feasible and cost-effective statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25 percent reduction in emissions).

AB 32 establishes a timetable for the CARB to adopt emission limits, rules, and regulations designed to achieve the intent of the Act. CARB staff is preparing a scoping plan to meet the 2020 greenhouse gas reduction limits outlined in AB 32. In order to meet these goals, California must reduce their greenhouse gases by 30 percent below projected 2020 levels, or about 10 percent from today's levels. In June 2008, CARB released their Draft Scoping Plan, which estimates a reduction of 169 million metric tons of CO_2-eq ($MMTCO_2$-eq). Approximately one-third of the emissions reductions strategies fall within the transportation sector and include the following: California Light-Duty Vehicle GHG standards, the Low Carbon Fuel Standard, Heavy-Duty Vehicle GHG emission reductions and energy efficiency, and medium and heavy-duty vehicle hybridization, high speed rail, and efficiency improvements in goods movement. These measures are expected to reduce GHG emissions by 60.2 $MMTCO_2$-eq. Emissions

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[2] California Energy Commission, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 -Final Staff Report*, publication CEC-600-2006-013-SF, December 22, 2006; and January 23, 2007 update to that report. Available on the internet at: http://www.arb.ca.gov/cc/ccei/emsinv/emsinv.htm.

[3] California Air Resources Board (CARB), *Climate Change Draft Scoping Plan: A Framework for Change,* June 2008 Discussion Draft. Available on the internet at: http://www.climatechange.ca.gov/index.php.

from the electricity sector are expected to reduce another 49.7 $MMTCO_2$-eq. Reductions from the electricity sector include building and appliance energy efficiency and conservation, increased combined heat and power, solar water heating (AB 1470), the renewable energy portfolio standard (33% renewable energy by 2020), and the existing million solar roofs program. Other reductions are expected from industrial sources, agriculture, forestry, recycling and waste, water, and emissions reductions from cap-and-trade programs. Local government actions and regional GHG targets are also expected to yield a reduction of 2 $MMTCO_2$-eq.[4]

Impacts

Although neither the San Joaquin Valley Air Pollution Control District (SJVAPCD) or any other agency has adopted significance criteria for evaluating a project's contribution to climate change, the Office of Planning and Research (OPR) has asked the California Air Resources Board to "recommend a method for setting thresholds of significance to encourage consistency and uniformity in the CEQA analysis of GHG emissions" throughout the state because OPR has recognized that "the global nature of climate change warrants investigation of a statewide threshold for GHG emissions."[5] In the interim, on June 19, 2008 OPR released a Technical Advisory for addressing climate change through CEQA review. OPR's technical advisory offers informal guidance on the steps that lead agencies should take to address climate changes in their CEQA documents, in the absence of statewide thresholds. OPR will develop, and the California Resources Agency will certify and adopt amendments to the CEQA guidelines on or before January 1, 2010, pursuant to Senate Bill 97.

The informal guidelines in OPR's technical advisory provide the basis for determining proposed project's contribution of greenhouse gas emissions and the project's contribution to global climate change. In the absence of adopted statewide thresholds, OPR recommends the following approach for analyzing greenhouse gas emissions:

- Identify and quantify the project's greenhouse gas emissions;
- Assess the significance of the impact on climate change; and
- If the impact is found to be significant, identify alternatives and/ or mitigation measures that would reduce the impact to less than significant levels.

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[4] Ibid.

[5] Governor's Office of Planning and Research. *Technical Advisory- CEQA and Climate Change: Addressing Climate Change to the California Environmental Quality Act (CEQA) Review*. June 19, 2008. This document is available online at the Office of Planning and Research's website at: www.opr.gov.

The following analysis is based on OPR's recommended approach for determining a project's contribution to and impact on climate change.

Identifying and quantifying a project's greenhouse gas emissions. OPR's technical advisory states that "the most common GHG that results from human activity is carbon dioxide, followed by methane and nitrous oxide." The informal guidelines also advise that lead agencies should calculate, or estimate, emissions from vehicular traffic, energy consumption, water usage and construction activities. The calculation presented below includes construction and operational emissions in terms of CO_2-eq emissions from increased construction, vehicular traffic, area source, and energy consumption. (Since water supply to the project is not imported from a substantial distance, greenhouse gas emissions from this source would be negligible.)

