8. SAFETY

8.1 Introduction

This chapter of the Background Report will identify hazards currently affecting the area as well as those that may affect the area in the future. This chapter has been divided into the following five sections:

- Geologic and Seismic Hazards (Section 8.2);
- Flood Hazards (Section 8.3);
- Fires Hazards (Section 8.4);
- Human-made Hazards (Section 8.5); and
- Noise (Section 8.6).

8.2 Geologic and Seismic Hazards

Introduction

This section provides an overview of the general topographical, geologic, and seismic conditions that characterize Tulare County. Specific topics addressed under this section include a description of the regulations that affect geology and seismicity, the locations of active and potentially active faults and associated seismic hazards, and a listing of all geologic hazards unique to Tulare County.

Methods

Information for this section was collected from the United States Geological Survey, California Department of Conservation - Division of Mines and Geology, and Tulare County staff.

Key Terms

The following key terms are used throughout this section to describe geologic and seismic hazards and the framework that regulates them.

- **Alquist-Priolo Fault Zone**. The Alquist-Priolo Earthquake Fault Zoning Act, passed in 1972, requires the State Geologist to identify zones of special study around active faults.

- **Fault.** A fault is a fracture in the Earth's crust that is accompanied by displacement between the two sides of the fault. An active fault is defined as a fracture that has shifted in the last 10,000 to 12,000 years (Holocene Period). A potentially active fault is one that has been active in the past 1.6 million years (Quaternary Period). A sufficiently active fault is one that shows evidence of Holocene displacement on one or more of its segments or branches (Hart, 1997).

- **Liquefaction.** Liquefaction in soils and sediments occurs during earthquake events, when soil material is transformed from a solid state to a liquid state, generated by an increase in pressure between pore space and soil particles. Earthquake-induced liquefaction typically occurs in low-lying areas with soils or sediments composed of unconsolidated, saturated, clay-free sands and silts, but it can also occur in dry, granular soils or saturated soils with partial clay content.

- **Magnitude.** Earthquake magnitude is measured by the Richter scale, indicated as a series of Arabic numbers with no theoretical maximum magnitude. The greater the energy released from the fault rupture, the higher the magnitude of the earthquake. Magnitude increases logarithmically in the Richter scale; thus, an earthquake of magnitude 7.0 is thirty times stronger than one of magnitude 6.0. Earthquake energy is most intense at the point of fault slippage, the epicenter, which occurs because the energy radiates from that point in a circular wave pattern. Like a pebble thrown in a pond, the increasing distance from an earthquake's epicenter translates to reduced groundshaking.

Regulatory Setting

Government Code Section 65302(g) discusses the significant issues that a General Plan must address in its Safety Element. Among these issues are the potential for seismically induced surface rupture, groundshaking, ground failure, tsunami, seiche, slope instability, and subsidence. Seismic and geologic hazards must be considered in determining design and building standards, and the location of future development, in order to minimize or mitigate the risk of injury,

death and property damage which could result from natural and man-made hazards.

Regulations that Affect Geologic and Seismic Conditions

- **Alquist-Priolo Earthquake Fault Zoning Act.** The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act), signed into law December 1972, requires the delineation of zones along active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near active fault traces to reduce the hazards associated with fault rupture and to prohibit the location of most structures for human occupancy across these traces. Cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations are conducted in order to demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture is not necessarily restricted to the area within an Alquist-Priolo Zone.

- **Seismic Hazards Mapping Act (1991).** The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong groundshaking, liquefaction, landslides, or other ground failure/hazards caused by earthquakes. This act requires the State Geologist to delineate seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site has to be conducted and appropriate mitigation measures incorporated into the project design.

- **California Building Code.** The California Building Code is another name for the body of regulations known as the California Code of Regulations (C.C.R.), Title 24, Part 2, which is a portion of the California Building Standards Code. Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable (Bolt, 1988).

  Published by the International Conference of Building Officials, the Uniform Building Code is a widely adopted

model building code in the United States. The California Building Code incorporates by reference the Uniform Building Code with necessary California amendments. About one-third of the text within the California Building Code has been tailored for California earthquake conditions.

- **California Health and Safety Code.** California Health and Safety Code Section 1250 defines essential facilities as those structures which are necessary for emergency operations subsequent to a natural disaster. These facilities include hospitals and other medical facilities having surgery and emergency treatment areas, fire and police stations, tanks or other structures containing water or other fire-suppression materials, emergency vehicle shelters and garages, structures and equipment in emergency-preparedness centers, standby power-generating equipment for essential facilities, and structures and equipment in government communication centers and other facilities required for emergency response. These facilities are subject to more stringent design and construction standards, as prescribed in Title 24, Chapter 23 of the Code of California Regulations, thus minimizing potential damage. Chapter 23 also applies to skilled nursing facilities, public schools and state-owned or state-leased essential services buildings regulated by the Office of Statewide Health Planning and Development and the Office of the State Architect, Structural Safety Section.

- **California Department of Transportation.** Caltrans has developed roadway design standards including those for seismic safety. Consideration of earthquake hazards in roadway design is detailed in the Highway Design Manual published by Caltrans (1995). Modifications to local highways and roads would be required to adhere to Caltrans engineering standards to minimize settlement.

Existing Conditions

Tulare County is divided into two major physiographic and geologic provinces: the Sierra Nevada Mountains and the Central Valley. The Sierra Nevada Physiographic Province, in the eastern portion of the county, is underlain by metamorphic and igneous rock. It consists mainly of homogeneous granitic rocks, with several islands of older metamorphic rock. The central and western parts of the county are

part of the Central Valley Province, underlain by marine and non-marine sedimentary rocks. It is basically a flat, alluvial plain, with soil consisting of material deposited by the uplifting of the mountains.

The foothill area of the county is essentially a transition zone, containing old alluvial soils that have been dissected by the west-flowing rivers and streams that carry runoff from the Sierra Nevada Mountains. This gently rolling topography is punctured in many areas by outcropping soft bedrock. The native mountain soils are generally quite dense and compact.

Seismicity

Seismicity varies greatly between the two major geologic provinces represented in Tulare County. The Central Valley is an area of relatively low tectonic activity bordered by mountain ranges on either side. The Sierra Nevada Mountains, partially located within Tulare County, are the result of movement of tectonic plates which resulted in the creation of the mountain range. The Coast Range on the west side of the Central Valley is also a result of these forces, and the continued uplifting of Pacific and North American tectonic plates continues to elevate these ranges. The remaining seismic hazards in Tulare County generally result from movement along faults associated with the creation of these ranges.

Earthquakes are typically measured in terms of magnitude and intensity. The most commonly known measurement is the Richter Scale, a logarithmic scale which measures the strength of a quake. The Modified Mercalli Intensity Scale measures the intensity of an earthquake as a function of the following factors:

- Magnitude and location of the epicenter;
- Geologic characteristics;
- Groundwater characteristics;
- Duration and characteristic of the ground motion;
- Structural characteristics of a building.

Faults

Faults are the indications of past seismic activity. It is assumed that those that have been active most recently are the most likely to be active in the future. Recent seismic activity is measured in geologic

terms. Geologically recent is defined as having occurred within the last two million years (the Quaternary Period). All faults believed to have been active during Quaternary time are considered "potentially active."

Although a number of faults have been located along the western edge of the Sierra Nevada Mountains, none are known to be active. The Owens Valley Fault Group poses the greatest seismic threat. The center of the fault zone is thought to be able to produce a maximum probable earthquake of 7.0 on the Richter Scale at a recurrence interval of 125 years, while the central area is thought to be capable of producing an earthquake of 8.25 magnitude every 300 to 10,000 years.

In 1973, five counties within the Southern San Joaquin Valley undertook the preparation of the Five County Seismic Safety Element to assess seismic hazards. The Element identifies areas of potential seismic activity, including Doyle Springs and most of the Moorehouse subareas, as being in the Sierra 1 (S1) Zone (eastern Sierra Nevada). All of the subareas east of and including Sequoia Crest, Pierpoint, and Roger's Camp lie within the Sierra 2 (S2) Zone (eastern Sierra Nevada, south of Owens Valley fault). In general, zones C1, S1, and V1 are safer than zones C2, S2, and V2.

Hazards due to groundshaking are considered to be "minimal" in the S1 Zone and "minimal" to "moderate" in the S2 and S2S Zones. Development occurring within the S1 Seismic Zone must conform to the Uniform Building Code-Zone II; while development within the S2 Zone must conform to Uniform Building Code-Zone III. There are three faults within the region that have been, and will be, principal sources of potential seismic activity within Tulare County. These faults are described below:

- **San Andreas Fault.** The San Andreas Fault is located approximately 40 miles west of the Tulare County boundary. This fault has a long history of activity, and is thus the primary focus in determining seismic activity within the county. Seismic activity along the fault varies along its span from the Gulf of California to Cape Mendocino. Just west to Tulare County lies the "Central California Active Area," where many earthquakes have originated.

- **Owens Valley Fault Group.** The Owens Valley Fault Group is a complex system containing both active and potentially active faults, located on the eastern base of the Sierra Nevada

Mountains. The Group is located within Tulare and Inyo Counties and has historically been the source of seismic activity within Tulare County.

- **Clovis Fault.** The Clovis Fault is considered to be active within the Quaternary Period (within the past two million years), although there is no historic evidence of its activity, and is therefore classified as "potentially active." This fault lies approximately six miles south of the Madera County boundary in Fresno County. Activity along this fault could potentially generate more seismic activity in Tulare County than the San Andreas or Owens Valley fault systems. In particular, a strong earthquake on the Fault could affect northern Tulare County. However, because of the lack of historic activity along the Clovis Fault, inadequate evidence exists for assessing maximum earthquake impacts.

Groundshaking

Groundshaking is the primary seismic hazard in Tulare County because of the county's seismic setting and its record of historical activity. Thus, emphasis focuses on the analysis of expected levels of groundshaking, which is directly related to the magnitude of a quake and the distance from a quake's epicenter. Magnitude is a measure of the amount of energy released in an earthquake, with higher magnitudes causing increased groundshaking over longer periods of time, thereby affecting a larger area. Groundshaking intensity, which is often a more useful measure of earthquake effects than magnitude, is a qualitative measure of the effects felt by population.

The valley portion of Tulare County is located on alluvial deposits, which tend to experience greater groundshaking intensities than areas located on hard rock. Therefore, structures located in the valley will tend to suffer greater damage from groundshaking than those located in the foothill and mountain areas. However, existing alluvium valleys and weathered or decomposed zones are scattered throughout the mountainous portions of the county which could also experience stronger intensities than the surrounding solid rock areas. The geologic characteristics of an area can therefore be a greater hazard than its distance to the epicenter of the quake.

The Five County Seismic Safety Element projects that with the maximum probable earthquake of a magnitude 8 to 8.5 centered along the San Andreas fault, "relatively low levels of shaking should be

expected in the eastern and central parts of the valley." The eastern portion of the county is composed of four "Sierran Zones," the boundaries of which are determined by the predicted effects of the maximum probable earthquake on the Owens Valley Fault. Since the mountains are underlain primarily by granitic rock, these zones tend to experience very low levels of groundshaking. However, most of the people residing in these zones do not live on the hard rock; instead, they tend to build in alluvial valleys, or the weathered and decomposed zones in the meadows or foothills. These areas will experience stronger groundshaking intensities. Characteristics within the microzones may vary greatly; thus groundshaking potential in the Sierran zones is more accurately analyzed on a site-by-site basis.

Older buildings constructed before current building codes were in effect, and even newer buildings constructed before earthquake resistance provisions were included in the current building codes, are most likely to suffer damage in an earthquake. Most of Tulare County's buildings are no more than one or two stories in height and are of wood frame construction, which is considered the most structurally resistant to earthquake damage. Older masonry buildings (without earthquake-resistance reinforcement) are the most susceptible to structural failure, which causes the greatest loss of life. The State of California has identified unreinforced masonry buildings as a safety issue during earthquakes. In high risk areas (Bay Area) inventories and programs to mitigate this issue are required. Because Tulare County is not a high risk area, state law only recommends that programs to retrofit URMs are adopted by jurisdictions.

The susceptibility of a structure to damage from earthquake groundshaking is also related to the foundation material underlying the structure. A foundation of rock or very firm material intensifies short period motions, which affect the low, rigid buildings more than those that are tall and flexible. A deep layer of water-logged soft alluvium may cushion low, rigid buildings, but accentuate the motion in tall buildings. The amplified motion resulting form softer alluvium soils can also severely damage older masonry buildings.

Liquefaction

Liquefaction is a process whereby soil is temporarily transformed to a fluid form during intense and prolonged groundshaking. Areas most prone to liquefaction are those that are water saturated (e.g., where the water table is less than 30 feet below the surface) and consist of relatively uniform sands that are low to medium density. In addition

to necessary soil conditions, the ground acceleration and duration of the earthquake must be of sufficient energy to induce liquefaction. Scientific studies have shown that the ground acceleration must approach 0.3g before liquefaction occurs in a sandy soil with relative densities typical of the San Joaquin alluvial deposits.

Liquefaction during major earthquakes has caused severe damage to structures on level ground as a result of settling, tilting, or floating. Such damage occurred in San Francisco on bay-filled areas during the 1989 Loma Prieta earthquake, even though the epicenter was several miles away. If liquefaction occurs in or under a sloping soil mass, the entire mass may flow toward a lower elevation, such as that which occurred along the coastline near Seward, Alaska during the 1964 earthquake. Also of particular concern in terms of developed and newly developing areas are fill areas that have been poorly compacted.

No specific countywide assessments to identify liquefaction hazards have been performed in Tulare County. Areas where groundwater is less than 30 feet below the surface occur primarily in the valley. However, soil types in the area are not conducive to liquefaction because they are either too coarse or too high in clay content. Areas subject to 0.3g acceleration or greater are located in a small section of the Sierra Nevada Mountains along the Tulare-Inyo County boundary. However, the depth to groundwater in such areas is greater than in the valley, which would minimize liquefaction potential as well. Detailed geotechnical engineering investigations would be necessary to more accurately evaluate liquefaction potential in specific areas and to identify and map the areal extent of locations subject to liquefaction.

Settlement

Settlement can occur in poorly consolidated soils during groundshaking. During settlement, the soil materials are physically rearranged by the shaking and result in reduced stabling alignment of the individual minerals. Settlement of sufficient magnitude to cause significant structural damage is normally associated with rapidly deposited alluvial soils, or improperly founded or poorly compacted fill. These areas are known to undergo extensive settling with the addition of irrigation water, but evidence due to groundshaking is not available. Fluctuating groundwater levels also may have changed the local soil characteristics. Sufficient subsurface data is lacking to conclude that settlement would occur during a large earthquake;

however, the data is sufficient to indicate that the potential exists in Tulare County.

Other Geologic Hazards

Landslides. Landslides are a primary geologic hazard and are influenced by four factors:

- Strength of rock and resistance to failure, which is a function of rock type (or geologic formation);
- Geologic structure or orientation of a surface along which slippage could occur;
- Water (can add weight to a potentially unstable mass or influence strength of a potential failure surface); and,
- Topography (amount of slope in combination with gravitation forces).

Tulare County has three geologic environments: the valley, foothills, and mountains. These dissimilarities present a range of landslide hazards. As of December 1996, the California Geological Survey had not developed landslide hazard identification maps for Tulare County. However, it is reasonable to assume that certain areas in Tulare County are more prone to landslides than others. Such areas can be found in foothill and mountain areas where fractured and steep slopes are present (as in the Sierra Nevada Mountains), where less consolidated or weathered soils overlie bedrock, or where inadequate ground cover accelerates erosion. Erosion and slumping of soils can also occur along bluffs along the Kaweah, Kings, and Tule Rivers.

Other areas where steep slopes are present, however, are not heavily populated and most are located in federal or state lands, although roadways such as SR 198 and SR 192 in eastern Tulare County could be affected by landslides in the event of an earthquake or heavy rain. California Geological Survey geologists determined that catastrophic failure was unlikely, but long-term road maintenance could be compromised due to undercutting of the slope by the creeks below the roads. There is no risk of large landslides in the valley area of the county due to its relatively flat topography. There is, however, the potential for small slides and slumping along the steep banks of rivers or creeks.

Subsidence. Subsidence occurs when a large portion of land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas. Soils that are particularly subject to subsidence include those with high silt or clay content. Subsidence caused by groundwater withdrawal generally presents a more serious problem, since it can affect large areas. Oil and gas withdrawal, on the other hand, tends to affect smaller, localized areas. Some areas of the Central Valley have subsided more than 20 feet during the past 50 years.

Seiche. A seiche is a standing wave produced in a body of water such as a reservoir, lake, or harbor, by wind, atmospheric changes, or earthquakes. Seiches have the potential to damage shoreline structures, dams, and levees. Studies of true seismic seiches are limited, but the largest recorded seiche was 1.2 feet during the 1964 Alaska earthquake. Since this is less than wave heights that could be expected from wind-induced waves, earthquake-induced seiches are not considered a risk in Tulare County. In addition, the effects from a seiche would be similar to the flood hazard for a particular area, and the risk of occurrence is perceived as considerably less than the risk of flooding.

Volcanic Hazards. The nearest volcanoes lie to the northeast of Tulare County in Mono County, in the Mammoth Lakes/Long Valley area. The most serious effect on Tulare County of an eruption in the Mammoth Lakes, area according to the California Geological Survey, would be ash deposition. Such an occurrence is highly unlikely, for two reasons. First, ash deposition in the county would be dependent upon an improbable northeast wind configuration. Second, and most importantly, although some of these volcanoes were active as recently as 800 years ago, they are generally not considered by geologists to be active. In the past decade, however, there has been renewed interest in the area by geologists, as a result of new patterns of earthquakes and uplifting of the earths' crust; it was hypothesized by some that the area may be entering a new period of activity. A volcanic eruption during the winter could result in snowmelt and lead to flooding.

The state has formulated a contingency plan, the "Long Valley Caldera Response Plan," designed to notify the public in the event of an earthquake in the Long Valley area.

8.3 Flood Hazards

Introduction

This section discusses flood hazards in Tulare County. Details on the storm drainage system within Tulare County can be found in Section 7. Stormwater Drainage.

Methods

Method for this section will be provided.

Key Terms

The following key terms are used throughout this section to describe flood hazards and the framework that regulates them.

- **Exceedance Probability.** The probability that a precipitation or runoff event of a specified size will be achieved or exceeded in any one year.
- **Frequency.** How often an event will occur expressed by the return period or by exceedance probability.
- **Floodplain.** Land adjacent to a stream, slough or river that is subject to flooding or inundation from a storm event. FEMA defines the floodplain to be the area inundated by the 100-year flood.
- **Floodplain Management.** The implementation of policies and programs to protect floodplains and maintain their flood control function.
- **Levee.** A dike or embankment constructed to confine flow to a stream channel and to provide protection to adjacent land. A levee designed to provide 100-year flood protection must meet FEMA standards.
- **Level of Protection.** The amount of protection that a drainage or flood control measure provides.
- **One Hundred Year (100-year) Runoff.** The storm runoff that has a one percent (1%) chance of occurring in any given year.

- **Return Period.** The long-term average number of years between occurrences of an event being equaled or exceeded.

Regulatory Setting

Federal Emergency Management Agency (FEMA). FEMA is the federal agency that oversees floodplains and manages the nation's flood insurance program. FEMA's regulations govern the delineation of floodplains and establish requirements for floodplain management.

Existing Conditions

The east side of Tulare County is drained primarily by the Kings, Kaweah, and Tule Rivers. Small streams, which are usually dry, except during winter and spring runoff, drain the foothills of the Tulare County.

Flooding is a natural occurrence in the Central Valley because it is a natural drainage basin for thousands of watershed acres of Sierra Nevada and Coast Range foothills and mountains. Two kinds of flooding can occur in the Central Valley: general rainfall floods occurring in the late fall and winter in the foothills and on the valley floor; and snowmelt floods occurring in the late spring and early summer. Most floods are produced by extended periods of precipitation during the winter months. Floods can also occur when large amounts of water (due to snowmelt) enter storage reservoirs, causing an increase in the amount of water that is released.

Tulare County has a long history of flooding, but minimum definitive data is available for specific floods, particularly on the smaller streams. Historical records indicate that nine significant flood events occurred in Fresno County between the 1840s and 1900, with the most recent large-scale flood occurring in 1969. As recently as 1997 and 1998, areas in the mountains sustained flooding as heavy rains swelled creeks over their banks. The mountain communities of Three Rivers and Springville, while on the valley floor the Tule and White rivers, experienced flooded agricultural fields. Similarly, the City of Lindsay and the community of Earlimart sustained flooding in their vicinities during this same period.

100-Year Flood Hazard

Official floodplain maps are maintained by the Federal Emergency Management Agency (FEMA). FEMA determines areas subject to

flood hazards and designates these areas by relative risk of flooding on a map for each community, known as the Flood Insurance Rate Map (FIRM). A 100-year flood is considered for purposes of land use planning and protection of property and human safety. The boundaries of the 100-year floodplain are delineated by FEMA on the basis of hydrology, topography, and modeling of flow during predicted rainstorms. The analysis of predicted flooding does not account for the effects of continued land subsidence or the rise in sea level associated with the greenhouse effect.

The 100-year flood is defined as the flood event that has a one percent chance of occurring in any given year. It is important to note that the delineation of areas within the 100-year floodplain represents a statistical probability for the long-term average occurrence of flooding. Actually, flooding can occur in a 100-year floodplain more or less frequently than once in a hundred years. Smaller floods have an even greater chance of occurring in any year and pose hazards as well. Areas that are sporadically flooded only become inundated as a result of more uncommon and extreme precipitation/runoff events.

The flood carrying capacity in rivers and streams has decreased as trees, vegetation, and structures (e.g., bridges, trestles, buildings) have increased along the Kaweah, Kings, and Tule Rivers. Unsecured and uprooted material can be carried down a river, clogging channels and piling up against trestles and bridge abutments that can, in turn, give way or collapse, increasing blockage and flooding potential. Flooding can force waters out of the river channel and above its ordinary floodplain. Confined floodplains can result in significantly higher water elevations and higher flow rates during high runoff and flood events.

Updated channel analyses have not been performed to determine the amount of obstruction posed by vegetation and development in the Kaweah, Kings, or Tule River channels. As such, FEMA maps depicting the 100-year floodplain for the rivers probably do not reflect the true extent and risk of flooding hazards in Tulare County.

Dam Failure Inundation

Two major dams could cause substantial flooding in Tulare County in the event of a failure: Terminus Dam and Success Dam. In addition, there are many smaller dams throughout the county that would cause localized flooding in the event of their failing. However, a comprehensive analysis of the potential for dam failure and possible

downstream effects for these upstream dams has not been undertaken.

Dam failure can result from numerous natural or human activities, such as earthquakes, erosion, improper siting, rapidly rising flood waters, and structural and design flaws. Flooding due to dam failure can cause loss of life, damage to property, and other ensuing hazards. Damage to electric-generating facilities and transmission lines associated with hydro-electric dams could also affect life support systems in communities outside the immediate hazard area.

8.4 Fire Hazards

Introduction

Both urban and wildland fire hazards exist in Tulare County, creating the potential for injury, loss of life, and property damage. Urban fires primarily involve the uncontrolled burning of residential, commercial, or industrial structures due to human activities. Wildland fires affect grass, forest, and brushlands, as well as any structures on these lands. Such fires can result from either human-made or natural causes. The type and amount of fuel, topography, and climate are the primary factors influencing the degree of fire risk. Vegetation fires comprised the majority of fires in Tulare County according to the California Department of Forestry and Fire Protection (CDF). Most of the fires are caused by human activities involving motor vehicles and equipment, arson, and debris burning.

Methods

Information in this section was provided by the Tulare County Fire Department, the California Department of Forestry, and Tulare County staff.

Key Terms

- **Fire Prevention and Suppression.** Public protection classifications are designated by the Insurance Services Office (ISO). The ISO bases its classifications on a number of factors, including fire department location, equipment, staffing, water supply, and communications abilities. Ratings range from 1 to 10, with 1 being the best possible fire protection, and 10 being the worst.

Regulatory Setting

Fire hazards are regulated by the following:

- **Tulare County Fire-Safe Regulations and Road Standards (Ordinance No. 542).**
- **Tulare County Public Resources Code (4290).**
- **Tulare County Fire Department. Capital Improvement Plan (CIP, December 1991).**
- **State Public Resource Code.**

Existing Conditions

The following information provides the existing conditions of fire hazards in Tulare County. The following section describes urban fire hazards, wildland fire hazards, fire prevention measures, and construction standards in Tulare County.

The ISO ratings in the incorporated areas of Tulare County range from 5 to 8 with unincorporated areas receiving an average rating of 8. The locations and ratings are described in more detail in Chapter 6, Public Services and Utilities.

Urban Fire Hazards

Urban fires primarily involve the uncontrolled burning of residential, commercial, and industrial structures due to human-made causes. Factors that exacerbate urban structural fires include substandard building construction, highly flammable materials, delay in response time, and inadequate fire protection services.

The Tulare County Fire Department currently reviews development plans and building permits for compliance with the Uniform Building Code. Until recently, minimal enforcement of structural fire codes (for example, building codes requiring interior sprinkler systems and fire-safe building materials) has taken place. As a result, many of the structures in Tulare County which were built prior to 1987 may be substandard in terms of fire safety. There is not an existing program for retrofitting such structures (with the exception of those structures that legally require inspection, such as institutional buildings).

Wildland Fire Hazards

Throughout California, communities are increasingly concerned about wildfire safety as increased development occurs in the foothills and mountain areas, and subsequent fire control measures have affected the natural cycle of the ecosystem. Suppression of natural fires allow the understory to become dense, creating the potential for larger and more intense wildland fires. Wind, steepness of terrain, and naturally volatile or hot-burning vegetation contribute to wildland fire hazard potential. Where human access exists in wildland areas, such as the Sierra Nevada Mountains and foothills, the risk of fire increases because of a greater chance for human carelessness and historic and current fire management practices. Human activities such as smoking, debris burning, and equipment operation are the major causes of wildland fires.

Although the total number of fires in the oak savannah portions of the lower Sierra foothills may have increased with five-acre lot subdivision activity, the size and duration of fires appears to have been reduced in this area due to firebreaks created by driveways and roads, reduced fuels and "checkerboard" fuel patterns through individual safe area vegetation clearance (PRC 4291); increased vigilance fostering early fire reporting; and early intervention (fire suppression) efforts by individuals and fire companies.

On the other hand, the creation of residential parcels in this area has compounded the potential for property damage from fires and has significantly complicated firefighting responsibilities in the area. Wildland firefighting strategies have become similar to municipal firefighting efforts. Foothill and mountain subdivisions have also virtually eliminated prescribed burning as a means of fire suppression.

Fire Prevention and Suppression. As of July 1, 2007, Tulare County fire protection is provided by the Tulare County Fire Department. Prior to July 1, 2007 fire protection was provided by the California Department of Forestry (CDF). CDF is also responsible for providing fire protection to the State Responsibility Area (SRAs). SRAs are areas in which the State Board of Forestry has determined that the state has the financial responsibility for fire prevention and suppression. In the Sequoia National Forest, the U.S. Forest Service is the responsible fire agency.

The Department's Capital Improvement Plan (CIP, December 1991) addresses current and future fire protection needs in the county, establishes priorities, sets level of service standards based on land uses, and establishes a long-range plan for fire prevention and protection. According to the CIP, conditions of the county's 16 fire stations, operated by CDF and Tulare County, range "from excellent to poor," with many of the facilities identified as inadequate for housing fire equipment. In addition, response times in the county have increased due to rapid growth without a correspondent growth in fire protection facilities and staffing. Therefore, as the county continues to grow, the risks of injury, loss of life, and property damage will also increase. The CIP identifies the lack of funding as the main obstacle to improving fire protection.

Fire Construction Standards. One method of fire prevention is the enactment of development standards. Public resources Code Section 4290 sets minimum fire safety standards for development in SRAs. Tulare County adopted Fire-Safe Regulations and Road Standards (Ordinance No. 542) amend the address, zoning, water, parcel map, subdivision ordinance, and the road standards to comply with the Public Resources Code 4290.

8.5 Human-Made Hazards

Introduction

The primary human-made hazard concerns for Tulare County include hazards associated with accidents, fire, crime, airports, and the potential exposure to hazardous materials. This section focuses on those hazards associated with the potential use, exposure, or release of hazardous materials. Additional public safety concerns (e.g., fire, accidents, law enforcement response times, etc.) are discussed in Chapter 6, Public Services and Utilities. This section provides an overview of federal, state, and local hazardous material and hazardous waste regulations and describes existing airfields and known hazardous materials in Tulare County.

Methods

The information contained in this section was obtained from various sources, including Tulare County staff. Additional information was obtained from state agencies (e.g., Central Valley Regional Quality Control Board [CVRWQCB]) that monitor or compile information

related to the locations of hazardous waste generators, hazardous materials treatment, storage and disposal facilities, underground storage tank locations, landfills, and contaminated sites. The Comprehensive Airport Land Use Plan and the Hazardous Waste Management Plan were also used.

Key Terms

The following key terms are used throughout this section to describe human-made hazard conditions and the framework that regulates them.

- **Airport Land Use Commission (ALUC).** The purpose of the ALUC is to provide for the orderly development of areas surrounding public airports. It is also intended to minimize the public's exposure to excessive noise and safety hazards and to ensure that the approaches to public airports remain clear of structures that could pose an aviation safety hazard.

- **Comprehensive Airport Land Use Plan (CALUP).** Assists in the preservation, continued development and expansion of existing airports in a manner consistent with the latest California Airport Land Use Planning Handbook. In addition, the plan protects the public health, safety and welfare by identifying land use measures to be implemented in order to minimize the public's exposure to excessive noise and safety hazards within areas surrounding public airports.

- **Hazardous Materials.** A hazardous material is defined by the California Code of Regulations (CCR) as a substance that, because of physical or chemical properties, quantity, concentration, or other characteristics, may either (1) cause an increase in mortality or an increase in serious, irreversible, or incapacitating, illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of (CCR, Title 22, Division 4.5, Chapter 10, Article 2, Section 66260.10).

