CHAPTER

8

Environmental Resources and Hazards

This chapter discusses environmental resources and hazards in Visalia such as biological resources; agriculture; air quality; greenhouse gases and climate change; water quality, surface hydrology, and flooding; fire hazards; noise; and hazardous materials.

8.1 Air Quality

This section discusses the overall regulatory framework for air quality management in California and the region, including national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS), and describes existing air quality conditions in Visalia.

Regulatory Framework

The air quality management agencies of direct importance to the General Plan Update include the U.S. Environmental Protection Agency (EPA), California Air Resources Board (CARB), and the San Joaquin Valley Air Pollution Control District (SJVAPCD). The EPA has established federal standards for which the CARB and SJVAPCD have primary implementation responsibility. The CARB and SJVAPCD are responsible for ensuring that state standards are met. SJVAPCD is responsible for implementing strategies for air quality improvement and recommending mitigation measures for new growth and development. At the local level, air quality is affected by development practices and measures addressing air quality are implemented through the General Plan, zoning, and development review process. SJVAPCD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws.

Federal and State Ambient Air Quality Standards

Air pollution control programs were established in California before federal requirements were enacted. However, federal Clean Air Act legislation in the 1970s resulted in a gradual merging of state and federal air quality programs, particularly those relating to industrial sources. Air quality management programs developed by California since the late 1980s have generally responded to requirements established by the federal Clean Air Act (CAA).

The enactment of the California Clean Air Act (CCAA) in 1988 and the federal CAA Amendments of 1990 has produced additional changes in the structure and administration of air quality management programs. The CCAA requires preparation of an air quality attainment plan for any area that violates state standards for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide

(NO_2), or ozone (O_3). Locally prepared attainment plans are not required for areas that violate the state standards for PM10, but the CARB is currently addressing PM10 attainment issues.

California and the federal government have established standards for several different pollutants. For some pollutants, separate standards have been set for different measurement periods. Most standards have been set to protect public health. For some pollutants, standards have been based on other values (such as protection of crops, protection of materials, or avoidance of nuisance conditions). State and federal standards, as well as the attainment status of Tulare County, for a variety of pollutants are summarized in Table 8-1.

Federal Regulations

The federal CAA, enacted in 1963 and amended several times thereafter (including the 1990 amendments), establishes the framework for modern air pollution control. The CAA directs the EPA to establish ambient air standards for six pollutants: ozone, CO, lead (Pb), NO_2, particulate matter, and SO_2. The standards are divided into primary and secondary standards. Primary standards are designed to protect human health, including the health of "sensitive" populations such as asthmatics, children, and the elderly, within an adequate margin of safety. Secondary standards are designed to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The primary legislation that governs federal air quality regulations is the Clean Air Act Amendments of 1990. These amendments delegate primary responsibility for clean air to the EPA. The EPA develops rules and regulations to preserve and improve air quality, as well as delegating specific responsibilities to state and local agencies.

Areas that do not meet the federal ambient air quality standards shown in Table 8-1 are called nonattainment areas. For these nonattainment areas, the CAA requires states to develop and adopt State Implementation Plans (SIPs), which are air quality plans showing how air quality standards will be attained. The SIP, which is reviewed and approved by the EPA, must demonstrate how the federal standards will be achieved. Failing to submit a plan or secure approval could lead to denial of federal funding and permits for such improvements as highway construction and sewage treatment plants. In California, the EPA has delegated authority to prepare SIPs to the ARB, which, in turn, has delegated that authority to individual air districts. In cases where the SIP is submitted by the state but fails to demonstrate achievement of the standards, the EPA is directed to prepare a federal implementation plan.

State Regulations

Responsibility for achieving California's air quality standards, which are more stringent than federal standards, is placed on the CARB and local air districts, and is to be achieved through district-level air quality management plans that will be incorporated into the SIP. In California, the EPA has delegated authority to prepare SIPs to the CARB, which in turn has delegated that authority to individual air districts.

The CARB has traditionally established state air quality standards, maintaining over-sight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

Table 8-1: Ambient Air Quality Standards Applicable in California and the Attainment Status of Tulare County										
			Standard (parts per million)		*Standard (micrograms per cubic meter)*		*Violation Criteria*		*Attainment Status of Tulare County*	
Pollutant	*Symbol*	*Average Time*	*California*	*National*	*California*	*National*	*California*	*National*	*California*	*National*
Ozone[a]	O_3	1 hour	0.09	NA	180	NA	If exceeded	NA	Severe nonattainment	NA
		8 hours	0.070	0.075	137	147	If exceeded	If fourth highest 8-hour concentration in a year, averaged over 3 years, is greater than the standard	Nonattainment	Serious nonattainment
Carbon monoxide	CO	8 hours	9.0	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year	Attainment	Attainment/Unclassified
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year	Attainment	Attainment/Unclassified
(Lake Tahoe only)		8 hours	6	NA	7,000	NA	If equaled or exceeded	NA	NA	NA
Nitrogen dioxide	NO_2	Annual arithmetic mean	0.030	0.053	57	100	If exceeded	If exceeded on more than 1 day per year	Attainment	Attainment/Unclassified
		1 hour	0.18	0.100	339	NA	If exceeded	3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed standard	Attainment	Attainment/Unclassified

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Pollutant	*Symbol*	*Average Time*	*California*	*National*	*California*	*National*	*California*	*National*	*California*	*National*
Sulfur dioxide	SO_2	Annual arithmetic mean	NA	0.030	NA	80	NA	If exceeded	NA	Attainment/Unclassified
		24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than 1 day per year	Attainment	Attainment/Unclassified
		1 hour	0.25	NA	655	NA	If exceeded	NA	Attainment	NA
Hydrogen sulfide	H_2S	1 hour	0.03	NA	42	NA	If equaled or exceeded	NA	Unclassified	NA
Vinyl chloride	C_2H_3Cl	24 hours	0.01	NA	26	NA	If equaled or exceeded	NA	NA	NA
Inhalable particulate matter	PM10	Annual arithmetic mean	NA	NA	20	NA	If exceeded	NA	Nonattainment	NA
		24 hours	NA	NA	50	150	If exceeded	If exceeded on more than 1 day per year	Nonattainment	Serious maintenance

Table 8-1: Ambient Air Quality Standards Applicable in California and the Attainment Status of Tulare County										
			Standard (parts per million)		*Standard (micrograms per cubic meter)*		*Violation Criteria*		*Attainment Status of Tulare County*	
Pollutant	*Symbol*	*Average Time*	*California*	*National*	*California*	*National*	*California*	*National*	*California*	*National*
	PM2.5	Annual arithmetic mean	NA	NA	12	15.0	If exceeded	If 3-year average of the weighted annual mean from single or multiple community-oriented monitors exceeds the standard	Nonattainment	Nonattainment
		24 hours	NA	NA	NA	35	NA	If less than 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard	NA	Nonattainment
Sulfate particles	SO_4	24 hours	NA	NA	25	NA	If equaled or exceeded	NA	Attainment	NA
Lead particles	Pb	Calendar quarter	NA	NA	NA	1.5	NA	If exceeded no more than 1 day per year	NA	Attainment/unclassified
		30-day average	NA	NA	1.5	NA	If equaled or exceeded	NA	Attainment	NA
		Rolling 3-Month average	NA	NA	NA	0.15	NA	Averaged over a rolling 3-month period	NA	Attainment/unclassified

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Table 8-1: Ambient Air Quality Standards Applicable in California and the Attainment Status of Tulare County

			Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria		Attainment Status of Tulare County	
Pollutant	*Symbol*	*Average Time*	*California*	*National*	*California*	*National*	*California*	*National*	*California*	*National*

Notes: National standards shown are the primary (public health) standards.
NA = not applicable.

Sources: California Air Resources Board, 2006; California Air Resources Board, 2010a; U.S. Environmental Protection Agency, 2010a.

Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required by the California Environmental Quality Act (CEQA).

The CCAA of 1988 substantially added to the authority and responsibilities of air districts. The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The CCAA focuses on attainment of the state ambient air quality standards, which, for certain pollutants and averaging periods, are more stringent than the comparable federal standards.

The CCAA requires designation of attainment and nonattainment areas with respect to state ambient air quality standards. The CCAA also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan if the district violates state air quality standards for CO, SO_2, NO_2, or O_3. These Clean Air Plans are specifically designed to attain these standards and must be designed to achieve an annual five percent reduction in district-wide emissions of each nonattainment pollutant or its precursors. Where an air district is unable to achieve a 5 percent annual reduction in district-wide emissions of each nonattainment pollutant or its precursors, the adoption of "all feasible measures" on an expeditious schedule is acceptable as an alternative strategy (Health and Safety Code Section 40914(b)(2)). No locally prepared attainment plans are required for areas that violate the state PM10 standards, but the CARB is currently addressing PM10 attainment issues.

The CCAA requires that the state air quality standards be met as expeditiously as practicable but, unlike the federal CAA, does not set precise attainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards.

The CCAA emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. The CCAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and to establish traffic control measures (TCMs). The CCAA does not define indirect and area-wide sources. However, Section 110 of the federal CAA defines an indirect source as:

> a facility, building, structure, installation, real property, road, or highway, which attracts, or may attract, mobile sources of pollution. Such term includes parking lots, parking garages, and other facilities subject to any measure for management of parking supply.

TCMs are defined in the CCAA as "any strategy to reduce trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing vehicle emissions."

The ARB's *Air Quality and Land Use Handbook: A Community Health Perspective* (2005) provides ARB recommendations for the siting of new sensitive land uses (including residences) near freeways, distribution centers, ports, refineries, chrome plating facilities, dry cleaners, and gasoline stations. The handbook recommends that new development be placed at certain distances from such facilities.

San Joaquin Valley Air Pollution Control District (SJVAPCD)

SJVAPCD is responsible for local air quality regulation. Its primary responsibility is to regulate stationary sources and develop plans to achieve and maintain air quality standards. The CARB and EPA have jurisdiction over controlling emissions from mobile sources.

Until the passage of the CCAA, the air districts' primary role was the control of stationary sources of pollution such as industrial processes and equipment that stayed within the districts' jurisdictional boundaries. With the passage of the CCAA and CAAA, air districts were additionally required to implement transportation control measures such as employer-based trip reduction programs. They were also encouraged to adopt indirect source control programs to reduce mobile source emissions. These mandates created the necessity for SJVAPCD to work closely with cities and counties and with regional transportation planning agencies to develop new programs.

SJVAPCD works with the Tulare County Association of Governments (TCAG) to ensure a coordinated approach in the development and implementation of transportation plans throughout Tulare County. This coordination ensures compliance with pertinent provisions of the federal and state Clean Air Acts, as well as related federal transportation legislation (such as the Intermodal Surface Transportation Efficiency Act, Transportation Conformity, and Transportation Improvement Plans).

To protect public health, SJVAPCD has adopted plans to achieve ambient air quality standards. The District must continuously monitor its progress for plan implementation and must report this effort regularly to CARB and the EPA. It must also periodically revise its attainment plans to reflect new conditions and requirements. The District tries to exercise a uniform emission control effort that will bring the entire region into compliance with State and federal standards as quickly as possible.

As a public agency, SJVAPCD takes an active part in the intergovernmental review process under CEQA, and may act as a lead agency, a responsible agency, or a commenting agency. The agency is available for consultation at any time in the project review process, but there are certain times when consultation is required.

Lead Agency

SJVAPCD acts as a lead agency when it has principal responsibility to carry out or approve a project. This typically occurs when it develops rules, regulations, and air quality plans.

Responsible Agency

SJVAPCD acts as a responsible agency when it has discretionary power over a project but does not have the principal authority to carry out the project. The District is often a responsible agency for development projects that require air pollution control permits. As a responsible agency, SJVAPCD is available to help identify applicable rules and regulations, to provide guidance and assistance on applicable air quality analysis methodologies, and to help address any other air quality related issues. SJVAPCD will also submit comments to the lead agency through the intergovernmental review process on the adequacy of the lead agency's air quality analysis. As part of the review, the agency may recommend mitigation measures to help reduce or eliminate impacts.

Commenting Agency

SJVAPCD acts as commenting agency for any project that has the potential to impact air quality and for which it is not a lead or responsible agency. To this end, it regularly provides comments to lead agencies that prepare environmental documents.

Air Quality Plans

SJVAPCD has adopted several attainment plans in an attempt to achieve State and federal air quality standards. The District must continuously monitor its progress in implementing attainment plans and must periodically report to the CARB and the EPA. It must also periodically revise its attainment

plans to reflect new conditions and requirements in accordance with schedules mandated by the CCAA and CAAA.

The CCAA requires districts to adopt air quality attainment plans and to review and revise their plans to address deficiencies in interim measures of progress once every three years. SJVAPCD compiles separate Air Quality Attainment Plans for CO, O_3, and particulate matter. The CO Attainment Plan was last updated in 1998, and it is not planned to be updated in the future unless violations of the CO NAAQS and/or CAAQS occur. The 2004 Extreme Ozone Attainment Demonstration Plan for 1-hour Ozone was adopted on October 8, 2004, submitted to EPA on November 15, 2004, and the Clarifications for the 2004 Extreme Ozone Attainment Demonstration Plan for 1-hour Ozone was adopted on August 21, 2008. The EPA proposed approval and partial disapproval of the 2004 Extreme Ozone Attainment Demonstration Plan for 1-hour Ozone on June 30, 2009.[1] The 2007 Ozone Plan for 8-hour ozone was adopted on April 30, 2007, and the Amendment to the 2007 Ozone Plan to Extend the Rule Adoption Schedule for Organic Waste Operations was adopted on December 18, 2008.[2] The 2007 PM10 Maintenance Plan and Request for Redesignation was approved by ARB on October 25, 2007,[3] and there are no PM10 Plans under development.[4] The 2008 PM2.5 Plan was adopted on April 30, 2008.[5]

Criteria Pollutants/Air Pollutants of Concern

The federal and state governments have established ambient air quality standards for the following six criteria pollutants: O_3, CO, NO_2, SO_2, particulate matter (particulate matter smaller than 10 microns or less in diameter [PM10] and particulate matter smaller than 2.5 microns or less in diameter [PM2.5]), and lead. O_3, NO_2, and particulate matter are generally considered to be "regional" pollutants, as these pollutants or their precursors affect air quality on a regional scale. Pollutants such as CO, SO_2, lead, and particulate matter are considered to be local pollutants that tend to accumulate in the air locally. Particulate matter is considered to be a localized pollutant as well as a regional pollutant. Toxic air contaminants (TACs) are also discussed below, although no state or federal ambient air quality standards exist for these pollutants. Brief descriptions of these pollutants are provided below.

Ozone

O_3 is a respiratory irritant that increases susceptibility to respiratory infections. It is also an oxidant that can cause substantial damage to vegetation and other materials.

O_3 is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. O_3 precursors (ROG/VOC and NO_X) react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem.

State and federal standards for ozone have been set for 1- and 8-hour averaging times. The state 1-hour ozone standard is 0.09 parts per million (ppm), not to be exceeded. The EPA recently replaced the 1-hour ozone standard with an 8-hour standard of 0.075 ppm. However, the California 1-hour standard will remain in effect. The state 8-hour standard is 0.070 ppm, not to be exceeded.

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[1] San Joaquin Valley Air Pollution Control District (a)
[2] *Ibid*
[3] California Air Resources Board 2007
[4] San Joaquin Valley Air Pollution Control District (b)
[5] San Joaquin Valley Air Pollution Control District

Carbon Monoxide

CO is a public health concern because it combines readily with hemoglobin and reduces the amount of oxygen transported in the bloodstream. CO can cause health problems such as fatigue, headache, confusion, dizziness, and death.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

State and federal CO standards have been set for 1- and 8-hour averaging times. The state 1-hour standard is 20 ppm, not to be exceeded, whereas the federal 1-hour standard is 35 ppm, not to be exceeded more than 1 day per year. The state 8-hour standard is 9.0 ppm, while the federal standard is 9 ppm. This means that a monitored 8-hour CO concentration from 9.1 to 9.4 ppm violates the state but not the federal standard.

Nitrogen Dioxide

Nitrogen oxides (NO_x) are a family of highly reactive gases that are primary precursors to the formation of ground-level ozone, reacting in the atmosphere to form acid rain. NO_x, a mixture of nitric oxide (NO) and NO_2, are produced from natural sources, motor vehicles, and other fuel combustion processes. NO is colorless and odorless and is in the atmosphere to form NO_2. NO_2 is an odorous, brown, acidic, highly corrosive gas that can affect human health and environment. NO_x are critical components of photochemical smog. NO_2 produces the yellowish-brown color of the smog.

NO_x can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. The effects of short-term exposure are still unclear, but continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children. Health effects associated with NO_x are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to eye and mucus membrane aggravation along with pulmonary dysfunction. NO_x can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to the production of particulate nitrates. Airborne NO_x can impair visibility.

NO_x is a major component of acid deposition in California. NO_x may affect both terrestrial and aquatic ecosystems. NO_x in the air is a potentially significant contributor to a number of environmental effects, such as acid rain and eutrophication in coastal waters. Eutrophication occurs when a body of water suffers an increase in nutrients that reduces the amount of oxygen in the water, producing an environment that is destructive to fish and other animal life.

The CARB and the EPA have set CAAQS and NAAQS standards, respectively, for NO_2 but not for NO. The state NO_2 standards are 0.18 ppm as a 1-hour standard, not to be exceeded, and 0.030 ppm as an annual arithmetic mean. The federal NO_2 standards are 0.100 ppm as a 1-hour standard, 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor not to be exceeded, and 0.053 ppm as an annual arithmetic mean, not to be exceeded more than one day per year.

Sulfur Dioxide

SO_x gases are a family of colorless, pungent gases that include SO_2 and are formed primarily by combustion of sulfur-containing fossil fuels (mainly coal and oil), metal smelting, and other industrial processes. SO_x can react to form sulfates, which significantly reduce visibility. SO_x is also a precursor to particulate matter formation.

The major health concerns associated with exposure to high concentrations of SO_x include effects related to breathing, respiratory illness, alterations in pulmonary defenses, and aggravation of existing cardiovascular disease. Major subgroups of the population that are most sensitive to SO_x include individuals with cardiovascular disease or chronic lung disease (such as bronchitis or emphysema), as well as children and the elderly. SO_x emissions can also damage tree foliage and agricultural crops. Together, SO_x and NO_x are the major precursors to acid rain, which is associated with the acidification of lakes and streams and accelerated corrosion of buildings and monuments.

The ARB and the EPA have set CAAQS and NAAQS standards for SO_2. The state standards are 0.04 ppm as a 24-hour average and 0.25 ppm as a 1-hour average, not to be exceeded. The federal standards are 0.030 ppm as an annual arithmetic mean, not to be exceeded, and 0.14 ppm as a 24-hour average, not to be exceeded more than one day per year.

Inhalable Particulates

Particulates can damage human health and retard plant growth. Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Particulates also reduce visibility and corrode materials.

The federal and state ambient air quality standard for particulate matter applies to PM2.5 and PM10. The main source of PM10 in Tulare County is farming operations. For PM2.5, the most significant source is secondary ammonium nitrate (constituting 50 to 60 percent on peak days), followed by combustion organic carbon.[6] Ammonium nitrate is formed from chemical reactions of nitrogen oxides (NOx), emitted from stationary combustion and motor vehicles, with ammonia. In the San Joaquin Valley, the primary source of the ammonia is agricultural operations. Major sources of organic carbon include burning activities, such as residential wood combustion and cooking, and direct tailpipe emissions from motor vehicles and other mobile sources.[7]

The state PM10 standards are 50 micrograms per cubic meter ($\mu g/m^3$) as a 24-hour average and 20 $\mu g/m^3$ as an annual arithmetic mean. The federal PM10 standard is 150 $\mu g/m^3$ as a 24-hour average. For PM2.5, the state has adopted a standard of 12 $\mu g/m^3$ for the annual arithmetic mean. The federal PM2.5 standards are 35 $\mu g/m^3$ for the 24-hour average and 15.0 $\mu g/m^3$ for the annual arithmetic mean.

Lead

Lead is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Several decades ago lead was used as an automotive fuel additive to increase the octane rating. Because gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels, and the use of leaded fuel has been mostly phased out, the ambient concentrations of lead have dropped dramatically.

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[6] California Almanac of Emissions and Air Quality, 2009.
[7] Analysis of the San Joaquin Valley 2008 PM2.5 Plan, 2008.

Short-term exposure to high levels of lead can cause vomiting, diarrhea, convulsions, coma, and death. Small amounts of lead can be harmful, especially to infants, young children, and pregnant women. Symptoms of long-term exposure to lower lead levels may be less noticeable but are still serious. Anemia is common, and damage to the nervous system may cause impaired mental function. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability, and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys.

Lead exposure is most serious for young children because they absorb lead more easily than adults do, and they are more susceptible to its harmful effects. Even low-level exposure may harm the intellectual development, behavior, size, and hearing of infants. During pregnancy, and especially in the last trimester, the developing fetus is at particular risk from maternal lead exposure, with low birth weight and slowed postnatal neurobehavioral development noted.[8]

The state standard for lead is 1.5 $\mu g/m^3$ as a 30-day average, not to be equaled or exceeded. The federal standards are 1.5 $\mu g/m^3$ averaged over a calendar quarter, not to be exceeded more than one day per year, and 0.15 $\mu g/m^3$ as a rolling 3-month average, not to be exceeded over a 3-month period.

Toxic Air Contaminants (TACs)

TACs are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants listed above. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., benzene near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and federal level.

Diesel exhaust is the predominant TAC in urban air with the potential to cause cancer. It is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to CARB, diesel exhaust is a complex mixture of gases, vapors and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs, and are listed as carcinogens either under the State's Proposition 65 or under the federal Hazardous Air Pollutants (HAPs) programs. California has adopted a comprehensive diesel risk reduction program. The EPA and CARB have adopted low sulfur diesel fuel standards that will reduce diesel particulate matter substantially. These went into effect in June 2006.

Existing Conditions

The city is located in Tulare County near the southern end of San Joaquin Valley Air Basin (valley air basin), which includes the counties of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and the western portion of Kern. The valley air basin is approximately 250 miles long and an average of 35 miles wide. The valley air basin is bounded on the east by the Sierra Nevada mountains, on the west by the Coast Ranges, and on the south by the Tehachapi mountains.

Regional Climate and Meteorology

The topographic features of the valley air basin affect pollutant concentrations and dispersion of pollutants into and out of the Basin. Marine air flows into the Basin from the San Joaquin River

[8] U.S. Environmental Protection Agency, 2000.