Construction of the proposed project would emit 2,763 tons CO_2-eq.[6] Direct project emissions of carbon dioxide equivalents (CO_2-eq) (including CO_2, NO_x, and CH_4 emissions) include 25,121 tons of CO_2-eq/year from transportation, and 1,631 tons of CO_2-eq /year from area sources and 10,215 tons per year of CO2-eq/year from electrical energy consumption, for a total of 36,967 tons of CO_2-eq/year of project-emitted GHGs. The methodology used in this calculation is described in Appendix _.

Assessing the significance of the impact on climate change. The project's incremental increases in GHG emissions associated with construction, traffic increases, direct and indirect energy use would contribute to regional and global increases in GHG emissions and associated climate change effects.

OPR encourages public agencies to adopt thresholds of significance, but notes that public agencies are not required to do so. In the absence of a quantitative threshold of significance, the project's contribution to climate change is judged using the following significance criterion:

- Does the project conflict with the state goal of reducing GHG emissions in California to 1990 levels by 2020, as set forth by the timetable established in AB 32 (California Global Warming Solutions Act of 2006), such that the project's GHG emissions would result in a substantial contribution to global climate change?

[6] Construction emissions and annual emissions are not intended to be additive as they occur at different points in the project's lifecycle. Construction emissions are one-time emissions that occur prior to building occupancy. Annual emissions are incurred only after construction of the proposed project and are expected to occur annually for the life of the project.

The 2020 GHG emissions limit for California, as adopted by CARB in December of 2007 is approximately 427 $MMTCO_2$-eq. The proposed project's annual contribution would be no more than 0.0078% of this total 2020 emissions limit, and therefore the proposed project would not generate sufficient emissions of GHGs to contribute considerably to the cumulative effects of GHG emissions such that it would impair the state's ability to implement AB32.

The proposed project is a modification of planned land uses and no specific development projects are currently proposed with the project site. Land uses within the project site are expected to be built out over a period of 20+ years. Global greenhouse measures developed as part of AB32 implementation would become effective during buidout. The recommendations outlined in the Draft AB 32 Scoping Plan will likely realize major reductions in vehicle emissions. Some proposed measures will require new legislation to implement, some will require subsidies, some have already been developed, and some will require additional effort to evaluate and quantify. Additionally, some emissions reductions strategies may require their own environmental review under CEQA or the National Environmental Policy Act (NEPA). Applicable measures that are ultimately adopted will become effective during build out of the project site and development within the project site would be subject to these requirements.

The State of California Attorney General's office has compiled a list of greenhouse gas reduction measures that could be applied to a diverse range of projects.[7] The proposed project would meet the intent of many of the greenhouse gas reduction measures identified by the Attorney General's office:

(1) As infill development, vehicle trips and vehicle miles traveled and therefore the project's transportation-related GHG emissions would tend to be less relative to the same amount of growth outside established urban limits;

(2) As new construction, the development within the project would be required to meet California Energy Efficiency Standards for Residential and Nonresidential Buildings, helping to reduce future energy demand as well as reduce the project's contribution to cumulative regional GHG emissions; and

(3) Future development within the project site would also be required to comply with the development guidelines for the Research and Technology Zoning District, which include

[7] State of California, Department of Justice, "The California Environmental Quality Act: Addressing Global Warming Impacts at the Local Agency Level." Updated 3/11/08. Available at: http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf.

development standards regarding solar energy, energy conservation, water conservation and landscaping which all act to reduce greenhouse gas emissions, regulate outdoor temperatures or aid in carbon sequestration.[8]

Since the proposed project would not contribute significantly to global climate change such that it would impede the State's ability to meet its greenhouse gas reduction targets under AB 32 and current and probable future state and local greenhouse gas reduction measures will continue to reduce the project's contribution to climate change, the proposed project would not contribute significantly, either individually or cumulatively, to global climate change.

[8] Carbon sequestration is the capture and long-term storage of carbon dioxide before it is emitted into the atmosphere.