- **Hazardous Wastes.** Similarly, hazardous wastes are defined as materials that no longer have practical use, such as substances that have been discarded, discharged, spilled, contaminated, or are being stored prior to proper disposal. According to Title 22 of the CCR, hazardous materials and hazardous wastes are

classified according to four properties: toxic, ignitable, corrosive, and reactive (CCR, Title 22, Chapter 11, Article 3).

Regulations

The storage, use, and handling of hazardous materials by industries and businesses are subject to various federal and state regulations. A brief overview of these regulations follows.

Federal Regulations

The principal federal legislation is the Resource Conservation and Recovery Act (RCRA), which is administered by the United States Environmental Protection Agency (EPA). RCRA places reporting, permitting, and operational control requirements on those who generate, treat, store, or dispose of hazardous waste. The federal Hazardous Materials Transport Act, administered by the U.S. Department of Transportation, requires detailed manifesting and reporting of hazardous materials shipped on the U.S. highway system; it also contains packaging requirements for shipped materials. The Clean Water Act, also administered by the EPA, controls the discharge of hazardous materials or hazardous waste to waters of the U.S. or to local wastewater treatment plants.

- **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 with 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.

- **The Superfund Amendments and Reauthorization Act (SARA).** SARA amended CERCLA on October 17, 1986. This amendment increased the size of the Hazardous Response Trust Fund to $8.5 billion, expanded EPA's response authority, strengthened enforcement activities at Superfund sites; and broadened the application of the law to include federal facilities. In addition, new provisions were added to the law that dealt with emergency planning and community right to know. SARA also required EPA to revise the Hazard Ranking System to ensure that the system accurately assesses the relative degree of risk to human health and the environment posed by sites and facilities subject to review for listing on the National Priorities List.

- **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.

- **Occupational Safety and Health Administration (OSHA).** Through the enactment of this act, OSHA was obligated to prepare and enforce occupational health and safety regulations with the goal of providing employees a safe working environment. OSHA regulations apply to the work place and cover activities ranging from confined space entry to toxic chemical exposure. OSHA regulates workplace exposure to hazardous chemicals and activities by promulgating regulations specifying work place procedures and equipment.

- **U.S. Department of Transportation (DOT).** The DOT regulates the interstate transport of hazardous materials and waste through implementation of the Hazardous Materials Transportation Act. This act specifies driver-training requirements, load labeling procedures, and container design and safety specifications. Transporters of hazardous wastes must also meet the requirements of additional statutes such as RCRA, discussed previously.

State Regulations

At the state level, existing legislation allows state agencies to accept the delegation of federal responsibility for hazardous materials and hazardous waste management. The Porter-Cologne Water Quality Control Act allows the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Board (RWQCB) to accept responsibility for the implementation of the Clean Water Act. The Hazardous Waste Control Act of 1977, and recent amendments to its implementation regulations, provides the Department of Health Services (DHS) with the lead role in administering the RCRA program. The Hazardous Substances Highway Spill Containment Act provides the California Highway Patrol (CHP) with the authority to respond to spills of hazardous materials on the state's highway system.

- **Hazardous Substance Account Act (1984), California Health and Safety Code Section 25300 ET SEQ (HSAA).** This act, known as the California Superfund, has three purposes: 1) to respond to releases of hazardous substances; 2) to compensate for damages caused by such releases; and 3) to pay the state's 10 percent share in CERCLA cleanups. Contaminated sites that fail to score above a certain threshold level in the EPA's ranking system may be placed on the California Superfund list of hazardous wastes requiring cleanup.

- **California Environmental Protection Agency (CAL/EPA).** The Cal/EPA was created in 1991 to enhance coordination of State environmental programs, reduce administrative duplication, and address the most substantial environmental/ health risks. Cal/EPA unifies the State's environmental authority under a single accountable, Cabinet-level agency. The Secretary for Environmental Protection oversees the following agencies: Air Resources Board, Integrated Waste Management Board, Department of Pesticide Regulation, State Water Resources Control Board, Department of Toxic Substances Control, and Office of Environmental Health Hazard Assessment.

- **Department of Toxic Substance Control (DTSC).** Cal/EPA has regulatory responsibility under Title 22 of the California Code of Regulations (CCR) for administration of the state and federal Superfund programs for the management and cleanup of hazardous materials. The DTSC is responsible for regulating hazardous waste facilities and overseeing the cleanup of

hazardous waste sites in California. The Hazardous Waste Management Program (HWMP) regulates hazardous waste through its permitting, enforcement and Unified Program activities. HWMP maintains the EPA authorization to implement the 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. The State Regulatory Programs Division of DTSC oversees the technical implementation of the state's Unified Program, which is a consolidation of six environmental programs at the local level, and conducts triennial reviews of Unified Program agencies to ensure that their programs are consistent statewide and conform to standards.

- **State Water Resources Control Board.** Acting through the RWQCB, the SWRCB regulates surface and groundwater quality pursuant to the Porter-Cologne Water Quality Act, the federal Clean Water Act, and the Underground Tank Law. Under these laws, RWQCB is authorized to supervise the cleanup of hazardous waste sites referred by local agencies in those situations where water quality may be affected.

  Depending on the nature of contamination, the lead agency responsible for the regulation of hazardous materials at the site can be the DTSC, RWQCB, or both. DTSC evaluates contaminated sites to ascertain risks to human health and the environment. Sites can be ranked by the DTSC or referred for evaluation by the RWQCB. In general, contamination affecting soil and groundwater is handled by the RWQCB and the contamination of soils is handled by the DTSC.

- **California Occupational Safety and Health Administration (Cal/OSHA).** Cal/OSHA and the Federal OSHA are the agencies responsible for assuring worker safety in the handling and use of chemicals in the workplace. Pursuant to the Occupational Safety and Health Act of 1970, Federal OSHA has adopted numerous regulations pertaining to worker safety, contained in the Code of Federal Regulations Title 29 (29 CFR). These regulations set standards for safe workplaces and work practices, including standards relating to hazardous material handling. Cal/OSHA assumes primary responsibility for developing and enforcing state workplace safety regulations. Because California has a federally

approved OSHA program, it is required to adopt regulations that are at least as stringent as those identified in 29 CFR. Cal/OSHA standards are generally more stringent than federal regulations.

Cal/OSHA regulations concerning the use of hazardous materials in the workplace, as detailed in Title 8 of the CCR, include requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal/OSHA enforces hazard communication program regulations that contain training and information requirements, including procedures for identifying and labeling hazardous substances, communicating hazard information related to hazardous substances and their handling, and the preparation of health and safety plans to protect workers and employees at hazardous waste sites. The hazard communication program requires that Material Safety Data Sheets (MSDS's) be available to employees and that employee information and training programs be documented.

- **Hazardous Materials Transport.** California law requires that Hazardous Waste (as defined in California Health and Safety Code Division 20, Chapter 6.5) be transported by a California registered hazardous waste transporter that meets specific registration requirements. The requirements include possession of a valid Hazardous Waste Transporter Registration, proof of public liability insurance, which includes coverage for environmental restoration, and compliance with California Vehicle Code registration regulations required for vehicle and driver licensing. Additional requirements can be found in Title 22 CCR, Chapter 13.

State agencies tasked with primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies are the CHP and Caltrans. Together, these agencies determine container types used and license hazardous waste haulers for hazardous waste transportation on public roads. The CHP only designates state and federal roadways as hazardous materials truck routes. The CHP classifies hazardous materials into three categories: explosives, poisons that can be inhaled, and radioactive material.

Local Regulations

At the local level, existing plans and agencies guide and regulate the production, disposal, and transport of hazardous materials and hazardous waste management.

- **Tulare County Comprehensive Airport Land Use Plan.** The Tulare County Airport Land Use Commission adopted a Comprehensive Airport Land Use Plan for the nine public-use airports in Tulare County in June 1992. The airport planning areas are divided into six traffic compatibility zones, which are determined by their location in relation to runways, approach/departure patterns, and common airport traffic (overflight zones). Each zone has identified acceptable and unacceptable uses, which are determined by the safety, noise, overflight, and airspace impacts associated with each particular zone.

- **Tulare County Hazardous Waste Management Plan.** Tulare County has prepared a Hazardous Waste Management Plan (HWMP) in accordance with California Health and Safety Code Section 24135 et seq. The Tulare County HWMP, which was developed in May 1989, identifies hazardous waste generators within the county, amounts and types of waste produced, and projected waste generation. In addition, the plan identifies the need for any potential future locations of treatment, storage, and disposal (TSD) facilities and includes policies and potential impacts for the management of hazardous waste within the county. The major goal of the HWMP is to reduce the need for new hazardous waste facilities by reducing waste at its source through recycling, reduced use of hazardous materials, and public education. Subsequent to the formation of the California Environmental Protection Agency (CalEPA) in 1991, County Hazardous Waste Management Plans are now submitted to the CalEPA's Department of Toxic Substances Control.

- **Tulare County Multi-Hazard Functional Plan.** Tulare County has prepared a Multi-Hazard Functional Plan to serve as the county's emergency response plan. The plan addresses responses to various emergency incidents, responsibilities of various agencies, and sources of outside assistance.

Existing Conditions

While many hazards exist in the county, the largest human-made hazards are produced by airports and hazardous waste. Safety measures that diminish the risk of harm related to these dangers involve assessing the conditions and providing procedures to mitigate the risks. The following discussion describes the current conditions of human-made hazards in Tulare County.

Airport Safety

Airport safety issues are primarily focused on flight hazards; as well as those on the ground. Flight hazards can be physical (e.g., tall structures that would obstruct airspace), visual (such as glare caused by lights or reflective surfaces), or electronic (interference with aircraft instruments or communication systems). As urban areas grow, there is an increased need for airport operations. Such increased activity generates an increased risk of aircraft crash hazards.

With proper land use planning, aircraft safety risks can be reduced, primarily by avoiding incompatible land uses. The formation of airport land use commissions (ALUCs) was mandated in 1968 for all counties containing at least one public use airport (Public Utilities Code Section 21670 et seq.). The commissioners represent the county, its cities, and the public. Legislation passed in 1982 established a direct link between ALUCs comprehensive plans and land use plans and regulations prepared by cities and counties (Public Utilities Code Section 21676). In accordance with this legislation, ALUCs must review the general and specific plans of local jurisdictions for consistency with the county's airport Comprehensive Land Use Plan (CLUP). Primary and secondary review areas must be identified for each facility. Projects proposed within the geographic boundaries of the primary review area are referred to the ALUC for review and evaluation. Within the secondary review area, only those projects involving a structure or other object with a height that would exceed that permitted under adopted zoning would be referred to the ALUC for review.

Air safety zones, which are established at the end of each runway, are intended to restrict the type and intensity of activities that occur in each zone. The State Airport Land Use Planning Handbook allows jurisdictional flexibility in determining air safety zones. Restrictions correspond to the probability of an accident in each zone, based on data generated by the Federal Aviation Administration (FAA). Each

zone has certain acceptable and unacceptable land uses, which are determined by safety, noise, and airspace issues relative to runways, departure patterns, and overflight (common aircraft traffic). For example, residential, commercial, industrial, institutional, and parks are considered incompatible land uses within clear zones. However, golf courses and agricultural land uses, provided there are no structures, would be considered compatible. Certain types of residential, commercial, and institutional land uses are not allowed within the approach safety zone.

The most difficult ALUC planning responsibility may be the determination of land use measures around airports that are appropriate (considering the risk level involved), without unnecessarily restricting the ability to allow reasonable development of private land. Land areas around airports are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained pilots. Despite stringent laws, accidents are going to occur. For this reason, airport safety areas are needed to minimize the number of people who may be exposed to air crash hazards.

When land use controls combine with safety areas, the risks to both people on the ground and aircraft utilizing the airport is decreased. The risk to persons on the ground being harmed by a falling plane is small. However, an air crash is a high consequence event. Therefore, when a crash does occur it can be catastrophic. These considerations have led to the adoption of safety standards which determine acceptable land uses (assuming a crash will occur) rather than attempting to estimate accident probabilities. While the majority of Tulare County airports have not experienced a serious aircraft accident, aircraft accidents are possible.

Airport Safety Zones for height restrictions are established by FAR, Part 77, for the purpose of protecting navigable airspace. These same zones are adopted by the Tulare County ALUC to determine safety zones and compatible land uses in the vicinity of all Tulare County public use airports. The airports located in Tulare County are as follows:

- Alta Airport;
- Eckert Field;
- Harmon Field;
- Porterville Municipal Airport;

- Sequoia Field;
- Thunderhawk Field;
- Tulare Municipal Airport (Mefford Field);
- Visalia Municipal Airport (VMA); and
- Woodlake Municipal Airport.

The land use controls for these airports are described in detail in Chapter 3, Land Use and Population. The general operation of these airports is discussed in detail in Chapter 5, Transportation and Circulation.

Hazardous Waste

As defined by the California Health and Safety Code, hazardous waste is "a waste or combination of wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may either: (a) cause, or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating, illness, or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed." This section describes how hazardous waste is managed in Tulare County, including generation, transportation, disposal, treatment, storage, and disposal facilities, and contaminated sites.

Hazardous Waste Generators. Hazardous waste generators can be classified in three groups depending on the quantity of waste generated in any month. A Conditionally Exempt Small Quantity Generator (CESQG) is defined in regulation as a generator of less than 100 kilograms of hazardous waste in a calendar month. A Small Quantity Generator (SQG) is a generator of greater than 100 kg and less than 1000 kg of hazardous waste in a calendar month. A Large Quantity Generator (LQG) generates greater than 1000 kg of hazardous waste in a calendar month.

Determination of whether a facility is a CESQG, SQG, or LQG is the responsibility of the generator. The designation may change during the year, based on the quantity of hazardous waste produced during a particular month. Specific hazardous waste materials may also be exempt from the monthly total quantity. Therefore, the Certified

Unified Program Agencies (CUPA) cannot authoritatively designate the number of generators within each of the above categories.

Small Quantity Generators. CUPA has designated 58 active and 30 inactive small quantity generators (SQG's). The total estimated quantities of hazardous waste generated within Tulare County by active and inactive SQG's during calendar year 2002 were 121.7 and 56.3 tons, respectively.

The Designation as a SQG is based on the following assumptions:

1. The maximum period of hazardous waste accumulation at each facility is 90 days (270 days for used oil).

2. Any individual shipment of hazardous waste greater than 0.33 tons indicates that over 0.11 tons (i.e., 100 kg) of hazardous waste was generated by the facility in a single month during the 90-day accumulation period.

3. Multiple shipments of the same waste category totaling over 0.33 tons within the same 90-day period indicate that the facility generates over 100 kg of hazardous waste per month.

4. The facility does not generate over 1,000 kilograms of hazardous waste per month.

Large Hazardous Waste Producers. CUPA has designated 23 active and 3 inactive large quantity generators (LQG's). The total estimated quantities of hazardous waste generated within Tulare County by active and inactive LQG's during calendar year 2002 were 559.7 and 121.6 tons, respectively.

The designation of a LQG is based on the following assumptions:

1. The maximum period of hazardous waste accumulation at each facility is 90 days (270 days for used oil).

2. Any individual shipment of hazardous waste greater than 3.3 tons indicates that over 1.1 tons (i.e., 1,000 kg) of hazardous waste was generated by the facility in a single month during the 90-day accumulation period.

3. Multiple shipments of the same waste category totaling over 3.3 tons within the same 90-day period indicate that the facility generates over 1,000 kg of hazardous waste per month.

Treatment Facilities. There are nine tiered permit facilities conducting onsite hazardous waste treatment in a total of eleven treatment processes in Tulare County. An estimated total of 10,549 tons of hazardous waste per year is treated by these facilities. The three highest-volume hazardous waste types treated are:

1. Unspecified Aqueous Solution (2 & lt; pH & lt; 12.5) – 6,028 tons;

2. Aqueous Solution with Metals – 3,570 tons; and

3. Liquids with Chromium^{6+} greater than 500 mg/L – 741 tons.

Storage Facilities. According to available information from the agencies (Department of Toxic Substances Control [DTSC] and RWQCB) that oversee treatment, storage and disposal facilities (TSDFs), there are no facilities authorized for the storage of hazardous waste in Tulare County.

Disposal Facilities. According to available information from the agencies (DTSC and RWQCB) that oversee treatment, storage and disposal facilities (TSDFs), there are no facilities authorized for the disposal of hazardous waste in Tulare County.

Planned Treatment, Storage and Disposal Facilities. According to information available to the CUPA, there are no new treatment, storage and disposal facilities proposed in Tulare County.

Hazardous Waste/Hazardous Material Shipments Originating Outside Tulare County. The major transportation routes for hazardous wastes generated outside Tulare County are State Route 99, Southern Pacific rail lines, and the Burlington Northern Santa rail line. CUPA does not have information regarding the types and quantities of hazardous wastes transported through Tulare County through intrastate shipments.

Title 13 California Code of Regulations, Division 2, Chapter 6, Article 1; 2.5; and 2.7 designate transportation routes for specified explosives, bulk inhalation hazards, and radioactive materials. SR's 43, 63, 65, 99, 198, 201, and 245 are designated as transportation routes of explosives subject to Division 14 (commencing with Section 31600) of the Vehicle Code. Designated Safe Stopping Locations for shipments of explosives are located at the following locations:

- **Delano.** Beacon Truck Stop, Avenue 16 & Highway 99. Food, gasoline, diesel: 24 hours. Southbound vehicles take Avenue

16 exit 2 miles north of Delano. Northbound vehicles exit on Avenue 24.

- **Tulare.** Lyn's Cafe, 1066 East Rankin Avenue. Food, gasoline, diesel: 24 hours. Use the Avenue 200 exit from SR-99. Park on west side of SR-99.

- **Pixley.** U.S.A. Truck Stop, 451 North Park Road. Fuel: 24 hours. Use Court Street exit from SR-99.

- **Earlimart.** Mart Fuel Stop. Food, gas, diesel: 24 hours.

There are no designated routes within Tulare County for the transportation of inhalation hazards in bulk packaging pursuant to Division 14.3 (commencing with Section 32100) of the Vehicle Code) or radioactive materials subject to Section 3300 of the Vehicle Code, respectively.

Hazardous Waste Shipments Originating Within Tulare County. A determination of the routes used to transport hazardous waste within Tulare County was performed by analysis of Hazardous Waste Tracking System (HWTS) data on hazardous shipments. Calendar year 2002 manifest data indicates that a total of 1,606 tons of hazardous waste was transported from all categories of generators in Tulare County. The quantities of hazardous waste transported from facilities located within each zip code in Tulare County are shown in Table 8-1.

Table 8-1. Transport of Hazardous Waste

Zip Code	Total Tons	Zip Code	Total Tons	Zip Code	Total Tons	Zip Code	Total Tons
93219	0.579	93221	19.100	93223	14.73	93227	6.792
93244	4.270	93247	36.370	93256	14.39	93257	155.000
93262	0.459	93271	4.463	93272	17.78	93274	146.700
93275	14.870	93277	407.80	93279	52.01	93286	7.152
93291	321.700	93292	25.600	93615	2.606	93618	139.100
93631	8.207	93647	65.630	93654	4.255	93673	4.915

The CUPA concludes from this analysis that SR's 43, 63, 65, 99, 198, and 201 are the primary routes for transportation of hazardous waste generated within Tulare County.

Hazardous Waste Exports. HWTS manifest data for calendar year 2002 reports that a total of 1,606 tons of hazardous waste was

transported from all categories of generators in Tulare County. Since there are no treatment, storage and disposal facilities within Tulare County, all hazardous waste was exported.

Hazardous Waste Imports. Since there are no treatment, storage and disposal facilities within Tulare County, hazardous waste was not imported.

Environmental Health Department Futures Assessment. The Environmental Health Department, of which the CUPA is a part, anticipates a slight increase in the reported volume of hazardous waste generated within Tulare County in year 2003/04. However, EHD does not expect an increase in the actual volume of hazardous waste generated over the same period.

The reason for the anticipated increase in reported hazardous waste generation is the advent of Senate Bill 271 creating the Consolidated Manifesting Procedure. This bill, which took effect on January 1, 2002, has the following effects on the reporting of certain hazardous waste streams that may be "consolidated" from multiple generators on a manifest.

1. Requires all generators using consolidated manifesting to have an identification number by January 2002. Formerly, transport of elected waste streams did not require the generator to obtain an identification number. Therefore, prior to January 2002 the number of generators of certain waste streams within Tulare County were under reported.

2. Starting October 31, 2002, SB271 requires all consolidated transporters to report quarterly detailed information from their receipts. The DTSC consolidated transporters that ship less than 1,000 tons per year using consolidated manifests will be allowed to submit the reports in paper format through October 31, 2003. Transporters that ship more than 1,000 tons per year on consolidated manifests must submit their reports in an electronic format.

Formerly, the volumes of certain waste streams transported from generators within Tulare County were not ascribed to those generators. Therefore, the volumes of certain wastes generated within Tulare County were underreported. The Consolidated Manifesting Procedure will increase the reporting of these waste streams. However, the CUPA expects only a slight actual increase in the

volume of hazardous waste generated in Tulare County, due to the primarily non-industrial nature of the economy. Furthermore, the CUPA anticipates a future decline in the number of asbestos removal projects generating asbestos-containing waste (the second and third highest volume wastes generated in 2002 and 2003, respectively).

The ability of Tulare County's current facilities to treat, store, dispose of, and transport hazardous waste in a safe manner has been assessed by CUPA. It is the opinion of the CUPA that there currently exists in Tulare County an adequate capacity to treat, store, dispose of, and transport hazardous waste in a safe manner.

Large and Small Contaminated Sites. CUPA's jurisdiction with respect to remedial oversight of contaminated sites is limited to leaking underground storage tanks. According to available information from the Department of Toxic Substance Control (DTSC) (www.dtsc.ca.gov) and the Regional Water Quality Control Board (RWQCB) (www.geotracker.swrcb.ca.gov), there are less than 60 total "Often" and "Crossed-Contaminated" sites in Tulare County. (See Table 8-2)

Table 8-2. Contaminated Sites

Site Designation	"Calsites"	"Needing Further Evaluation"	"Voluntary Cleanup"	"No Further Action"	"Schools"
Category	Large	Large	Large	Large	Small
Open	3	11	7	0	7
Closed	9	0	0	7	14
Total	**12**	**11**	**7**	**7**	**21**

In addition, there are 51 sites designated as "Unconfirmed Referrals" to the RWQCB or to other agencies. CUPA has arbitrarily designated the 16 sites on this list that were referred to the RWQCB (16) as large sites. Most of these sites are included in the RWQCB list below. Sites referred to other agencies (35) as small have been arbitrarily designated. It should be noted that in many referral cases, DTSC has not confirmed an actual release of hazardous substances. The RWQCB Spills, Leaks, Investigations & Cleanups list has 28 open sites and 30 closed sites.

Leaking Underground Storage Tanks. There are a total of 148 active cases involving leaking underground storage tanks in Tulare County. A total of 270 cases have been closed, and 14 have been referred to the RWQCB.

Household Hazardous Waste. In calendar year 2002 the following quantity of household hazardous waste (HHW) was collected in Tulare County:

Used Oil. Includes "non-certified" (Tulare County pays for recycling), and "certified" (California Integrated Waste Board pays for recycling collection centers; and "agricultural" (administered by Tulare County Youth Corps). Non-certified and certified site totals include used oil collected from the public (do-it-yourselfers [DIY]) and from the business at which the collection center is located. Agricultural used oil collection is not HHW per se, but represents an important waste stream in Tulare County.

1. **Non-certified Sites.** 142 total tons, 133 tons DIY used oil (estimated);

2. **Certified Sites.** 714 total tons, 138 tons DIY (estimated); and

3. **Agricultural.** 51 total tons.

Electronic Waste. Includes televisions, and computer monitors and central processing units. A total of 44.54 tons (represents July 2002 to December 2002 only) were collected in Tulare County.

Household Hazardous Waste. Household Hazardous Waste from one permanent collection center located in Visalia and eight mobile events (that are not included in the above two categories) collected 60 total tons during 2002.

Cortese List Contaminated Sites. Pesticide manufacturing/ processing, storage, applicator facilities, industrial manufacturing and processing, and old dumps comprise most of the sites where soil or groundwater contamination has occurred. Thirteen sites in Tulare County were identified in the 1988 HWMP. Five sites were included on the federal National Priorities List (NPL). Since 1988, three sites have been certified (i.e. remediation has been completed) by the California Department of Toxic Substances Control. As of 2004, nine sites were listed on the California Department of Substances Control Hazardous Waste and Substances Site List compiled pursuant to Government Code Section 65962.5 (See Table 8-3, Hazardous Waste Substances Site List).

Table 8-3. Hazardous Waste and Substances Site List (Cortese List), Tulare County 2004

City	Address	ZIP	Site Name
Dinuba	216 S. O St.	93618	So Cal Gas/Dinuba Mgp
Orosi	13133 Avenue 416	93647	Parmenter And Bryan
Pixley	1494 South Airport Drive	93256	Harmon Field
Porterville	167 West Poplar Avenue	93257	Beckman Instruments, Porterville Plant
Tulare	21636 Rd. 152	93274	Cam Chemicals
Visalia	2530 West Goshen	93219	Kaweah Crop Duster-Green Acres Airport
Visalia	300 North Tipton Street	93277	So Cal Gas/Visalia Mgp
Visalia	432 Ben Maddox Way	93277	Edison/Visalia Pole Yard
Visalia	6941 and 6707 West Goshen Avenue	93291	Goshen Avenue and Shirk Road Site

Source: California Department of Toxic Substance Control, 2004

Hazardous Material Emergency Response. Tulare County has prepared a Multi-Hazard Functional Plan to serve as the county's emergency response plan. The plan addresses responses to various emergency incidents, responsibilities of various agencies, and sources of outside assistance. The following types of emergencies are addressed in the Multi-Hazard Functional Plan.

- Earthquakes;
- Dam Failure;
- Flood;
- Wildfire;
- War Emergency;
- Hazardous Materials Incident;
- Aircraft Crash; and
- Volcanic Eruption.

In the event of a disaster, certain facilities are critical to serve as evacuation centers, provide vital services, and provide for emergency response. Existing critical facilities in Tulare County include hospitals,

county dispatch facilities, electrical, gas, and telecommunication facilities, water storage and treatment systems, wastewater treatment systems, schools, and other government facilities. This plan also addresses evacuation routes, which include all freeways, highways, and arterials that are located outside of the 100-year flood plain.

8.6 Noise

In technical terms, sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Simply, sound is what we hear. As sounds reach undesirable unacceptable levels, this is referred to as noise.

To develop goals and policies related to noise abatement in the updated General Plan, it is important to understand how sound, and noise are measured and compared, and to understand what sound levels occur in the county today. To do so, this section provides an overview of how noise is characterized (measured), describes existing regulations that affect noise issues, and discusses current noise conditions found in Tulare County.

Methods

The methods used to assess noise are described throughout this section. Descriptions of the standards or desired noise levels for land uses within the county are drawn from the Quad-Knopf General Plan Background Report Update (2001). Estimates of roadway noise have been updated based on recent data regarding average daily traffic volumes. Discussions of other noise sources were compiled by Quad-Knopf, based on measurements by Brown-Buntin Associates.

Key Terms

- **Ambient Noise.** The total noise associated with a given environment and usually comprising sounds from many sources, both near and far.

- **Attenuation.** Reduction in the level of sound resulting from absorption by the topography, the atmosphere, distance, barriers, and other factors.

- **A-weighted decibel (dBA)**. A unit of measurement for noise based on a frequency weighting system that approximates the frequency response of the human ear.

- **Community Noise Equivalent Level (CNEL).** Used to characterize average sound levels over a 24-hour period, with weighting factors included for evening and nighttime sound levels. L_{eq} values (equivalent sound levels measured over a 1-hour period - see below) for the evening period (7:00 p.m. to 10:00 p.m.) are increased by 5 dB, while L_{eq} values for the nighttime period (10:00 p.m. to 7:00 a.m.) are increased by 10 dB. For a given set of sound measurements, the CNEL value will usually be about 1 dB higher than the L_{dn} value (see below). In practice, CNEL and L_{dn} are often used interchangeably.

- **Decibel (dBA)**. A unit of measurement describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure (which is 20 micronewtons per square meter).

- **Day-Night Average Sound Level (L_{dn}).** Average sound exposure over a 24-hour period. L_{dn} values are calculated from hourly L_{eq} values, with the L_{eq} values for the nighttime period (10:00 p.m. to 7:00 a.m.) increased by 10 dB to reflect the greater disturbance potential from nighttime noises.

- **Equivalent Sound Level (L_{eq}).** The level of a steady-state sound that, in a stated time period and at a stated location, has the same sound energy as the time-varying sound (approximately equal to the average sound level). The equivalent sound level measured over a 1-hour period is called the hourly L_{eq} or L_{eq} (h).

- **L_{max} and L_{min}.** The maximum and minimum sound levels, respectively, recorded during a measurement period. When a sound meter is set to the "slow" response setting, as is typical for most community noise measurements, the L_{max} and L_{min} values are the maximum and minimum levels recorded typically for 1-second periods.

- **Percentile-Exceeded Sound Level (L_x).** The sound level exceeded during a given percentage of a measurement period. Examples include L_{10}, L_{50}, and L_{90}. L_{10} is the A-weighted sound level that is exceeded 10% of the measurement period, L_{50} is the level exceeded 50% of the period, and so on. L_{50} is the median sound level measured during the measurement

period. L_{90}, the sound level exceeded 90% of the time, excludes high localized sound levels produced by nearby sources such as single car passages or bird chirps. L_{90} is often used to represent the background sound level. L_{50} is also used to provide a less conservative assessment of the background sound level.

- **Sensitive Receptors.** Sensitive receptors are defined to include residential areas, hospitals, convalescent homes and facilities, schools, and other similar land uses.

Regulations that Affect Noise

Various noise guidelines and standards have been promulgated on the federal, state, and local levels. Relevant guidelines are discussed below.