Delta, but the topographic features of the valley air basin prevent air flow through and out of the area. The mountains surrounding the valley air basin result in weak airflow, which becomes vertically blocked by high barometric pressure over the area. This makes the valley air basin highly susceptible to pollutant accumulation over time.[9]

In addition to the topographic features of the valley air basin, local wind patterns affect pollutant concentration and dispersion. During the summer, wind usually originates at the north end of the basin and flows in a south-southeasterly direction through the basin, during the winter months, wind occasionally originates from the south end of the basin and flows in a north-northwesterly direction. Light, variable winds less than 10 miles per hour (mph) also characterize the winter months, which, when combined with low inversion layers, create conditions conducive to high CO and PM10 concentrations. Diurnal wind cycles in the Basin add to the complexity of regional wind flow and pollutant transport.[10]

Temperature and solar radiation in the valley air basin play a crucial role in the photochemical reaction that leads ozone formation. The photochemical reaction requires sunlight, and the valley air basin is characterized as an "inland Mediterranean" climate averaging 260 sunny days per year. High temperatures are also contributors to ozone formation, and summer high temperatures often exceed 100°F, averaging in the high 90s in the southern part of the basin. Winter conditions in the valley air basin are mild and humid. Average high temperatures are in the 50s, and the average daily low temperate is 45°F.[9]

Temperature inversions in the valley air basin also affect pollutant dispersion. Vertical dispersion of pollutants is limited by persistent temperature inversions. Temperature inversions occur when a layer of warm air traps cooler air beneath it. Air above and below the inversion base does not mix because of differences in air density; warm air above the inversion is less dense than the cool air below, which prevents air exchange. Ozone and its precursors will mix and react to produce higher concentrations under an inversion, and inversions trap and hold directly emitted pollutants like CO. PM10 concentrations are also directly related to inversion layers due to the limitation of mixing space. Temperature inversions are more persistent during the winter months.[9]

Precipitation and fog also affect pollutant concentrations in the valley air basin. Clouds and fog block the solar radiation necessary for ozone formation. CO is slightly water-soluble, so fog and precipitation tend to reduce atmospheric CO concentrations. Precipitation also assists in "washing" PM10 from the atmosphere. Most precipitation in the valley air basin occurs during the winter months, and precipitation during the summer months is rare. Precipitation on the valley floor and the Sierra Nevada in the valley air basin decreases from north to south. Average annual precipitation for the valley floor is 9.25 inches. Fog also occurs mostly in the winter. Fog can help to lower CO and NO_X concentrations, but it can also assist in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor of winter season violations of the PM10 and PM2.5 standards.[9]

Ambient Air Quality Conditions

Existing air quality conditions in the project area can be characterized in terms of the ambient air quality standards that the federal and state governments have established for various pollutants and by monitoring data collected in the region. Monitoring data concentrations are typically expressed in

[9] San Joaquin Valley Air Pollution Control District, 2002.
[10] *Ibid.*

terms of ppm or micrograms per cubic meter ($\mu g/m^3$). The only air quality monitoring station located in the City is the Visalia monitoring station, located at 310 North Church Street in Visalia, which monitors for NO_2, ozone, PM10, and PM2.5.[9] Air quality monitoring data from this monitoring station are summarized in Table 8-2.

The table shows violations of the following standards during the 5-year monitoring period for which complete monitoring data are available:

- **1-hour ozone:** CAAQS
- **8-hour ozone:** CAAQS and NAAQS
- **PM10:** CAAQS
- **PM2.5:** NAAQS

Attainment Status and Air Quality Planning

If monitored pollutant concentrations meet state or federal standards over a designated period of time, the area is classified as being in attainment for that pollutant. If monitored pollutant concentrations violate the standards, the area is considered a nonattainment area for that pollutant. If an area was previously designated as nonattainment but was redesignated as attainment, the area is designated as a maintenance area but must submit a maintenance plan to the EPA to ensure the attainment of the NAAQS for any pollutant is maintained. The plan must demonstrate continued attainment of the applicable NAAQS for at least ten years after the approval of a redesignation to attainment. If data are insufficient to determine whether a pollutant is violating the standard, the area is designated attainment/unclassified.

The EPA has classified Tulare County as a serious (0.107 ppm < 0.120 ppm) nonattainment area for the 8-hour ozone standard. For the CO 1-hour and 8-hour standards, the EPA has classified Tulare County as an attainment/unclassified. For the PM10 24-hour standard, the EPA has classified Tulare County as a serious maintenance area. For PM2.5, EPA has classified Tulare County as a nonattainment area for both the annual arithmetic mean and 24-hour standards. The CARB has classified Tulare County as severe nonattainment area for the 1-hour ozone standard and as a nonattainment area for the 8-hour ozone standard. For the CO 1-hour and 8-hour standards, CARB has classified Tulare County as an attainment area. For the PM10 annual arithmetic mean and 24-hour standards, ARB has classified Tulare County as a nonattainment area, and for the PM2.5 annual arithmetic mean standard, ARB has classified Tulare County as a nonattainment area. Tulare County's attainment status for each of these pollutants relative to the NAAQS and CAAQS is summarized in Table 8-1.

Existing Air Quality Inventory

The city is home to many industries, processes, and actions that generate emissions of criteria pollutants. The ARB compiles an emissions inventory for all sources of emissions within Tulare County, in which the city resides. This inventory is used by SJVAPCD and CARB for regional air quality planning purposes and is the basis for the region's air quality plans, and includes such sources as stationary (e.g., landfills, electric utilities, mineral processes); area-wide (e.g., farming operations, construction/demolition activities, residential fuel combustion); and mobile sources (e.g., automobiles, aircraft, off-road equipment). Estimates of emissions for the city were extrapolated from the Tulare County inventory based on the percent of the total County population residing in the

city. The population of Tulare County is 397,000, and the population of the city is 93,000 (Tulare County); therefore, the population of the city is approximately 23.43 percent of the total population of Tulare County. City emissions were therefore assumed to be 23.43 percent of the total Tulare County emissions. Current emissions of criteria pollutants for 2008 are summarized in Table 8-2.

Table 8-2: Ambient Air Quality Measurements at the Visalia Monitoring Station (2004 – 2008)					
Pollutant	*2004*	*2005*	*2006*	*2007*	*2008*
1-Hour Ozone					
Maximum 1-hour concentration (ppm)	0.133	0.117	0.116	0.107	0.130
Number of Days Standard Exceeded[1]					
CAAQS 1-hour (>0.09 ppm)	17	27	30	11	44
8-Hour Ozone					
State maximum 8-hour concentration (ppm)	0.100	0.099	0.096	0.100	0.122
Number of Days Standard Exceeded[a]					
CAAQS 8-hour (>0.070 ppm)	73	62	72	56	94
Carbon Monoxide (Co)					
National[b] maximum 8-hour concentration (ppm)	2.20	2.60	—	—	—
Maximum 1-hour concentration (ppm)	3.70	3.80	—	—	—
Number of Days Standard Exceeded[a]					
NAAQS 8-hour (≥9 ppm)	0	0	—	—	—
NAAQS 1-hour (≥35 ppm)	0	0	—	—	—
Particulate Matter (PM10)[D]					
State maximum 24-hour concentration (μg/m^3)	82.0	124.0	151.0	99.0	104.7
State maximum 3-year average concentration (μg/m^3)	52	45	47	47	47
State annual average concentration (μg/m^3)[e]	41.3	44.5	47.4	42.3	47.1
Number of Days Standard Exceeded[a]					
CAAQS 24-hour (>50 μg/m^3)[f]	90.6	146.2	156.2	91.4	160.8
Particulate Matter (PM2.5)					
National[b] maximum 24-hour concentration (μg/m^3)	82.0	122.0	145.0	98.0	103.9
Number of Days Standard Exceeded[a]					
NAAQS 24-hour (>35 μg/m^3)	—	34.9	29.8	60.4	52.3

Notes: CAAQS = California ambient air quality standards, NAAQS = national ambient air quality standards.
[1]An exceedance is not necessarily a violation.

Sources: California Air Resources Board 2010b; U.S. Environmental Protection Agency, 2010 (b).

8.2 Biological Resources

This section provides a general description of biological resources within the planning area, including resources that may require General Plan policies or guidelines to institute protection and restoration, where feasible. It also includes a summary of the State and federal regulations and policies that protect biological resources; and a description of the plants and wildlife, including special-status species that have the potential to occur within the planning area.

Regulatory Framework

Federal Regulations

Federal Endangered Species Act

The Federal Endangered Species Act (ESA) protects fish and wildlife species, and their habitats, that have been identified by the USFWS or National Oceanic & Atmospheric Administration's National Marine Fisheries Service (NMFS) as threatened or endangered. Endangered refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range. Threatened refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future.

The ESA is administered by the USFWS and the NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fish, whereas other listed species are under USFWS jurisdiction. Provisions of ESA Sections 7 and 9 are relevant to the general plan update and are summarized below.

Endangered Species Act Authorization Process for Federal Actions (Section 7)

Section 7 of the ESA provides a means for authorizing take of threatened and endangered species by federal agencies. Under Section 7, the federal agency conducting, funding, or permitting an action must consult with USFWS or NMFS, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project "may affect" a listed species or designated critical habitat, the lead agency is required to prepare a biological assessment evaluating the nature and severity of the expected effect. In response, USFWS or NMFS issues a biological opinion, with a determination that the proposed action either:

- May jeopardize the continued existence of one or more listed species (jeopardy finding) or result in the destruction or adverse modification of critical habitat (adverse modification finding), or

- Will not jeopardize the continued existence of any listed species (no jeopardy finding) or result in adverse modification of critical habitat (no adverse modification finding).

The biological opinion issued by the USFWS or NMFS may stipulate discretionary "reasonable and prudent" conservation measures. If the project would not jeopardize a listed species, the USFWS or NMFS issues an incidental take statement to authorize the proposed activity.

The planning area provides potentially suitable habitat for three federally listed plant species (California jewel-flower [*Caulanthus californicus*], Hoover's spurge [*Chamaesyce hooveri*],and San Joaquin adobe sunburst [*Pseudobahia peirsonii*]); and provides potentially suitable habitat for four federally- listed wildlife species: vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and San Joaquin kit fox (*Vulpes macrotis mutica*).

Endangered Species Act Prohibitions (Section 9)

Section 9 of the ESA prohibits the take of any fish or wildlife species listed as endangered. A take of threatened species also is prohibited, unless otherwise authorized by federal regulations. In some cases, exceptions may be made for threatened species under ESA Section 4[d]; in such cases, the USFWS or NMFS issues a "4[d] rule" describing protections for the threatened species and specifying the circumstances under which a take is allowed. Take, as defined by ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction.

Clean Water Act

The federal Clean Water Act (CWA) was enacted as an amendment to the federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the United States. The CWA serves as the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands.

The CWA empowers the Environmental Protection Agency (EPA) to set national water quality standards and effluent limitations and includes programs addressing both point-source and nonpoint-source pollution. Point-source pollution is pollution that originates or enters surface waters at a single, discrete location, such as an outfall structure or an excavation or construction site. Nonpoint-source pollution originates over a broader area and includes urban contaminants in stormwater runoff and sediment loading from upstream areas. The CWA operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool. The following sections provide additional details on specific sections of the CWA.

Permits for Fill Placement in Waters and Wetlands (Section 404)

CWA 404 regulates the discharge of dredged and fill materials into waters of the United States. Waters of the United States refers to oceans, bays, rivers, streams, lakes, ponds, and wetlands, including:

- Areas within ordinary high-water mark of a stream, including nonperennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned; and

- Seasonal and perennial wetlands, including coastal wetlands.

Following a 2001 U.S. Supreme Court decision, the Army Corps of Engineers (USACE) no longer has jurisdiction or regulates isolated wetlands (i.e., wetlands that have no hydrologic connection with a water of the United States).

In response to the issues of this court ruling, the USACE and the U.S. EPA issued a joint regulatory guidance memorandum (Rapanos Guidance) (U.S. Environmental Protection Agency and Department of the Army 2007). The Corps also created a jurisdictional determination form and guidebook (JD Guidebook) (U.S. Army Corps of Engineers 2007) that provides guidance on determining significant nexus of a wetland or water.

Applicants must obtain a permit from the USACE for all discharges of dredged or fill material into waters of the United States, including adjacent wetlands, before proceeding with a proposed activity. The USACE may issue either an individual permit evaluated on a case-by-case basis or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized

and are issued to cover multiple instances of similar activities expected to cause only minimal adverse environmental effects. Nationwide permits are a type of general permit issued to cover particular fill activities.

Compliance with CWA 404 requires compliance with several other environmental laws and regulations. The Corps cannot issue an individual permit or verify the use of a general permit until the requirements of the National Environmental Policy Act (NEPA), ESA, and NHPA have been met. In addition, the Corps cannot issue or verify any permit until a water quality certification or a waiver of certification has been issued pursuant to CWA 401.

Executive Order 13186 (Federal Migratory Bird Treaty Act)

The Migratory Bird Treaty Act (MBTA) (16 U.S. Government Code 703–711) prohibits the take of any migratory bird or any part, nest, or eggs of any such bird. Under the act, take is defined as the action of or attempt to "pursue, hunt, shoot, capture, collect, or kill." This act applies to all persons and agencies in the United States, including federal agencies.

Executive Order 13186 for conservation of migratory birds (January 11, 2001) requires any project with federal involvement to address the impacts of federal actions on migratory birds. The order is designed to assist federal agencies in their efforts to comply with the MBTA and does not constitute any legal authorization to take migratory birds. The order also requires federal agencies to work with the USFWS to develop a memorandum of understanding (MOU). Protocols developed under the MOU must promote the conservation of migratory bird populations through:

- Avoiding and minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions;
- Restoring and enhancing the habitat of migratory birds, as practicable; and
- Preventing or abating the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

State Regulations

California Endangered Species Act

Passed in 1984, the California Endangered Species Act (CESA) prohibits the take of endangered and threatened species; however, habitat destruction is not included in the state's definition of take. Under the CESA, a take is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include harm or harassment. Section 2090 of CESA requires state agencies to comply with endangered-species protection and recovery and promote conservation of these species. CESA defers to the California Native Plant Protection Act of 1977, which prohibits importing rare and endangered plants into California, taking rare and endangered plants, and selling rare and endangered plants. State-listed plants are protected mainly in cases where state agencies are involved in projects under CEQA. In these cases, plants listed as rare under the California Native Plant Protection Act are not protected under CESA but can be protected under CEQA.

The planning area provides suitable habitat for two state-listed plant species (California jewel-flower and San Joaquin adobe sunburst) and provides suitable habitat for two state-listed wildlife species: Swainson's hawk (*Buteo swainsoni*) and San Joaquin kit fox.

California Fish and Game Code

Section 1602

Under Section 1602 of the California Fish and Game Code, public agencies are required to notify the DFG before undertaking any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. Preliminary notification and project review occur generally during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, the DFG is required to propose reasonable project changes to protect the resources. These modifications are formalized in a streambed-alteration agreement that becomes part of the plans, specifications, and bid documents for the project.

Sections 3503 and 3503.5

Section 3503 of the California Fish and Game Code prohibits the destruction of bird nests. Section 3503.5 prohibits the killing of raptor species and the destruction of raptor nests. The planning area provides suitable nesting habitat for raptors, including white-tailed kite (*Elanus leucurus*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), Swainson's hawk, and American kestrel (*Falco sparverius*).

Section 3511 (Fully Protected Birds)

The California Fish and Game Code provides protection from take for a variety of species, referred to as fully protected species. Section 3511 lists fully protected birds and prohibits take of these species. The California Fish and Game Code defines take as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Except for take related to scientific research, all take of fully protected species is prohibited. The planning area provides potential nesting habitat for one fully protected bird species: white-tailed kite.

California Oak Woodlands Conservation Act

The California Oak Woodlands Conservation Act was enacted in 2001 to protect oak woodland habitats that were being diminished due to development, firewood harvesting, and agricultural conversions. The Oak Woodlands Conservation Program was established as a result of the act and is intended to provide project funding opportunities for private landowners, conservation organizations, and cities and counties to conserve and restore oak woodlands. The program authorizes the Wildlife Conservation Board to purchase oak woodland conservation easements and provide grants for land improvements and oak restoration efforts. The planning area contains a large stand of California Valley Oak Woodland and also contains scattered oak woodland stands which have been preserved throughout the city.

Existing Conditions

The planning area is located in the center of the Central Valley in the western part of Tulare County. Several rivers and creeks flowing from the Sierra Nevada Mountains have created a watershed landscape within the city. The city was historically dominated by oak forest and emergent and riparian wetlands. Today, much of the original forest is gone, but scattered valley oaks still exist in and around the city and along watercourses creating riparian corridors with other riparian trees (see valley oak woodland and valley oak riparian woodland in ***Figure 8-1***). Areas of pristine valley oak woodland and valley oak riparian woodland still exist. One approximately 3 miles east of the plan area is The Kaweah Oaks Preserve, this area supports special status species and sensitive biological communities. In addition, Tulare County is one of the most productive agricultural counties in the nation and these agricultural lands form a perimeter around the city.

The dominant land use within the planning area is developed urban, associated with annual grassland, valley oak woodland, wetlands (valley oak riparian woodland, freshwater marsh, seasonal

wetland, and vernal pool), open water, drainages, and agriculture. Of these, valley oak woodland, wetlands, open water, and drainages are considered sensitive natural communities. A description of each of these vegetative communities, with the associated plant and wildlife species, and potential of special-status species to occur within them is provided below.

Land Cover Types

Annual Grassland

Annual grassland is the most common "natural community" or undeveloped habitat type in the City of Visalia. In urban areas this habitat type is often called ruderal, or disturbed. This community is composed almost entirely of annual grasses and other herbaceous species. Plants typical of this community include several species of brome (*Bromus* spp.), wild oats (*Avena* spp.), filarees (*Erodium* spp.), schismus (*Schismus* spp.), fescues (*Festuca* spp.), and a variety of native wildflowers such as California poppy (*Eschscholtzia californica*) and phacelia (*Phacelia* spp.), along with other non-native species.

Annual grassland within the planning area provides suitable habitat for special-status plant species California jewel-flower and San Joaquin adobe sunburst. However the annual grassland within the planning area is dominated by mostly ruderal species, and the two special-status plants have a low potential to occur.

Annual grasslands are used by a large variety of wildlife species. Reptiles that occur in annual grassland habitats include western fence lizard (*Sceloperous occidentalis*), western skink (*Eumeces skiltonianus*), gopher snake (*Pituophis catenifer*), and western rattlesnake (*Crotalus viridis*). Mammals typically found in this habitat include California vole (*Microtus californicus*), western harvest mouse (*Reithrodontomys megalotis*), California ground squirrel (*Spermophilus beecheyi*), black-tailed jackrabbit (*Lepus californicus*), and coyote (*Canis latrans*). Savannah sparrow (*Passerculus sandwichensis*), western meadowlark (*Sturnella meglecta*), and horned lark (*Eremophila alpestris*) are common birds that breed in annual grasslands. Annual grasslands provide foraging habitat for red-tailed hawk and turkey vulture (Cathartes aura), whereas other species occupy annual grassland only when special habitat features such as cliffs, caves, ponds, or woody plants are available for breeding, resting, or as escape cover. In addition, many species that nest or roost in adjacent woodlands may forage in grasslands, including western bluebird (*Sialia mexicana*), western kingbird (*Tyrannus verticalis*), lark sparrow (*Chondestes grammacus*), and some species of bats. Amphibians such as western toad (*Bufo boreas*), Pacific tree frog (*Hyla regilla*), and California tiger salamander can be found in annual grassland habitat where there is suitable aquatic breeding habitat.

Annual grassland is a common habitat locally and regionally and is not considered by the DFG to be a sensitive natural community.

Valley Oak Woodland

Valley oak woodland can vary from savannas of annual grasslands with few trees to dense stands of trees. This woodland is dominated by valley oak but can have associates of western sycamore (*Platanus racemosa*), California black walnut (*Juglans californica* var. *hindsii*), interior live oak (Quercus wislizenii), box elder (Acer negundo var. californica), and blue oak (*Quercus douglasii*). Shrub species include California coffeeberry (*Rhamnus californica*), poison oak (*Toxicodendron diversilobum*), toyon (*Heteromeles arbutifolia*), and blackberry (Rubus sp.). Annual grasses and forbs dominate the herbaceous layer.

Oak woodlands are important habitats because of their high value to wildlife in the form of nesting sites, cover, and food. Cavities in oak trees are important nesting sites for many bird species. Birds associated with oak woodlands include acorn woodpeckers (*Melanerpes formicivorus*), Nuttall's

woodpeckers (*Picoides nuttallii*), western scrub jay (*Aphelocoma californica*), tree swallow (*Tachycineta bicolor*), oak titmouse (*Baeolophus inornatus*), western bluebird (*Sialia mexicana*), and yellow-rumped warbler (*Dendroica coronata*). Tree cavities also provide important roosting habitat for some species of bats. Oak woodlands provide nesting sites for raptors, such as red-tailed hawks, and great horned owls (*Bubo virginianus*). Mammals associated with woodlands include western gray squirrel (*Sciurus griseus*), bobcat (*Lynx rufus*), black-tailed deer (*Odocoileus hemionus*), and gray fox (*Urocyon cinereoagenteus*).

Oak woodland is a common habitat locally and regionally and is not considered by the DFG to be a sensitive natural community; however, native oak trees and woodland habitats are declining statewide because of development and land management practices. The City has made efforts to restore oak woodland by creating an urban forestry program that has planted over 5,000 trees. In addition, Visalia's Valley Oak Ordinance regulates pruning and removal of valley oak trees within the city limits. For these reasons, oak woodlands should be considered sensitive because they provide important habitat for local resident wildlife and are limited in extent compared with their historical distribution.

Valley Oak Riparian Woodland

The planning area has several major waterways which flow through the city. Valley oak riparian woodland occurs along the St. Johns River, Mill Creek, Packwood Creek, Cameron Creek, and along the numerous smaller perennial and ephemeral drainages (ditches). Valley oak riparian woodlands in the planning area are typically dominated by a mixture of trees and shrubs, including valley oak, California sycamore, Fremont cottonwood (*Populus fremontii*), Oregon ash (*Fraxinus latifolia*), wild grape (*Vitis californica*), and a variety of willows (Salix sp.).

Because the vegetation is diverse and well developed, riparian forest provides high-value habitat for wildlife, including several special-status species. Riparian forest habitat provides food, water, and migration and dispersal corridors, as well as escape, nesting, and thermal cover for many wildlife species. Invertebrates, amphibians, and aquatic reptiles live in aquatic and adjacent upland habitats. Raptors, such as red-tailed hawks, Cooper's hawk (Accipiter cooperi), and red-shouldered hawks (*Buteo lineatus*), great blue herons (*Ardea herodias*), black-crowned night herons (*Nycticorax nycticoraz*), great egrets (*Ardea alba*), belted kingfishers (*Ceryle alcyon*) and many other birds species nest in Valley oak riparian woodland. Various songbirds use the shrub canopy, and cavity-nesting birds, such as Nuttall's woodpecker, oak titmouse, and American kestrels, occupy dying trees and snags. Several mammals, including raccoons (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and striped skunks (*Mephitis mephitis*) are common in riparian habitats.

Valley oak riparian habitats are considered sensitive natural communities by the DFG and should be given special consideration in the planning area because they provide several important ecological functions, including streambank stabilization, water quality maintenance, and essential habitat for wildlife and fisheries resources.

Wetlands

Wetlands are considered sensitive natural communities by several resource agencies and should be given special consideration in the planning area because they provide a variety of important ecological functions and essential habitat for wildlife resources. Natural wetland habitats are steadily declining compared to their historical distribution, as a result of land management practices and development activities. The USACE, the DFG, and the USFWS have policies and regulations that protect wetland habitats.

Three main categories of wetlands occur within the planning area: freshwater marsh, seasonal wetland, and vernal pool. These wetland types are described below.

Freshwater Marsh

Freshwater marsh occurs along the margins of drainages and open water habitats in the planning area. Some agricultural areas within the planning area also support patches of freshwater marsh. Characteristic vegetation within freshwater marsh includes cattails (Typha sp.), rushes (*Juncus* sp.), and sedges (*Carex* sp.).