Federal Regulations

The Federal Highway Administration (FHWA) has developed noise abatement criteria that are used for federally funded roadway projects or projects that require federal review. These criteria are discussed in detail in Title 23 Part 772 of the Federal Code of Regulations (23CFR772). These noise criteria are based on Leq (h) and are summarized in Table 8-4.

Table 8-4. FHWA Noise Abatement Criteria

Activity Category	Design Noise Levels (Leq [h] [dBA])	Description of Activity Category
	Leq (h) (dBA)	
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas
C	72 (exterior)	Developed lands
D	---	Undeveloped lands
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Federal Highway Administration, 1982.

The EPA has identified the relationship between noise levels and human response. The EPA has determined that over a 24-hour period, an L_{eq} of 70 dBA will result in some hearing loss. Interference with activity and annoyance will not occur if exterior levels are maintained at an L_{eq} of 55 dBA and interior levels at or below 45 dBA. Although these levels are relevant for planning and design and useful for informational purposes, they are not land use planning criteria because they do not consider economic cost, technical feasibility, or the needs of the community.

The EPA has set 55 dBA L_{dn} as the basic goal for residential environments. However, other federal agencies, in consideration of their own program requirements and goals, as well as difficulty of actually achieving a goal of 55 dBA L_{dn}, have generally agreed on the 65 dBA L_{dn} level as being appropriate for residential uses. At 65 dBA L_{dn} activity interference is kept to a minimum, and annoyance levels are still low. It is also a level that can realistically be achieved.

The Department of Housing and Urban Development (HUD) was established in response to the Urban Development Act of 1965 (Public Law 90-448). HUD was tasked by the Housing and Urban Development Act of 1965 (Public Law 89-117) "to determine feasible methods of reducing the economic loss and hardships suffered by homeowners as a result of the depreciation in the value of their properties following the construction of airports in the vicinity of their homes."

HUD first issued formal requirements related specifically to noise in 1971 (HUD Circular 1390.2). These requirements contained standards for exterior noise levels along with policies for approving HUD-supported or assisted housing projects in high noise areas. In general, these requirements established the following three zones:

- **65 dBA L_{dn} or less** - an acceptable zone where all projects could be approved.

- **Exceeding 65 dBA L_{dn} but not exceeding 75 dBA L_{dn}** - a normally unacceptable zone where mitigation measures would be required and each project would have to be individually evaluated for approval or denial. These measures must provide 5 dBA of attenuation above the attenuation provided by standard construction required in a 65 to 70 dBA L_{dn} area and 10 dBA of attenuation in a 70 to 75 dBA L_{dn} area.

- **Exceeding 75 dBA L_{dn}** - an unacceptable zone in which projects would not, as a rule, be approved.

HUD's regulations do not include interior noise standards. Rather a *goal* of 45 dBA L_{dn} is set forth and attenuation requirements are geared towards achieving that goal. HUD assumes that using standard construction, any building will provide sufficient attenuation so that if the exterior level is 65 dBA L_{dn} or less, the interior level will be 45 dBA L_{dn} or less. Thus, structural attenuation is assumed at 20 dBA. However HUD regulations were promulgated solely for residential development requiring government funding and are *not* related to the operation of schools or churches.

The federal government regulates occupational noise exposure common in the workplace through the Occupational Health and Safety Administration (OSHA) under the USEPA. Noise exposure of this type is dependant on work conditions and is addressed through a facility's or construction contractor's health and safety plan. With the exception of construction workers involved in facility construction, occupational noise is irrelevant to this study and is not addressed further in this document.

State Regulations

The California Department of Transportation has adopted policy and guidelines relating to traffic noise as outlined in the Traffic Noise Analysis Protocol (Caltrans 1998b). The noise abatement criteria specified in the protocol are the same as those specified by FHWA.

The Governor's Office of Planning and Research has developed guidelines for the preparation of general plans (Office of Planning and Research, 1998). These include land use compatibility guidelines for noise exposure.

County Policies and Regulations

The California Department of Health Services (DHS) Office of Noise Control has studied the correlation of noise levels and their effects on various land uses. Land use and noise compatibility criteria for the county have been developed from the California Office of Noise Control Land Use Compatibility Matrix for Community Noise Exposure. Maximum acceptable noise levels for various land uses are shown in Table 8-5.

Table 8-5. Maximum Acceptable Ambient Noise Exposure for Various Land Uses

Land Use	Suggested Maximum Ldn
Residential – low density	60
Residential – high density	65
Transient lodging	65
Schools, libraries, churches, hospitals	65
Playgrounds, parks	65
Commercial	70
Industrial	75

The Tulare County Noise Element of the General Plan (1988) also gives guidance on techniques for noise control.

Characteristics of Sound

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale (i.e., dB scale) is used to keep sound intensity numbers at a convenient and manageable level.

Since the human ear is not equally sensitive to all frequencies within the entire spectrum, noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called "A-weighting" written as dBA. The human ear can detect changes in sound levels of approximately 3 dBA under normal conditions. Changes of 1 to 3 dBA are typically noticeable under controlled conditions, while changes of less than 1 dBA are only discernable under controlled, extremely quiet conditions. A change of 5 dBA is typically noticeable to the general public in an outdoor environment. Table 8-6 summarizes typical A-weighted sound levels from a variety of sources.

Table 8-6. Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock Band
Jet Fly-Over at 300 meters (1000 feet)		
	— 100 —	
Gas Lawn Mower at 1 meter (3 feet)		
	— 90 —	
Diesel Truck at 15 meters (50 feet)		Food Blender at 1 meter (3 feet)
at 80 kilometers/hour (50 miles/hour)	— 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
Quiet Suburban Nighttime		Room (Background)
	— 30 —	Library
Quiet Rural Nighttime		Bedroom at Night, Concert hall
	— 20 —	
		Broadcast/Recording Studio
	— 10 —	
Lowest Threshold of Human Hearing	— 0 —	Lowest Threshold of Human Hearing

Source: California Department of Transportation 1998a.

Environmental noise fluctuates over time. While some noise fluctuations are minor, others can be substantial. Some noise levels occur in regular patterns, others are random. Several noise descriptors have been developed to describe time-varying noise levels, and are listed under the "Key Terms" section.

Calculating Attenuation

Noise may be generated from a point source, such as a piece of construction equipment, or from a line source, such as a road containing moving vehicles. Because of spreading losses, noise attenuates (decreases) with distance. The typical atmospheric attenuation rate for point source noise is 6 dBA per doubling of the distance as predicted by the equation:

$$\text{dBA Reduction} = 20 \text{ Log } [D2/Dr]$$

Where: D2 = measured distance
Dr = reference distance

Noise from a line source will also attenuate with distance, but the rate of attenuation is a function of the shape of the source, distance and the type of terrain over which the noise passes. Hard sites, such as developed areas with paving, attenuate noise at a rate of 3 dBA per doubling of the distance as predicted by the equation:

dBA Reduction = 10 Log[D2/Dr]

Soft sites, such as undeveloped areas, open space, and vegetated areas attenuate line-source noise at a rate of 4.5 dBA per doubling of the distance, as predicted by the equation:

Attenuated dBA = 15 Log [D2/Dr]

True hard sites are fairly rare, particularly in rural areas. Accordingly, soft site attenuation is typically assumed for planning level analyses in rural areas.

Objects such as walls, topography, and buildings, which block the line-of-sight between a source and a receptor, will attenuate the noise source. If a receptor is located behind the object, but has a view of the source, the wall will do little to reduce the noise. Additionally, a receptor located on the same side of the barrier as the noise source may experience an increase in the perceived noise level as the wall or barrier may reflect noise back to the receptor, possibly increasing the noise.

Noise Contours

The interpretation of noise contours is a generalization, not an exact science. The measurements by sophisticated instruments are affected by many variables in a particular area, and noise sources themselves vary from day to day. However, these individual effects are generalized so that a noise contour describes the impact that can generally be expected. Noise contour lines themselves are not precise boundaries of noise levels. A contour line denoting a 65 dBA limit, for example, does not imply that residents on one side of the line are seriously affected, while on the other side of the line tolerable conditions exist. Rather, the area between 75 dBA and 65 dBA indicates that residents within this vicinity may experience a high level of noise and potential interference with daily functions.

Effects of Noise

High noise levels can interfere with a broad range of human activities in a way that degrades public health and welfare. Such activities may include:

- Speech communication in conversation and teaching;
- Telephone communication;
- Listening to television and radio;
- Listening to music;
- Concentration during mental and physical activities; and
- Relaxation; and Sleep.

Interference with listening situations can be determined in terms of the level of the environmental noise and its characteristics. The amount of interference in non-listening situations is often dependent upon factors other than the physical characteristics of the noise. These may include attitude toward the source of an identifiable noise, familiarity with the noise, characteristics of the exposed individual, and the intrusiveness of the noise.

Hearing loss, total or partial, and either permanent or temporary, is a well-established effect of noise on human health. The primary measure of hearing loss is the hearing threshold level, the level of a tone that can just be detected by an individual. As a person is exposed to increased noise levels, that person may experience a shift in the threshold at which sound can be detected. Exposure to very high noise levels for lengthy periods of time can generate threshold shifts, which can be temporary or permanent. In general, A-weighted sound levels must exceed 60-80 decibels before a person will experience temporary threshold shifts. The greater the intensity level above 60-80 decibels and the longer the exposure, the greater length of the temporary threshold shift.

Traffic Noise

Roadways and traffic noise are the dominant source of ambient noise in the county. The noise generated from vehicles using roads within the county is governed primarily by the number of vehicles, type of vehicles (mix of automobiles, trucks, and other large vehicles), and

speed. Sound32 is Caltrans' computer implementation of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). Sound32 and traffic information provided in Chapter 5 Transportation of this report were used to develop baseline traffic noise contours for major roads in the county. Table 8-7 summarizes the daily traffic volumes, the predicted Ldn noise level at 100 feet from the roadway centerline, and the distance from the roadway centerline to the 60-, 65-, and 70-dB-Ldn contours. The contour levels correspond to the land use compatibility levels used by Tulare County and specified by the California Office of Noise Control in Table 8-7. Since these calculated contours do not take into account shielding caused by local buildings, walls, or topographical features, the distances should be considered to be worst-case estimates of noise exposure along roadways in the county.

Railroad Operations Noise

Tulare County railroad operations consist of high speed mainline operations on the Burlington Northern-Santa Fe Railroad (formerly Atchison, Topeka and Santa Fe) in the southwest corner of the county and on the Union Pacific Railroad (formerly Southern Pacific Transportation Company) along SR 99. Lower speeds occur on various branchlines located throughout the county on the San Joaquin Valley Railroad.

Noise levels from mainline operations within Tulare County were quantified using the analytical methods developed in 1973 by Wyle Laboratories (Swing, 1973). The Wyle methodology calculates noise exposure based upon reference noise level data for various types of trains under different operating conditions, distance from the tracks, speed and the characteristics of the track the trains are passing over.

In order to provide a comparison of the noise levels predicted by the Wyle methodology to those actually occurring in Tulare County, and to document single-event noise levels, noise level measurements were conducted at various locations near or away from grade crossings. The reference measurement distance was 100 feet from the center of the tracks. Specific noise level data are described in the following sections describing operations for each railroad.

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
Existing									
	State Routes								
SR 63	SR 137 to Ave 264	17,400	93%	69.7	65.2	48	103	222	479
	Ave 264 to Ave 272	24,300	93%	71.2	66.7	60	129	278	599
	Ave 272 to Ave 280	26,500	93%	71.5	67.0	63	137	294	634
	Ave 280 to Ave 288	36,000	93%	72.9	68.4	78	168	361	778
	Ave 288 to Ave 292 (Tul. Av., Vis.)	34,500	93%	70.2	65.7	52	111	239	516
	Tul Av. Vis to Min. King Bl.	34,500	93%	70.2	65.7	52	111	239	516
	(break through the City of Visalia)								
	Houston Av. To Ave 328	14,700	93%	70.1	65.6	51	109	236	507
	Ave 328 to Ave 352	6,900	93%	67.0	62.5	31	68	146	315
	Ave 352 to Ave 384	7,300	93%	67.6	63.1	35	74	160	345
	Ave 384 to Ave 400	9,400	93%	67.5	63.0	34	74	159	343
	Ave 400 to Emerald Dr.	8,300	93%	67.0	62.5	32	68	147	316
	Em. Dr. to Ave 416	13,000	93%	69.0	64.4	43	92	198	426
	Ave 416 to Ave 422	7,200	93%	66.4	61.9	29	62	133	287
	Ave 422 to Ave 432	2,500	93%	61.8	57.3	14	31	66	142
	Ave 432 to Ave 460	1,800	93%	60.4	55.9	11	25	53	114
	Ave 460 to Fresno CL	1,950	93%	62.8	58.3	17	36	77	167
SR 65	So Co Line to Ave 56	7,700	93%	69.7	65.2	48	102	221	475
	Ave 56 to Ave 95	9,100	93%	70.1	65.6	51	110	237	511
	Ave 95 to Ave 112	10,500	93%	70.8	66.2	56	121	261	562
	Ave 112 to SR 190	13,900	93%	72.3	67.8	71	154	331	714
	SR 190 Olive St (Av 152)	22,500	93%	74.5	70.0	100	216	465	1,001
	Olive St to Linda Vista Av	19,000	93%	73.6	69.1	87	187	403	868

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
	Linda Vista to Ave 228	19,300	93%	71.9	67.4	67	145	313	674
	Ave 228 to Rd 207 (Oak Av)	16,100	93%	71.2	66.6	60	129	277	598
	Rd 207 to SR 137	17,600	93%	72.4	67.9	73	156	337	726
	SR 137 to D St (Exeter)	7,800	93%	69.6	65.1	47	101	219	471
	D St to Pine St (Exeter)	13,400	93%	69.5	65.0	46	99	214	461
	Pine St to SR 198	12,500	93%	70.9	66.4	58	124	268	578
SR 99	Co Line to Ave 24	44,000	81%	82.8	78.2	354	763	1,643	3,541
	Ave 24 to Ave 48	41,000	81%	82.4	77.9	338	728	1,568	3,378
	Ave 48 to Ave 76	38,500	81%	82.2	77.7	324	698	1,503	3,239
	Ave 76 to Ave 96	38,500	81%	82.2	77.7	324	698	1,503	3,239
	Ave 96 to Ave 100 (Court)	38,500	81%	82.2	77.7	324	698	1,503	3,239
	Ave 100 to Ave 104	42,500	81%	82.6	78.1	346	745	1,606	3,460
	Ave 104 to Ave 120	41,000	81%	82.4	77.9	338	728	1,568	3,378
	Ave 120 to SR 190	40,500	81%	82.4	77.9	335	721	1,553	3,347
	SR 190 to Ave 152 (Olive)	41,000	81%	82.3	77.8	333	717	1,545	3,328
	Ave 152 to Ave 184	42,500	81%	82.5	78.0	341	734	1,582	3,409
	Ave 184 to Ave 200	43,000	81%	82.6	78.0	344	740	1,595	3,435
SR 99 (Cont.)	Ave 200 to Airport	44,000	81%	82.7	78.1	349	752	1,619	3,489
	Airport to Ave 216 (Paige)	41,000	81%	82.3	77.8	333	717	1,545	3,328
	Ave 216 to Bardsley	41,000	81%	82.3	77.8	333	717	1,545	3,328
	Bardsley to SR 137	46,000	81%	83.0	78.5	367	791	1,703	3,670
	SR 137 to Prosperity Av	47,500	81%	83.0	78.5	370	797	1,717	3,699
	Prosp Av to Ave 264	42,500	81%	82.6	78.1	346	745	1,606	3,460
	Ave 264 to Ave 280	43,000	81%	82.7	78.1	349	751	1,618	3,487
	Ave 280 to SR 198	45,000	81%	82.8	78.3	359	774	1,668	3,594
	SR 198 to Ave 308 (Goshen)	50,000	81%	83.3	78.8	386	831	1,790	3,856

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
	Ave 308 to Merritt Dr	51,000	81%	83.4	78.9	391	842	1,813	3,907
	Merritt Dr to Ave 384	49,000	81%	83.2	78.7	380	820	1,766	3,804
	Ave 384 to Mendocino Av	49,500	81%	83.3	78.7	383	825	1,778	3,830
	Mend. Ave to Co line	49,500	81%	83.3	78.7	383	825	1,778	3,830
SR 137	Kings Co. Line - Road 68	3,350	82%	68.1	63.6	38	81	175	376
	Road 68 - West	5,600	82%	70.4	65.9	53	114	246	530
	West - J Street	12,900	82%	72.5	67.9	73	157	338	729
	J Street - Kern	7,400	82%	68.3	63.8	39	83	180	388
	Kern - Blackstone	19,200	82%	74.3	69.8	97	210	452	974
	Blackstone - SR 63	11,300	82%	72.0	67.5	68	147	317	684
	SR63 - SR 65	11,000	82%	74.5	70.0	100	215	463	997
SR 190	SR 99 - Newcomb	5,600	85%	72.7	68.2	75	162	350	754
	Newcomb - Road 265	17,300	85%	75.2	70.6	110	238	513	1,105
	Road 265 - Seq. NP	7,000	85%	69.6	65.1	47	101	218	470
SR 198	Kings Co. Line - SR 99	17,300	87%	75.2	70.7	112	241	518	1,117
	SR 99 - Akers	39,000	87%	78.4	73.9	182	393	846	1,823
	Akers - SR 63 (south)	45,500	87%	78.3	73.8	179	387	833	1,794
	SR 63 (south) - Road 168	20,000	87%	74.6	70.1	102	220	473	1,020
	Road 168 - Spruce (SR 65)	17,400	87%	74.0	69.5	93	200	431	929
	Spruce - SR 216	8,500	87%	70.9	66.4	58	124	268	576
	SR 216 - North Fork	3,250	87%	66.2	61.7	28	60	129	278
	North Fork - Mineral King	3,750	87%	66.8	62.3	31	66	142	305
	Mineral King - Seq. NP	1,650	87%	63.2	58.7	18	38	82	177
SR 201	Fresno Co. Line - SR 63	6,200	93%	68.7	64.1	41	88	189	407
	SR 63 - SR 245	4,850	93%	68.9	64.4	42	91	195	421
SR 216	SR198 (Visalia) - Houston	26,000	93%	68.7	64.2	41	89	191	412

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

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						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
	Houston - Road 144	11,300	93%	65.1	60.6	24	51	110	237
	Road 144 - Road 158	4,350	93%	63.5	59.0	18	40	86	185
	Road. 158 - Avenue. 344	4,000	93%	66.6	62.1	30	64	139	299
	Road 196 - Castlerock	4,550	93%	67.2	62.7	33	70	151	326
	Castlerock - SR198 (Lemon Cove)	1,800	93%	65.6	61.1	25	55	118	254
SR 245	Fresno Co. Line - SR 201	680	93%	58.6	54.1	9	19	40	87
	SR 201 - Avenue 352 (Cajon)	2,050	93%	64.1	59.5	20	43	93	201
	Avenue 352 - Woodlake S. Limits	3,250	93%	66.1	61.5	27	59	127	273
	Woodlake S. Limits - SR198	5,800	93%	68.6	64.1	40	86	186	401
	Principal Arterials								
Avenue 54	Kings Co. Line - SR 43	600	91%	56.5	52.0	6	14	29	63
Avenue 56	SR 43 - SR 99	5,105	91%	65.8	61.3	26	57	123	264
Avenue 56	SR 99 - Road 192	1,750	91%	61.2	56.7	13	28	60	129
Avenue 56	Road 192- SR 65	810	91%	57.8	53.3	8	17	36	77
Avenue 56/M56	SR 65 - Old Stage Road	1,230	91%	59.7	55.1	10	22	47	102
Avenue 56/M56	Old Stage Road - Sequoia NF	900	91%	58.3	53.8	8	18	39	83
Avenue 96	Road 96 - SR 99	1,250	91%	59.7	55.2	10	22	48	103
Avenue 96	SR 99 - Road 192	1,800	91%	61.3	56.8	13	28	61	132
Avenue 96	Road 192- SR 65	2,800	91%	63.2	58.7	18	38	82	177
Avenue 96	SR 65 - M109	1,180	91%	59.5	55.0	10	21	46	99
Avenue 152	SR 99 - Road 192	3,150	91%	63.7	59.2	19	41	89	191
Avenue 152	Road 192- Road 222	4,800	91%	65.6	61.1	25	55	118	253
Avenue 152 (Olive)	Road 222 - SR 65	4,750	91%	65.5	61.0	25	54	117	252

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
Avenue 152 (Olive)	SR 65 - Road 252	18,200	91%	71.4	66.8	62	133	286	616
Avenue 184	SR 137 - Road 96	3,550	91%	64.3	59.7	21	45	96	207
Avenue 196	Road 196 - SR 65	1,800	90%	61.5	57.0	14	29	63	136
Avenue 196	SR 65 - Road 236	4,990	90%	66.0	61.4	27	58	125	269
Avenue 196	Road 236 - SR 190	2,100	90%	62.2	57.7	15	32	70	151
Hermosa	SR 65 - Mirage	1,750	91%	60.2	55.7	11	24	52	112
Avenue 216	Road 84-K Street.	1,540	90%	61.8	57.3	14	30	66	141
Avenue 216	K Street.-SR 99	7,600	90%	68.7	64.2	41	88	190	410
Avenue 232	Kings Co. Line - Road 92	3,560	88%	64.9	60.4	23	49	106	228
Avenue 232 (Tulare Avenue)	Road 92 - (West St.) - I Street	3,020	88%	64.2	59.6	20	44	95	204
Avenue 256	SR 99 - Road 216	2,210	91%	62.2	57.7	15	33	70	151
Avenue 280 (Caldwell)	Kings Co. Line - SR 99	8,820	91%	68.2	63.7	38	82	176	380
Avenue 280	SR 99 - Akers	8,700	91%	68.2	63.6	38	81	175	377
Avenue 280 (Caldwell)	Akers - Shady	10,050	91%	68.8	64.3	41	89	193	415
Avenue 280 (Caldwell)	Shady - Fairway	10,000	91%	68.8	64.2	41	89	192	413
Avenue 280 (Caldwell)	Fairway - Lovers Lane	9,700	91%	68.6	64.1	41	87	188	405
Avenue 280	Lovers Lane - Virginia	10,000	91%	68.8	64.2	41	89	192	413
Avenue 280	Virginia - Farmersville Blvd.	8,700	91%	68.2	63.6	38	81	175	377
Avenue 280	Farmersville Blvd. - Brundage	4,540	91%	63.2	58.7	18	38	82	176
Avenue 280	Brundage - Beverly Place	11,600	91%	67.3	62.8	33	71	153	329
Avenue 280	Beverly Place - Filbert	13,800	91%	68.0	63.5	37	80	172	370

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
Avenue 280	G Streetreet - Kaweah	5,900	91%	64.3	59.8	21	45	97	210
Pine Street	G Street - Kaweah	3,240	91%	61.7	57.2	14	30	65	141
Avenue 304	SR 99 - Road 76	3,100	89%	65.0	60.5	23	50	108	232
Avenue 304 (Goshen)	Road 76 - Road 80	6,980	89%	68.5	64.0	40	86	185	399
Avenue 304 (Goshen)	Road 80 - Shirk	8,130	89%	69.2	64.7	44	95	205	442
Avenue 304 (Goshen)	Shirk - Giddings	9,400	89%	6.4	1.9	0	0	0	0
Avenue 304 (Murray)	Giddings - Locust	12,500	89%	69.2	64.7	44	95	205	441
Avenue 312 (Riggin)	Road 80 - SR 63	2,400	89%	63.0	58.5	17	37	79	170
Avenue 328	SR 99 - SR 63	2,130	92%	61.8	57.3	14	31	66	142
Avenue 328	SR 63 - Road 132	4,870	92%	65.4	60.9	25	53	115	247
Avenue 328	Road 132 - SR 216	5,020	92%	65.5	61.0	25	54	117	252
Avenue 384	SR 99 - Road 80	2,960	89%	64.8	60.3	23	49	105	225
Avenue 384	Road 80 - SR 63	3,530	89%	65.6	61.1	25	55	118	253
Avenue 416	Fresno Co. Line - Road 72	9,830	90%	68.9	64.4	42	91	196	422
Avenue 416 (El Monte)	Road 72 - Euclid	7,900	90%	67.9	63.4	36	79	169	365
Avenue 416 (El Monte)	Euclid - Nichols	8,400	90%	66.1	61.6	27	59	127	274
Avenue 416 (El Monte)	Nichols - Perry	5,800	90%	64.5	60.0	21	46	100	214
Avenue 416 (El Monte)	Perry - Road 92	15,100	90%	70.8	66.2	56	121	261	562
Avenue 416	Road 92 - Road 120	7,760	90%	67.9	63.4	36	78	167	361

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
Avenue 416	Road 120 - SR 63	8,000	90%	68.0	63.5	37	79	171	368
Avenue 416/Boyd Dr	SR 63 - SR 245	850	90%	58.3	53.7	8	18	38	83
Road 56	Avenue 384 - Fresno Co. Line	3,871	88%	66.2	61.6	28	60	129	277
Road 68	SR 99 - SR 198	4,000	88%	65.4	60.9	25	53	114	246
Road 68	SR 198 - SR 137	1,828	88%	62.0	57.5	15	31	68	146
Road 80	Avenue 384 - Goshen	7,700	89%	68.0	63.5	37	80	172	370
Road 80 (Plaza)	Goshen - Neeley Street	15,600	89%	71.1	66.6	59	128	275	592
Road 80 (Plaza)	Neeley Street - SR 198	12,610	89%	70.2	65.7	51	111	239	514
Road 92	Avenue 320 - Avenue 280	8,600	83%	69.6	65.0	47	101	217	467
Road 92	Avenue. 280 - SR 198	4,460	83%	66.7	62.2	30	65	140	302
Road 92	SR 198 - Avenue 320	8,400	83%	69.5	64.9	46	99	214	460
Road 96	SR 137 - Avenue 96	1,660	89%	61.4	56.9	13	29	62	133
Road 108 (Demaree)	Avenue 328 - Goshen	2,050	91%	61.9	57.4	14	31	67	144
Road 108 (Demaree)	Goshen - SR 198	3,650	91%	62.3	57.7	15	33	71	152
Road 108 (Demaree)	SR 198 - Walnut	3,890	91%	62.5	58.0	16	34	74	159
Road 108 (Demaree)	Walnut - Caldwell	15,800	91%	68.6	64.1	40	87	188	405
Road 108	Caldwell - Cartmill	11,920	91%	69.5	65.0	46	100	216	465
Road 108 (Hillman)	Cartmill - Leland	8,900	91%	68.3	63.7	38	82	178	382
Road 108 (Hillman)	Leland - Prosperity	9,300	91%	68.4	63.9	39	85	183	394

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
Road 132	SR 201 - Avenue 328	3,640	92%	64.1	59.6	20	44	95	204
Road 132	Avenue 328 - Street John's Pkwy	5,700	92%	66.1	61.6	27	59	127	275
Road 132 (Ben Maddox)	Street. John's Pkwy - Houston	11,340	92%	69.1	64.6	43	94	202	434
Road 132 (Ben Maddox)	Houston - SR 198	18,660	92%	71.2	66.7	61	130	281	606
Road 140	SR 216 - SR 198	17,900	89%	69.6	65.1	47	101	218	469
Road 140 (Lovers Lane)	SR 198 - Caldwell	6,800	89%	65.4	60.9	25	53	114	246
Road 140	Caldwell - Avenue 272	7,900	89%	66.0	61.5	27	59	126	272
Road 140	Caldwell - SR 137	8,650	89%	66.4	61.9	29	62	134	289
Road 152	SR 137 - Avenue 192	3,800	89%	65.0	60.5	23	50	107	231
Road 152	Avenue 192 - SR 190	2,010	89%	62.2	57.7	15	33	70	151
Road 152	SR 190 - Avenue 96	1,700	89%	61.5	57.0	14	29	63	135
Road 160	Avenue 56 - Kern Co. Line	1,600	89%	61.2	56.7	13	28	60	130
Road 164 (Farmersville Blvd)	SR 198 - Walnut	7,650	89%	68.0	63.5	37	79	171	368
Road 164 (Farmersville Blvd)	Walnut - Visalia Road	7,290	89%	67.8	63.3	36	77	166	357
Road 164 / Road 168	Visalia Road - SR 137	5,470	89%	66.6	62.0	29	63	137	295
Road 192	Avenue 196 - Avenue 152	1,516	90%	60.8	56.3	12	26	56	121
Road 192	Avenue 152 - Avenue 56	2,450	90%	62.9	58.3	17	36	78	167
Road 196	SR 216 - SR 198	3,970	91%	64.7	60.2	22	48	104	223
Road 204	SR 198 - SR 65	8,030	87%	68.6	64.1	40	87	187	403
Road 216/	Avenue 232 - M296	1,000	89%	59.2	54.7	9	20	44	95

Table 8-7. Traffic and Noise Level Data, State Routes and Major Roads, Tulare County, California

Roadway & Timeframe	Location	ADT	% Day	Ldn (dBA) @ 50 Feet	Ldn (dBA) @ 100 Feet	From Roadway Centerline			
						Distance (feet) to 70 Ldn Contour	Distance (feet) to 65 Ldn Contour	Distance (feet) to 60 Ldn Contour	Distance (feet) to 55 Ldn Contour
Avenue 272									
Mooney Blvd	SR 137 - Laspina in Tulare	5,570	93%	65.8	61.2	26	56	121	261
Main Street (Porterville)	SR 190 - Olive	11,100	94%	66.4	61.9	29	62	133	287
Main Street	Olive - Morton	8,670	94%	65.3	60.8	24	52	113	244
Main Street	Morton - Henderson	7,980	94%	65.0	60.4	23	50	107	231
Main Street	Henderson - Grand	6,800	94%	64.3	59.7	21	45	96	207
Mirage	Hermosa - Lindmore	3,000	89%	61.8	57.3	14	31	66	142
Diagonal 242 (Orangebelt)	Avenue 220 - Avenue 196	4,850	89%	66.0	61.5	27	59	126	272
Diagonal 242 (Orangebelt)	Avenue 196 - Avenue 194	5,800	89%	66.8	62.3	31	66	142	306
Diagonal 242 (Orangebelt)	Avenue 194 - Grand	4,750	89%	65.9	61.4	27	58	124	268
Road 256/Diagonal 252/Plano	Avenue 196 - SR 190	3,590	89%	64.7	60.2	22	48	103	222
Road 264	Avenue 95 - Avenue 56	170	89%	51.5	47.0	3	6	14	29
Resrevation Road	Worth Road - Tule R. Res. Border	2,300	89%	62.8	58.3	17	36	77	165
Plano/Avenue 116/M109	SR 190 - Avenue 56	10,000	89%	69.2	64.7	44	95	204	440
Yokohl Valley Road	State Rote 198 - Balch Park	470	89%	55.9	51.4	6	12	27	57
Avenue 304	Kings Co. Line - SR 99	6,000	89%	67.0	62.4	31	67	145	313

Railroads have the right to continue normal operations even through development may come close to the tracks.

Burlington Northern-Santa Fe Railroad

Mainline operations on the Burlington Northern-Santa Fe Railroad in Tulare County affect the small communities of Angiola and Allensworth and rural residential uses located near the tracks in the southwest corner of the county. Maximum speed is 70 mph for freights and 79 mph for passenger trains. Freight trains may occur at any time during the day or night and passenger trains generally operate during the daytime (7:00 a.m. - 10:00 p.m.) hours. According to the Wyle methodology, the above-described type and frequency of operations will result in present noise exposures of 65 and 60 dB Ldn at approximately 345 and 650 feet, respectively, from the center of the tracks, and at approximately 420 and 820 feet, respectively, from the center of the tracks for projected future operations. Noise levels in the vicinity of grade crossings are somewhat higher than this due to the use of the warning horn.

Union Pacific Railroad

Mainline operations on the Union Pacific Railroad in Tulare County affect the City of Tulare and a number of small communities and rural residential uses. According to the Trainmaster's office in Fresno, there are more than 20 freight train operations per day in the Tulare County Area. Passenger trains presently do not operate on Union Pacific tracks in Tulare County. Train speeds on the mainline are generally 45-65 mph and train movements may occur at any time during the night or day. According to the Wyle methodology, the above-described type and frequency of operation results in noise exposures of 65 and 60 dB Ldn at approximately 335 and 660 feet, respectively, from the center of the tracks for present operations, and at approximately 440 and 800 feet, respectively, from the center of the tracks for estimated future operations. Noise levels in the vicinity of grade crossings are somewhat higher than this due to the use of the warning horn.

Branchline operations on the Union Pacific Railroad in western Tulare County only affect small communities and rural residential uses within the county. Branchline operations presently occur 3 times per week. Their movements may occur at any time of the day or night. Speeds are restricted to a maximum of 40 mph. Measurements conducted on Union Pacific branchline operations in the Visalia area

resulted in maximum levels at 100 feet ranging from 92-105 dBA with the use of the horn. SEL's at the same distance ranged from 99.8 to 106.7 dB.

Tracks also go from Visalia to Huron. These tracks have been recently improved and potentially could have passenger service connecting Hanford and Visalia, which in turn would serve to link a future high-speed rail connection.

San Joaquin Valley Railroad

The San Joaquin Valley Railroad (SJVR), headquartered in Exeter, California, is a collection of Class I branch lines. The SJVR began service on January 2, 1992 with 50 miles of track, 25 customers and 20 employees. Today, SJVR operates over 312 miles of track, with 75 employees and 240 customers. The SJVR runs between Fresno and Bakersfield, California. No information is available on cumulative noise exposure, although, the SJVR could have significant short-term impacts near grade crossings during individual train movements.

Airport Noise

Airport noise data was based on the Noise Element of the Tulare County General Plan, adopted February 1988. The six (6) public use airports in Tulare County were evaluated to determine where existing or potential future noise-related land use conflicts may occur. The evaluations included interviews with airport management or fixed base operators (FBO's), a field survey of airport facilities, operations and surrounding land uses, and noise monitoring to document noise levels from individual aircraft operations. Noise exposure contours in terms of CNEL were prepared for the airports in instances where the number and type of operations would be expected to result in a 60 dB CNEL contour extending beyond the airport property. Noise contour maps for these airports were prepared based upon annual average operations.

The Integrated Noise Model (INM), developed by the Federal Aviation Administration, calculates aircraft noise exposure by mathematically combining aircraft noise levels and airport operational factors at a series of points within a Cartesian coordinate system which defines the location of airport runways and aircraft flight tracks. All IFR and VFR flight tracks, reportedly used with any regularity, were considered in the noise modeling process. User inputs to the INM include the following:

- Runway configuration;
- Aircraft flight track definition;
- Aircraft stage length (where applicable);
- Aircraft approach profiles; and
- Aircraft traffic volume and fleet mix.

The INM database contains aircraft performance and noise level data that are representative of most of the commercial and general aviation aircraft fleet and some of the military aircraft fleet. The smaller general aviation aircraft types are grouped by the INM data base into a composite single engine propeller class (COMSEP) and a composite twin engine propeller class (COMTEP).

The 60 dB CNEL contour for annual average operations at most Tulare County airports is located relatively close to the runway due to relatively low numbers of operations and an aircraft fleet consisting primarily of smaller propeller aircraft. However, it should be noted that maximum noise levels from individual operations by high performance single and twin engine aircraft, aerial application aircraft, fire suppression aircraft and some corporate jets may be expected to result in significant short term noise impacts for persons located near the approach, departure or local training patterns of an airport.

Visalia Municipal Airport

The Visalia Municipal Airport is the only airport in Tulare County that has scheduled airline service. The airport is classified as a "General Transport" facility and consists of a single 6,559' x 150' runway with a NW-SE (30-12) orientation. There are six Fixed Base Operators (FBOs) engaged in instruction, charter service and aircraft maintenance and service at the airport and 142 based aircraft. Commuter airline service is presently provided by United Express.

The majority of aircraft operations (approximately 90%) occur to the northwest on Runway 30. Aircraft operations by time of day are broken down into approximately 75% during the day (7:00 a.m. - 7:00 p.m.), approximately 15% during the evening (7:00 p.m. - 10:00 p.m.) and approximately 10% during the nighttime hours (10:00 p.m. - 7:00 a.m.). Noise contours previously prepared for the airport were done in terms of the Composite Noise Rating (CNR) scale as part of the

previous Master Plan (1973). The 60 and 65 dB CNEL contours for existing operations were prepared using the FAA's Integrated Noise Model (INM-Version 3.8) with inputs based upon aircraft activity information with aircraft assigned to the flight paths most frequently flown by pilots using the airport facility. At the present time, off-airport land uses in the Visalia Municipal Airport environs are generally compatible with airport uses.

Since operations at the airport are expected to increase in the future, and there is the possibility of more frequent use by larger air carrier and corporate jet aircraft, it is important that proposed developments of noise sensitive land uses in the vicinity of the airport be carefully considered by the City of Visalia and Tulare County.

Porterville Municipal Airport

Porterville Municipal Airport is owned by the City of Porterville. The primary runway (30-12) is 6000 feet long. A 4000-foot cross-wind runway (25-7) is designated as abandoned by the City of Porterville Airport Master Plan. Flight schools and aircraft charter FBO's and a California Division of Forestry (CDF) fire suppression operation are located at the airport. During the fire season 3 to 6 fire suppression aircraft may be based at the field. In addition to operations provided by based aircraft, transient corporate jets commonly use the field. On a typical busy day 5 or 6 of these jets may use the field. Approximately 70% of airport operations occur on Runway 30. About 75% of operations at the airport occur during the daytime hours (7:00 a.m. - 7:00 p.m.), 20% during the evening hours (7:00 p.m. - 10:00 p.m.) and 5% during the nighttime hours (10:00 p.m. - 7:00 a.m.). A standard left hand pattern is used on runway 30-12. Land uses adjacent to the airport include agricultural, commercial, industrial and recreational uses. Based on reported operational information, 60 and 65 dB CNEL contours were prepared for existing annual average operations at the airport.

Tulare Municipal Airport (Mefford Field)

Mefford Field is owned and managed by the City of Tulare. The one runway at the airport is 3,900 feet long. It is estimated that about 70% of airport operations occur to the northwest on Runway 31. It is also estimated that about 70% of aircraft use the airport during the daytime hours (7:00 a.m. to 7:00 p.m.), 25% during the evening hours (7:00 p.m. to 10:00 p.m.) and 5% during the nighttime hours (10:00 p.m. to 7:00 a.m.) Land uses located to the east of the airport include

the Tulare Country Club and golf course. The Elk Bayou Park is located south of the airport. Commercial uses border the north and west sides of the airport along SR 99. The 1972 Master Plan for the airport included a noise contour map in terms of the Noise Exposure Forecast (NEF) scale. 60 and 65 dB CNEL contours were prepared for airport operations.

Woodlake Airport

The Woodlake Airport is owned and managed by the City of Woodlake. The one runway at the airport is 3355 feet long. It is estimated that departing and landing aircraft use Runway 25, 90% of the time and Runway 7 the remainder of the time. Most aircraft use a standard left hand pattern in departing or landing at the airport. About 95% of aircraft operations occur during the daytime hours. The airport is generally surrounded by agricultural land uses with the exception of some residential uses to the east along the river.

Sequoia Field

Sequoia Field is owned by the county of Tulare and managed by one of the fixed-base operators. The single airport runway is 3,020 feet long by 60 feet wide. Operations occur between 7:00 a.m. and 7:00 p.m. approximately 70% of the time, between 7:00 p.m. and 10:00 p.m. approximately 10% of the time, and between 10:00 p.m. and 7:00 a.m. approximately 20% of the time. Maximum noise levels from such departures and also from departures by aerial application aircraft could be expected to result in significant short-term noise impacts in areas located near the airport. Land uses in the vicinity of the airport include agricultural uses, scattered residential uses, and a Tulare County detention facility. Several homes are located near established flight corridors in the vicinity of the airport (west of Rd. 112). Local pilots attempt to avoid existing homes, but future development could result in noise-related land use conflicts, especially if airport operations increase significantly in the future.

Eckert Field

Eckert Field is privately owned and managed, but is open for public use. The one runway at the airport is 2050 feet long including the overrun. The airport owner estimates that there are approximately 7000 annual operations at the airfield. It is estimated that 80-90% of operations occur to the northwest on runway heading 31. About 90% or more of general aviation aircraft operations occur during the

daytime hours. A standard left hand pattern is used by most pilots at the airport. Eckert Field is surrounded by citrus groves.

Thunderhawk Field

Thunderhawk Field is a privately owned and maintained facility. The field contains a single runway that is 2,400 feet long and 50 feet wide. Surrounding land uses are mostly agricultural, with the exception of some scattered residential uses. Due to the number and type of aircraft at the facility, the 60 dB CNEL noise contour does not extend beyond the airport property.

Stationary Noise Sources

Production of noise is an inevitable part of many industrial, commercial, and agricultural processes, even when the best available noise control technology is applied. Noise production within an industrial, commercial or agricultural facility is controlled by federal and state employee health and safety regulations (OSHA and Cal-OSHA), but exterior noise emissions from such operations have a potential to exceed locally acceptable standards at noise-sensitive land uses.

From a land use planning perspective, noise control issues focus upon two objectives: to prevent the introduction of new noise generating uses in a noise sensitive area, and to prevent encroachment of noise sensitive uses upon existing noise generating facilities. The first objective can be achieved by applying noise performance standards to proposed new noise generating uses. The second objective can be met by requiring that new noise-sensitive uses in proximity to existing noise generating facilities include mitigation measures to ensure compliance with noise performance standards.

The spread of noise is dependent on atmospheric conditions. Atmospheric turbulence, temperature, humidity, and other conditions, which change from day to night and season to season, will result in noise level fluctuations. This phenomenon is most apparent at distances greater than a few hundred feet from a noise source. Since many noise-sensitive receiver locations in Tulare County are ½ mile or more from noise sources, it is probable that noise level measurements conducted in different seasons and under different atmospheric conditions will produce different results.

The following descriptions of existing industrial and other major noise sources in Tulare County are intended to be representative of the relative noise impacts of such uses, and to identify specific noise sources which should be considered in the review of development proposals in their environs. This is not a comprehensive listing of all noise generating uses, but rather an overview of the major ones.

Manufacturing Plants

Gang Nail Truss Company. This business manufactures trusses for the building trade and is located at the corner of Goshen Avenue and Shirk Road in Visalia. The plant typically operates from 8:00 a.m. to 10:00 p.m. The major noise producing equipment at the plant are nail machines and component cutter saws. Noise levels measured from the nail machine on October 29, 1986 ranged from 65-70 dBA at 50 feet.

Noise levels from the saw at 100 feet ranged from 69-71 dBA. Since the saw and nail machine operate intermittently, the 60 dB L_{dn} noise contour would be expected to be confined to within the company property. Surrounding land uses are industrial.

Ruiz Food Products, Inc. Ruiz Food Products, Inc. is located at 501 S. Alta Avenue in Dinuba. The firm processes Mexican-style foods. The main noise producing equipment at the plant are an ammonia compressor on the south side of the facility, a refrigeration compressor on the north-east corner of the building and refrigerated truck trailers (reefers) on the west end of the building. The plant operates 18 hours a day, but plant equipment runs 24 hours a day. At the former Tulare plant, noise measurements on September 12, 1985, at a distance of 25 feet from the ammonia compressor produced a constant level of 84 dBA. Measurements on October 15, 1986, at 50 feet from the refrigeration compressor produced a level of 67-68 dBA, and at 50 feet from the reefers, the level was a constant 73 dBA. Based upon these levels and the reported hours of operation, the generalized 60 dB L_{dn} contour would be located approximately 250 feet from the plant. Residential land uses are located to the east of the plant, and commercial uses to the south of the plant.

Advanced Food Products. Advanced Food Products, formerly, Real Fresh, Inc., is located at 1211 E. Noble in Visalia and prepares sterilized food products. The plant operates Monday through Friday, 24 hours a day. The main noise sources in the plant are boilers and the conveyor system. Noise level measurements at a distance of approxi-

mately 100 feet east of the plant on October 31, 1985 resulted in levels of about 62-63 dBA. At the closest residential interface to the plant, which is about 300 feet to the west, the measured noise level ranged from 52-53 dBA.

Dairyman's Land O' Lakes Cooperative Creamery. Located at 400 south "M" Street in Tulare, Dairyman's Cooperative Creamery processes fresh milk into a number of dairy products. The major noise producing equipment, which operate almost constantly, are boilers, blowers, evaporators, cooling towers, compressors, fans, product elevators and a natural gas-fired cogeneration engine. Two diesel engines that are used as standby electrical generators are tested each week. The plant operates 24 hours a day, 7 days a week, 365 days a year.

Additionally, about 120-140 trucks enter and leave the plant daily. Noise levels on three sides of the plant were measured on January 6, 1987. On the north side of the plant, about 160 feet from cooling towers, evaporators and the cogeneration engine, the noise level was a steady 64 dBA. On the east property line of the plant, noise from air conditioning compressors was a steady 57 dBA. On the south side of the plant, adjacent to the County Fairgrounds, the level was 61-62 dBA. The noise source at this location was steam from a still evaporator.

Mixed residential and commercial land uses abut the plant on its north and east sides, and the County Fairgrounds are south of the plant. Commercial and industrial land uses are located to the west of the plant. The City of Tulare should carefully review proposals that could result in the placement of noise sensitive land uses near the creamery.

Sequoia Walnut Growers Association. On October 15, 1986, noise level data was collected at the Sequoia Walnut Growers Association facility at Ben Maddox Road and Goshen Avenue in Visalia. The dominant noise sources at the Sequoia Walnut Growers Association plant are a metal conveyor belt and escaping steam. At a distance of 100 feet from the north side of the building, noise levels ranged from 68-69 dBA. The plant operates from 8:00 a.m. to 5:00 p.m. for approximately 6 weeks a year. The plant is currently surrounded by industrial uses.

Visalia Citrus Packers. The Visalia Citrus Packaging Group facility is located at the corner of Race and Tipton Streets in the City of Visalia.

The plant generally packs oranges from 8:00 a.m. to 5:00 p.m. May through November. Shipping and receiving generally occurs 24 hours a day. Noise sources associated with the business are forklifts, slow moving and idling, and a refrigeration unit located on the east side of the fruit receiving building. The equipment located within the building is not audible on the outside. At a residential location on Tipton Street opposite the fruit receiving building, noise levels from propane fork lifts moving bins of fruit ranged from 62-72 dBA. At a distance of 50 feet from an idling truck, the noise level was a constant 71 dBA.

The refrigeration unit was not operating at the time. Based on the reported operating hours and noise levels recorded on January 16, 1987, it is not expected that the 60 dB Ldn contour would extend beyond the property boundary. When the refrigeration unit on the east side of the fruit receiving building operates, which is reported to occur about 30 days a year, noise impacts on the east side of the plant are likely to be greater than observed during the survey.

Kaweah Citrus Association. Kaweah Citrus Association is a citrus packing house located southwest of Lemon Cove on Road 236. The packing house operates approximately 10 months out of the year (November through September) from 7:00 a.m. to 5:00 a.m. 5-6 days per week. Major noise sources outside the building are refrigeration equipment and compressors associated with the cold storage facility, bin dumping equipment, forklift movements around the plant and truck loading activities. Truck loading occurs between 7:00 a.m. and midnight. All processing and packing equipment is located inside the building. Measurements conducted on January 12, 1987 indicated that noise levels from refrigeration units and compressors on the south side of the cold storage building are approximately 66-68 dBA at 100 feet. At approximately 300 feet from the bin dumping area, noise levels from the open door of the packing house and from bin dumping and stacking activities ranged from 54-55 dBA. At 100 feet from an idling diesel truck in the loading area, the noise level was 60 dBA. Based upon the above-described hours of operation and noise level data, the 60 dB L_{dn} contour is confined to the property with the exception of the south and east side of the building where the contour extends across the railroad tracks to a distance of approximately 475 feet from the center of the location of the refrigeration equipment.

The packing house is presently surrounded by agriculture and a few scattered residential land uses.

Sierra View Hospital, Porterville. The Sierra View Hospital is located at the intersection of Putnam Avenue and Jaye Street in the City of Porterville. According to the Director of Plant Operations, the primary noise sources associated with the hospital are air conditioning equipment located on the southern end of the hospital and sirens from approaching ambulances. According to hospital policy, ambulances turn off sirens one block from the hospital. Noise measurements of the air conditioning system were made at the southern property line of the hospital on January 6, 1987. Based on these measurements, the 60 dB Ldn contour is not expected to extend beyond the hospital property line. Since heavier loads are imposed on the air conditioning system in the summer, higher noise levels may result from that equipment during that time.

Tulare County Landfill, Road 80, Visalia. Noise monitoring of a solid waste landfill operated by the Tulare County Public Works Department near Road 80 and Avenue 328 was conducted January 6, 1987. More than 1100 refuse trucks use the landfill each month. According to the County Public Works Department, this is the largest landfill in the county. The chief noise sources associated with the landfill are trucks and automobiles entering and leaving the landfill, and the heavy equipment used to manage and cover the refuse. The dominant noise sources were an Ingersoll-Rand Model 750 Landfill compactor and a Caterpillar D-7 dozer, which were operating on the working face of the landfill. At a distance of about 300 feet from this equipment, noise levels ranged from 63-68 dBA. Noise from refuse trucks and other vehicles in the landfill was not perceptible while this equipment was operating.

The posted operating hours of the landfill are 8:00 a.m. to 4:00 p.m., 7 days a week, year-round. Assuming that most of the heavy equipment activity takes place near the central part of the landfill, it is not expected that the 60 dB L_{dn} contour would extend beyond its boundaries.

Electric Pumps on Water Wells. Noise level measurements of two water wells powered by 50 horsepower electric motors were conducted by BBA on October 14, 1986. The wells were located on East and West Ash Avenues in the City of Farmersville. At a distance of 25 feet from the well at East Ash Avenue the noise level was a steady 57 dBA. When air was being released from the pressure tank the combined noise level from the motor and air release was 69 dBA. At a distance of approximately 60 feet from the well on West Ash Avenue the noise level was 57 dBA. According to the City of

Farmersville Public Works Department, the pump operates an average of 20 minutes per hour throughout the year. The distance to the 60 dB L_{dn} contour for the East and West Ash Avenue pumps is 83 and 41 feet, respectively.

Electric Storm Water Lift Pumps. Noise levels from the 5 horsepower storm water lift pump located on the corner of Front Street and Linnel Avenue in the City of Farmersville, were measured on October 14, 1986. At a distance of 25 feet from the pump, the level was 69 dBA. Since the pump runs sporadically, cumulative noise exposure as defined by L_{dn} for this source would be insignificant for persons located closer than approximately 100 feet from the pump. However, noise levels would be potentially annoying in these areas while the pump is operating.

Outdoor Recreational Complexes. Noise levels have been found to vary significantly depending on what activities are taking place during the game. Maximum noise levels have ranged from 65 to 70 dBA at a distance of approximately 200 feet from a softball diamond due to yelling and clapping by players and spectators.

Due to the sporadic nature of activities at most outdoor recreational complexes, cumulative noise exposure as defined by L_{dn} is usually insignificant. However, the potential for annoyance does exist depending on the time of day (typically the evening hours) such facilities are used. Steps should be taken to avoid the development of nearby noise sensitive land uses without appropriate receiver based mitigation.

Sand and Gravel Extraction and Processing

Kaweah River Rock Company, Inc. The Kaweah River Rock sand and gravel extraction and processing operation is located southwest of Woodlake. The plant generally operates 18 hours per day, 5 days per week. The plant occasionally operates 24-hours per day and on Saturdays. Excavation equipment consists of backhoes, graders, loaders, a drag line and off-road haul trucks. At any one time, it is common to have the drag line, backhoe or one of the loaders working in conjunction with the off-road haul trucks.

Noise levels at 700 feet from such an excavation operation using a CAT992A loader and 2 CAT 769B trucks on January 12, 1987, ranged from 47.5 to 66.5 dBA with an L_{eq} of 61 dBA. At 1,200 feet, the same operation generated noise levels of 46-61 dBA with an L_{eq} of 55 dBA.

The processing area of the operation contains 3 crushing and/or screening plants that are used to produce certain products. On January 12, 1986, the processing plant containing one jaw crusher, one cone crusher and four screens was in operation. At 200 feet, the plant produced noise levels of approximately 77 dBA at 150 feet from the jaw crusher. The CAT 988B loader working around the processing plant generated noise levels of 75-80 dBA at 150 feet.

Agricultural Operations

Wind Machines. Wind machines are found throughout the citrus-growing areas of Tulare County and in some areas where tree fruit, nuts and vegetables are grown. The machines are generally operated during the late night and early morning hours during the colder nights of the year, although they are test-run at other times. There are a number of different types of wind machines. Most of them have the engine on the ground (referred to as "ground power") although some have the engine (or electric motor) on top of the tower. Blades are generally 14 to 20 feet in diameter. Engines may use gasoline, diesel or propane. Noise measurements were conducted for a typical ground power wind machine with an internal combustion engine and for a typical electric wind machine with the motor on top of the tower. The ground power wind machine was a National Frost 391 GP with a gasoline fueled 391 cu./in. Ford V-8 engine and an 18' 6" blade. Measurements were conducted at 50 feet and 350 feet from the base of the tower. At 50 feet, noise levels were dominated by the unmuffled engine, and were a constant 91-92 dBA regardless of the position of the blade. At 350 feet, noise levels were caused by a combination of the engine and the blade, and ranged from 61 to 71 dBA depending upon the orientation of the blade. The highest levels occurred when the blade was facing the microphone.

According to the wind machine owner, this particular machine is typical of approximately 90 percent of the wind machines in the area. The electric wind machine had a 75 horsepower motor mounted on top of the tower and a blade of approximately 14 feet in diameter. At 50 feet, noise levels were dominated by the blade and ranged from 73 to 87 dBA depending upon blade orientation. At 350 feet, noise levels were also dominated by the blade and ranged from 56 to 67 dBA.

During periods of wind machine use, there may be many machines in simultaneous operation. The average number of wind machines for a properly-protected orchard is one for each ten acres.

Diesel Engines on Wells. Diesel or gasoline pumps produce noise levels of approximately 75-85 dBA at 50 feet if properly muffled. Unmuffled engines can be significantly louder. Cumulative noise exposure as defined by L_{dn} would depend on how many hours a day the engine is operated. For an engine which produced 80 dBA at 50 feet, the distance to the 60 dB L_{dn} contour would be approximately 1000 feet if the pump operated 24 hours per day. For this reason, such stationary diesel or gasoline powered engines may be a significant source of noise on agricultural wells if there are nearby noise sensitive land uses.

Aerial Application Aircraft (Crop Dusters). Aerial application aircraft are frequently used to spray crops or to spread seed or fertilizers. There are many types of fixed or rotary wing aircraft used for aerial application including aircraft with reciprocating, radial and turbine engines and 2 or 3 bladed propellers. Horsepower ratings generally range from 300 to 1200. Most of the noise impacts generated by aerial application aircraft occur as the result of propeller noise and the low altitude that the aircraft typically fly. Noise level measurements in Tulare County and elsewhere have shown that the noisiest designs are the medium to high horsepower engines with two-bladed propellers. Most of the highest horsepower engines utilize a three-bladed propeller, which is significantly quieter due to lower tip speed. Measurements conducted east of Pixley on October 17, 1986, of a Piper Brave (400 hp/ 3-bladed propeller) indicated that noise levels from this aircraft while applying cotton defoliant ranged from 85-88 dBA at about 600 feet to 97-100 dBA at 50 feet.

Measurements on January 16, 1987 at the Tulare Municipal Airport indicated that maximum noise levels from a 800 hp Turbine Thrush with a 3-bladed propeller range from 90-95 dBA at approximately 100 feet overhead. As noted in the sections addressing individual airports in this document, single event maximum noise levels for aerial application aircraft can be very significant in areas near airports where these aircraft are frequently operated.

Miscellaneous Farming Operations. Farming operations are common throughout Tulare County with the exception of some mountainous areas and heavily developed areas within larger communities. Some of the more common noise sources associated with farming operations include tractors, harvesting equipment and spray equipment. In order to document noise levels generated by such equipment, noise levels were measured at various locations throughout the county. Examples of measured levels include a cotton

picker operating at roughly 500 feet away, which produced a noise level of 58 dBA. A larger diesel-powered wheel tractor pulling a 20-foot disk generated levels of 72-75 dBA at approximately 150 feet. An International 574 diesel-powered wheel tractor (smaller than the above) pulling a furrowing appliance generated levels of 69-79 dBA at approximately 50 feet. Also measured were a Randall weed sprayer with a National one cylinder diesel engine which produced 74-75 dBA at 50 feet, an FMC Bean 267 engine-driven speed sprayer (345C.i.V8) which produced 92-97 dBA at 50 feet depending upon orientation, and an Aerofan 391 speed sprayer which generated 74-76 dBA at 100-300 feet.

The above-described levels do not include all types of farm equipment, but do present a range of levels that may be expected. A good general rule-of-thumb is that a diesel engine will produce noise levels of 75-85 dBA at approximately 50 feet. Although farming operations occasionally generate significant noise levels, such levels generally do not last more than a few hours at a given location unless a stationary piece of equipment such as a pump master (or engine) is involved. For this reason, significant cumulative noise exposure as defined by L_{dn} would not generally be expected to result from typical farming operations within Tulare County.

Special Interest Noise Sources

Fast Food Loudspeakers. Noise levels from several fast food loudspeakers were measured on October 14, 1986. An attempt was made to position the sound level meter microphone directly in front of the speakers. Unavoidably, the noise level data included idling automobile engines. Table 8-8 provides a range of the noise levels measured during the survey.

Table 8-8. Fast Food Loudspeaker Noise Data

Location *	Noise Level
McDonalds, Mooney Blvd. – Visalia	60-62 dBA
Wendy's, Mooney Blvd. - Visalia	72-77 dBA
Kentucky Fried Chicken, Prosperity Ave. – Tulare	62-65 dBA
Burger King, Prosperity Ave. – Tulare	61-63 dBA

* Measured at 25 feet from loudspeaker

Source: Brown-Buntin Associates Inc. (1986).

Truck Stops. The truck stop surveyed is located east of SR 99 about 1/2 mile south of Merritt Drive in Traver. It consists of a 7-bay service

station, laundromat, shower and restaurant. Noise level measurements approximately 100 feet from three idling and slowly moving trucks in the service station ranged from 61-67 dBA with a L_{eq} of 63.3 dB. It should be noted that since most truck stops are located close to busy freeways, the predominant noise source as measured at or near the truck stop will be produced by freeway traffic, not by trucks within the truck stop.

Wood Cutting. Noise generated by wood cutting activities is primarily caused by chainsaws. Noise may also be generated by wood splitting machines which are hydraulic rams powered by a small gasoline engine similar to what is typically found on a lawn mower. Noise levels generated by typical wood cutting activities were evaluated by measuring noise levels from a chainsaw which was being used to cut sections of wood approximately 10 inches in diameter. At 25 feet, the saw produced noise levels ranging from 85 to 92 dBA depending upon orientation of the saw and load on the engine.

At 50 feet, the saw produced noise levels of 75 to 84 dBA depending upon the same factors. It should be noted that the frequency content of the noise generated by most chainsaws is quite annoying to most persons due to the sensitivity of the ear to the range of sound that is produced by such saws.

Kennels. The Humane Society animal shelter located at Frontage Road 99 and Avenue 280 was selected as a site representative of a kennel. Noise level measurements around the shelter were conducted on October 14, 1986. Since the shelter is enclosed, some measurements were taken directly in front of opened doors to simulate an unenclosed kennel. At a distance of 50 feet from the kennel, noise levels from barking dogs ranged from 55-68 dBA with doors closed, and 65-79 dBA in front of open doors. As defined by Leq, the noise level at 50 feet from the enclosed building was 63.8 dBA and 71.4 dBA in front of the open doors.