Freshwater marsh is among the most productive wildlife habitats in the state. Vegetation associated with freshwater marsh provides foraging, nesting, and refuge habitat for numerous wildlife species that also occur in the adjacent open water. Common wildlife that is expected to occur in freshwater marsh habitats within the planning area include Pacific tree frog, bull frog (*Rana catesbeiana*), common garter snake (*Thamnophis sirtalis*), great blue heron, great egret, , red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), and marsh wren (*Cistothorus palustris*), and many species of waterfowl.

Seasonal Wetland

Seasonal wetlands typically occur in topographically low-lying areas along the edges of freshwater wetlands and along seasonal drainages. The primary distinction between these two types of wetlands is the length of time each is inundated with water. Freshwater marsh wetlands typically retain water for extended periods into the growing season, while seasonal wetlands usually flood or are saturated for short periods and do not remain inundated for very long into the growing season. Dominant species found in seasonal wetlands include Italian ryegrass (*Lolium multiflorum*), pale spikerush (*Eleocharis macrostachya*), bird's-foot trefoil (*Lotus corniculatus*), Baltic rush (*Juncus balticus*), and curly dock (*Rumex crispus*).

Seasonal wetlands provide habitat for many aquatic invertebrates whose eggs are able to survive the dry period and then hatch shortly after the wetlands are inundated. Seasonal wetlands also provide suitable aquatic breeding habitat for California tiger salamander, Pacific tree frog, western toad, and western spadefoot as long as they remain inundated long enough for the larvae to metamorphose. Many species of birds, including ducks and songbirds utilize seasonal wetlands for foraging habitat. This shortened inundation period precludes the establishment of non-native bullfrogs and fish.

Vernal Pool

Vernal pools are depressions in the landscape that pond water intermittently during the rainy season and are completely dry during late spring and summer. Vernal pools pond because they contain an impervious soil layer that prevents water from infiltrating into the lower soil layers. Because of their unique hydrologic regime, they support a highly specialized flora adapted to prolonged inundation and subsequent dry periods. Vernal pools were historically widespread throughout the region, but their extent is now limited due to development and agricultural conversion over the last 150 years.

One vernal pool is known to occur in the far western portion of the planning area. It is located on a parcel at the corner of Goshen Ave and RD 80, and is currently zoned as Heavy Industry on the City of Visalia General Plan/ Land Use and Circulation Element (dated 03-15-10). This vernal pool occurs within annual grassland and was reported as having native topography intact but vegetation was disked[11]. Typical plants within disturbed vernal pools in the region include pale spike rush, annual rabbitsfoot grass (*Polypogon monspeliensis*), coyote thistle (*Eryngium* sp.), and navarretia (*Navarretia* sp).

Vernal pools provide habitat for many aquatic invertebrates, including federally listed vernal pool fairy shrimp and vernal pool tadpole shrimp, that have evolved for their eggs to survive desiccation

[11] California Natural Diversity Database, 2010.

when the pools dry in the spring and remain dry until the next rains, generally in late October or November. Vernal pools also provide aquatic breeding habitat for Pacific tree frog and western spadefoot.

Open Water

Open water communities in the planning area include agricultural ponds (lacustrine) and areas within the high water mark of perennial and ephemeral drainages (riverine). These communities are generally unvegetated. Most of these areas are regulated under the jurisdiction of the USACE and the RWQCB.

Lacustrine habitats provide aquatic and breeding habitat for amphibians such as Pacific tree frog and western toad. Reptile species that utilize aquatic habitats include common garter snake and western pond turtle (*Actinemys marmorata*). Introduced species that utilize aquatic habitats include bullfrogs, red-eared slider (*Trachemys scripta*), and many species of fish.

Drainages

Perennial and ephemeral drainages occur throughout the planning area originating from the Sierra Nevada Mountain Range from the east and flowing west into the valley. These drainages typically are associated with riparian habitat described above and may support areas of freshwater marsh. Primary drainages within the planning area include the St. Johns River, Mill Creek, Packwood Creek, and Cameron Creek. Smaller drainages within the planning area include the Modoc, Persian, Mill Creek, Evans, Oakes, Tulare, and Watson Ditches.

Open water and riverine habitat provide habitat for a variety of wildlife. Western pond turtles and red-eared sliders utilize riverine habitats. Birds such as great blue herons, great egrets, and belted kingfishers (*Ceryle alcyon*) forage in these communities, primarily along the water's edge. Many species of insectivorous birds (e.g., swallows, swifts, and flycatchers) catch their prey over open water. River otter, muskrat, beaver, and raccoons are common mammals that can be found in and along riverine habitat include.

Drainages are considered other waters of the United States by the USACE and are regulated by the USAC, the DFG, and the USFWS.

Agricultural Land

Agriculture forms the backbone of Visalia and surrounding land. An abundance of crops are exported from this area including grains, fruits and nuts, vegetables, wine grapes, and most notably cotton and milk. Areas used for agriculture within the planning area are most prevalent in the southwestern portion.

Agricultural lands are established on fertile soils that historically supported abundant wildlife. The quality of habitat for wildlife is greatly diminished when the land is converted to agricultural uses and is intensively managed. Many species of rodents and birds have adapted to agricultural lands, but they are often controlled by fencing, trapping, and poisoning to prevent excessive crop losses. However, depending on the crop pattern and the proximity to native habitats, row crops and rice fields can provide relatively high-value habitat for wildlife, particularly as foraging habitat. Raptor species use row- and grain-crop agricultural lands for foraging because several species of common rodents are found in agricultural fields. Rice fields and fallow agricultural fields provide important foraging and resting habitat for migrating and wintering waterfowl and shorebirds. Wildlife species associated with agricultural lands include mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), various raptor species, egrets, and many species of rodents.

For a detailed description of the agricultural lands within the planning area please refer to Section 8.3.

Urban Areas

Biological communities in these areas are relatively limited and support a predominance of horticultural plant species rather than native species. However, the City has preserved many valley oaks with urban areas.

Urban areas generally have a lower value for wildlife because of human disturbance and a lack of vegetation. Wildlife species that use these areas are typically adapted to human disturbance. However, more densely vegetated "urban forests" can provide habitat for songbirds and some raptor species. Wildlife species associated with urban residential and suburban areas include western scrub jay, northern mockingbird (*Mimus polyglottos*), yellow-billed magpie (*Pica nuttalli*), house finch (*Carpodacus mexicanus*), rock dove (*Columba livia*), fox squirrel (*Sciurus niger*), raccoon, Virginia opossum, and striped skunk.

Special-Status Species

Special-status species are plants and animals that are legally protected under state and federal Endangered Species Acts or other regulations, and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status plants and animals are species in the following categories:

- Species listed or proposed for listing as threatened or endangered under the federal Endangered Species Act, and various notices in the Federal Register [proposed species];
- Species that are candidates for possible future listing as threatened or endangered under the federal Endangered Species Act;
- Species listed or proposed for listing by the State of California as threatened or endangered under the California Endangered species Act;
- Species that meet the definitions of rare or endangered under CEQA;
- Plants listed as rare under the California Native Plant Protection Act;
- Plants considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California";
- Plants listed by CNPS as plants about which more information is needed to determine their status and plants of limited distribution, which may be included as special-status species on the basis of local significance or recent biological information;
- Animal species of special concern to the California Department of Fish and Game; and
- Animals fully protected in California (California Fish and Game Code, Section 3511 [birds], 4700 [mammals], and 5050 [amphibians and reptiles]).

Special-Status Plant Species

Table 8-3 is a current list of special-status plant species that have a moderate to high potential to occur in or near the planning area, based on a review of CNPS, CNDDB, and USFWS sources.

These species should be addressed during environmental review of projects permitted under the proposed General Plan Update.

Table 8-3: Special-Status Plant Species with the Potential to Occur within the Planning Area

Scientific and Common Name	*Federal Status*	*State Status*	*CNPS Status*	*Habitat*	*Potential to Occur in General Plan Area*
Atriplex cordulata Heartscale	—	—	1B.2	Saline or alkaline area in chenopod scrub, meadows and seeps, sandy soils in valley and foothill grassland; below 375 meters	Moderate. Planning area does not provide suitable microhabitat. However, known occurrence is one mile away from the planning area boundary and is presumed extant.
Atriplex depressa Brittlescale	—	—	1B.2	Alkaline clay soils in chenopod scrub, playas, valley and foothill grasslands; below 320 meters	Moderate. Not recorded on CNDDB as occurring within area, but species is closely related to A. minuscula which has an occurrence approximately one mile away from the planning area boundary.
Atriplex minuscula Lesser saltscale	—	—	1B.1	Sandy alkaline soils in chenopod scrub, playas, valley and foothill grassland; 15-200 meters	Moderate. Known occurrence is within the planning area. However this occurrence is dated from1881and is on private land.
Imperata brevifolia California satintail	—	—	2.1	Mesic sites in chaparral, coastal scrub, Mojave desert scrub, meadows often alkali, riparian scrub; 0-500 meters	Moderate. Known occurrence is within the planning area. However, this occurrence is dated from1895 and exact location is unknown.

Status Definitions:
U.S. Fish and Wildlife Service
Federal
E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
– = No status definition.
State
E = listed as endangered under the California Endangered Species Act.
R = listed as rare under the California Native Plant Protection Act and California Endangered Species Act.
– = No status definition.
California Native Plant Society (CNPS)
1A= List 1A species: presumed extinct in California
1B= List 1B species: rare, threatened, or endangered in California and elsewhere
2 = List 2 species: rare, threatened, or endangered in California, but more common elsewhere
3 = List 3 species: plants about which we need more information—a review list
4 = List 4 species: plants of limited distribution—a watch list
CNPS Code Extensions:
0.1 = seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat
0.2 = fairly endangered in California (20- 80% of occurrences threatened)
0.3 = not very endangered in California (<20% of occurrences threatened or no current threats known)
Definitions of levels of occurrence likelihood:

High: Known occurrence of plant within 5 miles of the project from Natural Diversity Data Base, California Native Plant Society Inventory, or other documents. Suitable habitat and microhabitat conditions present

Moderate: Known occurrence of plant in Tulare County, but more than 5 miles from the planning area, from Natural Diversity Data Base, California Native Plant Society Inventory, or other documents. Suitable habitat conditions present, but suitable microhabitat conditions unlikely to be present or of poor quality.

Low: Plant not known to occur in the region from the Natural Diversity Data Base, California Native Plant Society Inventory, or other documents in the vicinity of the project, or plant is known only historically from the region. Habitat conditions of poor quality.

None: Plant not known to occur in the region from the Natural Diversity Data Base, California Native Plant Society Inventory, or other documents in the vicinity of the project. Suitable habitat not present in any condition.

Source: California Natural Diversity Data Base, 2010; California Native Plant Society, 2010

Special-Status Wildlife Species

Table 8-4 is a current list of special-status wildlife species that were identified by a review of the CNDDB and a list obtained from the USFWS that have been known to occur or have a potential to occur within the Plan Area. These species should be addressed during environmental review of projects permitted under the proposed General Plan Update.

Table 8-4: Special-Status Wildlife Species with the Potential to Occur within the Planning Area

Scientific and Common Name	*Federal Status*	*State Status*	*Geographic Distribution and Habitat requirements*	*Potential to Occur within the Planning Area*
Invertebrates				
Branchinecta lynchi VERNAL POOL FAIRY SHRIMP	FT	--	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County. Found in vernal pools, particularly small, clear-water sandstone depression pools and grassy swale, earth slump, or basalt-flow depression pools.	Known occurrence in the planning area on a parcel of undeveloped parcel NE of Rd 76 and W. Goshen Ave. near town of Goshen. Potential to occur in parcels containing vernal pools and in ponded areas in the planning area.

Table 8-4: Special-Status Wildlife Species with the Potential to Occur within the Planning Area

Scientific and Common Name	*Federal Status*	*State Status*	*Geographic Distribution and Habitat requirements*	*Potential to Occur within the Planning Area*
Amphibians				
Spea hammondii WESTERN SPADEFOOT	--	CSC	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California. Grassland and valley-foothill hardwood woodlands, vernal pools or seasonal wetlands are essential for egg laying.	Known occurrence in the planning area on a parcel of undeveloped parcel NE of Rd 76 and W. Goshen Ave. near town of Goshen. There is potential for this species to occur in parcels containing vernal pools and in ponded areas in the planning area.
Reptiles				
Actinemys marmorata WESTERN POND TURTLE	--	CSC	Occurs from the Oregon border of Del Norte and Siskiyou Counties south along coast to San Francisco Bay, inland through Sacramento Valley, and on western slope of Sierra Nevada. Ponds, marshes, rivers, streams, irrigation ditches, vernal pools. Needs basking sites such as partially submerged logs or rocks, and suitable upland habit (sandy banks or grassy open fields) for egg laying.	One occurrence in the planning area from the 1870s. No recent occurrences in Plan area. There is potential for this species to occur in streams and ponded areas in the planning area.
Phrynosoma coronatum frontale COAST (CALIFORNIA) HORNED LIZARD	--	CSC	Sacramento Valley, including foothills, south to southern California. Coast Ranges south of Sonoma County. Below 4,000 feet in northern California. Sandy loam areas and on alkali flats. Dietary specialists dependent on ants, as well as beetles and other seasonally abundant insects. Forage on the ground in open areas, usually between shrubs and often near an ant nest. Utilize small mammal burrows or burrow under surface objects during periods of extended inactivity or hibernation.	No known occurrences within planning area. There is potential for this species to occur in annual grassland habitats within the planning area.

Table 8-4: Special-Status Wildlife Species with the Potential to Occur within the Planning Area

Scientific and Common Name	*Federal Status*	*State Status*	*Geographic Distribution and Habitat requirements*	*Potential to Occur within the Planning Area*
Birds				
Agelaius tricolor TRICOLORED BLACKBIRD	--	CSC	Permanent resident in the Central Valley from Butte County to Kern County. Breeds at scattered coastal locations from Marin County south to San Diego County and at scattered locations in Lake, Sonoma, and Solano Counties. Almost endemic to California; permanent resident and migrant. Highly colonial species, most numerous in Central Valley and vicinity. Nests next to open water typically in freshwater marsh habitat where there is extensive emergent or riparian vegetation. Increasing percentage of breeding colonies has been reported in grain fields. Forages in grasslands, wetland habitats, and some agricultural areas.	No known occurrences within planning area. There is potential for this species to nest in ponded areas and parcels containing grain fields within the planning area.
Ammodramus savannarum GRASSHOPPER SPARROW	--	CSC	Summer resident and breeder in foothills and lowlands west of the Cascade-Sierra Nevada crest. Occurs in California primarily as a summer (breeding) resident. At least partly migratory. Ecological requirements vary substantially from region to region within its wide range. In general, prefer short to middle-height, moderately open grasslands with scattered shrubs. Ground nester.	No known occurrences within planning area. There is potential for this species to occur in areas containing annual grassland habitat.
Athene cunicularia WESTERN BURROWING OWL	--	CSC	Lowlands throughout California, including Central Valley, northeastern plateau, southeastern deserts, and coastal areas. Year round resident throughout much of California range. Migrants from other parts of western North America may augment resident populations in winter. Found in open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Uses small burrows for nesting and roosting.	No known occurrences within planning area. There is potential for this species to nest within the planning area where ground squirrel burrows and other man-made burrows are present.

Table 8-4: Special-Status Wildlife Species with the Potential to Occur within the Planning Area

Scientific and Common Name	*Federal Status*	*State Status*	*Geographic Distribution and Habitat requirements*	*Potential to Occur within the Planning Area*
Buteo swainsoni SWAINSON'S HAWK	--	ST	Lower Sacramento and San Joaquin Valleys, Klamath Basin, and Butte Valley. Highest nesting densities occur near Davis and Woodland in Yolo County. Breeds in California, few residents remain in winter. Found in open country such as grassland, shrubland, and agricultural areas. Nests in riparian areas and oak woodlands as well as isolated and roadside trees close to grassland or agricultural foraging habitat.	No known occurrences within planning area. There is potential for this species to nest in large trees in the Plan area and forage in grassland and agricultural fields within the planning area.
Cirus cyaneus NORTHERN HARRIER	--	CSC	Occurs throughout lowland California. Has been recorded in fall at high elevations. Occurs year round within breeding range in California and may potentially winter in areas statewide. Breeds and forages in variety of open (treeless) habitats such as marshes, meadows, pastures, prairies, weedy borders of lakes, rivers, and streams, grasslands, some croplands, sagebrush flats, and desert sinks. Constructs nests on ground in open field or meadow in shrubby vegetation, usually near wet areas.	No known occurrences within planning area. There is potential for this species to nest in grasslands and wetlands within the planning area and forage in grassland and agricultural fields within the Plan area.
Elanus leucurus WHITE TAILED KITE	--	FP	Lowland areas west of Sierra Nevada from head of Sacramento Valley south, including coastal valleys and foothills to western San Diego County at Mexico border. Found year round within California range in grasslands, agricultural fields, oak woodlands, savannah, and riparian habitats in rural and urban areas. They are often found along tree-lined river valleys with adjacent open areas. Nests in trees.	No known occurrences within planning area. There is potential for this species to nest in large trees in the Plan area and forage in grassland and agricultural fields within the planning area.

Table 8-4: Special-Status Wildlife Species with the Potential to Occur within the Planning Area

Scientific and Common Name	*Federal Status*	*State Status*	*Geographic Distribution and Habitat requirements*	*Potential to Occur within the Planning Area*
Lanius ludovicianus LOGGERHEAD SHRIKE	--	CSC	Resident and winter visitor in lowlands and foothills throughout California. Rare on coastal slope north of Mendocino County, occurring only in winter. Year round throughout most of California range; some breeding populations may be migratory. Wintering individuals augment resident populations and occupy areas where none breed. Breeds and forages in open habitats interspersed with shrubs and small trees, including disturbed habitats. Nests placed in trees.	No known occurrences within planning area. There is potential for this species to occur in grassland habitats in the planning area.
Mammals				
Antrozous pallidus PALLID BAT	--	CSC	Occurs throughout California except the high Sierra Nevada from Shasta County to Kern County and the northwest coast; primarily at lower and mid-elevations. Occurs throughout California; species forages in open areas of grasslands, shrublands, woodlands, and forests from sea level up through 6,560 feet; roosts in caves, rock crevices, mines, hollow trees, buildings, and bridges.	No known occurrences within planning area. There is potential for this species to occur in riparian woodland habitat in the planning area.
Eumops perotis californicus WESTERN MASTIFF BAT	--	CSC	Occurs in southeastern San Joaquin Valley and Coastal Range south of Monterey County and throughout southern California. Roosts in crevices in cliff faces, high buildings, and tunnels; forages in arid, semi arid habitat-coniferous and deciduous woodlands, coastal scrub, grasslands, and chaparral.	Known occurrence along Packwood Creek in southern portion of planning area. There is potential for this species to occur in riparian woodland habitat in the planning area.
Taxidea taxus AMERICAN BADGER	--	CSC	Found throughout most of California except in the northern North Coast area. Suitable habitat is characterized by herbaceous, shrub, and open stages of most habitats with dry, friable soils. Occurs throughout California in grasslands, savannas, and mountain meadows near timberline; require friable soils, and relatively open, uncultivated ground; requires suitable prey base of burrowing rodents such as gophers, ground squirrels, marmots, and kangaroo rats.	No known occurrences within planning area. There is potential for this species to occur in grassland habitats in the planning area.

Table 8-4: Special-Status Wildlife Species with the Potential to Occur within the Planning Area

Scientific and Common Name	*Federal Status*	*State Status*	*Geographic Distribution and Habitat requirements*	*Potential to Occur within the Planning Area*
Vulpes macrotis mutica SAN JOAQUIN KIT FOX	FE	ST	Principally occurs in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County. Occurs in the San Joaquin Valley in annual grassland or grassy open stages with scattered shrubby vegetation; requires loose-textured sandy soils for burrowing; requires suitable prey base of small rodents, including kangaroo rats or California ground squirrels.	2 Known occurrences from the 1970's in planning area. Several occurrences, mainly from 1970s and 1980s but one from 2003 in areas surrounding planning area. There is potential for this species to occur in grassland habitats in the planning area.

Status definitions

Federal Status

FE = Listed as endangered under the Federal Endangered Species Act.

FT = Listed as threatened under the Federal Endangered Species Act.

Delisted = Species that has been removed from listing under the Federal Endangered Species Act.

State Status

SE = Listed as endangered under the California Endangered Species Act.

ST = Listed as threatened under the California Endangered Species Act.

CSC = California Species of Special Concern designated by the California Department of Fish and Game

FP = Fully Protected Species designated by the California Department of Fish and Game

Source: California Natural Diversity Database 2010 (Version 3.1.0, update February 28, 2010), U.S. Fish and Wildlife Service 2010 (Obtained from the U.S. fish and Wildlife Service, Sacramento Office website http://www.fws.gov/sacramento/ - accessed April 26, 2010

Summary

In summary, the biological resources within Visalia are centered on the areas of Oak Woodland and the riparian and wetland habitats associated with the waterways that flow through the planning area. Additionally, one parcel in the western portion of the planning area, near the town of Goshen, has historically contained a vernal pool which provided habitat for federally listed vernal pool fairy shrimp and western spadefoot (a species of special concern). Policies to protect and even enhance any remaining natural resources would be ecologically beneficial to the region and aesthetically beneficial to the city.

INSERT Figure 8-1 Biological Resources

Back of Figure 8-1

8.3 Agriculture

Farm land is the most prominent land use in the planning area, and agriculture has been and continues to be an important contributor to Visalia's economy and character. The region contains rich soils, available water, good geography, and climatic conditions that allow farms to be highly productive.

As of 2007, Tulare County was ranked second in the U.S. in terms of its total value of agricultural production, closely behind Fresno County.[12] The 2008 Tulare County Annual Crop and Livestock Report finds a total value of agricultural products of just over $5 billion in 2008. The County's agricultural economy is diverse, with very significant contributions from fruit and nut crops, field crops, livestock and poultry, and livestock and poultry products. Milk was the County's top agricultural product at $1.786 billion, three times higher than the next highest product, oranges ($593 million). Cattle and calves ($502 million), grapes ($488 million), alfalfa ($216 million) and corn ($214 million) rounded out the top six.[13] The County had 783,000 acres in pasture and range; 172,600 acres in corn; 121,000 acres in small-grain silage; and 102,000 acres in alfalfa and hay. Important fruit and nut crops included oranges (93,800 acres), grapes (58,400 acres), and almonds (24,800 acres).

Farmland Monitoring and Mapping Program

The California Department of Conservation uses the Important Farmlands Inventory to classify farmland into several categories based on soil type and current land use, as follows.

Prime Farmland has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when managed according to current farming methods. Prime Farmland must have been used for the production of crops within the last three years.

Farmland of Statewide Importance is land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production. It must have been used for crop production within the last three years.

Unique Farmland does not meet the criteria for Prime Farmland or Farmland of Statewide Importance, but is currently used for the production of specific high-value crops, such as oranges, olives, avocados, rice, grapes, and cut flowers.

Farmland of Local Importance is land other than Prime Farmland, Farmland of Statewide Importance, or Unique Farmland, which may be important to the local economy due to its productivity.

Grazing Land has existing vegetation, whether grown naturally or through management, suitable for livestock grazing.

Other Land. Land used for confined animal agriculture; non-agricultural land with natural vegetation; land with rural commercial or residential uses; urban land; and vacant or disturbed land.

[12] US Census Bureau, 2007 Census of Agriculture.
[13] Tulare County Agricultural Commissioner/Sealer, *Tulare County Annual Crop and Livestock Report,* 2008.