Community Noise Survey

A community noise survey was conducted to document noise exposure in areas of the county containing noise-sensitive land uses. The following noise sensitive land uses have been identified within the county: all residential uses, schools, and long-term care medical

facilities, such as hospitals, nursing homes, etc. A total of 70 monitoring sites were chosen as shown in Table 8-7.

A combination of short-term and continuous noise monitoring was used to document existing noise levels at these locations. Noise monitoring equipment used for short-term monitoring consisted of Bruel & Kjaer (B&K) Type 2218 and 2230 precision sound level meters equipped with Type 4165 and 4155'/x" microphones, respectively. Equipment used for continuous monitoring consisted of Larson-Davis Laboratories Model 820 environmental noise monitors equipped with B&K Type 4176 microphones. All measurement equipment complies with applicable requirements of the American National Standards Institute (ANSI) for Type I sound level meters.

During the short term monitoring programs, noise levels were measured for approximately 15 minutes during each of the two periods of the day and 5 minutes during the night so that reasonable estimates of Ldn at the monitoring sites could be predicted.

The data collected during the short-term sampling program included the average noise level (Leq), maximum noise level (Lmax), minimum noise level (Lmin) and a description of noise sources that were audible at the monitoring sites. Continuous noise monitoring was conducted at 10 out of the 70 community noise survey sites to document fluctuations in noise levels over a typical 24-hour period.

Noise level data collected during continuous monitoring included the hourly Leq and Lmax and the statistical distribution of noise levels over each hour of the sample period. The community noise survey results indicate that typical noise levels in noise-sensitive areas of the unincorporated areas of Tulare County are in the range of 29-65 dB Ldn. As would be expected, the quietest areas are those that are removed from major transportation-related noise sources and industrial or stationary noise sources.

9. BIOLOGICAL, ARCHAEOLOGICAL, AND HISTORICAL RESOURCES

9.1 Introduction

This chapter of the Background Report summarize the biological, archaeological and historical resources within Tulare County. Methodologies for developing these sections, key terms related to their discussion, and local, state and federal regulations that pertain to these topics will be addressed.

The chapter is divided into the following sections:

- Biological Resources (Section 9.2); and
- Archaeological and Historical Resources (Section 9.3).

9.2 Biological Resources

The study area to address the biological resources of Tulare County is considered to be the extent of the county boundaries. However, many of the ecosystems and habitats that exist in Tulare County also extend outside the county. Therefore, this discussion of biological resources will include ecosystems and habitats that extend beyond the boundaries of Tulare County.

This section describes the biological resources in the county from both qualitative and quantitative perspectives. The results of this assessment will be used in the development of policy guidance that not only protects biological resources in the county, but also describes the affected biological resources environment for inclusion in the environmental impact report for the General Plan update to comply with CEQA.

Methods

URS biologists reviewed pertinent literature, and utilized secondary source database queries to identify biological resources within the county. The primary sources of data referenced for this section included the following:

- California Natural Diversity Data Base (CNDDB) – GIS Database, California Department of Fish and Game, April 2004 version;

- University of California, Santa Barbara (UCSB) California GAP Analysis Project website http://www.biogeog.ucsb.edu/projects/gap/gap_home.html (UCSB 2004);

- California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants website http://www.northcoast.com/~cnps/cgi-bin/cnps/sensinv.cgi (CNPS 2004a);

- U.S. Forest Service (USFS) Ecological Subregions of California website http://www.fs.fed.us/r5/projects/ecoregions/ (USFS 2004); and

- California Department of Fish and Game Habitat Conservation Planning Branch website www.dfg.ca.gov/hcpb/species (CDFG, 2004a).

Key Terms

- **Listed Species.** Listed species are recognized by federal, state, or other agencies in an effort to protect them or their habitat under the federal Endangered Species Act (1973) and the California Endangered Species Act (1984). These species are vulnerable to habitat loss or population decline because of their rarity. Some of these species receive specific protection that is defined by federal or state endangered species legislation. Species that are considered "threatened" or "endangered" under the federal Endangered Species Act or the California Endangered Species Act receive the most legal protection under these laws. Other species have been "listed" on the basis of adopted policies and expertise of state resource agencies, local governmental agencies or organizations with acknowledged expertise to meet local conservation objectives. A "listed" species is a collective term in this report based on the species being identified by one or more of the following:

    - Candidates for listing under the Federal Endangered Species Act (61 FR 7596-7613);

- Federally listed or proposed under the Federal Endangered Species Act (50 CFR 17.11-17.12);
- Fully protected animals, as defined by the State of California (California Fish and Game Code Section 3511, 4700, and 5050);
- Plants listed as rare or endangered under the California Native Plant Protection Act (California Fish and Game Code Section 1900 et seq.);
- Plants listed by the California Native Plant Society (CNPS) as rare, threatened, or endangered (List 1B and List 2 status), as needing more information (List 3), and as having a limited distribution (List 4) (CNPS 2004).
- Species listed by the U.S. Fish and Wildlife Service (USFWS) or the California Department of Fish and Game (CDFG) as a species of concern (USFWS), rare (CDFG), or of special concern (CDFG);
- Species listed or proposed under the California Endangered Species Act (14 CCR 670.5); and
- Species that meet the definition of threatened, endangered, or rare under CEQA (CEQA Guidelines Section 15380).

- **Critical Habitat.** Critical habitat is the natural environment designated by the USFWS, as required, for the conservation of a federally listed species. These habitats are specifically protected under the federal Endangered Species Act. (16 USC 1532, 50 CFR 424.02). The designation of a critical habitat is a formal process that involves the posting of a draft proposal in the federal register of the critical habitat designation, a public comment period, and a final determination.

- **Wetlands.** The federal government defines wetlands in Section 404 of the Clean Water Act as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support (and do support, under normal circumstances) a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3[b] and 40 CFR 230.3). The definition of wetlands requires three wetland identification parameters to be present: wetland hydrology,

hydric soils, and hydrophytic vegetation. Wetlands can be areas that are consistently inundated or seasonally inundated. Wetlands typically support a unique flora and fauna. The United States Army Corps of Engineers (ACOE) is the responsible agency for regulating wetlands under Section 404 of the Clean Water Act, while the Environmental Protection Agency (EPA) administers overall responsibility for this Act. A permit from the ACOE is required under Section 404 of the Clean Water Act for any action affects wetlands (33 USC 1344 and EPA 2004).

- **Waters of the U.S.** This is also a term defined in Section 404 of the Clean Water Act, referring to those hydric features that are regulated by the Clean Water Act but are not defined as wetlands (33 CFR 328.4). Waters of the U.S. include lakes, rivers, and intermittent streams. To be considered under the jurisdiction of the ACOE, these features must exhibit an identified bed and bank and an ordinary high-water mark. A permit from the ACOE is required under Section 404 of the Clean Water Act for any action affects other Waters of the U.S. (33 USC 1344 and EPA 2004).

- **Waters of the State.** This term is defined in the Porter-Cologne Act as "any surface or groundwater, including saline waters, within the boundaries of the state" (California Water Code Section 13000 et seq.). Waters of the state includes all wetlands, including those not listed under the Clean Water Act, such as isolated wetlands. The Regional Water Quality Control Board enforces the Porter-Cologne Act and is charged with protecting Waters of the State.

- **Sensitive Natural Community.** A sensitive natural community is a biological community that is regionally rare, provides important habitat opportunities for wildlife, or is of special concern to local, state, or federal agencies. The California Environmental Quality Act (CEQA) identifies the elimination or substantial degradation of such communities as a significant impact (CERES 2004). Based on federal and state regulations, wetlands and critical habitat are examples of sensitive natural communities.

Regulatory Setting

Federal Regulations

Clean Water Act-Section 404. Wetlands and other waters of the U.S. are subject to the jurisdiction of the ACOE and EPA under Section 404 of the Clean Water Act. Wet areas that are not regulated by this Act do not have a hydrologic link to other waters of the U.S., either through surface or subsurface flow. The ACOE has the authority to issue a permit for any discharge, fill, or dredge of wetlands on a case-by-case basis, or by a general permit. General permits are handled through a Nationwide Permit (NWP) process. These permits allow specific activities that generally create minimal environmental effects. Projects that qualify under the NWP program must fulfill several general and specific conditions under each applicable NWP. If a proposed project cannot meet the conditions of each applicable, an individual permit would likely be required from the ACOE (EPA 2004).

Federal Endangered Species Act. The USFWS administers the federal Endangered Species Act (16 USC Section 153 et seq.) and thereby has jurisdiction over federally listed threatened, endangered, and proposed species. Projects that may result in a "take" of a listed species or critical habitat must consult with the US Fish and Wildlife Service. "Take" is broadly defined as harassment, harm, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collection; any attempt to engage in such conduct; or destruction of habitat that prevents an endangered species from recovering (16 USC 1532, 50 CFR 17.3). Federal agencies that propose, fund, or must issue a permit for a project that may affect a listed species or critical habitat are required to consult with the USFWS under Section 7 of the Federal Endangered Species Act. If it is determined that a federally listed species or critical habitat may be adversely affected by the federal action, the USFWS will issue a "Biological Opinion" to the federal agency that describes minimization and avoidance measures that must be implemented as part of the federal action. Projects that do not have a federal nexus must apply for a take permit under Section 10 of the Act. Section 10 of the act requires that the project applicant prepare a habitat conservation plan as part of the permit application (16 USC 1539 and USFWS 1996).

Under Section 4 of the federal Endangered Species Act, a species can be removed, or delisted, from the list of threatened and endangered species. Delisting is a formal action made by the USFWS and is the

result of a determined successful recovery of a species. This action requires posts in the federal registry and a public comment period before a final determination is made by the USFWS.

Migratory Bird Treaty, Bald and Bald Golden Eagle Protection Act. The Migratory Bird Treaty Act (MBTA, 16 USC Section 703-711) and the Bald and Golden Eagle Protection Act (16 USC Section 668) protect certain species of birds from direct "take". The MBTA protects migrant bird species from take by setting hunting limits and seasons and protecting occupied nests and eggs. The Bald Eagle Protection Act (16 USC Sections 668-668d) prohibits the take or commerce of any part of Bald and Golden Eagles. The US Fish and Wildlife Service administers both acts, and reviews federal agency actions that may affect species protected by the acts.

State Regulations

California Department of Fish and Game Code Sections 1601-1607. The CDFG regulates the modification of the bed, bank, or channel of a waterway under Sections 1601-1607 of the California Fish and Game Code. Also included are modifications that divert, obstruct, or change the natural flow of a waterway. Any party who proposes an activity that may modify a feature regulated by the Fish and Game Code must notify the California Department of Fish and Game before project construction. The California Department of Fish and Game will then decide whether to enter into a Streambed Alteration Agreement with the project applicant either under Section 1601 (for public entities) or Section 1603 (for private entities) of the Fish and Game Code (CDFG 2004b).

California Endangered Species Act. The CDFG administers the California Endangered Species Act of 1984 (Fish and Game Code Section 2080), which regulates the listing and "take" of endangered and threatened state-listed species. A "take" may be permitted by California Department of Fish and Game through implementing a management agreement. "Take" is defined by the California Endangered Species Act as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" a state-listed species (Fish and Game Code Sec. 86). Under state laws, the California Department of Fish and Game is empowered to review projects for their potential impacts to state-listed species and their habitats.

The California Department of Fish and Game maintains lists for Candidate-Endangered Species (SCE) and Candidate-Threatened

Species (SCT). California candidate species are afforded the same level of protection as state-listed species. California also designates Species of Special Concern (CSC) that are species of limited distribution, declining populations, diminishing habitat, or unusual scientific, recreational, or educational value. These species do not have the same legal protection as listed species, but may be added to official lists in the future. The CSC list is intended by the California Department of Fish and Game as a management tool for consideration in future land use decisions (Fish and Game Code Section 2080).

All state lead agencies must consult with CDFG under the California Endangered Species Act when a proposed project may affect state-listed species. CDFG would determine if a project under review would jeopardize or result in taking of a state-listed species, or destroy or adversely modify its essential habitat, also known as a "jeopardy finding." (Fish and Game Code Sec. 2090). For projects where CDFG has made a jeopardy finding, CDFG must specify reasonable and prudent alternatives to the proposed project to the state lead agency (Fish and Game Code Sec. 2090 et seq.).

Natural Communities Conservation Planning Act. The Natural Communities Conservation Planning Act allows a process for developing natural community conservation plans (NCCPs) under CDFG direction. NCCPs allow for regional protection of wildlife diversity, while allowing compatible development. CDFG may permit takings of state-listed species whose conservation and management are provided in a NCCP, once a NCCP is prepared (Fish and Game Code Secs. 2800 et seq.).

Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act regulates the discharge of waste into waters of the state. The Regional Water Quality Control Board (RWQCB) administers this regulation. Water Code Section 13260 requires "any person discharging, or proposing to discharge waste, within any region that could affect the waters of the state to file a report of discharge." A report of waste discharge ("RWD") is essentially an application for waste discharge requirements ("WDRs"). WDRs contain conditions imposed on a given discharge by the appropriate RWQCBs for the purpose of protecting the beneficial uses of the waters of the state. Upon receipt of a RWD, the RWQCB may issue WDRs imposing conditions on the proposed discharge, or it may waive the requirement for WDRs.

Local Regulations and Policies

The unincorporated lands of Tulare County fall under the jurisdiction of the county. The Tulare County General Plan contains many regulations and policies to protect the biological resources within the county, such as the Tulare County Mitigation and Conservation Bank Feasibility Study.

Existing Conditions

Tulare County exhibits a diverse ecosystems landscape created through the extensive amount of topographic relief (elevations range from approximately 200 to 14,000 feet above sea level). A broad-scale method of classifying the landscape is by eco-region. This method is used by the U.S. Forest Service (USFS) and relates to the California Manual of Vegetation and U.S. Geological Survey (USGS) Major Land Resources Area system. The eco-region approach evaluates the land from a wide range of interrelated environmental variables including topography, soils, hydrology, flora, and fauna.

A total of three eco-region sections exist in Tulare County. These sections apportion the county in a north-south pattern. The majority of the western portion of the county comprises the Great Valley Section, the majority of the eastern portion of the county is in the Sierra Nevada Section, and a small section between these two sections comprises the Sierra Nevada Foothill Area (USFS 2004).

The natural vegetation of the Great Valley Section is predominately characterized by the purple needlegrass series, valley oak series, vernal pools and wetland communities, and blue oak series. Fauna associated with this section include mule deer, black-tailed deer, coyotes, jackrabbits, kangaroo rats, kit fox, and muskrats. Birds include waterfowl, hawks, golden eagles, owls, white-tailed kites, herons, western meadowlark, and quail (USFS 2004).

The natural vegetation of the Sierra Nevada Foothills Section is predominately characterized by the blue oak series, needlegrass grasslands, chamise series, mixed chaparral series, foothill pine series, and valley oak series. Fauna associated with this section include black-tailed and mule deer, coyotes, ground squirrels, cottontails, jack rabbits, and kangaroo rats. Common birds include turkey vultures, falcons, eagles, hawks, owls, quail, mourning dove, mockingbird, scrub jay, herons, ravens, western meadowlarks, finches, and sparrows (USFS 2004).

The natural vegetation of the Sierra Nevada Section is predominately characterized by the mixed conifer series, ponderosa pine series, jeffrey pine series, white fir series, red fir series, lodgepole pine series, huckleberry oak series, western juniper series, aspen series, big sagebrush series, mixed subalpine forest series, mountain hemlock series, whitebark pine series, and giant sequoia series. Fauna associated with this section include black-tail and mule deer, black bear, mountain lion, coyote, bobcat, red and gray fox, ringtail, weasels, skunks, badger, mountain sheep, yellow-bellied marmot, marten, fisher, wolverine, and porcupine. Birds include eagles, hawks, owls, woodpeckers, falcons, osprey, stellar jay, herons, quail, kingfisher, goshawk, and blue grouse (USFS 2004).

Habitat types and ecosystems are often identified by general vegetation-types. There are 14 general habitat types in Tulare County. Table 9-1 identifies the habitat type and acreages of each, found in Tulare County. Figure 9-1 shows the various habitat types that exist in Tulare County.

Table 9-1. Habitat Types of Tulare County

Habitat Type	Acres (Approximate)	Percent of County
Alpine Habitat	5,625	0.18%
Annual Grassland	152,899	4.9%
Barren	165,486	5.3%
Chapparal	78,136	2.5%
Conifer Forest	930,922	30.1%
Conifer Woodland	183,782	5.9%
Desert Scrub	29,980	0.97%
Hardwood forest	559,110	18.1%
Lake	5,391	0.17%
Mixed hardwood/conifer forest	42,762	1.4%
Riparian	10,459	0.34%
Urban	27,779	0.90%
Vineyard/cropland	898,086	29.0%
Wetlands	6,412	0.21%
Total Acreage	3,096,837	100%

Note: Due to the scale of the analysis used to determine the quantities of habitats in Tulare County, vernal pools, which are a type of wetland, are not addressed in this table or in Figure 9-1. Please see the below text regarding wetlands for more information about vernal pools.

Tulare Lake Basin

The Tulare Lake Basin is located in Kern, Kings and Tulare Counties. Historically, Tulare Lake varied in size from 450 to 800 square miles and was known to become completely dry during drought years (Moore 1990). The historical seasonal flooding of Tulare Lake and four other smaller lakes created an interconnected patchwork of aquatic, wetland, riparian forest, and valley oak savannah habitats. These wetlands were utilized for wintering or as a migratory stop for waterfowl. Most of the historic Tulare Lake Basin has been converted to agricultural land uses. Portions of the Pixley National Wildlife Refuge (also see Section 4) are located within the historic Tulare Lake Bed. This 6,000-acre refuge is located in southwestern Tulare County and contains grassland and wetlands habitats. This refuge was established to restore and protect wetland habitat for waterfowl. Approximately 4,392 acres of the refuge provide habitat for three endangered species, the San Joaquin Kit Fox, the Blunt-Nosed Leopard Lizard, and the Tipton Kangaroo rat (USBR 2001).

Wetlands

Wetlands exist throughout Tulare County. Through the creation of protective regulations, both the federal and state government have demonstrated the importance of wetlands through the passage of the Clean Water Act and the Porter-Cologne Water Quality Act. Wetlands provide habitat for many plants and animals. They are essential in preserving the quality of surface waters and in recharging groundwater aquifers. Through implementation of the California Wetlands Conservation Policy, CDFG has begun to coordinate wetland information for the state. Currently, their efforts have been focused on the Central Valley (CDFG 2004c). Figure 9-1 shows the presence of wetlands in Tulare County; however, a focused survey has not been completed of all wetlands in the county.

Tulare County contains a unique and threatened wetland-type known as vernal pools. Vernal pools are seasonally flooded depressions in the landscape that are underlain by subsurface soils that limit drainage. These pools are typically dry in the summer and inundated during parts of the winter. Depending on their depth and the quantities of rainfall, inundation can occur for a week to several months. The surrounding non-pool terrain that divides vernal pools typically exists in higher proportions than the areas that are actually inundated. Vernal pools exist singly or in complexes of pools that occur in close proximity and are hydrologically connected. This

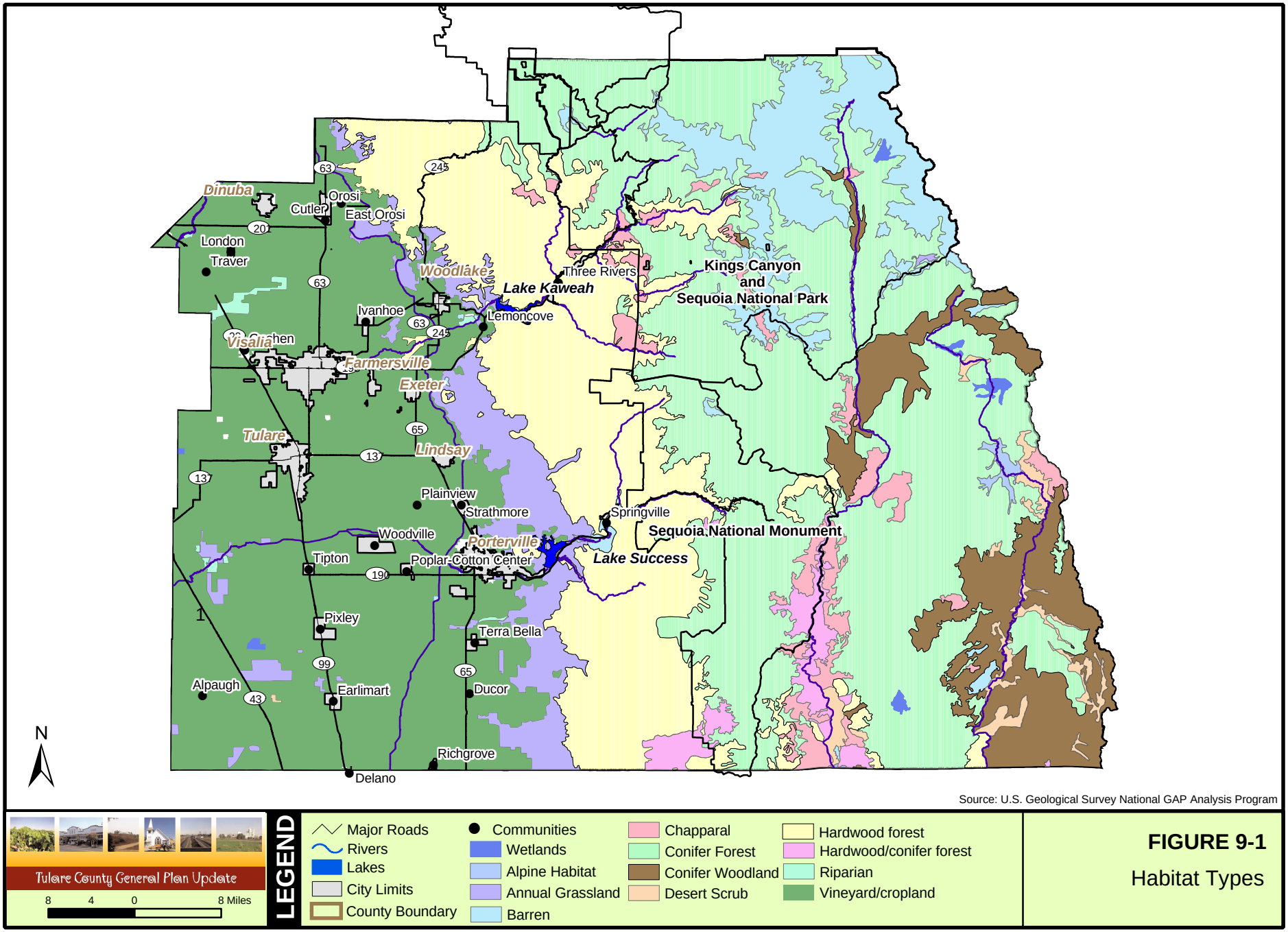


FIGURE 9-1

Habitat Types

wetland supports a specialized biota that includes a large number of threatened and endangered species. Historically, vernal pools existed in native grassland prairie areas. Today, vernal pools exist in Tulare County in annual grassland and cultivated areas. It is estimated that 38,531 acres of vernal pools exist in Tulare County. Most of this wetland is not addressed in Figure 9-1 or Table 9-1 because the habitat types addressed in the figure and table are based on dominant vegetation and the size of an actual vernal pool area would not appear at the scale of the analysis conducted to determine the vegetation-types addressed in the figure and the table. Vernal pools are generally addressed as an ecosystem. Their ecosystem is considered one of the most threatened ecosystems in California. Because this ecosystem often occurs on relatively flat terrain, it is highly vulnerable to destruction from agriculture, heavy grazing, urbanization, brush clearing, and off-road vehicle use. The USFWS has designated critical habitat for several listed vernal pool species that typically protects large tracts of vernal pool areas. There is a total of 36,357 acres in Tulare County that have been designated critical habitat for several listed vernal pool species (Holland 1998; CDFG 1998; USFWS 2003).

Species Recovery Plan

The *Recovery Plan for Upland Species of the San Joaquin Valley*, released and adopted by the USFWS in 1998, is a conservation and recovery plan for federally listed species, candidate species, and species of concern. This recovery plan protects 34 species; 11 of which are federally listed as threatened or endangered, and 23 listed as candidate species or species of concern. Some of the species that are addressed in this recovery plan include California jewelflower, Kern mallow, giant kangaroo rat, blunt-nosed leopard lizard, and San Joaquin kit fox. The ultimate objective of this plan is for the recovery and subsequent de-listing of the 11 endangered or threatened species and for the long-term conservation of the candidate species and species of concern. This plan provides an ecosystem approach to the conservation and recovery of these species. The strategy of the plan is to focus on the recovery of the natural communities and ecosystems where many of the upland species co-occur. One of the key elements of this plan contains economic and social consideration with recommendations to "reduce the [fiscal] cost recovery, impacts of recommended actions on the local economy, and the constraints placed on the citizens of the San Joaquin Valley." The recovery plan identifies the need to create a link between ecosystems near Highway 43 (SR 43) and Garces Highway (SR 155), in the western part of the

county. The plan also identifies the Sierra Nevada foothills in Tulare County, at the east and southeast edge of the San Joaquin Valley, as an area to maintain its natural lands (USFWS 1998). This recovery plan illustrates how species habitats exist throughout a geographical and ecosystem area and are not determined by county boundaries.

Federally and State-Protected Lands

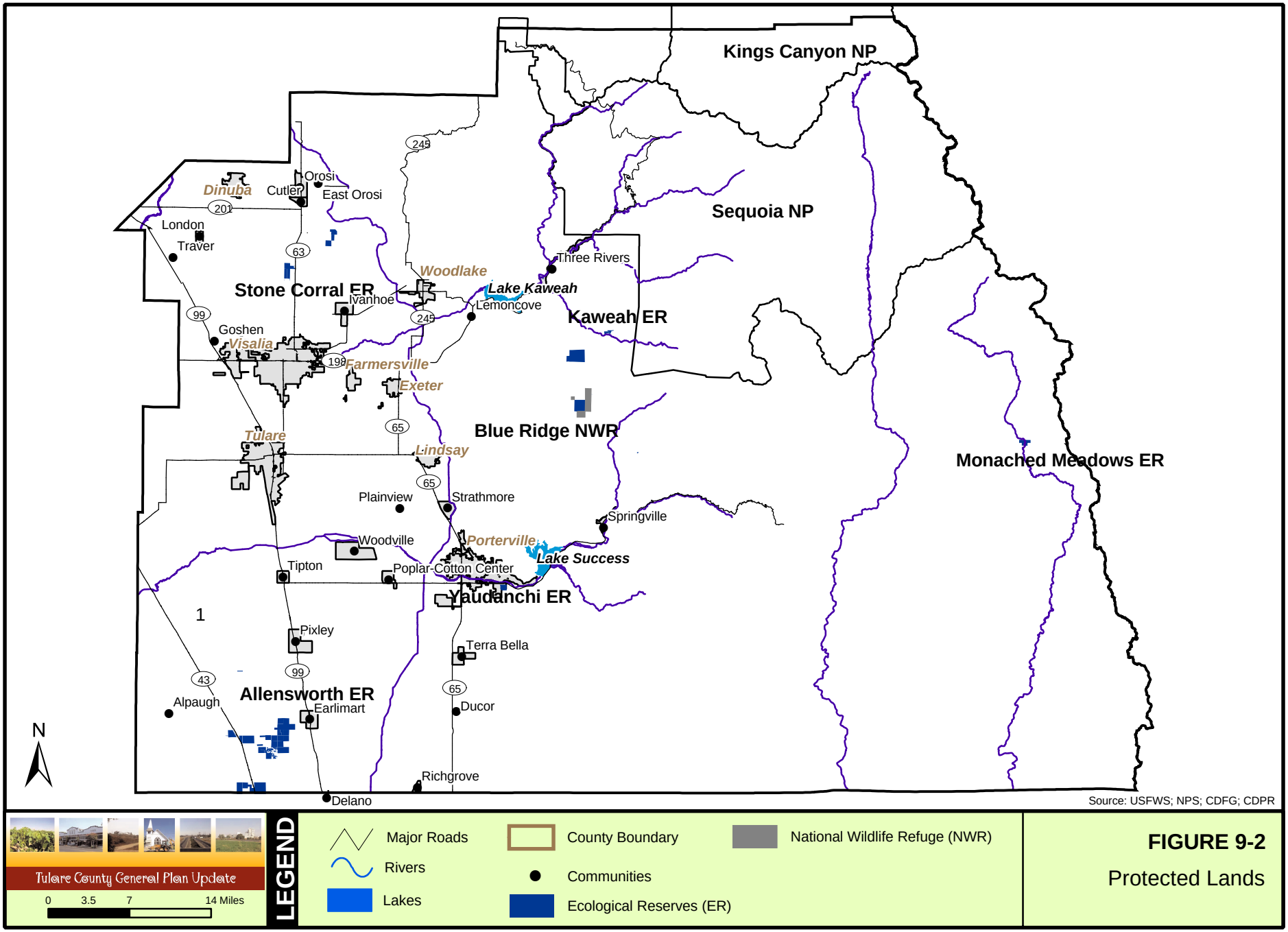
Within Tulare County, there exist lands which have large limitations on land uses, i.e. wildlife refuges, national parks, etc. These areas generally provide nursery sites, high quality habitat, corridors, and migratory stopping points for biological resources. Many of these areas are created to protect rare species and their ecosystems. Some of the larger sites as shown in Figure 9-2, are listed below.

- **Blue Ridge Ecological Reserve.** This is a 3,195-acre reserve that is managed by the Bureau of Land Management (BLM). The Blue Ridge Critical Condor Habitat Zone, which has been designated by the USFWS, is contained within this reserve. The BLM manages this area for the protection of the designated critical condor habitat in cooperation with the USFWS and CDFG (BLM 2004a).

- **Pixley National Wildlife Refuge.** This is a 6,192-acre reserve of native grassland and marsh habitat in the former Tulare Basin that is owned and managed by the USFWS. This reserve provides habitat for the San Joaquin kit fox, Tipton kangaroo rat, and the blunt-nosed leopard lizard and is a wintering area for migratory waterfowl (USFWS 2004a).

- **Sequoia and Kings Canyon National Parks.** These two parks comprise 863,741 total acres. Kings Canyon National Park is located to the north and Sequoia National Park is located to the south. They are both managed by the National Park Service. These parks exists in many different habitats that range in elevation from approximately 5,000 feet to over 14,000 feet (NPS 1999).

- **Sequoia National Forest and Sequoia National Monument.**


Kings Canyon NP
Sequoia NP
Monached Meadows ER
Kaweah ER
Blue Ridge NWR
Stone Corral ER
Yaudanchi ER
Allensworth ER
Lake Kaweah
Lake Success
Woodlake
Dinuba
Orosi
Cutler
East Orosi
London
Traver
Three Rivers
Ivanhoe
Lemoncove
Goshen
Visalia
Farmersville
Exeter
Tulare
Lindsay
Plainview
Strathmore
Springville
Woodville
Porterville
Tipton
Poplar-Cotton Center
Pixley
Terra Bella
Alpaugh
Earlimart
Ducor
Richgrove
Delano
245
201
63
99
198
65
43
1
N
Source: USFWS; NPS; CDFG; CDPR
Tulare County General Plan Update
0 3.5 7 14 Miles
LEGEND
Major Roads
Rivers
Lakes
County Boundary
Communities
Ecological Reserves (ER)
National Wildlife Refuge (NWR)
FIGURE 9-2
Protected Lands

- **Mineral King, Golden Trout, and Domelands Wilderness areas.**
- **Monache Meadows Wildlife Area.**
- **Mountain Home State Forest.**
- **Allensworth Ecological Reserve.**
- **Yaudanchi Ecological Reserve.**
- **San Joaquin River Ecological Reserve.**
- **Springville Ecological Reserve.**
- **Kaweah Ecological Reserve.**
- **Stone Coral Ecological Reserve.**

Habitat Conservation Plans

Habitat Conservation Plans (HCPs) are required for a non-federal entity that has requested a take permit of a federal listed species or critical habitat under Section 10 of the Endangered Species Act. HCPs are designed to offset harmful effects of a proposed project on federally listed species. These plans are utilized to achieve long-term biological and regulatory goals. Implementation of HCPs allows development and projects to occur while providing conservation measures that protect federally listed species or their critical habitat and offset the incidental take of a proposed project. HCPs substantially reduce the burden of the Endangered Species Act on small landowners by providing efficient mechanisms for compliance with the ESA, thereby distributing the economic and logistic effects of compliance. A broad range of landowner activities can be legally protected under these plans (USFWS 1996). There are generally two types of HCPs, project specific HCPs which typically protect a few species and have a short duration and multi-species HCPs which typically cover the development of a larger area and have a long term duration. The Kern Water Bank Habitat Conservation Plan is the only approved multi-species HCP that exists in Tulare County. This HCP was approved by the USFWS on October 2, 1997 and protects a total of 22 federally listed species and 29 non-listed species. The HCP covers a 19,900-acrea area located in Tulare, Kern, and Kings Counties. The species protected in this HCP include the valley elderberry longhorn beetle, California condor, Conservancy fairy shrimp, San Joaquin kit fox, and western snowy plover (USFWS 2004b).

Conservation and Mitigation Banking

A conservation or mitigation bank is land that is managed for its natural resource values. This land is either privately or publicly owned. The bank operator sells habitat credits to developers who need to satisfy legal requirements for compensating environmental impacts of development projects. The bank operator is obligated to permanently protect the land. Conservation banks generally protect threatened and endangered species habitat and are approved by a wildlife agency such as CDFG or the USFWS. Mitigation banks are specifically for wetland restoration, creation, and enhancement undertaken to compensate for unavoidable wetland losses and are generally approved by the wildlife agencies and the ACOE (CDFG 2004d).

Listed Species and Sensitive Natural Communities

Listed species need to be considered when identifying and evaluating biological resources. Table 9-2 documents the special status species listed by the USFWS and CDFG for Tulare County. The California Natural Diversity Database (CNDDB) and the California Native Plant Society (CNPS) lists 182 documented occurrences (of California's approximately 1,843 listed species) in Tulare County (CNDDB 2004 and CNPS 2004).

In addition to individual species the USFWS and CDFG are also concerned with sensitive and critical habitat. The CNDDB-documented occurrences of sensitive habitat for Tulare County are:

- Big Tree Forest;
- Central Valley Drainage Hardhead/Squawfish Stream;
- Great Valley Oak Riparian Forest;
- Northern Hardpan Vernal Pool;
- Southern Interior Cypress Forest;
- Sycamore Alluvial Woodland;
- Valley Sacaton Grassland;
- Valley Saltbush Scrub;
- Valley Sink Scrub;
- Blue Ridge Ecological Reserve (Condor Habitat);
- Sequoia Riverlands Trust; and
- Kaweah Oaks Preserve.

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
INVERTEBRATES					
Lytta hoppingi	Hopping's blister beetle	Special Concern	None	N/A	Foothills
Lytta moesta	Moestan blister beetle	Special Concern	None	N/A	Central California
Lytta molesta	molestan blister beetle	Special Concern	None	N/A	Central California
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Threatened	None	N/A	Riparian and other habitats, in association with blue elderberry (*sambucus mexicana*).
Branchinecta lynchi	vernal pool fairy shrimp	Threatened	None	N/A	Annual grassland
Lepidurus packardi	vernal pool tadpole shrimp	Endangered	None	N/A	Vernal pools and swales
FISH					
Oncorhynchus mykiss whitei	Little Kern golden trout	Threatened	None	N/A	Native to the Little Kern River in Tulare County. Also found in lake habitats.
Oncorhynchus mykiss aguabonita	Volcano Creek golden trout	Special Concern	Special Concern	N/A	Riparian areas
AMPHIBIANS					
Ambystoma californiense	California tiger salamander	Threatened	Special Concern	N/A	Riparian and Lake habitats
Rana boylii	foothill yellow-legged frog	Special Concern	Special Concern	N/A	Riparian habitats
Batrachoseps simatus	Kern Canyon slender salamander	Special Concern	Threatened	N/A	Chaparrel, hardwood forest and mixed hardwood/conifer forest in the lower kern river canyon.
Batrachoseps sp. 4	Kern Plateau slender salamander	None	None	N/A	Conifer forest
Hydromantes platycephalus	Mount Lyell salamander	Special Concern	Special Concern	N/A	Mixed hardwood/conifer forest, conifer forest
Rana muscosa	mountain yellow-legged frog	Endangered	Special Concern	N/A	Wetlands

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
REPTILES					
Gambelia sila	blunt-nosed leopard lizard	Endangered	Endangered	N/A	Desert scrub
Phrynosoma coronatum (frontale)	Coast (California) horned lizard	Special Concern	Special Concern	N/A	Sandy washes with scattered low bushes
Emys (=Clemmys) marmorata	western pond turtle	None	Special Concern	N/A	Wetlands
Bufo canorus	Yosemite toad	Special Concern	Special Concern	N/A	Wet meadow
Masticophis flagellum ruddocki	San Joaquin whipsnake	Special Concern	Special Concern	N/A	Annual grassland, desert scrub
Spea (=Scaphiopus) hammondii	western spadefoot	Special Concern	Special Concern	N/A	Annual grassland, hardwood forest
BIRD*S*					
Cypseloides niger	black swift	Special Concern	Special Concern	N/A	Rocky cliffs
Athene cunicularia	burrowing owl	Special Concern	Special Concern	N/A	Annual grassland, desert scrub
Gymnogyps californianus	California condor	Endangered	Endangered	N/A	Annual grassland, chapparal
Accipiter cooperii	Cooper's hawk	None	Special Concern	N/A	Hardwood forest, mixed hardwood/conifer forest.
Ardea herodias	great blue heron	None	None	N/A	Wetlands
Strix nebulosa	great gray owl	None	Endangered	N/A	Annual grassland, conifer forest, mixed hardwood/conifer forest
Charadrius montanus	mountain plover	None	Special Concern	N/A	(wintering) Vineyard/cropland
Buteo swainsoni	Swainson's hawk	Special Concern	Threatened	N/A	Riparian, hardwood forest, conifer woodland
Agelaius tricolor	tricolored blackbird	Special Concern	Special Concern	N/A	(Nesting colony) Riparian
Charadrius alexandrinus nivosus	western snowy plover	Threatened	Special Concern	N/A	(Nesting) Annual grassland
Empidonax traillii	willow flycatcher	None	Endangered	N/A	(Nesting) Wet meadow, wetlands

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Accipiter gentiles	northern goshawk	Special Concern	Special Concern	N/A	Sierra Nevada, Sierra Nevada Foothills/Hardwood forest, conifer woodland
MAMMAL					
Ovis canadensis californiana	California bighorn sheep	Endangered	Endangered	N/A	Alpine
Martes pennanti pacifica	Pacific fisher	Special Concern	Special Concern	N/A	Coniferous forest, riparian
Antrozous pallidus	pallid bat	None	Special Concern	N/A	Desert scrub, annual grassland, conifer forests, hardwood forests, mixed conifer/hardwood forests
Ammospermophilus nelsoni	San Joaquin antelope squirrel	Special Concern	Threatened	N/A	Desert scrub
Vulpes macrotis mutica	San Joaquin kit fox	Endangered	Threatened	N/A	Desert scrub, urban, annual grassland
Perognathus inornatus inornatus	San Joaquin pocket mouse	Special Concern	None	N/A	Annual grassland, hardwood forest
Vulpes vulpes necator	Sierra Nevada red fox	Special Concern	Threatened	N/A	Wet meadow, conifer forest, hardwood forest, mixed hardwood/conifer forest
Dipodomys nitratoides nitratoides	Tipton kangaroo rat	Endangered	Endangered	N/A	Desert scrub
Gulo Gulo	California wolverine	Special Concern	Threatened	N/A	Sierra Nevada/Open habitat, above or at timberline
Martes americana	American marten	Special Concern	Special Concern	N/A	Sierra Nevada/Conifer forests, mixed conifer/hardwood forests
PLANTS					
Calochortus striatus	alkali mariposa lily	None	None	List 1B	Chaparral, desert scrub, wet meadow
Streptanthus gracilis	alpine jewel-flower	None	None	List 1B	Conifer forest
Ribes menziesii var. ixoderme	aromatic canyon gooseberry	None	None	List 1B	Chaparral/Hardwood forest
Arabis bodiensis	Bodie Hills rock cress	None	None	List 1B	Desert scrub, conifer forest, conifer woodland
Atriplex depressa	brittlescale	None	None	List 1B	Desert scrub, wetlands, annual grassland
Mimulus pictus	calico monkeyflower	None	None	List 1B	Hardwood forest

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Caulanthus californicus	California jewel-flower	Endangered	Endangered	List 1B	Desert scrub, annual grassland, conifer woodland
Phacelia nashiana	Charlotte's phacelia	None	None	List 1B	Desert scrub, conifer woodland
Lotus oblongifolius var. cupreus	copper-flowered bird's-foot trefoil	None	None	List 1B	Wet meadow, conifer forest
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	None	None	List 1B	Wetlands, annual grassland
Trifolium dedeckerae	DeDecker's clover	None	None	List 1B	Conifer forest, conifer woodland
Githopsis tenella	delicate bluecup	None	None	List 1B	Chaparral/Hardwood forest / mesic
Atriplex erecticaulis	Earlimart orache	None	None	List 1B	Annual grassland
Lupinus padre-crowleyi	Father Crowley's lupine	None	Rare	List 1B	Desert scrub, riparian, conifer forest
Ivesia campestris	field ivesia	None	None	List 1B	Wet meadow, conifer forest
Monardella linoides ssp. oblonga	flax-like monardella	None	None	List 1B	Conifer forest, conifer woodland
Tuctoria greenei	Greene's tuctoria	Endangered	Rare	List 1B	Vernal pools, Annual Grassland
Fritillaria brandegeei	Greenhorn fritillary	None	None	List 1B	Conifer forest
Viola pinetorum ssp. grisea	grey-leaved violet	None	None	List 1B	Wet meadow, conifer forest
Erigeron aequifolius	Hall's daisy	None	None	List 1B	Conifer woodland, coniferous forest
Atriplex cordulata	heartscale	None	None	List 1B	Desert scrub, wet meadow, annual grassland
Lupinus lepidus var. culbertsonii	Hockett Meadows lupine	None	None	List 1B	Wet meadow, conifer forest
Chamaesyce hooveri	Hoover's spurge	Threatened	None	List 1B	Vernal pools
Brodiaea insignis	Kaweah brodiaea	None	Endangered	List 1B	Hardwood forest, annual grassland
Erythronium pusaterii	Kaweah fawn lily	None	None	List 1B	Wet meadow, conifer forest
Mimulus norrisii	Kaweah monkeyflower	None	None	List 1B	Chaparral, conifer forest

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Sidalcea keckii	Keck's checker-mallow	Endangered	None	List 1B	Hardwood forest, annual grassland
Erigeron inornatus var. keilii	Keil's daisy	None	None	List 1B	Conifer forest, wet meadow
Delphinium purpusii	Kern County larkspur	None	None	List 1B	Chaparral, hardwood forest, conifer woodland
Cordylanthus eremicus ssp. kernensis	Kern Plateau bird's-beak	None	None	List 1B	Desert scrub, conifer woodland, conifer forest
Horkelia tularensis	Kern Plateau horkelia	None	None	List 1B	Conifer forest
Astragalus lentiginosus var. kernensis	Kern Plateau milk-vetch	None	None	List 1B	Wet meadow, conifer forest
Erigeron multiceps	Kern River daisy	None	None	List 1B	Wet meadow, conifer forest
Atriplex minuscula	lesser saltscale	None	None	List 1B	Desert scrub, annual grassland
Linanthus serrulatus	Madera linanthus	None	None	List 1B	Hardwood forest, conifer forest
Petrophyton caespitosum ssp. acuminatum	marble rockmat	None	None	List 1B	Conifer forest
Draba cruciata	Mineral King draba	None	None	List 1B	Conifer forest
Eriogonum nudum var. murinum	mouse buckwheat	None	None	List 1B	Chaparral, hardwood forest, annual grassland
Draba sharsmithii	Mt. Whitney draba	None	None	List 1B	Alpine habitat, conifer forest
Carlquistia muirii	Muir's tarplant	None	None	List 1B	Chaparral, conifer forest
Iris munzii	Munz's iris	None	None	List 1B	Hardwood forest
Phacelia novenmillensis	Nine Mile Canyon phacelia	None	None	List 1B	Hardwood forest, conifer woodland
Eriogonum wrightii var. olanchense	Olancha Peak buckwheat	None	None	List 1B	Alpine habitat, conifer forest
Epilobium oreganum	Oregon fireweed	Special Concern	None	List 1B	Wetlands, conifer forest
Dudleya cymosa ssp. costafolia	Pierpoint Springs dudleya	None	None	List 1B	Chaparral, hardwood forest
Cupressus arizonica ssp. nevadensis	Piute cypress	None	None	List 1B	Conifer forest, chaparral, hardwood forest, conifer woodland

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Navarretia setiloba	Piute Mountains navarretia	None	None	List 1B	Hardwood forest, conifer woodland, annual grassland
Oreonana purpurascens	purple mountain-parsley	None	None	List 1B	Conifer forest
Hulsea vestita ssp. pygmaea	pygmy hulsea	None	None	List 1B	Alpine habitat, conifer forest
Abronia alpina	Ramshaw Meadows abronia	Candidate	None	List 1B	Wetlands
Delphinium recurvatum	recurved larkspur	None	None	List 1B	Desert scrub, hardwood forest, annual grassland
Pseudobahia peirsonii	San Joaquin adobe sunburst	Threatened	Endangered	List 1B	Hardwood forest, annual grassland
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	Threatened	Endangered	List 1B	Vernal pools
Ribes tularense	Sequoia gooseberry	None	None	List 1B	Conifer forest
Orthotrichum shevockii	Shevock's bristle-moss	None	None	List 1B	Conifer woodland
Astragalus shevockii	Shevock's milk-vetch	None	None	List 1B	Conifer forest
Calochortus westonii	Shirley Meadows star-tulip	None	None	List 1B	Hardwood forest, conifer forest, wetlands
Hulsea brevifolia	short-leaved hulsea	None	None	List 1B	Conifer forest
Eryngium spinosepalum	spiny-sepaled button-celery	None	None	List 1B	Annual grassland, vernal pools
Clarkia springvillensis	Springville clarkia	Threatened	Endangered	List 1B	Chaparral, hardwood forest, annual grassland
Fritillaria striata	striped adobe-lily	None	Threatened	List 1B	Hardwood forest, annual grassland
Atriplex subtilis	subtle orache	None	None	List 1B	Annual grassland
Monardella beneolens	sweet-smelling monardella	None	None	List 1B	Alpine habitat, conifer forest
Cryptantha incana	Tulare cryptantha	None	None	List 1B	Conifer forest
Pohlia tundrae	tundra thread-moss	None	None	List 1B	Alpine habitat

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Eriogonum twisselmannii	Twisselmann's buckwheat	None	Rare	List 1B	Conifer forest
Nemacladus twisselmannii	Twisselmann's nemacladus	None	Rare	List 1B	Conifer forest
Atriplex persistens	vernal pool smallscale	None	None	List 1B	Vernal pools
Lewisia disepala	Yosemite lewisia	None	None	List 1B	Conifer forest, conifer woodland
Bruchia bolanderi	Bolander's bruchia	None	None	List 2	Wetlands, conifer forest
Meesia uliginosa	broad-nerved hump-moss	None	None	List 2	Wetlands, conifer forest
Mielichhoferia elongata	elongate copper-moss	None	None	List 2	Hardwood forest
Utricularia intermedia	flat-leaved bladderwort	None	None	List 2	Wetlands, lake margins
Juncus nodosus	knotted rush	None	None	List 2	Wetlands, lake margins
Poa lettermanii	Letterman's blue grass	None	None	List 2	Alpine habitat
triglochin palustris	marsh arrow-grass	None	None	List 2	Wetlands, conifer forest
Carex arcta	northern clustered sedge	None	None	List 2	Wetlands, Conifer forest
Asplenium septentrionale	northern spleenwort	None	None	List 2	Chaparral, conifer forest
Arabis dispar	pinyon rock cress	None	None	List 2	Conifer woodland, desert scrub
Sphenopholis obtusata	prairie wedge grass	None	None	List 2	Hardwood forest, wetlands
Botrychium crenulatum	scalloped moonwort	None	None	List 2	Wetlands, conifer forest
Hackelia sharsmithii	Sharsmith's stickseed	None	None	List 2	Alpine habitat, conifer forest
Myurella julacea	small mousetail-moss	None	None	List 2	Alpine habitat, conifer forest
Meesia triquetra	three-ranked hump-moss	None	None	List 2	Wetlands, conifer forest
Pohlia tundrae	tundra thread-moss	None	None	List 2	Alpine habitat

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Calystegia malacophylla var. berryi	Berry's morning-glory	None	None	List 3	Chaparral, conifer forest
Mimulus acutidens	Kings River monkeyflower	None	None	List 3	Hardwood forest, conifer forest
Myosurus minimus ssp. apus	little mousetail	None	None	List 3	Annual grassland, vernal pools
Jensia yosemitana	Yosemite tarplant	None	None	List 3	Conifer forest, wetlands
Perideridia pringlei	adobe yampah	None	None	List 4	Chaparral, hardwood forest, desert scrub, conifer woodland
Antennaria pulchella	beautiful pussy-toes	None	None	List 4	Alpine habitat, wetlands
Selaginella asprella	bluish spike-moss	None	None	List 4	Hardwood forest, conifer forest, conifer woodland
Cinna bolanderi	Bolander's woodreed	None	None	List 4	Wetlands, conifer forest, streamsides
Carex buxbaumii	Buxbaum's sedge	None	None	List 4	Wetlands
Pityopus californicus	California pinefoot	None	None	List 4	Conifer forest
Angelica callii	Call's angelica	None	None	List 4	Hardwood forest, conifer forest
Juncus hemiendytus var. abjectus	Center Basin rush	None	None	List 4	Wetlands, conifer forest
Oxytheca caryophylloides	chickweed oxytheca	None	None	List 4	Conifer forest
Cryptantha glomeriflora	clustered-flower cryptantha	None	None	List 4	Desert scrub, wetlands, conifer forest
Piperia colemanii	Coleman's rein orchid	None	None	List 4	Chaparral, conifer forest
Carex congdonii	Congdon's sedge	None	None	List 4	Alpine habitat, conifer forest
Muilla coronata	crowned muilla	None	None	List 4	Desert scrub, conifer woodland
Mimulus laciniatus	cut-leaved monkeyflower	None	None	List 4	Chaparral, conifer forest
Carex incurviformis var. danaensis	Dana's sedge	None	None	List 4	Alpine habitat
Delphinium hansenii ssp. ewanianum	Ewan's larkspur	None	None	List 4	hardwood forest, annual grassland

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Streptanthus farnsworthianus	Farnsworth's jewel-flower	None	None	List 4	Hardwood forest
Lasthenia ferrisiae	Ferris's goldfields	None	None	List 4	Vernal pools
Plagiobothrys myosotoides	forget-me-not popcorn-flower	None	None	List 4	Chaparral
Ceanothus fresnensis	Fresno ceanothus	None	None	List 4	Hardwood forest, conifer forest
Goodmania luteola	golden goodmania	None	None	List 4	Desert scrub, wetlands, annual grassland
Mimulus grayi	Gray's monkeyflower	None	None	List 4	Conifer forest
Arabis repanda var. greenei	Greene's rock cress	None	None	List 4	Conifer forest
Wyethia elata	Hall's wyethia	None	None	List 4	Hardwood forest, conifer forest
Phlox dispersa	High Sierra phlox	None	None	List 4	Alpine habitat
Gilia interior	inland gilia	None	None	List 4	Hardwood forest, conifer woodland, conifer forest
Ceanothus pinetorum	Kern ceanothus	None	None	List 4	Conifer forest
Astragalus subvestitus	Kern County milk-vetch	None	None	List 4	Desert scrub, wetlands, conifer woodland
Utricularia minor	lesser bladderwort	None	None	List 4	Wetlands
Dudleya calcicola	limestone dudleya	None	None	List 4	Chaparral, conifer woodland
Claytonia palustris	marsh claytonia	None	None	List 4	Wetlands
Azolla mexicana	Mexican mosquito fern	None	None	List 4	Wetlands
Piperia michaelii	Michael's rein orchid	None	None	List 4	Desert scrub, conifer forest, chaparral, hardwood forest
Phacelia orogenes	mountain phacelia	None	None	List 4	Wetlands, conifer woodland, conifer forest
Piperia leptopetala	narrow-petaled rein orchid	None	None	List 4	Hardwood forest, conifer forest
Nemophila parviflora var. quercifolia	oak-leaved nemophila	None	None	List 4	Hardwood forest, conifer forest

Table 9-2. Special-Status Species That May Occur In the Study Area

Scientific Name	Common Name	Federal Listing	State Listing	CNPS	Habitat
Fritillaria pinetorum	pine fritillary	None	None	List 4	Chaparral, conifer forest, conifer woodland
Petradoria pumila ssp. pumila	rock goldenrod	None	None	List 4	Conifer woodland
Jamesia americana var. rosea	rosy-petalled cliffbush	None	None	List 4	Alpine habitat, desert scrub, conifer woodland, conifer forest
Trichostema ovatum	San Joaquin bluecurls	None	None	List 4	Desert scrub, annual grassland
Cordylanthus rigidus ssp. brevibracteatus	short-bracted bird's-beak	None	None	List 4	Chaparral, conifer forest, conifer woodland
Monardella candicans	Sierra monardella	None	None	List 4	Chaparral, hardwood forest, conifer forest
Linanthus oblanceolatus	Sierra Nevada linanthus	None	None	List 4	Conifer forest
Clarkia exilis	slender clarkia	None	None	List 4	Hardwood forest
Eriophyllum lanatum var. obovatum	southern Sierra woolly sunflower	None	None	List 4	Conifer forest
Microseris sylvatica	sylvan microseris	None	None	List 4	Chaparral, hardwood forest, desert scrub, conifer woodland, annual grassland
Eriogonum breedlovei var. shevockii	The Needles buckwheat	None	None	List 4	Conifer forest, conifer woodland
Phacelia exilis	Transverse Range phacelia	None	None	List 4	Wetlands, conifer forest
Silene aperta	Tulare campion	None	None	List 4	Conifer forest
Dicentra nevadensis	Tulare County bleeding heart	None	None	List 4	Conifer forest, alpine habitat
Eriogonum polypodum	Tulare County buckwheat	None	None	List 4	Conifer forest
Arabis pygmaea	Tulare County rock cress	None	None	List 4	Conifer forest, wetlands
Delphinium inopinum	unexpected larkspur	None	None	List 4	Conifer forest

In addition to individual species the USFWS and CDFG are also concerned with sensitive and critical habitat. The CNDDB-documented occurrences of sensitive natural communities for Tulare County are listed below.

- Big Tree Forest;
- Central Valley Drainage Hardhead/Squawfish Stream;
- Great Valley Oak Riparian Forest;
- Northern Hardpan Vernal Pool;
- Southern Interior Cypress Forest;
- Sycamore Alluvial Woodland;
- Valley Sacaton Grassland;
- Valley Saltbush Scrub; and
- Valley Sink Scrub;

The CNDDB also has documented several areas that are operated by non-governmental conservation organizations. In addition to these areas mentioned in the CNDDB, there are several other privately owned nature reserves.

- Kaweah Oaks Preserve;
- James K. Herbert Wetland Prairie Preserve;
- Dry Creek Preserve;
- Lewis Hill Preserve; and
- Homer Ranch Preserve.

  The Kaweah Oaks, James K. Herbert Wetland Prairie, Dry Creek, Lewis Hill, and Homer Ranch preserves are owned by the Sequoia Riverlands Trust (SRT). These preserves total 3,148 acres within Tulare County. The SRT is a non-profit conservation organization based in Tulare County that purchases lands for the intent of land conservation and preservation (SRT 2004).

Existing Environmental Plans

- There are many existing land management plans for lands owned by governmental and non-governmental organizations in Tulare County that focus on protection and preservation of biological resources. These plans are listed and described below.

- Sequoia and Kings Canyon National Park Natural and Cultural Resources Management Plan.

- The National Park Service has prepared a management plan specific for the protection and management of natural and cultural resources in 1999 (NPS 1999).
- Kings Canyon National Park Plan.
- Sequoia National Monument Plan.
- Sequoia National Forest Plan.
- Kern and Pixley National Wildlife Refuges Comprehensive Conservation Plan.
- The USFWS has developed a draft Comprehensive Conservation Plan and Environmental Assessment for the Kern and Pixley National Wildlife Refuges. This document has not been finalized and certified by the USFWS. There was a public comment period for the document that ended July 30, 2004 (USFWS 2004a).
- Tulare County Mitigation and Conservation Bank Feasibility Study.

9.3 Archaeological and Historical Resources

Introduction

Consideration of cultural resources, which includes archaeological and historic resources, is an important aspect of all phases of a project, including design, construction, permitting, and maintenance activities. Project proponents operate within federal and state environmental laws and regulations designed to protect cultural resources significant in American architecture, archaeology, history, and Native American values.

Tulare County lies within a historically rich province of the San Joaquin Valley. To assist in the preservation of the county's unique cultural heritage, this section discusses the federal and state requirements for identifying, evaluating, and preserving cultural resources, and introduces the regional historical context.

Methods

Information on Tulare County's archaeological and historic resources was obtained from the 1992 City of Tulare General Plan Update, the Tulare County Historical Society (database dated February 2004), the Native American Heritage Commission (website accessed at http://ceres.ca.gov/nahc/), and the Office of Historic Preservation (California inventory database dated 23 July 2003). Records were also accessed and reviewed in the National Register of Historic Places (database dated February 2004), the Historic American Building Survey/Historic American Engineering Record (HABS/HAER) (database dated February 2004), the California Inventory of Historic Resources (Office of Historic Preservation California inventory database dated 23 July 2003), California Historical Landmarks (database dated 28 October 2003), "The San Joaquin Valley Through Time," and The Buena Vista Museum of Natural History website.

Key Terms

- **Cultural Resources.** Cultural resources consist of tangible or observable evidence of past human activity, found in direct association with a geographic location, including tangible properties possessing intangible, traditional cultural values. Cultural resources may include buildings, structures, objects, sites, areas, places, records, or manuscripts, which are historically or archaeologically significant.

- **Ethnohistoric Resources.** Ethnohistoric resources are Native American objects, sites, buildings, or structures that resulted after the arrival of European settlers in California. Ethnohistory began at different times at different places within California. Generally, ethnohistoric resources were produced beginning 1770 to 1850, to roughly 1900.

- **Prehistoric Archaeological Resources.** Prehistoric archaeological resources are sites, buildings, or structures produced prior to western entry into the region, or somewhat later Native American sites characterized by substantially pre-western types of material deposits. Prehistoric archaeological sites can retain remnants of thousands of years of human activity, dating from the early Holocene (10,000 to 7,000 years ago) to European contact (1542). Physical evidence of prehistoric sites might include stone artifacts and by-products of the manufacturing process, food waste (shell or animal bone

debris), soil discoloration (a result of decaying organic matter), fire hearths, stone alignments, grinding slicks, bedrock mortars, or human skeletal remains.

- **Paleontological Resources.** Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth, with the exception of materials associated with an archaeological resource (as defined in Section 3(1) of the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470bb[1]), or any cultural item as defined in Section 2 of the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001).

- **Historical Archaeological Resources.** Historical archaeological resources are sites, historic occupations and activities that are generally more than 50 years of age, where the location itself possesses archaeological value, regardless of the significance of any existing historic-era building or structure that may be at the site. Evidence of historic activity might include the physical remains of cemeteries, designed landscapes, battlegrounds, mines, canals, trails, and farmsteads.