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INSERT Figure 8-2 Farmland

Back of Figure 8-2

Farmland in the Planning Area

As shown on ***Figure 8-2***, the majority of land encircling the urbanized area of Visalia is categorized as Prime Farmland. To the far northwest there is a band of land classified as Farmland of Statewide Importance. Many parcels immediately adjacent to urbanized Visalia are included in the Farmland of Local Importance category. Parcels used for animal raising or feeding are scattered in the farmland west of the city, while pockets of rural residential land are dispersed to the east.

Farmland Conservation

California Land Conservation Act of 1965 (Williamson Act)

The California Land Conservation Act of 1965, also known as the Williamson Act, aims to discourage the unnecessary conversion of productive agricultural land to other land uses. Farmers with land under Williamson Act contracts agree not to develop their land for 10 years, and in exchange, they are taxed according to the land's farm income-producing value, as opposed to its "highest and best use." Contracts are automatically renewed every year; cancellation requires "extraordinary circumstances," payment of a penalty of 12.5 percent of the land's fair market value, and a public hearing. Local governments receive an annual subvention of foregone property taxes from the State, through the Open Space Subvention Act of 1971.

Farmland Security Zones

In August 1998, the Williamson Act's farmland security zone (FSZ) provisions were enacted. This sub-program, dubbed "Super Williamson Act," allows agricultural land owners to enter into contracts with a specific county for 20-year increments instead of 10, and entitled to an additional 35 percent tax benefit over and above the standard Williamson Act contract.

Senate Bill 1835 and the Cortese-Knox Local Government Reorganization Act

Regarding Williamson Act contracts, Senate Bill 1835 (from 1998) requires the appropriate Local Agency Formation Commission (LAFCO) to determine whether a particular city is required to adhere to the rights, duties, and powers of the county under the contract or whether the city may exercise an option not to adhere to the rights, duties, and powers of the county. The determination would be required pursuant to any proposal by a city that would result in the annexation of Williamson Act contracted land.

Senate Bill 2227

Senate Bill 2227 added new requirements to the Cortese-Knox Local Governmental Reorganization Act regarding any proposed annexation of Williamson Act contracted land. If the proposal would result in the annexation of land that is subject to Williamson Act contracts, then the petition shall state whether the City shall adhere to the contract or whether the City intends to exercise its option not to adhere to the contract.

Williamson Act Land in the Planning Area

Currently, 511 parcels in the planning area, totaling 25,724 acres (65 percent of the total agricultural acreage in the planning area) were under Williamson Act contracts. Of these, 65 parcels, totaling 2,417 acres, are in non-renewal, meaning that at the end of their 10-year period, they will not renew their contracts. Figure 8-2 indicates which parcels are under contract and which are not renewing.

Parcels under Williamson Act contracts are fairly well distributed throughout the non-urbanized sections of the planning area, with the exception of the Southeast Area Specific Plan location and north of the St. Johns River, where parcels under contract are smaller and more scattered. The majority of parcels under contract are on Prime Farmland, except for those in the northwest corner of the planning area, where the land is classified as Statewide Importance. Almost half of those that are

under contract are not renewing, and this area has the largest cluster of non-renewal parcels. Most of the parcels whose contracts are not renewing are located just north of the city limits, near the Highway 99/198 interchange, in the West 198 Corridor area, and adjacent to the city boundary on the southeast. The non-renewal status is likely due to landowners' anticipation of forthcoming residential and commercial development in these areas.

8.4 Geological Hazards

The planning area is in a basin bounded by the Sierra Nevada foothills and mountains to the east and the Coast Ranges to the west, and filled with deep layers of sediment from the Sierra Nevada. The St. Johns River flows through the northeastern portion of the planning area, along with smaller streams and canals; these form alluvial fans. The area is basically flat, lying at an elevation of 330 feet above sea level.

Soils

Surface soils exhibit various characteristics dependent on location, slope, parent rock, climate, and drainage. According to soil survey information obtained from the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), surface soils in the planning area range from fine sandy loam and loam to alkali soils. The most prevalent soils in the planning area are Nord fine sandy loam (19,201 acres); Grangeville sandy loam, drained (15,709 acres); Tagus loam (12,495 acres); and Akers-Akers, saline-sodic, complex (8,094 acres). Some soils have the potential to present moderate geologic hazards to building, due to their susceptibility to erosion or to expansion and contraction.

Soil Erosion

A soil's "K factor" indicates its inherent susceptibility to erosion by water, without taking into consideration slope or groundcover factors. Values of K range from 0.05 to 0.69; the higher the value, the more susceptible the soil is to erosion by water. In general, soil containing high amounts of silt can be easily eroded, while sandy soils are less susceptible. Erosion is most likely to occur on sloped areas with exposed soil, especially where unnatural slopes are created by cut-and-fill activities. Soil erosion rates can be higher during the construction phase. Excessive soil erosion can eventually damage building foundations and roadways. Most surface soils in the planning area have moderate potential for erosion by water; in some areas, the erosion potential is considered low to moderate, depending on soil depth.

Expansive Soils

Expansive soils create a shrink-swell hazard. Structural damage may result over a long period of time, usually from inadequate soils and foundation engineering or the placement of structures directly on expansive soils. Expansive soils are largely comprised of clays, which expand in volume when water is absorbed and shrink as the soil dries. Four of the planning area's soil types are considered to have a moderate "shrink-swell" potential. These soils underlie about 2,480 acres, and are located on the western edge of the planning area near the Highway 99/198 interchange, north of the St. Johns River, and in the northwest near the intersection of Road 80 and Avenue 328.

INSERT Figure 8-3 Soil Erosion and Shrink-Swell Potential

Back of Figure 8-3

Water Infiltration

Soils vary in terms of how quickly they carry water downward from the surface. A number of features of soils influence their water infiltration rate, including texture, crust, compaction, aggregation, water content, and amount of organic matter. Sandy surface soil normally has a higher infiltration rate than surface soil with high clay content. Soils intermixed with plant material and soils characterized by high porosity tend to have greater infiltration, while soils with crusts or compacted zones near the surface tend to have low infiltration rates.

Development on poorly-drained soils (soils with high water infiltration rates) is likely to require a greater degree of stormwater management. Drainage may be a more important consideration in site planning, and more land may need to be set aside for drainage facilities.

Most soils in the planning area are considered well-drained or moderately well-drained. The Grangeville sandy loam, which underlies about 26 percent of the planning area, especially along the St. Johns River and Packwood and Cameron creeks, is classified as "somewhat poorly drained."

Table 8-5 summarizes the planning area's soils by their susceptibility to erosion, expansion, and water infiltration. ***Figure 8-3*** demonstrates the distribution of these soils geographically.

Seismic Hazards

The planning area is in a seismically stable region of the State. While the southern San Joaquin Valley contains some small faults, the closest of these are 30 miles away, and none are known to be active. Visalia's current Seismic Safety Element determines that the primary seismic risk in the area is the potential for ground schaking caused by earthquakes along the San Andreas fault to the west or the Owens Valley fault to the east. The Element identifies 16 seismic zones, distinguished by their relative risk of ground shaking caused by seismic activity. Together with much of the eastern side of the Valley, Visalia is located in a zone characterized by a relatively thin layer of sedimentary rock over the granitic basement, which could result in amplified ground shaking. Because the zone is a considerable distance from major faults, ground shaking hazards are considered low.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act, passed in 1972, intends to prevent the construction of buildings meant for human occupation on the surface traces of active faults. The planning area is not located in an Alquist-Priolo Earthquake Fault Zone.

Seismic Hazards Mapping Act

The California Division of Mines and Geology (DMG) has established a program known as the Seismic Hazards Mapping Act of 1990 to map liquefaction and landslide potential in various parts of the state. The DMG provides, in addition to maps, policies and criteria regarding the responsibilities of cities, counties, and State agencies pursuant to development in designated seismic hazard areas. Tulare County has not yet been mapped for seismic hazards, and given its flat topography and distance from active faults, Visalia does not have risk of landslides.

Current General Plan Seismic Safety Element

The Visalia General Plan incorporates the Seismic Safety Element completed in 1974 by the Five-County Seismic Safety Committee, with participation from Tulare Council of Governments. As noted above, the Element determines that ground shaking is the main potential hazard in the southern Central Valley, and risk of ground shaking in the Visalia area is low. The Element recommends a number of policies, including the creation of a public relations and education program to build awareness; development of an Earthquake Disaster Plan; consideration of seismic hazards in

the environmental impact assessment process; and adoption and enforcement of the Uniform Building Code.

8.5 Greenhouse Gases

Background

Global Climate Change

Global climate change (GCC) is currently one of the most important and widely debated scientific, economic, and political issues in the United States. GCC refers to a change in the average climate of the earth that may be measured by wind patterns, storms, precipitation, and temperature. The baseline by which these changes are measured originates in historical records identifying temperature changes that have occurred in the distant past, such as during previous ice ages. The rate of temperature change has typically been incremental, with warming and cooling occurring over the course of thousands of years. In the past 10,000 years the earth has experienced incremental warming as glaciers retreated across the globe. However, scientists have observed an unprecedented increase in the rate of warming over the past 150 years, roughly coinciding with the global industrial revolution.

Although GCC is now widely accepted as a concept, the extent and speed of change to be expected, and the exact contribution from human sources, remains in debate. Nonetheless, the world's leading climate scientists, the Intergovernmental Panel on Climate Change (IPCC), have reached consensus that global climate change is "very likely" caused by humans, and that hotter temperatures and rising sea levels will continue for centuries no matter how much humans control their future emissions. In particular, human influences have:

- *very likely* contributed to sea level rise and increased storm surge during the latter half of the 20th century;
- *likely* contributed to changes in wind patterns, affecting extra-tropical storm tracks and temperature patterns;
- *likely* increased temperatures of extreme hot nights, cold nights and cold days;
- *more likely than not* increased risk of heat waves, area affected by drought since the 1970s, and frequency of heavy precipitation events.[14]

The IPCC predicts that global mean temperature increase from 1990-2100 could range from 2.0 to 11.5 degrees Fahrenheit, with the most likely scenario between 3.2 and 7.1 degrees. The same report projects a sea level rise of 7 to 23 inches by the end of the century, with a greater rise possible depending on the rate of polar ice sheet melting.

According to the California Climate Action Team (CCAT), accelerating GCC has the potential to cause a number of adverse impacts in California, including but not limited to: a shrinking Sierra snowpack that would threaten the state's water supply; public health threats caused by higher temperatures and more smog; damage to agriculture and forests due to reduced water storage capacity, rising temperatures, increasing salt water intrusion, flooding, and pest infestations; critical habitat modification and destruction; eroding coastlines; increased wildfire risk; and increased electricity demand.[15] These impacts have and will continue to have considerable costs associated with them.

[14] Intergovernmental Panel on Climate Change, November 2007.
[15] California Climate Action Team, April 2006.

Greenhouse Gases

Gases that that trap heat in the Earth's atmosphere are called greenhouse gases (GHGs). These gases play a critical role in determining the Earth's surface temperature. Part of the solar radiation that enters Earth's atmosphere from space is absorbed by the Earth's surface. The Earth reflects this radiation back toward space, but GHGs absorb some of the radiation. As a result, radiation that otherwise would have escaped back into space is retained, resulting in a warming of the atmosphere. Without natural GHGs, the Earth's surface would be about 61°F cooler.[16] This phenomenon is known as the greenhouse effect. However, many scientists believe that emissions from human activities—such as electricity generation, vehicle emissions, and even farming and forestry practices—have elevated the concentration of GHGs in the atmosphere beyond naturally-occurring concentrations, contributing to the larger process of global climate change. The six primary GHGs are:

- **Carbon dioxide (CO_2),** emitted as a result of fossil fuel combustion, with contributions from cement manufacture;
- **Methane (CH_4),** produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion;
- **Nitrous oxide (N_2O),** typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning;
- **Hydrofluorocarbons (HFCs),** primarily used as refrigerants;
- **Perfluorocarbons (PFCs),** originally introduced as alternatives to ozone depleting substances and typically emitted as by-products of industrial and manufacturing processes; and
- **Sulfur hexafluoride (SF_6),** primarily used in electrical transmission and distribution systems.

Though there are other emissions, such as diesel particulate matter and water vapor that can contribute to global warming, these six are identified explicitly in California legislation and litigation as being of primary concern. GHGs have varying potentials to trap heat in the atmosphere, known as global warming potential (GWP), and atmospheric lifetimes. GWP ranges from 1 (carbon dioxide) to 23,900 (sulfur hexafluoride). GHG emissions with a higher GWP have a greater global warming effect on a molecule-by-molecule basis. For example, one ton of CH_4 has the same contribution to the greenhouse effect as approximately 21 tons of CO_2.[17] GWP is alternatively described as "carbon dioxide equivalents", or CO_2e. The parameter "atmospheric lifetime" describes how long it takes to restore the system to equilibrium following an increase in the concentration of a GHG in the atmosphere. Atmospheric lifetimes of GHGs range from tens to thousands of years.

Existing Conditions

GHG Emissions Inventories

The first step in managing greenhouse gas emissions is to establish an inventory of those emissions. Table 8-6 shows global greenhouse gas emissions in metric tons (MT) of CO_2e generated worldwide, within the United States, within California, and within Visalia, with Visalia data coming from the

[16] California Climate Action Team, April 2006.
[17] California Climate Action Registry, 2008.

City's Draft Preliminary Climate Action Plan (CAP) dated May 2010. If California were considered a country of its own, it would be the 16th largest emitter in the world. Per capita emissions in California, however, are among the lowest in the U.S.

Table 8-6: Greenhouse Gas Emissions Inventories Comparison (2000)

Locations	*Emissions ($MTCO_2e$)*	*Population (Millions)*	*Average Per Capita Emissions ($MTCO_2e$)*
World	33,712,900,000	6,055	5.6
United States	7,033,000,000	281	25.0
California	458,450,000	33.9	13.5
Visalia Community (Preliminary CAP Inventory)	1,140,724	0.09	12.5
Visalia Municipal (Preliminary CAP Inventory)	17,412	na	0.19

Source: World emissions from World Resources Institute – Climate Analysis Indicators tool (2004); U.S. emissions from Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006, USEPA #430-R-08-005; California emissions from California Air Resources Board; Visalia emissions from Draft Preliminary Climate Action Plan (May 2010); U.S. Census.

At the state level in 2000, the transportation sector was the largest source of GHG emissions, accounting for 38 percent of all emissions. Electricity generation—both in-state production and imported electricity—accounted for 22 percent of the state's total GHG emissions. The remaining emissions sources include: industrial uses, 22 percent; residential and commercial uses, 10 percent; agriculture uses, 6 percent; and other sources, 3 percent.[18]

Visalia's Draft Preliminary CAP inventory of GHG emissions in 2000 indicates that emissions by sector are: commercial and industrial uses, 49 percent; transportation, 30 percent; residential uses, 20 percent; solid waste, 1 percent; and other uses (primarily propane consumption), less than 1 percent.[19] Emissions from gasoline in the transportation sector account for 18 percent of the City's total inventoried emissions. Within the commercial and industrial sector, refrigerants account for 43 percent of the total emissions inventoried[20]; electricity, 30 percent; natural gas, 24 percent; and propane, 2 percent. Commercial and industrial refrigerants account for 21 percent of the City's total GHG emissions. Within the residential sector, electricity accounts for 47 percent of the total emissions inventoried; natural gas, 43 percent; propane, 5 percent; and refrigerants, 5 percent.

The City's Draft Preliminary CAP shows a "business-as-usual" (BAU) emission forecast based on the annual average population growth rate from 2000 to 2020. This BAU forecast shows over 1.6 million $MTCO_2e$ in 2020, a 42 percent increase from 2000 levels. However, the CAP also accounts for emissions reductions that can be expected from existing statewide initiatives, such as the Renewables Portfolio Standard, vehicle fuel efficiency requirements, low carbon fuel standard, and other new legislation. Accounting for these State efforts, Visalia community emissions are expected to grow by only 20 percent between 2000 and 2020, to about 1.4 million $MTCO_2e$.

[18] California Air Resources Board, California Greenhouse Gas Inventory for 2000-2006, updated March 13, 2009.
[19] Visalia Draft Preliminary CAP, Table 10, Page 26.
[20] Visalia Draft Preliminary CAP, Table 14, page 29. However, the CAP states explicitly on page 24 that a notable gap in the 2000 base year inventory included the incomplete set of emission from refrigerant leakage from air conditioning systems and refrigeration systems for the community and municipal sectors. Therefore, refrigerant emissions data are more uncertain than other data in the CAP.

Table 8-7: Visalia GHG Emissions 2000 Baseline, 2020 Forecasts, and Recommended Reduction Targets (MT CO_2e)

	Community Sector Emissions	*Municipal Sector Emissions*
2000 Baseline Inventory	1,140,724	17,412
Recommended 2020 Reduction Target	*1,057,037*[1]	*15,052*[2]
2020 Year Emissions under Business-As-Usual	1,622,391	23,796
Reduction Attributable to State Select Measures	255,950	4,451
Reduction Attributable to Existing Community Measures	41,802	6,128
Remaining Reduction Needed	267,602	NA[3]

[1] A reduction target of 7% below 2000 base year level by 2020 (Equivalent to ARB's recommended reduction target of 15% below 2005 levels).

[2] A reduction target of 14% below 2000 emissions level by 2020 (Equivalent to 20% below 2005 levels).

[3] With anticipated reductions attributable to existing state and local measures, the City expects to exceed the recommended 2020 reduction target by 1,835 MT CO_2e.

Source: Visalia Draft Preliminary Climate Action Plan (May 2010), Tables 3 and 4, Figures 1 and 2.

The City's Preliminary Draft CAP currently proposes a 2020 community sector emissions reduction target equivalent to 7 percent below 2000 levels, and a municipal sector emissions reduction target equivalent to 14 percent below 2000 levels.[21] According to the Preliminary Draft CAP, the recommended community reduction target equates to a reduction of 565,354 metric tons CO_2e from business-as-usual in 2020. By 2020, the community will have reduced its emissions by 41,802 metric tons CO_2e (or over 7 percent of total emissions reduction needed) through the implementation of numerous measures.[22] Anticipated emissions reductions from State initiatives will result in a further reduction of 255,950 metric tons of CO_2e by 2020. The remaining reduction needed to achieve the recommended community target is 267,602 $MTCO_2e$. On the other hand, the Draft Preliminary CAP analysis suggests that existing State and local measures related to municipal emissions will succeed in reducing emissions below the recommended reduction target for 2020.

Visalia's Climate Change Initiatives

In January 2007, Visalia's mayor signed the "Cool Cities" pledge, part of the U.S. Mayors Climate Protection Agreement. By signing this pledge, the City adopted the goal of reducing citywide emissions to 7 percent below 1990 levels by 2012 (An inventory of 1990 emissions has not yet been completed, so this reduction is not quantified). In 2008, the City also became a partner in the San Joaquin Valley Clean Energy Organization (SJVCEO), non-profit serving the eight county region.

In 2008, the City of Visalia became a member of the Cities for Climate Protection (CCP) campaign sponsored by ICLEI-Local Governments for Sustainability. The CCP campaign is a global coalition of local governments working to reduce greenhouse gases at the community level. The framework the communities are using includes the following five steps: 1) conduct an inventory of local GHG emissions; 2) establish a GHG reduction target; 3) develop a climate action plan (CAP) for achieving the emissions reduction target; 4) implement the climate action plan; and 5) re-inventory emissions to monitor and report on progress toward the target. Through the Draft Preliminary CAP, the City has completed draft versions of steps 1 through 3, though the CAP has not yet been finalized or adopted.

[21] These suggested reduction targets have not yet been approved or adopted by the City.

[22] These measures are referred to within the Draft Preliminary CAP as "existing measures," and encompass emissions reductions already achieved since the 2000 base year as well as emissions reductions from future measures that will be implemented with high probability.

The Draft Preliminary CAP is the culmination of the City's efforts to-date to quantify local GHG impacts, to develop a set of reasonable and feasible reduction measures, and to evaluate the potential for those measures to help Visalia play its part in achieving statewide AB 32 goals.

Other Climate Change Impacts and Adaptation

While the all impacts of climate change will be felt in California in general, impacts on air and water quality, water supply, and related impacts on agriculture and public health have particular risks for Visalia. The following paragraphs summarize many of the findings in the 2009 California Climate Adaptation Strategy about the potential environmental impacts that could result from continued global warming.[23]

Increased Temperatures and Extreme Heat Events

Climate change is expected to lead to an increase in average outdoor air temperature, with greater increases expected in summer than in winter months. Larger temperature increases are anticipated in inland communities as compared to the California coast. Climate models predict a 4°F temperature increase in the next 20 to 40 years, with an increase in the number of long dry spells.

The potential health impacts from sustained and significantly higher than average temperatures include heat stroke, heat exhaustion, and the exacerbation of existing medical conditions such as cardiovascular and respiratory diseases, diabetes, nervous system disorders, emphysema, and epilepsy. Over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined. As record-breaking heat waves occur more frequently in California, excess morbidity will also increase during the summer months.

Increased temperatures also pose a risk to human health when coupled with high concentrations of ground-level ozone and other air pollutants, which may lead to increased rates of asthma and other pulmonary diseases. The incidence of bad air days in California's urban areas has increased, mostly in hot summer days. On long, hot, stagnant days, ground level ozone can build up to levels that violate federal and state health-based standards. As described previously, air quality in the Central Valley, in general, and Visalia, specifically, does not meet State and federal standards.

Higher temperatures and heat waves will impact peak electricity demand in California. Increased demand for air conditioning and refrigeration, especially in the Central Valley, coupled with decreased water availability for hydropower generation and decreased transmission efficiencies will increase the risk of brown-outs and black-outs.

Other impacts related to increased temperatures and heat waves include:

- Urban heat islands are especially dangerous because they are both hotter during the day and do not cool down at night, increasing the risk of heat-related illness.
- Fewer freezing events may decrease cold-related health effects.
- Warming temperatures, fewer freezing spells, and increased precipitation can are likely to change the distribution and quantity of common disease vectors, such as mosquitoes, ticks, and rodents.

Changes in Precipitation and Extreme Events

Climate change is anticipated to cause 20-30 percent increase in precipitation in the spring and fall in California. More frequent and heavier precipitation events cause flooding and mudslides, which

[23] California Natural Resources Agency, 2009.

would incur considerable costs in damages to property, infrastructure and even human life. Such events also are associated with drinking water contamination outbreaks; contamination of shellfish and other food-borne illnesses; and overloading of wastewater and stormwater systems.

With warmer average temperatures, more winter precipitation will fall in the form of rain instead of snow. This will decrease the Sierras' capacity as a natural water tower, resulting in decreased water availability for agricultural irrigation, hydro-electric generation and the general needs of a growing population. The decrease in snow-pack is particularly relevant in the State of California, as the Sierra snow-pack provides approximately 80 percent of California's annual water supply. In addition, stream flows are expected to be heavier during the spring and lower during the summer and fall months. Drought conditions are likely to increase, causing decreased water supply and quality; food production impacts; and increased risks of waterborne disease.

Drought conditions also result in increased frequency, intensity, and duration of wildfires, especially in conifer-dominant ecosystems in the Sierra Nevada and chaparral ecosystems in coastal and interior southern California. In these conditions, fires burn hotter and spread faster. During 2003, there were 14 reported fires in California which were enhanced due to Santa Ana winds and very low levels of humidity. The estimated damage costs were over $2 million. In addition to fatalities and property damage, smoke from wildfires impairs air quality and can cause acute and chronic health impacts.

Impacts on Vegetation and Agriculture

Native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects and other threats to native species. Changes in stream flow and increased salinity of water resources could also seriously affect the food web and mating conditions for fish that are of both of economic and recreational interest to residents. Due to impacts on biodiversity and on the structure and functioning of ecosystems, indirect impacts may include diminished carbon sequestration, forage production, timber production, water storage and filtration, crop pollination, soil fertility, fish and game habitat, tourism, recreation and aesthetic values.

Changing temperature conditions and natural cycles, increased drought conditions, changes in pests and pollinators, and a longer growing season will alter the thriving locally adapted agriculture. In California, the impacts of climate change on agriculture are estimated to be $30 billion by the Farm Bureau, mostly due to changes in chill hours required per year for high-value crops such as fruits, wine grapes and nuts. Tulare County's total gross production value for crops and livestock was more than $5 billion in 2008, with milk, oranges, cattle, grapes, and alfalfa ranking as the top five crops. In 2007, Tulare County was ranked as the second highest agricultural producing county in the state. One study in the 2009 California Climate Adaptation Strategy report shows the potential changes in perennial crop yields in Tulare County between 2005 and 2030-2050:

- Almonds (0-5 percent of state's yield in 2005): increase by more than 5 percent
- Table grapes (more than 30 percent of state's yield in 2005): decrease by 0 to 5 percent
- Cherries (5-10 percent of state's yield in 2005): decrease by more than 15 percent

Water shortages may impact agriculture more acutely in the western Central Valley and Tulare Basin. With climate change the Central Valley is projected to have greater irrigation demand and

evapotranspiration than the Sacramento Valley, leading to more risk for agriculture in the southern Central Valley counties by the end of the century.[24]

Sea Level Rise

Sea level rise as a consequence of global warming has received considerable attention in the scientific community and the media. It is widely believed that higher global temperatures will lead to the melting of polar ice caps, which in turn will cause global sea levels to rise. The IPCC and the 2006 California Climate Action Team Report project that mean sea level will rise between 12 and 36 inches by the year 2100. Due to Visalia's inland location, the physical and public health impacts due to sea level rise, such as flooding of septic systems, salt water intrusion on drinking water, and potential displacement due to flooding and erosion, are not anticipated.

Greenhouse Gas Regulations and Climate Change Initiatives

The regulation of greenhouse gas is changing constantly as nations, and the US federal, State, and local governments work to determine strategies that will work to systematically reduce GHG emissions and the impacts of climate change. The following is a list of the regulations that apply to or may impact local planning efforts.

Federal and International Regulations

Section 202 GHG Regulation of Cars and Light Duty Trucks

The final Clean Cars rule was signed on April 1, 2010 and will become effective 60 days after its publication in the Federal Register. This rule was proposed jointly by EPA and the National Highway Traffic Safety Administration (NHTSA) to create a National Program of GHG emission standards and Corporate Average Fuel Economy (CAFE) standards. The standards apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards will require these vehicles to meet an estimated combined average emissions level of 250 grams of CO2 per mile in model year 2016 under EPA's GHG program, and 34.1 mpg in model year 2016 under NHTSA's CAFE program. The goal is to reduce CO_2 emissions by 960 million metric tons and save 1.8 billion barrels of oil over the lifetime of the vehicles sold in model years 2012 through 2016.[25]

Renewable Fuel Standard Program and Energy Independence and Security Act of 2007

On February 3, 2010, the Renewable Fuel Standard (RFS) program was changed, as required by the Energy Independence and Security Act (EISA) of 2007. The revised statutory requirements increases the amount of renewable fuels, such as cellulosic biofuel and biomass-based diesel, that must be blended in transportation fuel (gasoline and diesel) each year from 9 billion gallons in 2008 to 36 billion gallons in 2022. EISA also established new categories of renewable fuel, and set separate volume requirements for each one and requires EPA to apply lifecycle greenhouse gas performance threshold standards to ensure that each category of renewable fuel emits fewer greenhouse gases than the petroleum fuel it replaces.

EISA also tightens the Corporate Average Fuel Economy (CAFE) standards that regulate the average fuel economy in the vehicles produced by each major automaker. The current CAFE standard for cars, set in 1984, requires manufacturers to achieve an average of 27.5 miles per gallon, while a new standard for light trucks and heavier SUVs was adopted in 2006 that would require new vehicles to achieve 24 mpg by 2011 (this standard was later challenged in court). This energy bill requires that

[24] *Ibid.*
[25] U.S. EPA, 2010 (c).

these standards be increased such that, by 2020, the new cars and light trucks sold each year deliver a combined fleet average of 35 miles per gallon. (See Section 202 above)

State Regulations

California Global Warming Solutions Act of 2006 (AB 32)

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act (Health and Safety Code Section 38500 et. seq.). The Act requires the reduction of statewide GHG emissions to 1990 levels by the year 2020. This change, which is equivalent to a 25 percent reduction from current emission levels, will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012.

AB 32 also directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources and address GHG emissions from vehicles. CARB has stated that the regulatory requirements for stationary sources will be first applied to electricity power generation and utilities, petrochemical refining, cement manufacturing, and industrial/commercial combustion. The second group of target industries will include oil and gas production/distribution, transportation, landfills and other GHG-intensive industrial processes.

Senate Bill 1368 (Chapter 598, Statutes of 2006)

Senate Bill (SB) 1368, signed by Governor Schwarzenegger in September 2006, required the California Public Utilities Commission (PUC) to establish a GHG emissions performance standard for "baseload" generation from investor-owned utilities by February 1, 2007. The California Energy Commission (CEC) was required to establish a similar standard for local publicly-owned utilities by June 30, 2007. The legislation further required that all electricity provided to California, including imported electricity, must be generated from plants that meet or exceed the standards set by the PUC and the CEC. In January 2007, the PUC adopted an interim performance standard for new long-term commitments (1,100 pounds of CO_2 per megawatt-hour), and in May 2007, the CEC approved regulations that match the PUC standard.

Senate Bill 375 (Chapter 728, Statutes of 2008)

Enacted in 2008, Senate Bill (SB) 375 links transportation and land use planning with the CEQA process to help achieve the GHG emission reduction targets set by California. Regional transportation planning agencies are required to include a Sustainable Communities Strategy (SCS) in regional transportation plans. The SCS must contain a planned growth scenario that is integrated with the transportation network and policies in such a way that it is feasible to achieve AB 32 goals on a regional level. SB 375 also identifies new CEQA exemptions and streamlining for projects that are consistent with the SCS and qualify as Transportation Priority Projects (TPP).

Executive Order (EO) S-13-08 (Gov. Schwarzenegger, November 2008)

On November 14, 2008, Governor Schwarzenegger issued Executive Order (EO) S-13-08 directing state agencies to plan for sea level rise and climate change impacts. There are four key actions in the EO including: (1) initiate California's first statewide climate change adaptation strategy that will assess the state's expected climate change impacts, identify where California is most vulnerable and recommend climate adaptation policies by early 2009; (2) request the National Academy of Science establish an expert panel to report on sea level rise impacts in California to inform state planning and development efforts; (3) issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects; and (4) initiate a report on critical existing and planned infrastructure projects vulnerable to sea level rise.

Executive Order S-01-07 (Gov. Schwarzenegger, January 2007)
In January 2008, Governor Schwarzenegger established a Low-Carbon Fuel Standard by Executive Order. Executive Order S-01-07 calls for a statewide goal to be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 ("2020 Target"), and that a Low Carbon Fuel Standard ("LCFS") for transportation fuels be established for California. Further, it directs CARB to determine if an LCFS can be adopted as a discrete early action measure pursuant to AB 32, and if so, consider the adoption of a LCFS by June 30, 2007, pursuant to Health and Safety Code Section 38560.5. The LCFS applies to all refiners, blenders, producers or importers ("Providers") of transportation fuels in California, will be measured on a full fuels cycle basis, and may be met through market-based methods by which Providers exceeding the performance required by a LCFS shall receive credits that may be applied to future obligations or traded to Providers not meeting the LCFS.

In June 2007, CARB approved the LCFS as a Discrete Early Action item under AB 32. It is expected that the regulatory process at CARB to implement the new standard will be completed no later than December 2008.

Senate Bill 97 (Chapter 185, Statutes 2007)
Senate Bill (SB) 97 directs the Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Resources Agency guidelines for feasible mitigation of GHG emissions or the effects of GHG emissions, by July 1, 2009. The Resources Agency was to have certified and adopted amendments to the Guidelines implementing the California Environmental Quality Act ("CEQA Guidelines") on or before January 1, 2010. These new CEQA Guidelines will provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents. In the interim, the OPR offered informal guidance regarding steps lead agencies should take to address climate change in their CEQA documents. (Governor's Office of Planning and Research, 2008)

Executive Order S-3-05 (Gov. Schwarzenegger, June 2005)
The Governor of California signed Executive Order S-3-05 on June 1, 2005. The Order recognizes California's vulnerability to climate change, noting that increasing temperatures could potentially reduce snow pack in the Sierra Nevada, which is a primary source of the State's water supply. Additionally, according to this Order, climate change could influence human health, coastal habitats, microclimates, and agricultural yield. The Order set the greenhouse gas reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020 reduce GHG emissions to 1990 levels; by 2050 reduce GHG emissions to 80 percent below 1990 levels.

Executive Order S-20-04 (Gov. Schwarzenegger, December 2004)
Executive Order S-20-04 commits the State to aggressive action to increase building energy efficiency, since it has been determined that commercial buildings use 36 percent of the state's electricity and account for a large percentage of greenhouse gas emissions, raw materials use and waste. In addition to requiring state-owned building to be retrofit to be more energy efficient, this EO requires the California Energy Commission to undertake all actions within its authority to increase efficiency by 20 percent by 2015, compared to Titles 20 and 24 non-residential standards adopted in 2003.

Assembly Bill 1493 (Chapter 200, Statutes 2002)
Assembly Bill 1493 (Pavley) amended Health and Safety Code sections 42823 and 43018.5 requiring the California Air Resources Board (CARB) to develop and adopt regulations that achieve maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, light-duty trucks, and other vehicles used for noncommercial personal transportation in California.

In September 2004, pursuant to this bill, the CARB approved regulations to reduce greenhouse gas emissions from new motor vehicles. Under the regulation, one manufacturer fleet average emission standard is established for passenger cars and the lightest trucks, and a separate manufacturer fleet average emission standard is established for heavier trucks. The regulation takes effect on January 1, 2006 and sets near-term emission standards, phased in from 2009 through 2012, and mid-term emission standards, phased in from 2013 through 2016. CARB calculates that the AB 1493 vehicle requirements would cumulatively produce 41 percent more GHG reductions by 2020 compared to the new federal CAFE standard in the Energy Independence and Security Act of 2007 (above). CARB has estimated that these regulations would reduce GHG emissions from these light-duty vehicles 18 percent by 2020 and 27 percent by 2030. (CARB, 2004) However, EPA has refused to grant a waiver that would allow California to implement these standards, and California has challenged this action in federal court.

Senate Bill 1078 (Statutes of 2002)

Senate Bill 1078 established a Renewable Portfolio Standard, which requires electricity providers to increase purchases of renewable energy resources by 1 percent per year until they have attained a portfolio of 20 percent renewable resources.

Senate Bill 1771 (Statutes of 2000)

Senate Bill 1771 requires the California Energy Commission (CEC) to prepare an inventory of the state's greenhouse gas emissions, to study data on global climate change, and to provide government agencies and businesses with information on the costs and methods for reducing greenhouse gases. It also established the California Climate Action Registry to serve as a certifying agency for companies and local governments to quantify and register their greenhouse gas emissions for possible future trading systems.

Regional & Local Regulations

San Joaquin Valley Air Pollution Control District

SJVAPCD adopted a Climate Change Action Plan (CCAP) in August 2008. While the plan does not have regulatory powers, it directs SJVAPCD to develop guidance to assist District staff, valley businesses, land-use agencies, and other permitting agencies in addressing GHG emissions as part of the CEQA process. The CCAP also directs District staff to investigate and develop a greenhouse gas banking program, enhance the existing emissions inventory process to include greenhouse gas emissions reporting consistent with new state requirements, and administer voluntary greenhouse gas emission reduction agreements. The CCAP Final Draft Staff Report concludes that while existing science is inadequate to support characterization of impacts that project specific GHG emissions have on global climatic change, the cumulative impact of all the projects is best addressed by requiring all projects subject to CEQA to reduce their GHG emissions through project design elements.

Since the adoption of the CCAP, SJVAPCD has published Best Performance Standards (BPS) for stationary sources and development projects, and guidance for valley land-use agencies in addressing GHG emissions for new projects under CEQA. However, the District has not published guidance related to the large scale planning projects such as General Plans.

California Attorney General Actions

As the chief law enforcement officer of the State, charged by the Constitution to protect the public interest and the State's natural resources, California Attorney General Edmund G. Brown Jr. is committed to doing everything in his power to ensure that California meets its greenhouse gas

reduction targets[26]. Examples of the Office of Attorney General's efforts include suing companies in the power industry and the auto industry for their contributions to global warming and writing letters or submitting oral testimony in over 30 different CEQA environmental review processes for city general plans, county general plans, regional transportation plans, and specific projects throughout California.

8.6 Surface Hydrology, Water Quality, and Flooding

This section builds on the description of water supply and groundwater provided in Chapter 7: Public Facilities and Services. This section discusses surface water hydrology and quality in and around Visalia, starting with a detailed regulatory setting as it pertains to hydrology, flooding, and water quality and then describing exiting conditions. Potential future constraints are discussed at the end of this section.

Regulatory Setting

Clean Water Act

The permit program for placement of clean fill materials into the waters of the United States, regulated by Section 404 of the Clean Water Act, is administered by the Corps. Section 401 of the Act requires that an applicant pursuing a federal permit to conduct any activity that may result in a discharge of a pollutant obtain a water quality certification or waiver. In California, this certification is issued by one of nine Regional Water Quality Control Boards with jurisdiction over the permitting area, in this case the Central Valley Regional Board. Under the Act, the Regional Board must issue the certification or a waiver for the proposed activity to be permitted under Section 404. A certification requires the evaluation of water quality considerations associated with dredging or placement of fill materials into waters of the United States.

Section 402 of the Act establishes the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES program is intended to control discharges of pollutants from both point and nonpoint sources, such as stormwater. EPA has delegated NPDES permitting authority to the State Water Resources Control Board.

Federal Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were enacted to reduce the need for large publicly funded flood control structures and disaster relief through restriction of development within floodplain areas.

FEMA administers the National Flood Insurance Program to provide subsidized flood insurance to communities that comply with FEMA regulations by limiting development within floodplains. FEMA issues Flood Insurance Rate Maps for communities participating in the program. These maps delineate flood hazard zones in communities.

Executive Order 11988 Floodplain Management

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. The order generally requires all federal agencies proposing to construct, permit, or fund development activities to:

[26] The Attorney General global warming web portal may be found at http://ag.ca.gov/globalwarming/ The portal contains information on global warming generally, impacts in California, and documentation of the comments, speeches, op-eds, testimony, and litigation actions he has taken to support AB 32 goals.

- avoid incompatible floodplain development,
- be consistent with the standards and criteria of the NFIP, and
- restore and preserve the natural and beneficial floodplain values.

The Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1969 established the State Board and divided the state into nine regional basins, each with a regional board. The State Board is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies.

This Act authorizes the State Board to draft state policies regarding water quality. It also authorizes the State Board to issue waste discharge requirements for discharges to state waters and requires that State Board or a regional board adopt water quality control plans (basin plans) for the protection of water quality. A basin plan must:

- identify beneficial uses of water to be protected,
- establish water quality objectives for the reasonable protection of the beneficial uses, and
- establish a program of implementation for achieving the water quality objectives.

These plans also provide the technical basis for determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals. Basin plans are updated and reviewed every 3 years. NPDES permits issued to control pollution must implement requirements of the applicable regional basin plans.

Central Valley Regional Water Quality Control Board

The Porter-Cologne Act provides for the development and periodic review of basin plans that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Beneficial uses represent the services and qualities of a water body (i.e., the reasons why the water body is considered valuable), while water quality objectives represent the standards necessary to protect and support those beneficial uses. Basin plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met. Basin plans are updated every 3 years, and provide the technical basis for determining waste discharge requirements and taking enforcement actions.

Basin plans are adopted and amended by the Central Valley Regional Water Quality Control Board for both the Sacramento and San Joaquin River Basins, in addition to the Tulare Lake Basin. There have been a total of four editions adopted for the Sacramento-San Joaquin Basins in 1975, 1989, 1994, and 1998, which is the current adopted edition. There is also a second edition of the Tulare Lake Basin Plan. However, the 1998 Sacramento-San Joaquin River Basin Plan has been updated with amendments more recently in September of 2009.

The Central Valley Board has set water quality objectives for all surface waters in its region (including the Tulare Lake Basin) for the following substances and parameters: ammonia, bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes

and odors, temperature, toxicity, and turbidity. Specific objectives for concentrations of chemical constituents are applied to bodies of water based on their designated beneficial uses[27].

Water quality objectives applicable to all groundwaters have been set for bacteria, chemical constituents, radioactivity, tastes and odors, and toxicity.

One method the Central Valley Board uses to implement basin plan criteria is through the issuance of permits to any entity that discharges point-source effluent to a surface water body. This permit also serves as a federally required NPDES permit (under the federal Clean Water Act) and incorporates the requirements of other applicable regulations.

Construction Activities

Construction activities are regulated under the NPDES General Permit for Discharges of Storm Water Runoff associated with Construction Activity provided that the total amount of ground disturbance during construction exceeds one acre. The appropriate Regional Board enforces the General Construction Permit. Coverage under a General Construction Permit requires the preparation of a stormwater pollution prevention plan. The SWPPP includes pollution prevention measures (erosion and sediment control measures and measures to control non-stormwater discharges and hazardous spills), demonstration of compliance with all applicable local and regional erosion and sediment control standards, identification of responsible parties, a detailed construction timeline, and a best management practices monitoring and maintenance schedule. The NOI includes site-specific information and the certification of compliance with the terms of the General Construction Permit. In September of 2009, the State Board adopted a new Construction General NPDES Permit that contains a few additional regulatory requirements for the control of stormwater runoff from construction sites.

Local Regulations

The City's Engineering Department establishes improvements standards. These standards include specific engineering specifications for drainage structures, water structures and sewer structures and other design specifications to ensure adequate drainage in the urbanized areas of the city. In addition, the Engineering Department also provides detailed interactive flood maps that are available on the City's website.

Environmental Setting

Climate

The north Pacific high-pressure system dominates the region's large-scale meteorology and produces northerly winds along the entire west coast of the United States during most of the year. The California Irrigation Management Information System (CIMIS) measures meteorological data including temperature and precipitation and has multiple monitoring stations throughout California. CIMIS historically monitored in Visalia, but for the sake of a more recent record, the Fresno State location contains more recent data from 1988 to 2010. The reason there are so few data counts in summer months for precipitation is that it rains rarely during summer months. In addition, the reason there are many counts higher than the amount of days in a month is because Table 8-8 is presenting all the Januarys and Februarys from 1988 to 2010.

[27] Central Valley Board, 1998.

Table 8-8: Precipitation and Air Quality: Measurements at Fresno State (1988 to 2010)

	Precipitation			*Air Temperature*			
Month	*Count*	*Average*	*Maximum*	*Count*[1]	*Minimum*	*Average*	*Maximum*[2]
January	263	0.21	1.79	682	21	46	74
February	224	0.20	1.55	612	23	50	80
March	161	0.26	2.52	672	28	55	88
April	95	0.19	0.99	622	32	60	99
May	60	0.20	1.06	651	32	68	103
June	16	0.25	1.24	623	32	75	106
July	7	0.07	0.16	644	32	80	110
August	5	0.08	0.16	639	51	78	110
September	23	0.09	0.31	617	32	73	105
October	63	0.20	1.54	655	32	63	100
November	153	0.13	1.14	650	26	52	86
December	239	0.16	1.56	678	18	45	79

[1] Count based on average temperature data set.
[2] Outlier of 193 removed from March on original dataset and recalculated.

Source: California Irrigation Management System, 2010

Surface Water Hydrology

The planning area is located on relatively level terrain typical of the Tulare Lake Basin. However, Visalia does rest in the heart of the Kaweah River's Delta system, so many rivers and creeks flow through the city. Surface runoff generally flows from east to west and terminates in the Tulare Lake Basin. Major surface water resources in the area include Saint John's River, Modoc Ditch, Mill Creek Ditch, Mill Creek, Tulare Irrigation District (TID) Canal, Packwood Creek, Cameron Creek, Deep Creek, Evans Creek, Persian Ditch, and some other local ditches (See Figure 8-4). Except for the TID Canal, most watercourses are intermittent drainages that receive a significant portion of flow from storm water runoff during the rainy season. This intermittent flow is typically supplemented from water released from Terminous Dam, which was constructed in 1962 and is operated by the U.S. Army Corps of Engineers.

The City operates and maintains a vast municipal storm drainage system that consists of drainage channels, 23 detention and retention basins, 33 pump stations and 250 miles of pipe. Historically, runoff was disposed of by directing it to the natural creeks, rivers and irrigation ditches that flow through the city including the St. John's River, Mill Creek, Packwood Creek, Modoc Ditch, Evans Ditch and Persian Ditch. To mitigate the increased runoff due to urbanization, the City has invested thousands of dollars in the purchase of land and the construction of permanent retention basins. These retention basins also help replenish groundwater in the city as the water infiltrates back into the aquifer. Future restoration of the natural drainages should be one of the City's priorities as urbanization concentrates and redirects flows to these drainages, causing potential excessive erosion.

Monthly minimum, mean and maximum inflow into Lake Kaweah is presented in Table 8-9. Count refers to the number of data points from 1994 to 2010. Note that the January maximum flow of 17,948 cubic feet per second (cfs) is from 1997 when a storm causes the highest storm flows on the period of record. Table 8-10 contains the monthly minimum, mean and maximum outflow from Lake Kaweah. This flow drains down into the Kaweah River Delta system and through the many drainages and creeks that meander through the City of Visalia. Note that the January maximum outflow from Lake Kaweah is much less than the inflow due to the lake retaining the flow.

Table 8-9: Monthly Inflow into Lake Kaweah from 1994 to 2010

		Cubic feet per second		
Month	*Count*	*Minimum*	*Mean*	*Maximum*
January	496	54	577	17,948[1]
February	430	101	597	5,077
March	481	221	820	8,369
April	411	222	1,186	6,737
May	437	487	1,870	4,882
June	414	53	1,438	5,332
July	422	2	623	4,772
August	396	8	163	1,151
September	396	7	74	638
October	435	3	92	7,360
November	457	7	162	9,436
December	455	25	239	6,354

1. Data point 17,948 is from January 1997 storm. Based on daily data in cubic feet per second.

Source: California Data Exchange Center

Table 8-10: Monthly Outflow into Lake Kaweah from 1994 to 2010

		Cubic feet per second		
Month	*Count*	*Minimum*	*Mean*	*Maximum*
January	489	1	470	4,543
February	429	1	489	3,738
March	481	2	444	1,947
April	404	6	480	2,622
May	431	16	1,074	3,680
June	413	62	1,747	4,505
July	418	100	1,649	4,532
August	398	32	744	2,386
September	397	6	199	1,483
October	437	4	81	914
November	458	0	134	2,062
December	450	2	207	1,449

Notes: Based on daily data in cubic feet per second.