- **Historic-era Built Environment Resources.** Historic-era built environment resources include buildings, structures, objects, or districts. Buildings, such as houses, barns, churches, hotels, or similar construction, are created principally to shelter any form of human activity. "Structure" distinguishes buildings from functional structures built for purposes other than human shelter. The term "object" is used to distinguish from buildings and structures those facilities erected that are primarily artistic or relatively small in scale, and simply built. A "district" refers to a significant concentration or grouping of sites, buildings structures, or objects.

Regulatory Setting

Federal Regulations

- **National Historic Preservation Act (NHPA) and National Environmental Policy Act (NEPA).** The majority of applicable federal regulations concerning cultural resources have been

established to comply with the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) of 1966, as amended. The NHPA established guidelines to "preserve important historic, cultural, and natural aspects of our national heritage, and to maintain, wherever possible, an environment that supports diversity and a variety of individual choice." The NHPA includes regulations specifically for federal land-holding agencies, but also includes regulations (Section 106) which pertain to all projects that are funded, permitted, or approved by any federal agency and which have the potential to affect cultural resources. All projects that are subject to NEPA are also subject to compliance with Section 106 of the NHPA and the NEPA requirements concerning cultural resources. Provisions of NHPA establish a National Register of Historic Places (The National Register) maintained by the National Park Service, the Advisory Councils on Historic Preservation, State Historic Preservation Offices, and grants-in-aid programs.

- **American Indian Religious Freedom Act and Native American Graves and Repatriation Act.** The American Indian Religious Freedom Act recognizes that Native American religious practices, sacred sites, and sacred objects have not been properly protected under other statutes. It establishes as national policy that traditional practices and beliefs, sites (including right of access), and the use of sacred objects shall be protected and preserved. Additionally, Native American remains on federal lands are protected by the Native American Graves and Repatriation Act of 1990.

- **Secretary of the Interior's Standards.** The Secretary of the Interior is responsible for establishing professional standards and providing guidance related to the preservation and protection of all cultural resources listed in, or eligible for, listing in the National Register of Historic Places. The Secretary of the Interior's Standards for the Treatment of Historic Properties apply to all grant-in-aid projects assisted through the National Historic Preservation Fund, and are intended to be applied to a wide variety of resource types, including buildings, structures, sites, objects, and districts. The treatment standards, developed in 1992, were codified as 36 CFR 68 entitled, "The Secretary of the Interior's Standards for Historic Preservation Projects." The standards address four treatments:

- **Preservation** focuses on the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time (protection and treatment are also considered under this treatment).

- **Rehabilitation** as a treatment focuses on the repair and replacement of deteriorated features; when alterations or additions to the property are planned for a new or continued use; and when a depiction of a property at a particular point in time is not appropriate.

- **Restoration** is the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time through the removal of features from other periods in its history and reconstruction of missing features from the reconstruction period.

- **Reconstruction** addresses those aspects of treatment necessary to re-create an entire non-surviving building with new material.

- **Certified Local Government Program.** The Certified Local Government (CLG) Program is a national program designed to encourage the direct participation of a local government in the identification, registration, and preservation of historic properties located within the jurisdiction of the local government. A local government may become a CLG by developing and implementing a local historic preservation program based on federal and state standards.

  The CLG program encourages the preservation of cultural resources by promoting a partnership among local governments, the State of California, and the National Park Service (NPS). Becoming a CLG can provide local staff and commissions with the tools, technical training, and more meaningful leadership roles in the preservation of a community's cultural heritage. Local interests and concerns are integrated into the official planning and decision-making processes at the earliest possible opportunity.

- Any local government is eligible to apply for certification, with the exception of regional commissions and councils of governments. A local government is any general purpose political subdivision of California such as a city, county, or

city/county. It is important to be aware that certification pertains to the entire local government and its agencies, not simply to the preservation commission that serves the local government.

According to a list provided by the California Office of Historic Preservation dated September 15, 2004, Tulare County is not a Certified Local Government.

- **Other Federal Legislation.** Historic preservation legislation was initiated by the Antiquities Act of 1966, which aimed to protect important historic and archaeological sites. It established a system of permits for conducting archaeological studies on federal land, as well as setting penalties for noncompliance. This permit process controls the disturbance of archaeological sites on federal land. New permits are currently issued under the Archeological Resources Protection Act (ARPA) of 1979. The purpose of ARPA is to enhance preservation and protection of archaeological resources on public and Native American lands. The Historic Sites Act of 1935 declared that it is national policy to "preserve for public use historic sites, buildings, and objects of national significance."

State Regulations

- **California Environmental Quality Act (CEQA).** Section 15064.5 of the CEQA Guidelines requires that lead agencies determine whether projects may have a significant effect on archaeological and historical resources. This determination applies to those resources which meet significance criteria qualifying them as “unique,” or “important,” listed on the California Register of Historical Resources (CRHR), or eligible for listing on the CRHR. If the agency determines that a project may have a significant effect on a significant resource, the project is determined to have a significant effect on the environment, and these effects must be addressed. If a cultural resource is found not to be significant or unique under the qualifying criteria, it need not be considered further in the planning process.

  CEQA emphasizes avoidance of archaeological and historical resources as the preferred strategy of reducing potential significant environmental effects resulting from projects. If

avoidance is not feasible, an excavation program or some other form of mitigation must be developed to mitigate the impacts. In order to adequately address the level of potential impacts, and thereby design appropriate mitigation measures, the significance and nature of the cultural resources must be determined. The three phases of cultural resources studies under CEQA are:

Phase I – Inventory of Cultural Resources:

1. **A records search** conducted by the Regional Archaeological Information Center (Information Center). The Information Center for the Tulare County area is located at California State University, Bakersfield. The Information Center works in conjunction with the California Historical Resources Information System (CHRIS), which is under the authority and direction of the State Office of Historic Preservation (OHP), the State Historic Preservation Officer (SHPO), and State Historical Resources Commission (SHRC).

   The Information Center is the repository for records produced during cultural resource studies conducted in the region. The record search will determine if a part or all of the project area has been previously surveyed for cultural resources; if any known cultural resources have already been recorded on or adjacent to the project area; if the probability is low, moderate, or high that cultural resources are located within the project area; and whether a field survey is required to determine the presence of previously unrecorded cultural resources.

2. **A field survey** by a professional archaeologist will be required in many instances. The purpose of the field survey is to survey the entire property for cultural resources. The archaeologist will visually inspect the project area for signs of cultural resources.

3. **A written report** is prepared when a record search and field survey are completed. If cultural resources are identified, a report must be written which describes how the survey was conducted with recommendations for further work, if needed. Copies of the survey record

forms and written report must be filed with the Regional Archaeological Information Center. Guidelines for the format and content of all types of archaeological reports have been developed by the California Office of Historic Preservation, and reports will be reviewed by the regional information centers to determine their ability to meet those requirements.

4. **Native American Consultation**. It is recommended that consultation with the Native American Heritage Commission be conducted as part of the Phase I Inventory of Cultural Resources. Upon request, the Native American Heritage Commission will provide project managers with a list of the local region's most likely descendents, tribal elders, and political and spiritual leaders. Each of the persons or organizations listed by the NAHC should be contacted to determine if there are known sites or places important to the heritage of Native Americans.

Phase II – Evaluation of Cultural Resources:

The purpose of this phase is to determine if a cultural resource is significant. If the resource is not significant according to the criteria outlined in Section 15064.5 of the California Environmental Quality Act, there will be no significant environmental effect, requiring no additional work. If the resource is significant, then impacts to the resource must be mitigated.

Phase III – Treatment of Impacted, Significant Cultural Resources:

If Phases I and II (inventory and evaluation) determine that no significant cultural resources are present within the project area, then no further work is needed. A Negative Declaration can be issued for cultural resources.

If significant resources are identified, there are several ways to treat and mitigate impacts to these resources, including avoidance; site capping (in those instances where avoidance is not feasible, it is often possible to cover burials or other important discoveries with a protective layer of earth or other material); creation of conservation easements; and/or data recovery.

In the case of prehistoric or historic archaeological sites, data recovery consists of archaeological excavations to capture, in the most efficient means possible, information about the site. Data recovery for the built environment – buildings and structures – consists of archival and photographic documentation).

Section 15064.5 of the CEQA Guidelines states: "Generally, a project that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings or the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (1995), Weeks and Grimmer, shall be considered as mitigated to a level of less than a significant impact on the historical resource."

- **State Laws Pertaining to Human Remains.** Section 7050.5 of the California Health and Safety Code requires that construction or excavation be stopped in the vicinity of discovered human remains until the county coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the California Native American Heritage Commission. CEQA Guidelines (Public Resources Code Section 5097) specify the procedures to be followed in case of the discovery of human remains on non-federal land. The disposition of Native American burials is within the jurisdiction of the Native American Heritage Commission.

Local Regulations

According to a survey conducted in 1998 by the Governor's Office of Planning and Research, neither Tulare County, nor any of the eight cities in the county reported having a Historical Resources Commission or Committee. However, several cities have historic preservation ordinances or policies in place (Tulare and Visalia are examples), and many communities have historic preservation projects underway at the present time.

Existing Conditions

The following section summarizes the paleontologic, prehistoric, ethnographic, and historic settings within Tulare County.

Paleontologic Setting

The following description is summarized from "The San Joaquin Valley Through Time," by Tim Elam (2001), and the Buena Vista Museum of Natural History, Bakersfield, California website.

During the Tertiary Period (65 to 2 million years ago [mya]), the Sierra Nevada Mountains had eroded to mere hills compared to earlier form, and the Coast Ranges rose. This gave way to the formation of the San Joaquin Valley, which comprises the southern portion of the Great Central Valley, an interior lowland 466 miles long and from 19 to 50 km wide. The Great Central Valley is enclosed by the Siskiyou, Sierra Nevada, Tehachapi, and Coast Ranges on the north, east, south, and west, respectively.

The Sierra Nevada is an island arc volcano system that formed about 200 million years ago during the Jurassic Period (144-208 mya). During this time, the area that would become the San Joaquin Valley lay off shore several thousand feet below the surface of the Pacific Ocean. Sediment from the Sierra Nevada, and the movement of the earth's plates (tectonic action) facilitated the accumulation of material into the Late Cretaceous Period (65-75 mya).

The Jurassic and Cretaceous Periods brought flowering plants, early dinosaurs, along with the first birds and mammals. The basic form of the Great Central Valley rose during the Cenozoic period from the Pacific Ocean, first as islands, then as mountains attached to the ocean valleys below them.

The Paleocene Period (58-66 mya) witnessed the extinction of the dinosaur and the development, and later, dominance of the mammal. During the Eocene Epoch (53-39 mya), the western edges of the San Joaquin Valley rose above sea level for the first time. Sedimentation and uplift of geological formations continued until two million years ago.

The Holocene Epoch (10,000 years to present) brought the San Joaquin Valley above sea level, and humans entered the area. Fresh water lakes, rivers, and thousands of feet of rich alluvium formed the valley floor.

Prehistoric Setting

Although a relatively small amount of information is known concerning the earliest occupants of the Tulare County region, it is clear that much of the San Joaquin Valley and Sierra foothills have been occupied throughout most of the Holocene Epoch (~10,000 B.P. [Before Present] to the present). The reconstruction of cultures inhabiting the subject area during the late Paleo-Indian to early Archaic Periods (~9,000 B.P. to ~3,000 B.P.) has proven difficult based on erosion and depositional patterns of the San Joaquin. Over the millennia, these processes have re-deposited or deeply buried the evidence of much of those early cultures.

A number of investigations into San Joaquin Valley prehistory have been conducted in Tulare County. Much of the literature has supported the notion that the inhabitants of the San Joaquin Valley maintained fairly dense populations situated along the banks of major waterways, wetlands, and streams. Although many sites are more obvious, many of the earliest archaeological records for the region have likely been buried beneath the vast alluvial deposits created by erosion and depositional processes indicative of the valley and Sierra foothills, especially over the last 9,000 years.

Ethnohistoric Setting

Tulare County was inhabited by aboriginal California Indian groups consisting of the Southern Valley Yokuts, Foothill Yokuts, Monache, and Tubatulabal. Most information regarding these groups is based on Spanish government and Franciscan mission records of the 18th and 19th centuries, and in studies conducted during the 1900s to 1930s by American and British ethnographers. The ethnographic setting presented below is derived from the early works, as compiled by W. J. Wallace, Robert F.G. Spier, and Charles R. Smith (*Handbook of North American Indians*, Volume 8, Washington: Smithsonian Institution, 1978), with statistical information provided by the California Native American Heritage Commission.

Of the five main groups inhabiting the Tulare County area, the Southern Valley Yokuts occupied the largest territory, which is defined roughly by the crest of the Diablo Range on the west and the foothills of the Sierra Nevada on the east, and from the Kings River on the north, to the Tehachapi Mountains on the south. The Foothill Yokuts inhabited the western slopes of the Sierra Nevada, between the Fresno River and Kern River, with settlements generally occurring

between the 2,000 to 4,000-foot elevations. The Tubatulabal inhabited the Sierra Nevada Mountains, at the higher elevations, near Mt. Whitney in the east, extending westward along the drainages of the Kern River, and the Kern River-South Fork. The Monache were comprised of six small groups that lived in the Sierra east of the Foothill Yokuts, in locations ranging between 3,000 to 7,000 foot elevations.

According to the U.S. Census Bureau, approximately 6,252 Native Americans reside in Tulare County.

Historical Setting

California's coast was initially explored by Spanish (and a few Russian) military expeditions during the late 1500s. However, European settlement did not occur until the arrival into southern California of land-based expeditions originating in Spanish Mexico. The early groups arrived during the 1760s, and consisted of Spanish military, Mexican Indian, Franciscan missionary, and citizen colonists. Thus began what is today known as the Spanish Period (1769-1822). This period includes the establishment of a chain of 21 Franciscan missions, constructed in old California, from San Diego to Sonoma. With the establishment of the missions came the exertion of Spanish religious and military authority over California's indigenous population, and the development of presidios, civilian ranchos, and pueblos throughout California. Although the region known today as Tulare County did not come under the jurisdiction of a mission proper, periodically small numbers of aboriginal tribal members fleeing the control of distant missions would enter the valley.

In 1822, the colonial territory of Mexico won its independence from Spain, and established a republic. Because it lay strategically situated within the new republic's northern frontier, California remained a territory of Mexico, and home to a new group of ranchers and settlers that arrived to take advantage of large land grants being offered by the new government. During the 1840s, Mexico awarded five grants (known as ranchos) on what later became Tulare County lands. However, in 1860, Kern County was formed from a portion of Tulare County; all five Tulare County ranchos were included within the new Kern County boundaries.

In 1846, hostilities between Mexico and the United States led to war. Two years later (1848), war ended, and the United States and Mexico signed the Treaty of Guadalupe Hidalgo. As part of the post-war

arrangements, Mexico ceded California and the Southwest to the United States. In 1848-1849, the discovery of gold in northern California brought tens of thousands of itinerant miners, merchants, and speculators. By 1850, the huge influx of prospective citizens allowed California to skip the usual stage of territorial status, and enter the union as a state. Two years later (1852), Tulare County was formed from the southern portion of Mariposa County. And, although Tulare County is listed today as the seventh largest of California's 58 counties (containing 4,935 square miles), several other counties were subsequently carved from Tulare, including Fresno (1856), Kern (1860), Inyo (1866), and Kings Counties (1893).

Early settlement in the Tulare County area focused on ranching. In 1872, the Southern Pacific Railroad entered Tulare County, connecting the San Joaquin Valley with markets in the north and east. About the same time, valley settlers constructed a series of water conveyance systems (canals, dams, and ditches) across the valley. With ample water supplies and the assurance of rail transport for commodities such as grain, row, crops, and fruit, a number of farming colonies soon appeared throughout the region. Colonies such as Mt. Whitney, Orosi, Oakview, Holliday, Vina, and McCall's offered affordable farmland, water, and modern transportation. The colonies grew to become cities such as Tulare, Visalia, Porterville, and Hanford. Visalia, the county seat, became the service, processing, and distribution center for the growing number of farms, dairies, and cattle ranches. By 1900, Tulare County boasted a population of about 18,000. New transportation links such as Highway 99 (completed during the 1950s), affordable housing, light industry, and agricultural commerce brought steady growth to the valley. The U.S. Census Bureau estimated the 2003 Tulare County population to be 390,791 (http://quickfacts.census.gov/qfd/states/06/06107.html).

Existing Cultural and Historic Resources

Tulare County's known and recorded cultural resources were identified through historical records, such as those found in the National Register of Historic Places, the Historic American Building Survey/Historic American Engineering Record (HABS/HAER), the California Register of Historic Resources, California Historical Landmarks, and the Tulare County Historical Society list of historic resources.

Due to the sensitivity of many prehistoric, ethnohistoric, and historic archaeological sites, the resources listed in the following table

(Table 9-3) include only those that are available to the general public. The Information Center at California State University Bakersfield houses records associated with reported cultural resources surveys, including the records pertinent to sensitive sites. Only qualified professionals can access the records and other responsible parties such as selected representatives of the region's Native American community. Sensitive sites include burial grounds, important village sites, and other buried historical resources protected under state and federal laws. The San Joaquin Valley is rich in such sites, and part of a local government's cultural resources program should include the education of project participants, agency representatives, and concerned citizens as to the laws, codes, and ordinances that forbid the collecting of items such as grave goods, pottery, arrowheads, glass, and pottery associated with archaeological sites of any kind.

Table 9-3. Historic Properties of Tulare County, 2004

Site/Building	Location	Year Constructed	Historical Landmark Designation	National Register Status
First Tule River Indian Reservation	Alta Vista School, Porterville	1857	CA SHL No. 388	
Charter Oak/Election Tree	Charter Oak Dr., 7 mi East of Visalia	1852	CA SHL No. 410/TCHS HS	
Tailholt Gold Mining Camp	County Hwy. M109, 8.0 mi S. Fountain Springs	1856	CA SHL No. 413/TCHS HS	
Butterfield Stage Route	SW Corner Hermosa St and SR 65, 1 mi W of Lindsay	1858	CA SHL No. 471/TCHS HS	
Tule River State Station	Porterville Public Park	1854	CA SHL No. 473	
Fountain Springs	Junction Co. Rd. J22/M109	1858	CA SHL No. 648/TCHS HS	
Temporary Detention Camps for Japanese-Americans	Tulare Co. Fairgrounds	1942	CA SHL No. 934	
Commercial and Savings Bank/Bank of America Building	343 East Main St.	1915	None	Listed in NR as individual property
Allensworth Historic District	SR 43, Allensworth	1908-1912		Listed in NRHP as district
Ash Mountain Entrance Sign	N of Three Rivers in Sequoia National Park	1925		Listed in NRHP
Bank of Italy Building	128 E. Main St, Visalia	1900-1924		Listed in NRHP as building
Barton-Lackey Cabin	N of Mineral King, in Kings Cyn. Nat. Park	1900		Listed in NRHP
Cattle Cabin	NE of Three Rivers on Sequoia Nat. Park	1875		Listed in NRHP
Elster, C.A. Building	SR 190 and Tule River Dr., Springville	1912		Listed in NRHP

Table 9-3. Historic Properties of Tulare County, 2004

Site/Building	Location	Year Constructed	Historical Landmark Designation	National Register Status
Exeter Public Library	Exeter	1900-1924		Listed in NRHP as Building
Giant Forest Lodge Historic District	NE of Three Rivers in Sequoia Nat. Park	1900-1924		Listed in NRHP as District
Giant Forest Village – Camp Kaweah Historic District	N of Three Rivers in Sequoia Nat. Park	1886-1924	HABS/TCHS Historical Site	Listed in NRHP as District
Groenfeldt Site	Address Restricted	1000-2999BC		Listed in NRHP
Hockett Meadow Ranger Station	S. of Silver City in Sequoia Nat. Park	1925-1949		Listed in NRHP
Hospital Rock	Address Restricted	1499-1000AD		Listed in NRHP
Hyde House	500 S. Court St., Three Rivers	1875		Listed in NRHP
Moro Rock Stairway	N. of Three Rivers in Sequoia Nat Park	1925-1949		Listed in NRHP
Orosi Branch Library	12662 Ave. 416, Orosi	1900-1924		Listed in NRHP as Building
Pear Lake Ski Hut	N. of Mineral King on Sequoia Nat. Park	1925-1949		Listed in NRHP as Building
Pogue Hotel	32792 Sierra Dr., Lemoncove	1879	TCHS HS	Listed in NRHP as Building
Quinn Ranger Station	S. of Mineral King on Sequoia Nat. Park	1900-1924		Listed in NRHP as Building
Redwood Meadow Ranger Station	NE of Three Rivers n Sequoia Nat. Park	1925-1949		Listed in NRHP as Building
Sequoia Field – Visalia – Dinuba School of Aeronautics	Jct. Of Ave. 368 and Road 112, 9 mi N. of Visalia	1925		Listed in NRHP as Building

Table 9-3. Historic Properties of Tulare County, 2004

Site/Building	Location	Year Constructed	Historical Landmark Designation	National Register Status
Shorty Lovelace Historic District	E. of Pinehurst on Kings Cyn. Nat. Park	1900-1949		Listed in NRHP as District
Smithsonian Institution Shelter	W. of Lone Pine in Sequoia Nat. Park	1900-1924		Listed in NRHP
Squatter's Cabin	NE of Three Rivers, Three Rivers	1875		Listed in NRHP as Building
Tenalu	Address Restricted	1925-1949		Listed in NRHP
Tharp's Log	NE of Three Rivers, Three Rivers	1850-1874		Listed in NRHP
The Pioneer	27000 S. Mooney Blvd., Visalia	1900-1924		Listed in NRHP as Building
Tulare Union High School Auditorium and Administration Building	755 E. Tulare Ave., Tulare	1925-1949		Listed in NRHP as Building
US Post Office, Porterville Main	65 W. Mill Ave., Porterville	1925-1949		Listed in NRHP as Building
US Post Office, Visalia Downtown Center Station	11 W. Acequia St., Visalia	1925-1949		Listed in NRHP as Building
Wilsonia Historic District	Roughly bounded by Pine Ln., Fern Ln., Hillcrest Rd., Sierra Ln., Kaweah Ln., Goddard Ln., and Park Rd.	1900-1924		Listed in NRHP as District
Zalud House	393 N. Hockett St.	1875-1899		Listed in NRHP as Building
Porterville Flour Mill		1868	TCHS HS	
Butterfield Overland Mail Route	7 mi. E. of Ducor	1855	TCHS HS	

Table 9-3. Historic Properties of Tulare County, 2004

Site/Building	Location	Year Constructed	Historical Landmark Designation	National Register Status
Fremont Trail	W. of Lindsay	1844	TCHS HS	
Mooney Grove	RE Kaweah Delta	1852	TCHS HS	
Jordan Trail	Yohohl Rd., near SR 198	1861	TCHS HS	
George S. Berry Marker	Lindsay High School	1880s	TCHS HS	
Hog Wallow Preserve	Ave. 314/Rd. 220, Exeter	n.d.	TCHS HS	
Fort Visalia	Garden, between School and Oak Streets	1852	TCHS HS	
Woodville School Marker	Woodville Memorial Bldg.	n.d.	TCHS HS	
Lone Oak Cemetery	Ave. 324, off Rd 168, East of Ivanhoe	n.d.	TCHS HS	
Plano Marker	Former site of Plano	1861	TCHS HS	
Old State Road	Ave. 56, Fountain Springs	n.d.	TCHS HS	
Ina Stiner Home	“E” St., Porterville	n.d.	TCHS HS	
Klink Station Marker	Ivanhoe	n.d.	TCHS HS	
Artesian Well, Pixley	S. of Waukena	Ca 1880s	TCHS HS	
Wilcox Family Monument	Lake Success, Porterville	n.d.	TCHS HS	
Allen I. Russel Tree	Balch Park	1961	TCHS HS	
Liberty Elementary School	Mooney Blvd., Visalia	n.d.	TCHS HS	
Kern Street Commercial Buildings	Tulare		HABS	

Table 9-3. Historic Properties of Tulare County, 2004

Site/Building	Location	Year Constructed	Historical Landmark Designation	National Register Status
Tule River Hydroelectric Complex	SR 90, Tulare	1902	HABS	
Generals Highway	Three Rivers	1921	HAER	
Marble Fork Bridge	Kaweah River, Three Rivers	1919	HAER	
Pumkin Hollow Bridge	Kaweah River, Three Rivers	1922	HAER	
General Grant National Historic District	Kings Canyon National Park, Wilsonia	n.d.		Listed in NRHP as District

Acronyms/Abbreviations:
CA SHL – California State Historic Landmark
NRHP – National Register of Historic Places
HABS/HAER – Historic American Building Survey/Historic American Engineering Record (National Park Service)
TCHS HS – Tulare County Historical Society Historical Site

Sources: National Register of Historical Places (2004), HABS/HAER NPS (2004), California Office of Historic Preservation (2004), and Tulare Co. Historical Society (2004).

10. NATURAL RESOURCES

10.1 Introduction

This chapter of the Background Report provides a general overview of water resources and mineral resources within Tulare County to identify and understand these key natural resources. This chapter is divided into the following sections:

- Water Resources (Section 10.2);
- Mineral Resources (Section 10.3);
- Oil and Gas Resources (Section 10.4); and
- Timber Resources (Section 10.5).

10.2 Water Resources

Introduction

This section describes existing state and regional water supply issues, major sources of water in the larger Tulare Lake hydrologic basin, and estimates of current water use by agricultural, urban, and environmental interests in the Study Area. Other water resource issues are addressed in 7.2, Domestic Water Infrastructure and in Appendix C, Water Resources.

Methods

The information contained in this section was obtained from various sources, including the 2001 Tulare County General Plan Background Report. Additional information is based on printed reports by the State Department of Water Resources, including *The State Water Plan*, and various water resource management plans prepared for water districts and management entities within Tulare County and the San Joaquin Valley.

Key Terms

The following key terms are used in this section to describe water supply conditions and the framework of regulations that pertain to water resources.

- **Tulare Lake Basin.** The State Department of Water Resources subdivides the state into ten hydrologic regions for planning purposes, corresponding to the state's major drainage basins. Tulare County is located primarily within the Tulare Lake Basin.

- **Acre-feet.** The amount of water needed to cover one acre with one foot of water, or approximately 325,851 gallons.

- **Aquifer.** A geologic formation that stores water and yields significant quantities of water to wells or springs.

- **maf.** One million acre-feet.

- **taf.** One thousand acre-feet.

- **CVP.** Central Valley Project, authorized in 1933. The CVP, operated by the United States Bureau of Reclamation, is the largest water storage and delivery system in California, comprising 29 of the state's 58 counties. The project's features include 18 federal reservoirs and 4 additional reservoirs jointly owned with the State Water Project.

- **SWP.** State Water Project, authorized in 1960. SWP facilities include 20 dams, 662 miles of aqueduct, and 26 power and pumping plants. Major facilities include the multi-purpose Oroville Dam and Reservoir on the Feather River, the California Aqueduct, South Bay Aqueduct, North Bay Aqueduct, and a share of the state-federal San Luis Reservoir.

- **SDWA.** The Safe Drinking Water Act, administered by the U.S. Environmental Protection Agency in coordination with the states, is the chief federal regulatory legislation regulating drinking water quality.

- **USBR.** United States Bureau of Reclamation.

- **Confined aquifer.** A water-bearing subsurface stratum that is bounded above and below by formations of impermeable, or relatively impermeable, soil or rock.

- **Groundwater basin.** A groundwater reservoir, defined by an overlying land surface and the underlying aquifers that contain water stored in the reservoir. In some cases, the

boundaries of successively deeper aquifers may differ and make it difficult to define the limits of the basin.

- **Groundwater overdraft.** The condition of a groundwater basin in which the amount of water withdrawn (by pumping) exceeds the amount of water that recharges the basin.

- **Groundwater recharge.** The natural or intentional infiltration of surface water into the zone of saturation (i.e., into groundwater).

Regulatory Setting

Water in California is managed by a complex set of federal and state regulations. California administers rights to surface water at the state level, but not rights to groundwater. In California, groundwater may be managed under a variety of authorities, ranging from judicial adjudication of individual basins to several forms of local agency management. The following discussion summarizes major regulatory policies for water management.

- **California Water Code.** The California Water Code requires the State Department of Water Resources to publish an update of the California Water Plan every five years. The plan evaluates water supplies and assesses agricultural, urban, and environmental water uses to quantify the gap between water supplies and uses.

- **Urban Water Management Planning Act.** The Urban Water Management Planning Act became part of the California water code with passage of AB 797 in 1984. The act requires every urban water supplier (providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually) to adopt and submit an urban water management plan at least once every five years to the Department of Water Resources.

- **Safe Drinking Water Act.** The Safe Drinking Water Act (SDWA), administered by the U.S. Environmental Protection Agency in coordination with the states, is the chief federal regulatory legislation regulating drinking water quality. The 104th Congress reauthorized and made significant changes to the SDWA, which had most recently been reauthorized in 1986. Major changes included establishing a drinking water state revolving loan fund to be made available to public water

systems to help them comply with national primary drinking water regulations and to upgrade water treatment systems; and requirements for EPA to establish drinking water standards based on risk assessment and cost/benefit analysis.

- **Bay Delta Accord (1994).** The December 1994 Bay-Delta Accord established several principles governing ESA administration in the Bay-Delta during the agreement's term. The Accord is intended to improve habitat conditions in the Bay-Delta to avoid the need for additional species listings during the agreement's term. If additional listings do become necessary, the federal government will acquire any additional water supply needed for those species through the purchase of water from willing sellers. There is not intended to be any additional water cost to the CVP and SWP resulting from incidental take of listed species.

- **CEQA.** CEQA Guidelines Section 15083.5 requires the county to request information from the public water systems serving the project area. The requested information includes: an indication of whether the projected water demand associated with the proposed project was included in its last urban water management plan; and, an assessment of whether its total projected water supplies during normal, single-dry, and multiple-dry water years as included in the 20-year projection (contained in its urban water management plan) will meet the projected water demand associated with the proposed project, in addition to the system's existing and planned future uses.