Source: California Data Exchange Center

INSERT Figure 8-4 Hydrology and Flooding

Back of Figure 8-4

Flooding

Visalia experienced several major floods in 1950, 1955, 1966 and 1969. The waterways described in the hydrology section above have historically been used for flood control, storm water conveyance, riparian and recreational uses. In addition, the city maintains parks and detention ponds that serve to detain storm water runoff when significant storm events occur. Table 8-11 contains the FEMA floodplain designation (zones) definitions.

Table 8-11: FEMA Floodplain Designations (Zones)

Zone	*Description*
Moderate to Low Risk	
B and X	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
C and X	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.
High Risk Areas	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.

Source: ICF, 2010

In June 2009, FEMA updated the Flood Insurance Rate Map panels for Visalia to reflect the infrastructure improvements made to capture and convey storm water within the city. The other FIRM panels (1994/1998) detailed much larger areas of prone to the 100-year flood. However, the recent data shows more areas in the city protected from the 100-year event. Figure 8-4 delineates the multiple flood zones in the planning area. Most of the city is located in defined as areas of moderate to low risk of flooding. However some areas along the creeks and drainages are within Zone A and Zone AE which are high risk areas prone to flooding from a 100-year storm event. Some of these areas along Mill Creek and St. Johns River are urbanized and would be affected by flooding if the 100-year event were to occur.

Surface Water Quality

The surface water quality of the Kaweah River Delta system is considered to be excellent and typical of Sierra Nevada snowmelt runoff, no known water quality impairments in the area. The City complies with the terms of its permits for storm water discharges from small municipal separate storm sewer systems. In November of 2005, the City adopted a Storm Water Management Plan that includes a detailed analysis of plans to handle storm water runoff from increased amounts of impervious surface. These plans include retention/detention facilities, street sweeping, establishment of a water quality hotline, and an illicit discharge protection system which will allow the City to determine if there is a serious water quality problem from illegal discharges.

The quality of storm water can vary greatly, depending on weather and land use. Urban runoff and industrial runoff are known to contribute significantly to the levels of toxic materials, such as metals and organic pesticides, transported to streams. Storm water discharges may contain unacceptable levels of petroleum fuels and oils; organic matter such as pet and domestic livestock wastes; pesticides, metals such as copper, lead, cadmium, and zinc; and fertilizers such as nitrogen and phosphorus.

8.7 Fire Hazards

Fire Hazard Area Classification

The California Department of Forestry and Fire Protection (CDF) maps areas of significant fire hazards in the state. These areas are identified based on weather, terrain, fuels (e.g. type of ground vegetation), and other factors. The CDF designates land as State or Local Responsibility Areas (SRA and LRA), based on population density, land use, and land ownership. CDF has legal responsibility for SRA land and local jurisdictions have responsibility for LRA land. LRA land generally includes densely populated urban areas and agricultural land. The planning area is classified as LRA, meaning that the City and County are responsible for incorporated and unincorporated areas, respectively.

Fire Hazards in Visalia

Fire risk is considered low for the great majority of the planning area. The threat of wildland fires is very small because of the area's flat topography and relative absence of grassland, forest, and brush. The threat of urban fires is also low due to the generally good condition of the building stock, and the ability of the City's Fire Department to provide adequate service.

As ***Figure 8-5*** illustrates, three very small portions of the Planning area are classified by CDF as having moderate fire hazards. These areas are adjacent to silos and aboveground tanks north of the community of Goshen; a landscaped corridor adjacent to large industrial facilities along Plaza Drive; and along a section of Highway 99.

INSERT **Figure 8-5 Fire Hazards**

Back of Figure 8-5

Visalia General Plan

Safety Element

The Tulare County General Plan Safety Element was adopted in 1975, and incorporated into the Visalia General Plan. Fire hazards are the primary emphasis of the Safety Element, but much of the attention is focused on wildland fire hazards, which have low relevance for Visalia. The City of Visalia adopted the County's Element, and modified policies which emphasize the risk of structural fires. The Safety Element calls for the City to "eliminate unfit, unhealthy, dangerous, structurally unsafe and fire hazardous housing units," and structures used by the public. Other policies include the following:

- Weed abatement programs directed by local fire districts and fire departments are encouraged;
- Public safety should be a top priority for the use of water;
- Building permits for structures with fire hazard implications should be reviewed by the Fire Warden; and
- Water supply systems should be designed to match proposed or anticipated development.

8.8 Hazardous Materials and Sites

Sites where hazardous chemical compounds have been released into the environment can pose health threats. Historic or current activities, most often associated with industrial or commercial uses (including gas stations and drycleaners) may result in the release, leak, or disposal of toxic substances on or below the ground surface, where they can then contaminate soil and ground water. Furthermore, disturbance of the ground through grading or excavation can result in exposure of these chemicals to the public. Improper handling of contaminated sites may result in further exposure via airborne dust, surface water runoff, or vapors.

This section describes the nature and location of hazardous materials and contaminated sites in the planning area, and the implications their presence may have for future development.

Regulatory Framework

Areas where activities resulting in contamination are known or suspected to have taken place are tracked and monitored by federal and state agencies. Sites eligible for federal remediation funding through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) are on EPA's Superfund list. The California Department of Toxic Substances Control and the State Water Resources Control Board list other sites in the state. These may be categorized as Leaking Underground Storage Tanks (LUST)—common at gas stations—or Spills, Leaks, Investigations, and Cleanups (SLIC), which are generally not fuel-related.

Federal Regulations

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

CERCLA, commonly referred to as Superfund, was enacted on December 11, 1980. The purpose of CERCLA was to provide authorities the ability to respond to uncontrolled releases of hazardous substances from inactive hazardous waste sites that endanger public health and the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at such sites, and established a trust fund to provide for cleanup when no responsible party could be identified.

Additionally, CERCLA provided for the revision and republishing of the National Contingency Plan (NCP) that provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also provides for the National Priorities List, a list of national priorities among releases or threatened releases throughout the United States for the purpose of taking remedial action.

Federal Resource Conservation and Recovery Act of 1976 (RCRA)

RCRA is the nation's hazardous waste control law. It defines hazardous waste, provides for a cradle-to-grave tracking system and imposes stringent requirements on treatment, storage and disposal facilities. RCRA requires environmentally sound closure of hazardous waste management units at treatment, storage, and disposal facilities. The EPA is the principal agency responsible for the administration of RCRA, SARA, and CERCLA.

State and County Authorities

California Environmental Protection Agency (Cal/EPA)

The Cal/EPA was created in 1991 to coordinate state environmental programs, reduce administrative duplication, and address the greatest environmental and health risks. Cal/EPA unifies the state's environmental authority under a single accountable, cabinet-level agency. The Secretary for Environmental Protection oversees the Air Resources Board, Integrated Waste Management Board, Department of Pesticide Regulation, State Water Resources Control Board, Department of Toxic Substances Control, and the Office of Environmental Health Hazard Assessment.

California Department of Toxic Substance Control (DTSC)

The DTSC is responsible for regulating hazardous waste facilities and overseeing the cleanup of hazardous waste sites in California. The Department's Hazardous Waste Management Program (HWMP) implements the Federal RCRA program in California, and develops regulations, policies, guidance and technical assistance/training to assure the safe storage, treatment, transportation and disposal of hazardous wastes.

California State Water Resources Control Board (SWRCB)

Acting through Regional Water Quality Control Boards, the State Board regulates surface and groundwater quality pursuant to the Porter-Cologne Water Quality Act, the federal Clean Water Act, and the Underground Tank Law. Depending on the nature of contamination, the lead agency responsible for the regulation of hazardous materials at the site can be the DTSC, regional board, or both. In general, contamination affecting soil and groundwater is handled by regional boards and contamination of soils is handled by DTSC.

Tulare County Environmental Health Division

The County's Environmental Health Division is the Certified Unified Program Agency charged with establishing and administering requirements for businesses that handle hazardous materials or generate or treat hazardous wastes, and businesses that operate storage tanks. The agency maintains a "Business Plan" which includes an inventory of hazardous materials and response plans in case of accidental release. The Environmental Health Division also operates the County's household hazardous waste collection program.

Visalia General Plan

Safety Element

The Safety Element (1975) identifies fuel storage depots in urban areas as a safety hazard due to the risk of fire and the close proximity to other structures and concentrations of people. It suggests that land use planning, zoning, and subdivision regulations can play a role in minimizing this hazard. The

Safety Element also notes that transportation of fuel and chemicals by rail and truck poses a hazard. The Safety Element does not contain explicit policies dealing with hazardous waste.

Conservation, Open Space, Recreation and Parks Element

The General Plan's Conservation, Open Space, Recreation and Parks Element (1989) describes the groundwater resources in the planning area, and includes a policy that calls on the City to develop a Hazardous Waste Management Plan (see policies, below). The County Hazardous Waste Management Plan (CHWMP) was adopted that same year, establishing some of the functions performed by the Tulare County Environmental Health Division discussed above.

Contaminated Sites in Visalia

EPA, the California Department of Toxic Substances Control, and the State Water Resources Board have identified 42 contaminated sites in the planning area (with some sites tracked by both agencies). Sites are shown in Table 8-12 below, and in ***Figure 8-6***. Most of the identified sites are either current or former dry-cleaning operations where voluntary cleanups overseen by the DTSC are underway, or LUST cleanup sites at current or former gas stations administered by the SWRCB. There is one Federal Superfund site in the planning area, as well as four sites which have been subject to State Response. A handful of other sites are being handled by the Water Resources Control Board as Cleanup Program Sites. These are briefly discussed below.

Federal Superfund Site

The planning area contains one Superfund site, where electrical poles were treated between the 1920s and the 1980s (Site 1 in ***Figure 8-6*** and Table 8-11). In 1976, the Regional Water Quality Control Board (RWQCB) initiated cleanup, as groundwater contamination had been detected. In 1987, the site was placed on the National Priorities List (NPL), with the Department of Toxic Substances Control as lead agency. New site investigations resulted in a Remedial Action Plan in 1994 involving groundwater pumping and treatment and soil bioremediation. Work was completed in 2006, and achievement of water and soil standards was certified in 2009. Land use restrictions on the site prevent residential use, hospitals, schools, daycare facilities, or any use which disturbs the soil below a depth of ten feet.

State Response from Department of Toxic Substances Control

The Department of Toxic Substances Control has led state efforts at three other contaminated sites in Visalia. Agricultural chemicals were detected on the 20-acre former site of Green Acres Airport on West Goshen Avenue (Site 2). Site remediation involving soil excavation and removal and extensive water sampling is complete. A covenant was recorded on the property in 2008, which prohibits residential use, day care centers, hospitals, schools, agriculture, or any soil excavation without agency approval. The remediation actions were certified complete in 2009.

At a 1.75-acre site on North Tipton Street (Site 3), home to a series of industrial uses beginning with a gas manufacturing plant, site investigations in 1988 found petroleum-based soil contamination, to a depth of 33 feet adjacent to an underground vault, and groundwater contamination with heavy metals and Volatile Organic Compounds (VOCs). Remediation began under the Tulare County Environmental Health Department, and authority was transferred to DTSC in 1991. The site was remediated to an industrial/commercial standard, and capped with asphalt, and a deed restriction requires that the present commercial/industrial use designation remain. Portions of the site are now used as a natural gas refueling station and auto sales lot, and ongoing groundwater monitoring will continue.

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INSERT Figure 8-6 Contaminated Sites

Back of Figure 8-6

Table 8-12: Contaminated Sites				
ID	*Site Name*	*Address*	*Site Type*	*Cleanup Status*
Active Cases Identified by the Department of Toxic Substances Control				
1	Edison/Visalia Pole Yard	432 Ben Maddox Way	Federal Superfund - Listed	Certified - Land Use Restrictions
2	Kaweah Crop Duster - Green Acres Airport	2530 W. Goshen	State Response	Certified - Land Use Restrictions
3	So. Cal. Gas/Visalia MGP	300 N. Tipton St.	State Response	Certified - Land Use Restrictions
4	Goshen Avenue and Shirk Road Site	6941 and 6707 W. Goshen Ave.	State Response	Active
5	Visalia Dry Cleaner Investigation	Central City Area	State Response	Active
6	Former Country Club Cleaners	5214 and 5240 W. Walnut Ave.	Voluntary Cleanup	Active
7	Former Lamoure's Cleaners and Laundry, Noble	1415 E. Noble Ave.	Voluntary Cleanup	Active
8	Former Village Cleaners	2615 S. Mooney Blvd.	Voluntary Cleanup	Active
9	Lamour's Cleaners, Mooney	2911 S. Mooney Blvd.	Voluntary Cleanup	Active
10	Miller's Cleaners, Whitendale	2235 W. Whitendale Ave.	Voluntary Cleanup	Active
11	Millers Dry Cleaners	110 N. Willis St.	Voluntary Cleanup	Active
12	Mission Uniform	520 E. Mineral King Ave.	Voluntary Cleanup	Active
13	One Hour Martinizing	717 W. Main St.	Voluntary Cleanup	Active
14	Paragon Dry Cleaners	119 S. Willis St.	Voluntary Cleanup	Active
15	Visalia Civic Center Brownfields Development	NW Burke St. and Oak Ave.	Voluntary Cleanup	Active
Open Cases Identified by the State Water Resources Control Board				
16	Country Club Cleaners	2000 W. Whitendale Ave.	Cleanup Program Site	Open
17	Sierra Beverage Co.	1001 S. Ben Maddox Way	Cleanup Program Site	Open
18	CDF Visalia Maintenance Yard	1968 S. Lovers Ln.	Cleanup Program Site	Open - Site Assessment
19	Former Cargill Property	31189 Road 68	Cleanup Program Site	Open - Site Assessment
20	Holiday RV Park	6610 Betty Drive	Cleanup Program Site	Open - Site Assessment
21	Kawneer Company	7200 Doe Ave.	Cleanup Program Site	Open - Site Assessment
22	Trellis Company	Avenue 305	Cleanup Program Site	Open - Site Assessment
23	Union Pacific Railroad - Goshen Junction	Effie	Cleanup Program Site	Open - Site Assessment
24	Valley Warehouse	31071 Road 68	Cleanup Program Site	Open - Site Assessment
25	Visalia Village Shopping Center (Near Time Oil Inc.)	2615 S. Mooney Blvd.	Cleanup Program Site	Open - Site Assessment
26	Dunn's Sand, Inc.	15602 Avenue 296	Cleanup Program Site	Open - Remediation

Table 8-12: Contaminated Sites

ID	*Site Name*	*Address*	*Site Type*	*Cleanup Status*
27	Sprague Electric Co. (Former)	26899 S. Mooney Blvd.	Cleanup Program Site	Open - Remediation
28	California Acid Delinting - Visalia		Cleanup Program Site	Open - Inactive
29	Milbros Investment Company	Ave. 305 & Hwy. 99	Cleanup Program Site	Open - Inactive
30	Mooney Grove Park	27000 S. Mooney Blvd.	LUST Cleanup Site	Open - Site Assessment
31	R.L. Frakes	620 E. Center	LUST Cleanup Site	Open - Site Assessment
32	Sanders Market	27548 Road 148	LUST Cleanup Site	Open - Site Assessment
33	Shell Service Station	201 W. Noble	LUST Cleanup Site	Open - Site Assessment
34	The Job Shop	2129 E. Main St.	LUST Cleanup Site	Open - Site Assessment
35	Time Oil Co./Mooney Mart	2440 S. Mooney Blvd.	LUST Cleanup Site	Open - Site Assessment
36	Tulare County Motor Pool	Burrel & Sunset	LUST Cleanup Site	Open - Site Assessment
37	Fast Break Food Store	30821 Hwy. 99	LUST Cleanup Site	Open - Remediation
38	JA Fischer Inc.	1633 E. Mineral King	LUST Cleanup Site	Open - Remediation
39	Lee's Mini Mart	540 N. Court St.	LUST Cleanup Site	Open - Remediation
40	Tosco - Facility #2177	100 W. Mineral King	LUST Cleanup Site	Open - Remediation
41	Double D Mini Mart	1500 W. Houston	LUST Cleanup Site	Open - Verification Monitoring
42	Langendorf Bakery	525 N. Burke	LUST Cleanup Site	Open - Inactive

Note: The four highlighted sites are identified by both DTSC and SWRCB. SWCRB classifies each of these sites as Cleanup Program Sites with their status as Open.

Sources: California Department of Toxic Substances Control, 2010; State Water Resources Control Board, 2010

Wastes containing VOCs were found to be contaminating groundwater from two adjacent parcels at Goshen Avenue and Shirk Road (Site 4) where various industrial activities had taken place. Remedial investigations began in 1991, and indicated that downgradient groundwater contamination was present for a length of about one mile. A Remedial Action Plan was approved in 1997 calling for groundwater extraction and treatment and continued sampling. Remediation is still underway.

Finally, in 2006 the DTSC initiated a comprehensive investigation of the sources of a regional groundwater plume of tetrachloroethylene (PCE), a waste product commonly associated with former dry cleaning operations. Many individual former or current dry cleaners are listed as individual cleanup sites by both DTSC and the State Water Resources Control Board.

Cleanup Sites Overseen by State Water Resources Control Board

Cleanup programs being overseen by the State Water Resources Control Board are primarily in two categories: former or current drycleaning operations which have resulted in groundwater contamination by PCE, and Leaking Underground Storage Tanks (LUSTs) which have caused groundwater infiltration by gasoline and related compounds. In some cases (Sites 1 and 2, discussed above) industrial processes have contaminated both groundwater and soils, and these sites are monitored by both DTSC and the Water Resources Control Board. One other noteworthy case is the Kawneer site, where waste products from aluminum anodizing process were disposed in evaporating ponds between 1971 and 1985. Residual material was excavated in 1990, and groundwater wells were put in place; these wells have showed elevated levels of several chemicals and continue to be monitored.

8.9 Noise

This chapter section provides an overview of the existing noise environment in the City. The General Plan Noise Element will serve as a guide for establishing a pattern of land uses that minimizes the exposure of community residents to excessive noise. California Government Code Section 65302(f) specifies the required contents of the General Plan Noise Element, including quantifying noise levels from the following sources:

- Highway and freeways;
- Primary arterial and major local streets;
- Passenger and freight on-line railroad operation and ground rapid-transit systems;
- Commercial, general aviation, heliport, helistop, and military airport operations;
- Aircraft overflights;
- Jet engine test strands;
- All other ground facilities and maintenance functions related to airport operations;
- Local industrial plants, including railroad classification yards; and
- Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

To establish current baseline noise conditions in the City, a three-step process was used:

- Quantifying existing noise levels from major noise sources;
- Identifying existing land uses that are sensitive to noise, including residential areas, hospitals or healthcare facilities, libraries, parks and schools; and
- Identifying conflicts between noise sources and noise-sensitive uses.

As background, the following subsection explains noise terminology used in the analysis.

Noise Terminology

Sound and Noise

Sound is actually a process that consists of three components: the sound source, the sound path and the sound receiver. All three components must be present for sound to exist. Without a source to produce sound or a medium to transmit sound-pressure waves, there is no sound. Sound also must be received; a hearing organ, sensor, or object must be present to perceive, register or be affected by sound or noise. In most situations, there are many different sound sources, paths and receivers, not only one of each. Noise is defined as loud, unpleasant, unexpected, or undesired sound.

Sound Pressure Levels and Decibels

The amplitude of a sound determines its loudness. Loudness of sound increases and decreases with increasing and decreasing amplitude. Sound pressure level (SPL) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called bels, named after Alexander Graham Bell. To provide finer resolution, a bel is divided into 10 decibels (dB).

Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted by ordinary arithmetic means. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. When two sounds of equal SPL are combined, they produce a combined SPL 3 dB greater than the original individual SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sound levels differ by 10 dB or more, the combined SPL is equal to the higher SPL; the lower sound level would not increase the higher sound level.

A-Weighted Decibels

SPL alone is not a reliable indicator of loudness. The frequency of a sound also has a substantial effect on how humans respond. Although the intensity of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. To approximate the frequency response of the human ear, a series of SPL adjustments is usually applied to the sound measured by a sound level meter. The adjustments, referred to as a weighting network, are frequency-dependent.

The A-scale weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. Noise levels for environmental noise studies are typically reported in terms of A-weighted decibels (dBA). In environmental noise studies, A-weighted SPLs are commonly referred to as noise levels. Table 8-13 shows typical A-weighted noise levels.

Table 8-13: Typical Noise Levels

Common Outdoor Activities	*Noise Level (dBA)*	*Common Indoor Activities*
	— 110 —	Rock band
Jet flyover at 300 meters (1,000 feet)		
	— 100 —	
Gas lawn mower at 1 meter (3 feet)		
	— 90 —	
Diesel truck at 15 meters (50 feet) at 80 kilometers per hour (50 miles per hour)		Food blender at 1 meter (3 feet)
	— 80 —	Garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime		
Gas lawn mower, 30 meters (100 feet)	— 70 —	Vacuum cleaner at 3 meters (10 feet)
Commercial area		Normal speech at 1 meter (3 feet)
Heavy traffic at 90 meters (300 feet)	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: Caltrans: 1998

Human Response to Changes in Noise Levels

It is widely accepted that the average healthy ear can barely perceive 3-dB noise level changes. A 5-dB change is readily perceptible, and a 10-dB change is perceived as being twice or half as loud. As discussed above, doubling sound energy results in a 3-dB increase in sound; therefore, doubling sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Noise Descriptors

Noise in our daily environment fluctuates over time. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in traffic noise analysis.

- **Equivalent sound level (Leq):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level ($L_{eq}[h]$) is the energy average of the A-weighted sound levels occurring during a 1-hour period.

- **Percentile-exceeded sound level (Lx):** L_x represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, L_{90} is the sound level exceeded 90 percent of the time).

- **Maximum sound level (Lmax):** L_{max} is the highest instantaneous sound level measured during a specified period.

- **Day-night level (Ldn):** L_{dn} is the energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring between 10 p.m. and 7 a.m.

- **Community noise equivalent level (CNEL):** CNEL is the energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring between 10 p.m. and 7 a.m. and 5 dB added to the A-weighted sound levels occurring between 7 p.m. and 10 p.m.

Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

- **Geometric Spreading:** Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance. Highway noise is unique in that the movement of vehicles makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point.

- **Ground Absorption:** The noise path between the highway and the observer is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground-attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

- **Atmospheric Effects:** Atmospheric conditions can have a significant effect on noise propagation. Wind has been shown to be the most important meteorological factor within approximately 500 feet of the source, whereas vertical air-temperature gradients are more important for greater distances. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur as a result of temperature inversion conditions (i.e., increasing temperature with elevation).

- **Shielding by Natural or Human-Made Features:** A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by this shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. A taller barrier may provide as much as 20 dB of noise reduction.

Federal, State, and Local Standards

Federal Regulations

The federal Noise Control Act of 1972 (Public Law 92 574) established a requirement that all federal agencies administer their programs to promote an environment free of noise that would jeopardize public health or welfare. The U.S. Environmental Protection Agency (EPA) was given the responsibility for:

- Providing information to the public regarding identifiable effects of noise on public health and welfare,
- Publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety,
- Coordinating federal research and activities related to noise control, and
- Establishing federal noise emission standards for selected products distributed in interstate commerce.

The Noise Control Act also directed that all federal agencies comply with applicable federal, state, interstate and local noise control regulations.

Although the EPA was given major roles in disseminating information to the public and coordinating federal agencies, each federal agency retains authority to adopt noise regulations pertaining to agency programs. The EPA, however, can require other federal agencies to justify their noise regulations in terms of Noise Control Act policy requirements. The Occupational Safety and Health Administration retains primary authority for setting workplace noise exposure standards, the Federal Aviation Administration retains primary jurisdiction over aircraft noise standards, the Federal Highway Administration (FHWA) retains primary jurisdiction over highway noise standards, and the Federal Transit Administration (FTA) retains primary jurisdiction over transit noise standards.

In 1974, in response to the requirements of the Noise Control Act, the EPA identified indoor and outdoor noise limits to protect public health and welfare (e.g., communication disruption, sleep disturbance and hearing damage). Day-night average sound level (L_{dn}) limits of 55 decibels (dB) outdoors and 45 dB indoors are identified as desirable to protect against speech interference and sleep disturbance for residential, educational and healthcare areas. Sound-level criteria identified to protect against hearing damage in commercial and industrial areas are 24-hour equivalent sound level (L_{eq}) values of 70 dB (both outdoors and indoors).

Federal Highway Administration

Title 23, part 772, of the Code of Federal Regulations "Procedures for Abatement of Highway Traffic Noise" provides procedures for conducting noise studies for highway projects and

implementing noise abatement measures; supplies noise abatement criteria; and establishes requirements for information to be given to local officials for use in planning.

U.S. Department of Housing and Urban Development

The U.S. Department of Housing and Urban Development (HUD) has established guidelines for evaluating noise impacts on residential projects seeking financial support under various grant programs.[28] These describe HUD policies and programs to protect citizens against excessive noise in their communities and places of residence; they apply to development projects with HUD involvement. HUD's goal is that the interior noise level in residences not exceed 45 dB L_{dn}, wiuth a normally acceptable exterior noise level of 65 dB L_{dn}.

Federal Transit Administration (FTA)

Federal Transit Administration procedures for the evaluation of noise from transit projects, specified in *Transit Noise and Vibration Impact,* define noise-sensitive land use categories and establish two levels of impact: "severe" and "impact." Noise mitigation normally will be specified for severe impact areas unless there is no practical method of mitigating the noise. In the "impact" range of noise impacts, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation, including the increase compared with existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost-effectiveness of mitigating noise to more acceptable levels.

Federal Aviation Administration

14 CFR Part 150, "Airport Noise Compatibility Planning," prescribes the procedures, standards and methodology to be applied airport noise compatibility planning activities. including land use compatibility standards applied by the Federal Aviation Administration.

State Regulations

California General Plan Guidelines

The State of California General Plan Guidelines[29] provide direction for preparing the General Plan Noise Element. These guidelines include a sound level/land use compatibility chart that divides various outdoor L_{dn} ranges into four compatibility categories (normally acceptable, conditionally acceptable, normally unacceptable and clearly unacceptable) based on land use. For many land uses, the chart shows overlapping L_{dn} ranges for two or more categories. These overlapping L_{dn} ranges are intended to indicate that local conditions (existing sound levels and community attitudes toward dominant sound sources) should be considered in evaluating land use compatibility at specific locations.

The compatibility chart, shown in Table 8-14, identifies the normally acceptable range for low-density residential uses as less than 60 dB and the conditionally acceptable range as 55–70 dB. The normally acceptable range for high-density residential uses is identified as L_{dn} values below 65 dB, and the conditionally acceptable range is identified as 60–70 dB. For educational and medical facilities, L_{dn} values below 70 dB are considered normally acceptable, and L_{dn} values of 60–70 dB are considered conditionally acceptable. For office and commercial land uses, L_{dn} values below 70 dB are considered normally acceptable, and L_{dn} values of 67.5–77.5 are categorized as conditionally acceptable.

[28] 44 Federal Register 135:40860-40866, January 23, 1979.
[29] Governor's Office of Planning and Research, 2003.

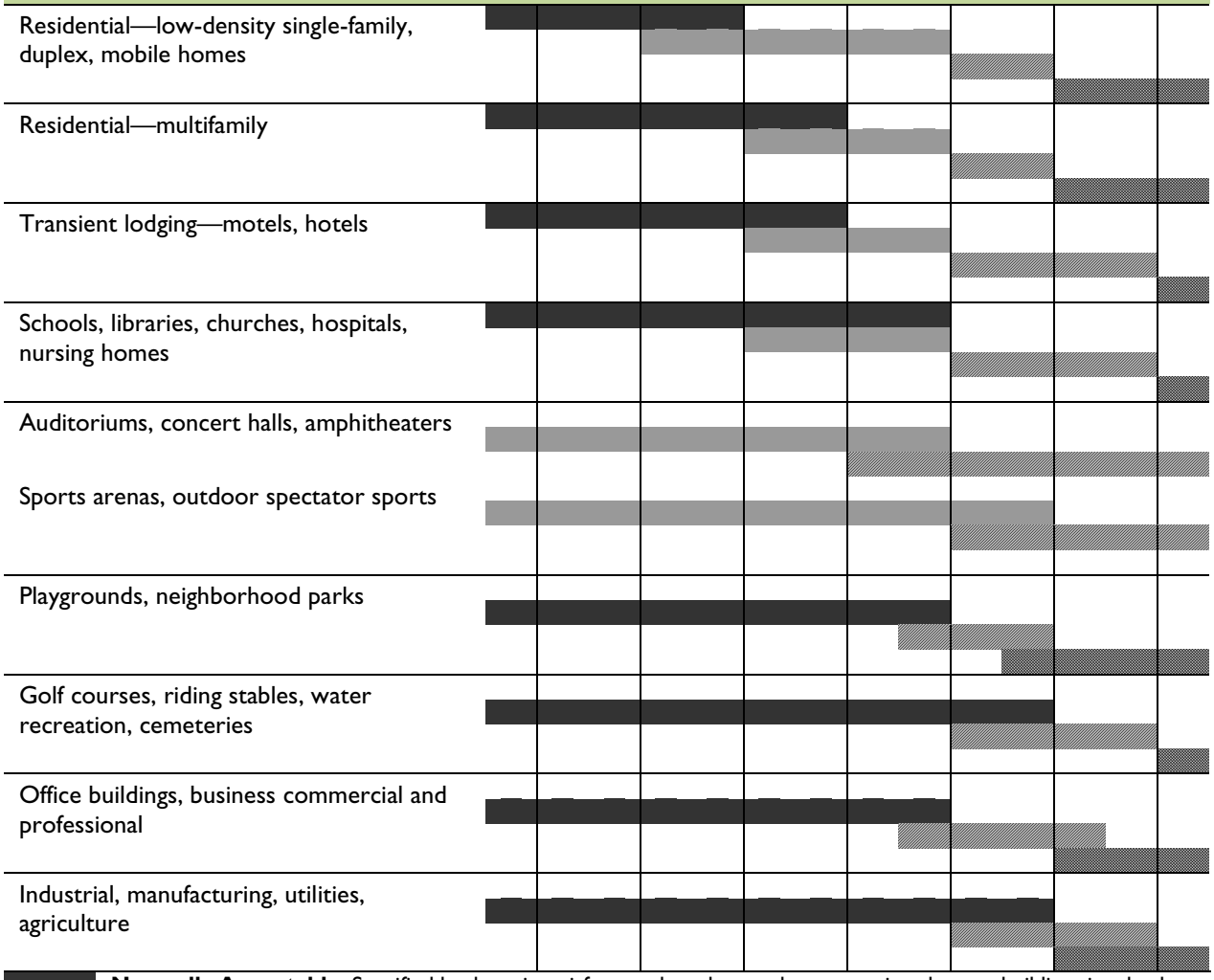
California Noise Insulation Standards

Part 2 Title 24 of the California Code of Regulations (CCR) "California Noise Insulation Standards" establishes minimum noise insulation standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses and dwellings other than single-family residences. Under this regulation, interior noise levels attributable to exterior noise sources cannot exceed 45 L_{dn} in any habitable room. Where such residences are located in an environment where exterior noise is 60 L_{dn} or greater, an acoustical analysis is required to ensure that interior levels do not exceed the 45 L_{dn} interior standard.

Division of Aeronautics Noise Standards

Title 21 Chapter 5000 of the CCR identifies noise compatibility standards for airport operations. Section 5014 of the code states that the standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is established to be a community noise equivalent level (CNEL) of 65 dB. Land uses such as residences, schools, hospitals, or places of worship exposed to aircraft noise exceeding 65 dB CNEL are deemed to be in a noise-impact area. This standard forms the basis for the limitation that no proprietor of an airport shall operate an airport such that incompatible land uses as those described above lie within a noise-impact area, unless the operator has applied for or received a variance.

Table 8-14: State Land Use Compatibility Standards for Community Noise Environment



Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after analysis of noise reduction requirements if noise insulation features are included in the design. Conventional construction with closed windows and fresh air systems or air conditioning will normally suffice.

Normally Unacceptable: Development should generally be discouraged. If development does proceed, analysis of the noise reduction requirements must be made, and noise insulation features included in the design.

Clearly Unacceptable: New construction or development generally should not be undertaken.

CNEL = Community noise equivalent level.

Source: Governor's Office of Planning and Research, 2003

Local Regulations

General Plan

The current noise element of the City's General Plan establishes goals and policies intended to limit community exposure to excessive noise levels. Visalia's current General Plan identifies noise sources such as roadways, rails, and airports within the city and includes land use compatibility guidelines. In addition, Implementation Policy 2.2 states that an acoustical analysis may be required if existing or projected future noise exposure at the exterior of buildings which will contain noise sensitive uses or within proposed outdoor activity areas exceeds 65 dB, Ldn, or if interior noise levels resulting from offsite noise are estimated to exceed 45 dBA.

Noise Ordinance

Section 8.36 of the City's Municipal Code contains the City's noise ordinance, which establishes exterior and interior noise level standards. Exterior and interior (Table 8-15) noise levels may not exceed any of the categorical noise level standards shown in the following tables:

Table 8-15: City of Visalia Noise Level Standards, dBA

Category	*Cumulative number of minutes in any one hour time period*	*Evening and daytime (6:00 a.m. to 7:00 p.m.)*	*Nighttime (7:00 p.m. to 6:00 a.m.)*
Exterior Levels			
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65
Interior Levels			
1	5	45	35
2	1	50	40
3	0	55	45

Source: City of Visalia, 2010

Noise Sensitive Land Uses

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Places where people live, sleep, recreate, worship and study generally are considered to be sensitive to noise because intrusive noise can be disruptive to these activities.

Low, medium, and high density residential uses are scattered throughout the city. Residential uses also are located near the SR 99/Highway 198 corridor, but are mainly concentrated east of N Shirk Street along Highway 198 (north of W. Visalia Parkway and south of W. Pratt Avenue). Schools, public parks and recreation areas, libraries, hospitals, and churches/places of worship are located throughout the city.

Major Mobile Noise Sources

Highways and Roadways

The FHWA Traffic Noise Model (TNM) version 2.5 was used to develop L_{dn} (24-hour average) noise contours for major roadways in the General Plan study area. The FHWA Model predicts hourly Leq values for free-flowing traffic conditions. Estimates of the hourly distribution of traffic for a typical 24-hour period were used to develop Ldn values from Leq values.

Traffic data representing annual average traffic volumes and truck mix, for existing conditions, were obtained from the project traffic engineers (Omni Means, 2010) and Caltrans. Using these data and the FHWA methodology, traffic noise levels, as defined by L_{dn}, were calculated for existing traffic volumes. The traffic noise level at 50 feet from the roadway centerline and distances from the centerlines of selected roadways to the 55 dB, 60 dB, 65 dB, and 70dB L_{dn} contours are summarized in Table 8-16. In many cases, the actual distances to noise level contours may vary from the distances predicted by the FHWA model. Factors such as roadway curvature, roadway grade, shielding from local topography or structures, elevated roadways, or elevated receivers may affect actual sound propagation. The distances reported are considered to be conservative estimates of noise exposure along roadways in the city.

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Akers St	Visalia Pkwy to	Caldwell Ave	64	<50 feet	49	88
Akers St	Caldwell Ave to	Whitendale Ave	67	33	68	118
Akers St	Whitendale Ave to	Walnut Ave	68	39	76	129
Akers St	Walnut Ave to	Tulare Ave	69	47	86	149
Akers St	Tulare Ave to	Cypress Ave	69	51	91	158
Akers St	Cypress to	Noble Ave	71	59	101	180
Akers St	Noble Ave to	Hillsdale Ave	69	52	92	160
Akers St	Hillsdale Ave to	Hurley Ave	69	45	83	143
Akers St	Hurley Ave to	Goshen Ave	67	<50 feet	66	115
Akers St	Goshen Ave to	Ferguson Ave	65	<50 feet	58	100
Akers St	Ferguson Ave to	Riggin Ave	63	<50 feet	45	82
Ben Maddox Way	Caldwell Ave to	K Ave	63	<50 feet	45	83
Ben Maddox Way	K Ave to	Walnut Ave	64	<50 feet	50	90
Ben Maddox Way	Walnut Ave to	Tulare Ave	65	<50 feet	56	97
Ben Maddox Way	Tulare Ave to	Noble Ave	67	<50 feet	67	119
Ben Maddox Way	Noble Ave to	Mineral King Ave	68	44	82	143
Ben Maddox Way	Mineral King Ave to	Main St	68	43	81	141
Ben Maddox Way	Main St to	Goshen Ave	68	39	76	132
Ben Maddox Way	Goshen Ave to	Houston Ave	67	34	69	122
Ben Maddox Way	Houston Ave to	St Johns Pkwy	67	38	74	126
Bridge St	Tulare Ave to	Noble Ave	59	<50 feet	<50 feet	48

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Bridge St	Noble Ave to	Mineral King Ave	61	<50 feet	<50 feet	64
Bridge St	Mineral King Ave to	Main St	63	<50 feet	38	76
Bridge St	Main St to	Murray Ave	58	<50 feet	<50 feet	39
Burke St	Cambridge Ave to	Tulare Ave	54	<50 feet	<50 feet	<50 feet
Burke St	Tulare Ave to	Noble Ave	58	<50 feet	<50 feet	44
Burke St	Noble Ave to	Mineral King Ave	60	<50 feet	<50 feet	52
Burke St	Mineral King Ave to	Center Ave	59	<50 feet	<50 feet	49
Burke St	Center Ave to	Douglas Ave	57	<50 feet	<50 feet	36
Caldwell Ave	Shirk St to	Akers St	68	41	77	129
Caldwell Ave	Akers St to	Linwood St	70	53	92	157
Caldwell Ave	Linwood St to	Demaree St	70	52	92	158
Caldwell Ave	Demaree St to	County Center Dr	69	51	90	158
Caldwell Ave	County Center Dr to	Mooney Blvd	68	41	78	135
Caldwell Ave	Mooney Blvd to	Fairway St	68	40	77	133
Caldwell Ave	Fairway St to	Court St	70	56	96	167
Caldwell Ave	Court St to	Santa Fe St	70	54	94	163
Caldwell Ave	Santa Fe St to	Ben Maddox Way	70	54	94	162
Caldwell Ave	Ben Maddox Way to	Lovers Lane	68	43	80	135
Cameron Ave	County Center Dr to	Mooney Blvd	62	<50 feet	<50 feet	68
Cameron Ave	Mooney Blvd to	Oak View St	64	<50 feet	51	92
Cameron Ave	Oak View St to	West St	64	<50 feet	46	87
Cameron Ave	West St to	Court St	63	<50 feet	39	77
Campus Dr	Demaree St to	Woodland St	56	<50 feet	<50 feet	<50 feet
Chinowth St	Caldwell Ave to	Whitendale Ave	61	<50 feet	<50 feet	62
Chinowth St	Whitendale Ave to	Walnut Ave	61	<50 feet	<50 feet	64
Chinowth St	Walnut Ave to	Tulare Ave	62	<50 feet	36	72
Chinowth St	Tulare Ave to	Noble Ave	64	<50 feet	47	86
Chinowth St	Noble Ave to	Mineral King Ave	64	<50 feet	51	92
Chinowth St	Mineral King Ave to	Goshen Ave	63	<50 feet	42	80
Conyer St	Walnut Ave to	Tulare Ave	61	<50 feet	<50 feet	60
Conyer St	Tulare Ave to	Noble Ave	61	<50 feet	<50 feet	59
Conyer St	Noble Ave to	Mineral King Ave	61	<50 feet	<50 feet	63

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Conyer St	Mineral King Ave to	Main St	60	<50 feet	<50 feet	56
Conyer St	Main St to	School Ave	56	<50 feet	<50 feet	<50 feet
Court St	Cameron Ave to	Caldwell Ave	66	<50 feet	59	102
Court St	Caldwell Ave to	Whitendale Ave	66	<50 feet	64	111
Court St	Whitendale Ave to	Walnut Ave	66	<50 feet	62	110
Court St	Walnut Ave to	Tulare Ave	64	<50 feet	49	91
Court St	Tulare Ave to	Noble Ave	62	<50 feet	34	70
Court St	Ne Third Ave to	Houston Ave	59	<50 feet	<50 feet	47
Court St	Houston Ave to	Vine Ave	60	<50 feet	<50 feet	56
Court St	Vine Ave to	Ferguson Ave	59	<50 feet	<50 feet	46
Court St	Ferguson Ave to	Robin Ave	57	<50 feet	<50 feet	33
Demaree St	Visalia Pkwy to	Caldwell Ave	64	<50 feet	46	86
Demaree St	Caldwell Ave to	Tulare Ave	66	<50 feet	66	116
Demaree St	Tulare Ave to	Mineral King Ave	66	<50 feet	60	107
Demaree St	Mineral King Ave to	Mill Creek Dr	65	<50 feet	56	100
Demaree St	Mill Creek Dr	Goshen Ave	66	<50 feet	65	116
Demaree St	Goshen Ave	Houston Ave	66	<50 feet	64	113
Demaree St	Houston Ave	Ferguson Ave	65	<50 feet	55	97
Demaree St	Ferguson Ave	Riggin Ave	64	<50 feet	49	89
Demaree St	Riggin Ave	Shannon Pkwy	63	<50 feet	44	82
Demaree St	Shannon Pkwy	Pratt Ave	61	<50 feet	<50 feet	61
Giddings St	Whitendale Ave	Evans Ave	63	<50 feet	42	79
Giddings St	Evans Ave	Walnut Ave	64	<50 feet	50	90
Giddings St	Walnut Ave	Cambridge Ave	65	<50 feet	56	97
Giddings St	Cambridge Ave	Tulare Ave	64	<50 feet	50	90
Giddings St	Tulare Ave	Myrtle Ave	63	<50 feet	44	83
Giddings St	Myrtle Ave	Noble Ave	65	<50 feet	53	93
Giddings St	Noble Ave	Mineral King Ave	64	<50 feet	49	89
Giddings St	Mineral King Ave to	Main St	59	<50 feet	<50 feet	51
Giddings St	Main St to	Murray Ave	58	<50 feet	<50 feet	42
Giddings St	Murray Ave to	Goshen Ave	54	<50 feet	<50 feet	<50 feet
Giddings St	Roosevelt Ave to	Houston Ave	51	<50 feet	<50 feet	<50 feet
Giddings St	Houston Ave to	Ferguson Ave	61	<50 feet	<50 feet	61
Giddings St	Ferguson Ave to	Robin Ave	61	<50 feet	<50 feet	59
Giddings St	Robin Ave to	Riggin Ave	58	<50 feet	<50 feet	44
Giddings St	Riggin Ave to	Shannon Pkwy	53	<50 feet	<50 feet	<50 feet

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Goshen Ave	Camp Dr to	American St	66	<50 feet	63	108
Goshen Ave	American St to	Plaza Dr	68	42	78	131
Goshen Ave	Plaza Dr to	Shirk St	69	48	86	145
Goshen Ave	Shirk St to	Akers St	69	47	85	143
Goshen Ave	Akers St to	Chinowth St	70	58	99	171
Goshen Ave	Chinowth St to	Demaree St	71	60	103	181
Goshen Ave	Demaree St to	Mooney Blvd	69	45	83	141
Goshen Ave	Mooney Blvd to	Hall St	69	49	87	149
Goshen Ave	Hall St to	Giddings St	66	<50 feet	61	107
Goshen Ave	Burke St to	Ben Maddox Way	63	<50 feet	44	82
Goshen Ave	Ben Maddox Way to	Lovers Lane	62	<50 feet	<50 feet	67
Hall St	Main St to	Murray Ave	61	<50 feet	<50 feet	61
Hangars Way	Plaza Dr to	Airport Dr	57	<50 feet	<50 feet	37
Houston Ave	Linwood St to	Demaree St	60	<50 feet	<50 feet	58
Houston Ave	Demaree St to	Mooney Blvd	65	<50 feet	57	98
Houston Ave	Mooney Blvd to	Divisadero St	63	<50 feet	39	76
Houston Ave	Divisadero St to	Giddings St	63	<50 feet	43	82
Houston Ave	Giddings St to	Jacob St	64	<50 feet	46	86
Houston Ave	Jacob St to	Willis St	63	<50 feet	43	82
Houston Ave	Willis St to	Dinuba Blvd	65	<50 feet	53	96
Houston Ave	Dinuba Blvd to	Encina St	59	<50 feet	<50 feet	46
Houston Ave	Encina St to	Court St	59	<50 feet	<50 feet	47
Houston Ave	Court St to	Santa Fe St	60	<50 feet	<50 feet	56
Houston Ave	Santa Fe St to	Ben Maddox Way	61	<50 feet	<50 feet	60
Houston Ave	Ben Maddox Way to	Lovers Lane	59	<50 feet	<50 feet	48
Hurley Ave	Shirk St to	Akers St	56	<50 feet	<50 feet	<50 feet
Hurley Ave	Akers St to	Chinowth St	55	<50 feet	<50 feet	<50 feet
Jacob St	Goshen Ave to	Houston Ave	60	<50 feet	<50 feet	55
Jacob St	Murray Ave to	Goshen Ave	63	<50 feet	40	77
Jacob St	Main St to	Murray Ave	63	<50 feet	39	76
K Ave	Santa Fe St to	Ben Maddox Way	61	<50 feet	<50 feet	59
K Ave	Ben Maddox Way to	Santa Fe St	57	<50 feet	<50 feet	37

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Linwood St	Visalia Pkwy to	Caldwell Ave	55	<50 feet	<50 feet	<50 feet
Linwood St	Caldwell Ave to	Walnut Ave	61	<50 feet	<50 feet	63
Linwood St	Walnut Ave to	Noble Ave	70	57	97	164
Linwood St	Noble Ave to	Mineral King Ave	71	61	105	180
Linwood St	Mineral King Ave to	Crowley Ave	69	49	88	152
Linwood St	Crowley Ave to	Hurley Ave	63	<50 feet	44	81
Locust St	Tulare Ave to	Noble Ave	61	<50 feet	<50 feet	62
Lovers Lane	Caldwell Ave to	Walnut Ave	66	<50 feet	59	106
Lovers Lane	Walnut Ave to	Tulare Ave	62	<50 feet	35	72
Lovers Lane	Tulare Ave to	Noble Ave	61	<50 feet	<50 feet	59
Lovers Lane	Houston Ave to	St Johns Pkwy	58	<50 feet	<50 feet	44
Main St	County Center Dr to	Mooney Blvd	61	<50 feet	<50 feet	62
Main St	Mooney Blvd to	Hall St	64	<50 feet	52	92
Main St	Hall St to	Giddings St	64	<50 feet	45	84
Main St	Giddings St to	Conyer St	62	<50 feet	36	72
Main St	Conyer St to	West St	60	<50 feet	<50 feet	54
Main St	West St to	Ben Maddox Way	64	<50 feet	50	90
Main St	Ben Maddox Way to	Cain St	58	<50 feet	<50 feet	39
Main St	Cain St to	Mineral King Ave	61	<50 feet	<50 feet	65
Mineral King Ave	Akers St to	Crenshaw St	62	<50 feet	38	74
Mineral King Ave	Crenshaw St to	Demaree St	65	<50 feet	56	97
Mineral King Ave	Demaree St	County Center Dr	63	<50 feet	44	83
Mineral King Ave	County Center Dr to	Mooney Blvd	66	<50 feet	65	116
Mineral King Ave	Mooney Blvd to	West St	67	37	72	121
Mineral King Ave	Court St to	Ben Maddox Way	65	<50 feet	54	96
Mineral King Ave	Ben Maddox Way to	Cain St	61	<50 feet	<50 feet	63
Mineral King Ave	Cain St to	Main St	63	<50 feet	40	77
Mineral King Ave	Main St to	Lovers Lane	60	<50 feet	<50 feet	54
Mineral King Ave	Lovers Lane to	Mcauliff St	62	<50 feet	<50 feet	67
Mooney Blvd	Mineral King Ave to	Main St	62	<50 feet	37	73
Mooney Blvd	Goshen Ave to	Houston Ave	68	38	74	127

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Mooney Blvd	Houston Ave to	Ferguson Ave	67	35	71	122
Mooney Blvd	Ferguson Ave to	Riggin Ave	66	<50 feet	64	110
Plaza Dr	Walnut Ave to	Hangar Dr	66	<50 feet	64	110
Plaza Dr	Airport Dr to	Shwy 198	63	<50 feet	42	79
Plaza Dr	Shwy 198 to	Goshen Ave	64	<50 feet	50	89
Plaza Dr	Goshen Ave to	Ferguson Ave	66	<50 feet	59	102
Plaza Dr	Ferguson Ave to	Riggin Ave	66	<50 feet	63	110
Plaza Dr	Riggin Ave to	Avenue 320	63	<50 feet	45	82
Riggin Ave	Shirk St to	Akers St	66	<50 feet	60	102
Riggin Ave	Akers St to	Demaree St	64	<50 feet	46	84
Riggin Ave	Demaree St to	Mooney Blvd	58	<50 feet	<50 feet	38
Riggin Ave	Mooney Blvd to	Dinuba Blvd	55	<50 feet	<50 feet	<50 feet
Riggin Ave	Dinuba Blvd to	Santa Fe St	<50 feet	<50 feet	<50 feet	<50 feet
Santa Fe St	Caldwell Ave to	Walnut Ave	<50 feet	<50 feet	<50 feet	<50 feet
Santa Fe St	Walnut Ave to	Tulare Ave	<50 feet	<50 feet	<50 feet	<50 feet
Santa Fe St	Tulare Ave to	Noble Ave	<50 feet	<50 feet	<50 feet	<50 feet
Santa Fe St	Mineral King Ave to	Main St	<50 feet	<50 feet	<50 feet	<50 feet
Santa Fe St	Main St to	Center Ave	64	<50 feet	49	88
Santa Fe St	Center Ave to	Murray Ave	67	33	68	118
Santa Fe St	Murray Ave to	Houston Ave	68	39	76	129
Shirk St	Caldwell Ave to	Mineral King Ave	69	47	86	149
Shirk St	Mineral King Ave to	Doe Ave	69	51	91	158
Shirk St	Doe Ave to	Riggin Ave	71	59	101	180
St Johns Pkwy	Dinuba Blvd to	Burke St	69	52	92	160
St Johns Pkwy	Burke St to	Ben Maddox Way	64	<50 feet	46	84
St Johns Pkwy	Ben Maddox Way to	Buena Vista Ave	63	<50 feet	42	79
St Johns Pkwy	Buena Vista Ave to	Lovers Lane	63	<50 feet	40	76
Tulare Ave	Roeben St to	Akers St	60	<50 feet	<50 feet	58
Tulare Ave	Akers St to	Demaree St	63	<50 feet	39	76
Tulare Ave	Demaree St to	County Center Dr	64	<50 feet	45	84

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Tulare Ave	County Center Dr to	Woodland St	64	<50 feet	49	88
Tulare Ave	Chinowth St to	Mooney Blvd	64	<50 feet	45	85
Tulare Ave	Mooney Blvd to	Central St	64	<50 feet	47	88
Tulare Ave	Central St to	Bridge St	64	<50 feet	52	93
Tulare Ave	Bridge St to	Santa Fe St	63	<50 feet	44	84
Tulare Ave	Santa Fe St to	Ben Maddox Way	63	<50 feet	40	79
Tulare Ave	Ben Maddox Way to	Lovers Lane	64	<50 feet	47	86
Walnut Ave	Aviation Dr to	Shirk St	62	<50 feet	<50 feet	67
Walnut Ave	Shirk St to	Roeben St	61	<50 feet	<50 feet	60
Walnut Ave	Roeben St to	Akers St	64	<50 feet	46	84
Walnut Ave	Akers St to	Demaree St	64	<50 feet	50	90
Walnut Ave	Demaree St to	Woodland St	67	36	71	122
Walnut Ave	Woodland St to	Mooney Blvd	68	39	75	128
Walnut Ave	Mooney Blvd to	Central St	67	<50 feet	67	119
Walnut Ave	Central St to	Conyer St	67	36	72	126
Walnut Ave	Conyer St to	Court St	67	<50 feet	67	118
Walnut Ave	Court St to	Santa Fe St	68	39	76	130
Walnut Ave	Santa Fe St to	Ben Maddox Way	66	<50 feet	63	110
Walnut Ave	Ben Maddox Way to	Lovers Lane	68	45	83	140
Walnut Ave	Lovers Lane to	Mcauliff St	67	35	70	119
West St	Visalia Pkwy to	Cameron Ave	66	<50 feet	63	108
West St	Cameron Ave to	Caldwell Ave	51	<50 feet	<50 feet	<50 feet
West St	Caldwell Ave to	Whitendale Ave	55	<50 feet	<50 feet	<50 feet
West St	Whitendale Ave to	Beech Ave	59	<50 feet	<50 feet	45
West St	Noble Ave to	Acequia Ave	56	<50 feet	<50 feet	<50 feet
West St	Acequia Ave to	Main St	63	<50 feet	40	78
West St	Main St to	Center Ave	60	<50 feet	<50 feet	57
West St	Center Ave to	Murray Ave	59	<50 feet	<50 feet	46
Whitendale Ave	Roeben St to	Akers St	56	<50 feet	<50 feet	<50 feet
Whitendale Ave	Akers St to	Linwood St	63	<50 feet	42	79
Whitendale Ave	Linwood St to	Demaree St	64	<50 feet	50	90
Whitendale Ave	Demaree St to	Mooney Blvd	66	<50 feet	64	111

Table 8-16: Existing Traffic Noise Contours

				Distance to Contour (feet)		
Street	*Limits*		*Ldn at 50 feet*	*70 Ldn*	*65 Ldn*	*60 Ldn*
Whitendale Ave	Mooney Blvd to	Central St	67	34	70	120
Whitendale Ave	Central St to	Divisadero St	68	41	77	132
Whitendale Ave	Divisadero St to	Giddings St	67	34	69	120
Whitendale Ave	Giddings St to	West St	66	<50 feet	65	113
Whitendale Ave	West St to	Court St	65	<50 feet	53	93
Willis St	Mineral King Ave to	Acequia Ave	63	<50 feet	41	78
Willis St	Acequia Ave to	Main St	55	<50 feet	<50 feet	<50 feet
Willis St	Main St to	Center Ave	55	<50 feet	<50 feet	<50 feet
Willis St	Center Ave to	Murray Ave	57	<50 feet	<50 feet	<50 feet
Willis St	Murray Ave to	Grove Ave	58	<50 feet	<50 feet	44
Willis St	Grove Ave to	Houston Ave	54	<50 feet	<50 feet	<50 feet
Woodland St	Caldwell Ave to	Victor Ave	54	<50 feet	<50 feet	<50 feet
Woodland St	Walnut Ave to	Tulare Ave	56	<50 feet	<50 feet	<50 feet
Woodland St	Tulare Ave to	Noble Ave	57	<50 feet	<50 feet	34
Woodland St	Noble Ave to	Main St	56	<50 feet	<50 feet	<50 feet
SR 99	South Of SR 198		82	235	431	723
SR 99	SR 198	Goshen Ave	82	222	409	691
SR 99	North Of Goshen		82	221	407	689
SR 198	SR 99	Alta Ave	76	103	185	331
SR 198	Alta Ave	County Road 102	78	129	232	416
SR 198	County Road 102	West Main Street	80	163	294	518
SR 198	West Main Street	Route 63 South	80	173	311	544
SR 198	Route 63 South	Route 63 North	81	183	328	572
SR 198	Route 63 North	Ben Maddox Way	81	186	334	582
SR 198	Ben Maddox Way	Lovers Lane	79	146	261	468

Source: ICF, 2010

Railways

Railroad activity in the City occurs along two railroad lines: the Union Pacific Railroad (formerly the Southern Pacific) and the Burlington Northern Santa Fe (formerly the Atchinson, Topeka, and Santa Fe Railroad).

Train movements occur on the Union Pacific Railroad approximately 5 times per week during daytime hours. Trains will usually have one engine and 20 cars. There are typically no train

movements between the hours of 10:00 p.m. to 7:00 a.m., and train speeds are restricted to 10mph. Train movements rarely occur on the Burlington Northern Santa Fe Railroad (Mattera pers. comm.).

To represent a worst-case scenario, an SEL of 106.7 was used to calculate rail noise. This is the highest SEL measured in the 1995 General Plan Noise Element.

To determine the distances to the Ldn railroad contours, it was necessary to calculate the Ldn for typical train operations. This was done using the SEL values and above-described number and distribution of daily freight train operations. The Ldn may be calculated as follows:

Ldn = SEL + 10 log Neq - 49.4 dB, where:

SEL is the mean SEL of the event, Neq is the sum of the number of daytime events (7 a.m. to 10 p.m.) per day plus 10 times the number of nighttime events (10 p.m. to 7 a.m.) per day, and 49.4 is 10 times the logarithm of the number of seconds per day. Based upon the above-described noise level data, number of operations and methods of calculation, the Ldn values for railroad line operations have been calculated, and the distances to the Ldn noise level contours are shown in Table N-12. The calculations are based upon the estimated number of freight train operations per day, and the distribution of the trains throughout the daytime and nighttime hours. Because the Burlington Northern Santa Fe Railroad is used so infrequently, only noise from the Union Pacific Railroad is shown below.

Table 8-17: Approximate Distances to Railroad Noise Contours for Union Pacific Railroad

Ldn at 100 feet	*Distance to Ldn Contour (feet)*		
Without Warning Horns			
	60dB	*65dB*	*70dB*
57.6	69.2	32.1	14.9

Source: ICF, 2010

Where grade crossings exist, and warning horns and crossing alarms are signaled, individual single event noise levels associated with a train generally will increase by approximately 10 dB. Warning horns generally are signaled within one-quarter mile of a grade crossing. Therefore, Ldn values are expected to increase between 5 dB and 10 dB above those reported in Table 8-17, within one-quarter mile of a railroad grade crossing.

Airports

The Visalia Municipal Airport is the only airport in Tulare County that has scheduled airline service. The noise impacts from these public airports were analyzed in the 2004 *Airport Master Plan*. Current average daily activity is estimated at 71 takeoffs and landings and approximately 26,000 operations per year. The projected 2019 total activity level is 90 takeoffs and landings and approximately 33,000 operations per year.

The *Airport Master Plan* establishes procedures and criteria for reviewing proposed development in the Airport environs. All land uses located outside of the 65 dB CNEL contours are considered compatible. However, residential and lodging land uses located between the 55 dB and 60 dB CNEL contours could generate complaints. This can be expected because the background noise levels, absent of aircraft overflights, are low. Maximum noise levels due to typical single engine aircraft overflights can range between 65 dB and 80 dB, which may be annoying to individuals.

The *Airport Master Plan* has developed CNEL noise-level contours for two scenarios: current (1999) and 20-year projected (2019) average daily airport activity levels. These scenarios will be used in developing and evaluating land use proposals for the airport environs to ensure conflicts do not arise that would affect future airport operations.

Major Stationary Noise Sources

Noise can result from many industrial processes, even when the best available noise control technology is applied. Noise exposures within industrial facilities are controlled by federal and state employee health and safety regulations set by the Occupational Safety and Health Administration [OSHA] and Cal-OSHA, but exterior noise levels may exceed locally acceptable standards. Commercial, recreational and public service facility activities can also produce noise that affects adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components that may be annoying to individuals who live nearby. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day and existing ambient noise levels.

From a land use planning perspective, fixed-source noise control issues focus upon two goals:

1. To prevent the introduction of new noise-producing uses in noise-sensitive areas.

2. To prevent encroachment of noise sensitive uses upon existing noise-producing facilities. The first goal can be achieved by applying noise level performance standards to proposed new noise-producing uses. The second goal can be met by requiring that new noise-sensitive uses in near proximity to noise-producing facilities include mitigation measures to ensure compliance with noise performance standards.

Fixed noise sources that are typically of concern include those listed in Table 8-18:

Table 8-18: Typical Noise Sources

HVAC Systems	Cooling Towers/Evaporative Condensers
Pump Stations	Lift Stations
Steam Valves	Steam Turbines
Generators	Fans
Air Compressors	Heavy Equipment
Conveyor Systems	Transformers
Pile Drivers	Grinders
Drill Rigs	Gas or Diesel Motors
Welders	Cutting Equipment
Outdoor Speakers	Blowers
Chippers	Cutting Equipment
Loading Docks	Amplified music and voice

Source: ICF, 2010

Land use uses that may typically produce the noise described above include wood processing facilities, pump stations, industrial facilities, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, public works projects, batch plants, bottling and canning plants, recycling centers, electric generating stations, race tracks, landfills, sand and gravel operations, special events such as concerts, and athletic fields.

Manufacturing Plants

Gang Nails Truss Company

This business manufactures trusses for the building trade and is located at the corner of Goshen Avenue and Shirk Road. Operations have not changed since the 1995 General Plan. The plant typically operates from 8:00 a.m. to 10:00 p.m. Major noise producing equipment at the plant are nail machines and component cutter saws. Noise levels from the nail machine were measured in 1986 and ranged from 65-70 dBA at fifty feed. Noise levels from the saw at 100 feet ranged from 69-71 dBA. These machines operate intermittently. Industrial land uses surround the plant.

Food Processing Plants

Knudsen/Draft Dairy Plant

The Kundsen/Draft Dairy Plant, located at 715 N. Divisadero Avenue, processes fresh milk into several dairy products. While the plant is under new ownership, the operations have not changed since the 1995 General Plan. The major noise producing equipment the plant are boilers, exhaust fans, and the power plant evaporator. Approximately 12-24 trucks bring products into the plant per day. Noise measurements were taken around the perimeter of the plant in 1987. East of the plant near 716 N. Divisadero, noise levels arranged from 58-60 dBA. West of the plant on Leslie Street the measured noise level was 62-63 dBA.

Advanced Food Products

Advanced Food Products, located at 1211 E Noble Avenue prepares sterilized food products. The plant operates Monday through Friday for 24 hours a day. The main noise sources in the plant are boilers and the conveyer system. Noise level measurements were taken at 1985 at a distance of about 100 feet east of the plant. Noise levels were about 62-63 dBA. Noise at the closest residential interface to the plant (about 300 feet to the west) ranged from 52-53 dBA.

Walnut Dryers/Hullers

Three walnut processing facilities are in Visalia: The Phil Moodey walnut huller at Road 156 and Avenue 280, the Blain Farming nut shelling operation at 1240 E. Caldwell Avenue, and the Sequoia Walnut Growers Association Facility at Ben Maddox Road and Goshen Avenue. The dominant noise source is at the Phil Moodey facility where the blower separates the nuts from other materials. This facility operates a few hours per day. Noise levels of 77-78 dBA were measured at 100 feet from the blower. The Moodey plant is surrounded by agricultural uses. Roof mounted fans were the dominant noise source at the Blain Farming facility. All other noise producing equipment is enclosed within the building. Noise levels of 76-78 dBA were measured at 100 feet west of the plant. Agricultural uses surround the plant. The dominant noise source at the Sequoia Walnut Growers Association plant is a rubber conveyor belt. Noise levels ranged from 68-69 dBA at a distance of 100 feet from the north side of the building. The plant operates from 8:00 a.m. to 5:00 p.m. for approximately 6 weeks per year. The plant is currently surrounded by other businesses, including a used car lot and a Sonic fast food restaurant.

Sand and Gravel Extraction and Processing

Vicon, a ready-mix batch plant, evaluated in the 1995 General Plan, is no longer in operation.

Agricultural Operations

Aerial Application Aircraft (Crop Dusters) and Other Farming Operations

Aerial application aircraft are frequently used to spray crops or to spread seed or fertilizers. The horsepower ratings of various aircraft used for aerial application generally ranges from 300 to 1200. Measurements were conducted with a Piper Brave (300 hp/3-bladed propeller) show noise ranged from 85-88 dBA at about 600 feet, and 97-100 dBA at fifty feet. By contrast, measurements

conducted with a Grumman Ag Cat (600 hp/2-bladed propeller indicated a maximum noise level of 103 dBA at 100 to 150 feet overhead. Finally, measurements taken at the Tulare Municipal Airport in 1998 of a 800 hp Turbine Thrust with a two-bladed propeller range showed noise from in the 90-95 dBA range at approximately 100 feet overhead.

Other farming operations that take place in the planning area are not expected to generate significant cumulative noise in the city.

Other Noise Sources

Tulare County Landfill, Road 80

Operations at the Tulare County Landfill have not changed since the 1995 General Plan. Noise monitoring for this solid waste landfill documented noise from refuse trucks and automobiles entering and leaving the landfill, and the heavy equipment use to manage and cover the refuse. Noise levels ranged from 63-68 dBA at a distance of 300 feet. The posted operating hours of the landfill are 8:00 a.m. to 4:00 p.m., seven days a week.

General Service Commercial and Light Industrial Uses

Noise sources associated with service commercial uses such as automotive repair facilities, wrecking yards, tire installation centers, car washes, loading docks, etc., are found at various locations within the city. The noise emissions of these types of uses are dependent on many factors and are therefore difficult to quantify precisely. Nonetheless, noise generated by the these uses contributes to the ambient noise environment in the immediate vicinity of these uses and should be considered where either new noise-sensitive uses are proposed nearby or where similar uses are proposed in existing residential areas.

Parks and School Playing Fields

There are numerous park and school uses within the city. Noise generated by these uses depends on the age and number of people utilizing the respective facility at a given time and the types of activities they are engaged in. School playing field activities tend to generate more noise than those of neighborhood parks, as the intensity of school playground usage tends to be higher. At a distance of 100 feet from an elementary school playground being used by 100 students, average and maximum noise levels of 60 and 75 dB, respectively, can be expected. At organized events such as high-school football games with large crowds and public address systems, the noise generation is often significantly higher. As with service commercial uses, the noise generation of parks and school playing fields is variable.

Community Noise Survey

A community noise survey was conducted to document noise exposure in the city containing noise sensitive land uses and for major roadways. Noise monitoring sites were selected to be representative of typical residential, commercial, or recreational areas within the city (see ***Figure 8-7***).

Short-term noise monitoring was conducted at eight sites on April 15 and 16, 2010. Community noise monitoring systems were calibrated with acoustical calibrators in the field prior to use. The systems comply with all pertinent requirements of the American National Standards Institute (ANSI) for Type I sound level meters.

Three continuous long-term 24-hour noise monitoring sites were also established in the city to record day-night statistical noise level trends and to develop CNEL values. The data collected included the hourly average (L_{eq}) the maximum level (L_{max}), and the minimum level (Lmin) during the

measurement period. Noise monitoring sites and the measured noise levels at each short-term site are summarized in Table 8-19.

Table 8-19: Short-Term Noise Measurements (2010)

				Measured Sound Level, dB		
Site	*Location*	*Date*	*Time*	L_{eq}	L_{min}	L_{max}
1	Community Campus, 220 NW 3rd Ave	4/15/10	15 minutes	53.5	45.1	65.1
2	Golden West High School 1717 N. McAuliff	4/15/10	15 minutes	49.8	42.2	62.1
3	Rec Park/Rawhide Stadium	4/15/10	15 minutes	50.7	45.2	60.8
4	College of the sequoias, 915 S. Mooney at Mineral King	4/15/10	15 minutes	50.3	47.1	58.9
5	Jefferson Park, Myrtle and S Watson	4/15/10	15 minutes	53.8	47.8	66.6
6	Willow Glen School, 310 N Akers	4/15/10	15 minutes	55.1	47.1	65.1
7	Crestwood School, 3001 W Whitendale Ave	4/15/10	15 minutes	54.9	46.3	70.2
8	Highway 198 and Lovers Lane	4/15/10	15 minutes	67.0	57.6	82.6

Source: ICF, 2010

Insert Figure 8-7

Back of Figure

Twenty-four hour noise measurements shown Table 8-20 indicate that the Golden West High School campus is fairly noisy, but the two other locations are fairly quiet to moderately noisy.

Table 8-20: Long-Term Noise Measurements Results (April 15, 2010)

Site	*Location*	*CNEL*
9	Community Campus, 220 NW 3rd Ave	57.5
10	Golden West High School 1717 N. McAuliff	71.1
11	Rec Park/Rawhide Stadium	51.8

Source: ICF, 2010

8.10 Issues and Planning Implications

As several previous chapters have described, Visalia's natural resources are an important community asset and provide the City with a unique identity. Features such as the river, creeks, Valley Oak trees, and the nearby Sierra Nevada range were frequently cited as some of the city's most important qualities by the public. Moreover, environmental resources and hazards have important ties to public health. Their recognition and appropriate management are critical components of the General Plan Update.

Emerging Themes

The following themes regarding natural resources and hazards emerged from existing conditions research and feedback from public outreach efforts.

- **Recognize and protect resources**. Many members of the public quickly identified Visalia's natural resources as important assets and key contributors to the city's high quality of life as well as a potential draw for tourism and convention center business. Conservation and stewardship of these resources was a clear theme throughout the initial public outreach process. Care and protection of the environment extends to both the more tangible aspects—trees, creeks—to the more intangible, such as air and water quality and greenhouse gas emissions.

- **Avoid hazards.** Visalia is at a relatively low risk for many natural hazards that threaten other communities in California, such as earthquakes and wildfires. However, certain natural conditions do pose risks to the city and must be dealt with from both physical planning and policy perspectives. These include, for example, flooding, contaminated sites, and health risks associated with poor air quality.

- **Minimize impacts**. Certain environmental impacts are associated with urban growth and development at any level. These include consumption of land and resources, reduction of habitat, and creation of noise. Steps can be taken in all environmental arenas to minimize the impacts associated with these consequences of development; for example, properly locating noise-sensitive receptors and promoting compact and infill development that converts a minimum of greenfields.

Planning Implications

The natural environment is as much a part of the city as its built environment, giving structure and value to the community as a whole. Residents of Visalia are keenly aware of their environmental resources and seek to conserve and protect them. The General Plan Update will comprehensively analyze and write new policies, as needed, for all natural resources and hazards, as they affect public health, economic and community vitality, and ecological functioning. A three-pronged approach that conserves resources, avoids hazards, and minimizes impacts associated with urban development will form the plan's approach to environmental issues. Additionally, a program-level Environmental Impact Report (EIR) will be written simultaneously with the General Plan, ensuring that all impacts associated with the plan are accounted for, and that the plan's policies are "self-mitigating."