- **SB 610 and SB 221.** Senate Bill 610 became effective January 1, 2002, and requires cities and counties in connection with CEQA to review and consider water supply assessments when evaluating certain development projects to determine if projected water supplies can meet the project's anticipated water demand. SB 610 also requires additional factors to be considered in the preparation of urban water management plans, water supply assessments, and for certain development projects that are otherwise subject to CEQA review. SB 221 requires similar analysis for subdivision maps that meet the threshold review criteria.

- **Water Code Section 10912** (also contained in CEQA Guidelines Section 15083.5) identifies those projects as: (a) a residential development of more than 500 dwelling units; (b) a

shopping center or business employing more than 1,000 persons or having more than 500,000 gross square feet of floor space; (c) a commercial office building employing more than 1,000 persons or having more than 250,000 gross square feet; (d) a hotel or motel with more than 500 rooms; (e) an industrial or manufacturing establishment housing more than 1,000 persons or having more than 650,000 gross square feet or 40 acres; (f) a mixed use project containing any of the foregoing; or (g) any other project that would generate a water demand at least equal to a 500 dwelling unit residential project.

- **Local Agency Groundwater Management Programs.** Some local agencies have specific statutory authority to manage groundwater resources in their service areas. Other local agencies may manage groundwater under authority provided by general enabling legislation, such as Water Code Section 10750 et seq. A few counties have adopted local ordinances to administer groundwater management. AB 3030 (Water Code Section 10750 et seq.) provided broad general authority for local agencies to adopt groundwater management plans and to impose assessments to finance the cost of implementing the plans. To date, about 150 local agencies have adopted AB 3030 groundwater management plans.

Existing Conditions

The State Department of Water Resources subdivides the state into regions for planning purposes. The largest planning unit is the hydrologic region, corresponding to the state's major drainage basins. Tulare County is located primarily within the Tulare Lake Basin, the closed drainage basin at the south end of the San Joaquin Valley, south of the San Joaquin River watershed, encompassing basins draining to Kern, Tulare, and Buena Vista Lakes.

Precipitation provides California with nearly 200 million acre-feet of surface water supply on an average basis. Of this renewable supply, about 65 percent is depleted through evaporation and transpiration by trees and other plants. The remaining 35 percent remains in the state's hydrologic system as runoff.

Over 30 percent of the state's runoff is not explicitly designated for urban, agricultural, or environmental uses. This water is depleted from the hydrologic system as outflow to the Pacific Ocean or other

salt sinks. The remaining runoff (2 – 3 percent) is available as a renewable water supply for urban, agricultural, and environmental uses.

Table 10-1 shows California's estimated water supply, for average and drought years under 1995 and 2020 levels of development, with existing facilities and programs. This information is excerpted from the *California Water Plan*, prepared by the California Department of Water Resources. The state's 1995-level average year water supply was about 77.9 million acre-feet (maf), including about 31.4 maf of dedicated flows for environmental uses.

Table 10-1. California Water Supplies with Existing Facilities and Programs[a] Thousand Acre Feet (taf)

Supply	1995		2020	
	Average	Drought	Average	Drought
Surface				
CVP	7,004	4,821	7,347	4,889
SWP	3,126	2,060	3,439	2,394
Other Federal Projects	910	694	912	683
Colorado River	5,176	5,227	4,400	4,400
Local Projects	11,054	8,484	11,073	8,739
Required Environmental Flow	31,372	16,643	31,372	16,643
Reapplied	6,441	5,596	6,449	5,575
Groundwater[b]	12,493	15,784	12,678	16,010
Recycled and Desalted	324	333	415	416
Total (rounded)	**77,900**	**59,640**	**78,080**	**59,750**

[a] Bulletin 160-98 presents water supply data as applied water, rather than net water. This distinction is explained in a previous section. Past editions of Bulletin 160 presented water supply data in terms of net supplies.

[b] Excludes groundwater overdraft

Source: Department of Water Resources, California Water Plan.

The annual average statewide supply is projected to increase about 0.2 maf by 2020 without implementation of new water supply options. While the expected increase in average year water supplies is due mainly to higher Central Valley Project (CVP) and State Water Project (SWP) deliveries (in response to higher 2020-level demands), new water production will also result from groundwater and from recycling facilities currently under construction.

The state's 1995-level drought year water supply was about 59.6 maf, of which about 16.6 maf is dedicated for environmental uses. Annual drought year supply is expected to increase slightly by 2020 without implementation of new water supply options. The increase is expected to be created through higher CVP and SWP deliveries and new production from surface water, groundwater, and recycling facilities currently under construction.

Surface Water Supplies

Surface water supplies for the Tulare Lake Basin include developed supplies from the CVP, the SWP, rivers, and local projects. Surface water also includes the supplies for required environmental flows. Required environmental flows are comprised of undeveloped supplies designated for wild and scenic rivers, supplies used for instream flow requirements, and supplies used for Bay-Delta water quality and outflow requirements. Finally, surface water includes supplies available for reapplication downstream. Urban wastewater discharges and agricultural return flows, if beneficially used downstream, are examples of reapplied surface water.

Central Valley Project. The Legislature authorized the State Central Valley Project in 1933. Because California was unable to sell the bonds needed to finance the project during the Great Depression, the United States Bureau of Reclamation (USBR) initiated project construction. Initial congressional authorization for the CVP included facilities such as Shasta and Friant Dams, Tracy Pumping Plant, and the Contra Costa, Delta-Mendota, and Friant-Kern Canals.

The USBR's CVP is the largest water storage and delivery system in California, comprising of 29 of the state's 58 counties. The project's features include 18 federal reservoirs and 4 additional reservoirs jointly owned with the State Water Project. The keystone of the CVP is the 4.55 maf Lake Shasta, the largest reservoir in California. CVP reservoirs provide a total storage capacity of over 12 maf, nearly 30 percent of the total surface storage in California, and deliver about 7 maf annually for agricultural (6.2 maf), urban (0.5 maf), and wildlife refuge use (0.3 maf) (Table 10-2).

Table 10-2. Major Central Valley Project Reservoirs

Reservoir	Capacity (taf)	Year Completed	Stream/River Outflow
Shasta	4,552	1945	Sacramento River
Trinity	2,448	1962	Trinity River
New Melones	2,420	1979	Stanislaus River
Folsom	977	1956	American River
San Luis (Federal Share)	966	1967	Off stream
Millerton	520	1947	San Joaquin River
Whiskeytown	241	1963	Clear Creek

Source: Department of Water Resources, *California Water Plan1999.*

The CVP supplies water to more than 250 long-term water contractors, including 15 districts in Tulare County. The majority of CVP water is allocated to agricultural water users. Large urban centers receiving CVP water include Redding, Sacramento, northeastern Contra Costa County, and Fresno. Collectively, the contracts identify a maximum annual delivery of 9.3 maf, including the delivery of 1.7 maf of Friant Division supply when available in wet years.

The capability of the CVP to meet full water supply requests by its south-of-Delta contractors in a given year depends on rainfall, snow pack, runoff, carryover storage, pumping capacity from the Delta, and regulatory constraints on CVP operations. Existing CVP facilities have only a 20 percent chance of making full deliveries in any given year.

Friant Dam on the San Joaquin River, constructed by the United States Army Corps of Engineers (ACOE) and operated by the USBR was completed in 1944. This is the key facility in the San Joaquin Valley that made the first major inter-basin transfer of water possible in the service area. Millerton Reservoir has a capacity of 520,000 acre-feet of which about 400,000 acre-feet is annually usable for irrigation.

Water diverted through the Friant-Kern Canal to users in Tulare County is replaced to water right holders along the lower San Joaquin River with water imported from the Delta through an exchange agreement.

State Water Project. State voters authorized the State Water Project (SWP) in 1960. The majority of existing project facilities were constructed in the 1960's and 1970's. SWP facilities include 20 dams, 662 miles of aqueduct, and 26 power and pumping plants. Major facilities include the multi-purpose Oroville Dam and Reservoir on the Feather River, the California Aqueduct, South Bay Aqueduct, North Bay Aqueduct, and a share of the state-federal San Luis Reservoir.

Initial project contracts were signed for an eventual annual delivery of 4.2 maf. Of this annual entitlement, about 2.5 maf was to serve Southern California and about 1.3 maf was to serve the San Joaquin Valley. Except during very wet or drought years, San Joaquin Valley use of SWP supply has been near full contract amounts since 1980. The ability of the SWP to deliver full water supply requests by its contractors in a given year depends on rainfall, snow pack, runoff, carryover storage, pumping capacity from the Delta, and regulatory constraints on SWP operation. Existing SWP facilities have only a 65 percent chance of making full deliveries.

In 1975, the locally financed Cross Valley Canal was completed, transforming water from the California Aqueduct through a series of six pump stations to the east side of the southern San Joaquin Valley near the City of Bakersfield. A complex series of transport and exchange agreements allows of equivalent amounts of water to be swapped between the Arvin-Edison Water Storage District (a long-term Friant Unit contractor) and eight entities that contract for water with the ACOE from Shasta Dam and Reservoir, (including five in Tulare County). Water delivered to the Arvin-Edison Water Storage District is exchanged for a portion of their water supply from Millerton Reservoir. This exchange is capable of bringing an additional 128,300 acre-feet to the southern valley.

Rivers and Reservoirs. In addition to water from the San Joaquin River delivered by the Friant Kern Canal, other rivers serving Tulare County are the Kings, Kaweah, Tule, Kern, and White Rivers.

The Kings River watershed encompasses 1,742 square miles, ranging in elevation from 500 to 14,000 feet above sea level. The current yearly

average runoff for the Kings River is 1,689,700 acre-feet. Variation in runoff is great, not only from year to year, but month to month. As a result of this variation, there were alternating periods of flood in the drainage area until Pine Flat Dam was completed in 1954 by the Army Corp Of Engineers (ACOE). Pine Flat Reservoir has a capacity of 1,000,000 acre-feet and over 1,000,000 acres of agricultural land receives Kings River water.

The Kaweah River drains an area of 561 square miles of the Sierra Nevada Mountains. The headwaters are at elevations near 12,000 feet. Below the foothills, the Kaweah divides into several distributaries that cross the river's alluvial fan and terminate in Tulare Lake. The average annual runoff is nearly 430,000 acre-feet. Terminous Dam on the Kaweah River was completed in 1962 by the ACOE and creating Lake Kaweah with a capacity of 150,000 acre-feet.

The Tule River is a watershed of 390 square miles above Success Dam, with headwaters rising to an elevation of about 9,500 feet. Flood flows historically traversed the fan through several channels terminating in Tulare Lake. The average annual runoff is approximately 136,000 acre-feet. Success Dam was completed in 1961 by the ACOE and has a capacity of 85,000 acre-feet.

Isabella Dam on the Kern River was completed in 1954 by the ACOE and has a capacity of 570,000 acre-feet.

The subject of flood control merits special mention because of the direct relationship between the operation of water supply projects and flood control projects. Water supplies can be affected by flood control actions such as increasing the amount of reservoir storage dedicated to flood control purposes. In many major river systems, flood control dams have reduced flood flows by half or more, saving lives and significantly reducing property damage. However, in some areas, leveed flood control systems can be overwhelmed causing significant damages.

The 1997 Final Report of the Governor's Flood Emergency Action Team identified many actions that could be taken to increase valley flood protection, including better emergency preparedness, floodplain management actions, levee system improvements, construction of new floodways, temporary storage of floodwaters on wildlife refuges, reoperation or enlargement of existing reservoirs to increase flood storage, and construction of new reservoirs.

Groundwater Supplies

The San Joaquin Valley is a geologic depression formed between two uplifted areas, the Coastal Mountain Range on the west and the Sierra Nevada Mountains to the east. The depression has been filled by over 20,000 feet of sedimentary material, most of which contains water too saline for domestic use. The upper and most recently deposited material consists of alluvial deposits that extend to a depth of approximately 3,000 feet. These alluvial deposits contain fresh water and comprise an extensive underground reservoir. Within the basin, groundwater moves generally from areas of major replenishment along the eastern side of the San Joaquin Valley westerly to its trough. It is estimated that over 150 million acre-feet of fresh water is stored in the underground reservoir to a depth of 500 feet.

Groundwater in Tulare County occurs in an unconfined state throughout, and in a confined state beneath its western portion. Extensive alluvial fans associated with the Kings, Kaweah, and Tule Rivers provide highly permeable areas in which groundwater in the unconfined aquifer system is readily replenished. Interfan areas between the streams contain less permeable surface soils and subsurface deposits, impeding groundwater recharge and causing well yields to be relatively low. The mineral quality of groundwater in Tulare County is generally satisfactory for all uses.

In an average year, about 30 percent of California's urban and agricultural water is provided by groundwater extraction. In drought years when surface supplies are reduced, groundwater supports an even larger percentage of use. The amount of water stored in California's aquifers is far greater than that stored in the state's surface water reservoirs, although only a portion of California's groundwater resources can be economically and practically extracted for use.

The Department of Water Resources has estimated the groundwater overdraft by hydrologic region. For the Tulare Lake Basin, the total overdraft is estimated at 820,000 acre-feet per year, the greatest overdraft projected in the state, and 56 percent of the statewide total overdraft. This overdraft is due to reductions of surface supplies in recent years by Delta export restrictions, Endangered Species Act requirements, and other factors. CVP contractors in these regions who rely on Delta exports for their surface water supply have experienced

supply deficiencies of up to 50 percent subsequent to implementation of export limitations. Many of these contractors have turned to groundwater pumping for additional water supplies.

Groundwater overdraft is expected to decline statewide by 2020. The reduction in irrigated acreage in drainage problem areas on the west side of the San Joaquin Valley is expected to reduce groundwater demands in the Tulare Lake region by 2020.

The groundwater overdraft is most pronounced along the western boundary of the county, as manifested by a lowering of pressure levels in the confined aquifers. There is also a progressive lowering of ground water levels along the easterly margins of the basin, particularly in the southerly part of the Kern-Tulare Water District. The importation of additional CVP water through the Cross Valley Canal, obtained by exchange with the Arvin-Edison Water Storage District, will act to mitigate the lowering of ground water levels, particularly in the Pixley Irrigation District and Rag Gulch Water District. The Kern-Tulare Water District is actively proceeding with plans to provide facilities for distribution of its full supply of Arvin-Edison exchange water that should alleviate the problem in that area.

There are 19 entities in Tulare County with active programs of groundwater management. These management programs include nearly all types of direct recharge of surface water. Groundwater recovery is accomplished primarily through privately owned wells. Among the larger programs of groundwater management are those administered by the Kaweah Delta Water Conservation District, the Kings River Water Conservation District, the Tulare Irrigation District, the Lower Tule Water Users Association, and the Alta Irrigation District, utilizing water from the Friant-Kern Canal and local streams. The Kings River Water Conservation District covers the western county.

Water Marketing. While several long-term agreements have been completed in recent years, short-term agreements have comprised the majority of water marketing. Short-term agreements, with terms less than one year, can be an effective tool to alleviate the most severe drought year impacts. Short-term agreements can be executed on the spot market. However, water purveyors are increasingly interested in negotiating longer-term agreements for drought year transfers. In such future agreements, specific water supply conditions may be the triggers to determine whether water would be transferred in a specific year.

Water Quality. A critical factor in determining the usability and reliability of any particular water source is water quality. The quality of a water source will significantly affect the beneficial uses of that water. Water has many potential uses, and the water quality requirements for each use vary.

The establishment and enforcement of water quality standards for water bodies in California is administered by the State Water Resources Control Board (SWRCB) and the nine regional water quality control boards (RWQCB). The RWQCB's protect water quality through adoption of region-specific water quality control plans, commonly known as basin plans. In general, water quality control plans designate beneficial uses of water and establish water quality objectives designed to protect them. The designated beneficial uses of water may vary through individual water bodies.

The mineral quality of groundwater extracted for use in Tulare County is generally satisfactory for crop irrigation. The salinity of groundwater typically increases in a westward direction across the San Joaquin Valley. Under natural conditions, groundwater moves from recharge areas along the sides of the Valley toward the low or central portion where it is discharged at the land surface by seepage and evapotranspiration. The great alkali areas of the southwestern parts of the county indicate natural discharge of groundwater by evaporation has occurred, leaving salt accumulations in surface soils.

The SDWA requires states to implement wellhead protection programs designed to prevent the contamination of groundwater supplies. Wellhead protection programs rely heavily on local efforts to be effective, because communities have the primary access to information on potential contamination sources and can adopt locally based management.

Existing and Projected Water Use

Tulare County water supplies are apportioned into thirds comprising local (37 percent), imported (31 percent), and groundwater (32 percent) supplies. The conveyance system consists of unlined canals and pipelines. Groundwater recharge occurs both naturally and artificially. Natural recharge consists of percolation from lakes, drainage channels, and rainfall. Artificial recharge occurs through seepage from conveyance facilities and percolation from irrigation, as well as deliveries of surface water to recharge basins, open land, unlined canals, and fields in the off-season. Recharge can serve to

stabilize groundwater reservoirs and utilize groundwater storage capacity made available by the removal of water from the groundwater aquifer. Most recharge programs are designed to retain and percolate surface water supplies not immediately needed or used for irrigation.

Urban Water Use. Table 10-3 summarizes urban water use for the Tulare Lake Basin compared to the entire state. Statewide urban use is estimated at 8.8 maf in average water years and 9.0 maf in drought years compared to 690,000 acre-feet for the Tulare Lake Basin (7.9 percent). Drought year demands are slightly higher because reductions in precipitation are not available to meet exterior water uses, such as landscape watering. Projected 2020 use statewide increases to 12.0 maf in average years and 12.4 maf in drought years, compared to 1.099 maf in the Tulare Lake Basin (9.1 percent). The increase in percentage of the state total reflects the higher growth levels projected for the San Joaquin Valley.

Table 10-3. Urban Water Use in the Tulare Lake Basin and State (taf)

Region	1995		2020	
	Average	Drought	Average	Drought
Tulare Lake	690	690	1,099	1,099
Total (rounded)	**8,770**	**9,010**	**12,020**	**12,360**

Source: Department of Water Resources, *California Water Plan 1999*

Agricultural Water Use. Crop water use information and irrigated acreage data are combined to generate the agricultural water use for the Tulare Lake Basin shown in Table 10-4, which compares agricultural water use in the Tulare Lake Basin to the entire state. Existing irrigation districts in Tulare County are shown in the Table 8-4 along with sources of supply.

Agricultural water use is expected to decline over time as land is removed from agriculture through urbanization and retirement of lands occur in areas of poor soils and drainage. The percentage of agricultural water use in the Tulare Lake Basin compared with the state, is projected to remain at nearly 1/3 of the state total (see Table 10-5).

Table 10-4. Irrigation Districts in Tulare County

Entity	Surface Water	Imported Water Source	Groundwater Extraction
Alpaugh Irrigation District	NA	Friant-Kern Canal (1,000af average)	19,000 af
Alta Irrigation District	King River	Friant-Kern Canal (surplus)	230,000 af
Delano-Earlimart Irrigation District	NA	Friant-Kern Canal (146,050 af average)	8,000 af
Exeter Irrigation District	NA	Friant-Kern Canal (1,000 af average)	14,000 af
Hills Valley Irrigation District	NA	Cross Valley Canal (2,000 af average)	1,000 af
Ivanhoe Irrigation District	Kaweah River	Friant-Kern Canal (11,650 af average)	15,000 af
Kaweah Delta Water Cons. District	Kaweah River	Friant-Kern Canal (24,000 af average)	130,000 af
Kern-Tulare Water District	Kern River	Cross Valley Canal (41,000 af average)	33,000 af
Lindmore Irrigation District	NA	Friant-Kern Canal (44,000 af average)	28,000 af
Lower Tulare River Irrigation Dist.	Tule River	Friant-Kern Canal (180,200 af average) Cross Valley Canal (31,000 af average)	NA
Lindsay-Strathmore Irrigation District	NA	Friant-Kern Canal (24,150 af average)	NA
Orange Cove Irrigation District	NA	Friant-Kern Canal (39,200 af average)	30,000 af
Pioneer Water Irrigation District	Tule River		3,000 af
Pixley Irrigation District	NA	Friant-Kern Canal (1,700 af average) Cross Valley Canal (31,000 af average)	130,000 af
Porterville Irrigation District	Tule River	Friant-Kern Canal (31,000 af average)	15,000 af
Rag Gulch Water District	Kern River	Friant-Kern Canal (3,700 af average) Cross Valley Canal (13,300 af average)	
Saucelito Irrigation District	Tule River	Friant-Kern Canal (37,600 af average)	15,000 af
Stone Corral Irrigation District	NA	Friant-Kern Canal (10,000 af average)	5,000 af
Teapot Dome Irrigation District	NA	Friant-Kern Canal (5,600 af average)	
Terra Bella Irrigation District	NA	Friant-Kern Canal (29,000 af average)	2,000 af
Tulare Irrigation District	Kaweah River	Friant-Kern Canal (100,500 af average)	65,000 af

Source: Bookman-Edmonston Engineering Inc. Water Resources Management in the Southern San Joaquin Valley, Table A-1.

Table 10-5. Applied Agricultural Water in the Tulare Lake Basin and State (taf)

Region	Year			
	1995		2020	
	Average	Drought	Average	Drought
Tulare Lake	10,736	10,026	10,123	9,532
State Total	**33,780**	**34,540**	**31,500**	**32,330**

Source: Department of Water Resources, California Water Plan

Environmental Water Use. Water flows in wild and scenic rivers constitute the largest environmental water use in the state. In the Tulare Lake Basin, designated state and federal wild and scenic rivers include the north and south forks of the Kern River. The 1968 National Wild and Scenic Rivers Act, codified to preserve the free-flowing characteristics of rivers having outstanding natural resource values, prohibited federal agencies from constructing, authorizing, or funding the construction of water resources projects having a direct or adverse effect on the values for which the river was designated. (This restriction also applies to rivers designated for potential addition to the national wild and scenic rivers system.) Table 10-6 shows the Wild and Scenic River flows in the Tulare Lake Basin.

Table 10-6. Wild and Scenic River Flows (taf)

Region	1995		2020	
	Average	Drought	Average	Drought
Tulare Lake	1,614	751	1,614	751
State Total	**23,560**	**10,560**	**23,560**	**10,560**

Source: Department of Water Resources, California Water Plan

Water Use Summary. Tables 10-7 and 10-8 summarize average and drought year applied water use for the Tulare Lake Basin. The tables combine the urban, agricultural, and environmental water use described in earlier subsections of this chapter.

Table 10-7. Tulare Lake Basin Average Year Water Use (taf)

Region	1995				2020			
	Urban	Agricultural	Environmental	Total (rounded)	Urban	Agricultural	Environmental	Total (rounded)
Tulare Lake	690	10,736	1,672	**13,100**	1,099	10,123	1,676	**12,900**

Table 10-8. Tulare Lake Basin Drought Water Use (taf)

Region	1995				2020			
	Urban	Agricultural	Environmental	Total (rounded)	Urban	Agricultural	Environmental	Total (rounded)
Tulare Lake	690	10,026	809	**1,530**	1,099	9,532	813	**11,440**

10.3 Mineral Resources

Introduction

From an economic standpoint, minerals extraction activities in Tulare County focus on aggregate (sand, gravel and crushed stone), which is the most significant resource and is used for building materials. Other minerals present but not mined include asbestos, copper, gold, iron and silver.

Methods

The information contained in this section was compiled using the Mineral Land Classification of Concrete Aggregate Resources in the Tulare Production-Consumption Region, California, 1997; California Department of Conservation-Division of Mines and Geology.

Regulatory Setting

California Surface Mining and Reclamation Act of 1975. Enacted by the State Legislature in 1975, the Surface Mining and Reclamation Act (SMARA) insures a continuing supply of mineral resources for the

state. The act also creates surface mining and reclamation policy to assure that:

- Production and conservation of minerals is encouraged;
- Environmental effects are prevented or minimized;
- Consideration is given to recreational actives, watersheds, wildlife, range and forage, and aesthetic enjoyment;
- Mined lands are reclaimed to a useable condition once mining is completed; and
- Hazards to public safety both now and in the future are eliminated.

Areas in the state (city or county) that do not have their own regulations for mining and reclamation actives rely on the Department of Conservation, Division of Mines and Geology, Office of Mine Reclamation to enforce this law.

SMARA only covers mining activities that impact or disturb the surface of the land. Deep mining (tunnel) or petroleum and gas production is not covered by SMARA.

Key Terms

- **SMARA.** SMARA contains provisions for the inventory of mineral lands in the State of California. The State Geologist, in accordance with the State Board's Guidelines for *Classification and Designation of Mineral Lands,* must classify Mineral Resource Zones (MRZ) as designated below:
- **MRZ-1.** Areas where available geologic information indicates that there is minimal likelihood of significant resources.
- **MRZ-2.** Areas underlain by mineral deposits where geologic data indicate that significant mineral deposits are located or likely to be located.
- **MRZ-3.** Areas where mineral deposits are found but the significance of the deposits cannot be evaluated without further exploration.

- **MRZ-4.** Areas where there is not enough information to assess the zone. These are areas that have unknown mineral resource significance.

Environmental Setting

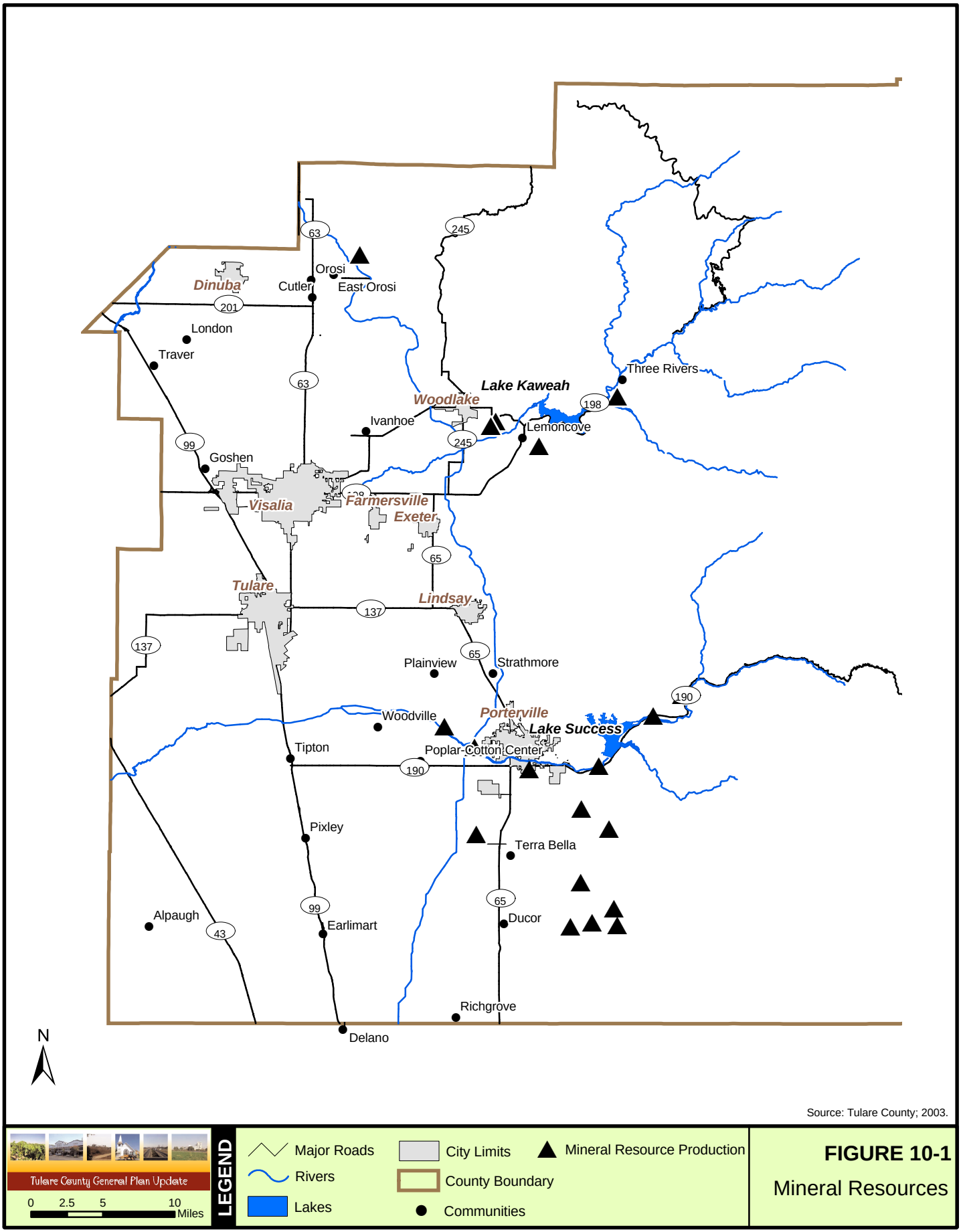
Mineral Resources

Economically, the most important minerals that are extracted in Tulare County are sand, gravel, crushed rock and natural gas. Other minerals that could be mined commercially include tungsten, which has been mined to some extent, and relatively small amounts of chromite, copper, gold, lead, manganese, silver, zinc, barite, feldspar, limestone, and silica. Minerals that are present but do not exist in the quantities desired for commercial mining include antimony, asbestos, graphite, iron, molybdenum, nickel, radioactive minerals, phosphate, construction rock, and sulfur. Figure 10-1 shows the general locations of the 13 corrosion mineral production sites within the county. The majority of these activities appear to occur in the Sierra Foothill Area.

Aggregate resources are the most valuable mineral resource in the county because it is a major component of the Portland Cement concrete (PCC) and asphaltic concrete (AC). PCC and AC are essential to constructing roads, buildings, and providing for other infrastructure needs. There are three streams that have provided the main source of high quality sand and gravel in Tulare County to make PCC and AC. They include the Kaweah River, Lewis Creek, and the Tule River. The highest quality deposits are located at the Kaweah and Tule Rivers. Lewis Creek deposits are considerably inferior to that of the other two rivers. This is due to the fact that the sand and gravel particles in Lewis Creek are flat. The higher quality aggregate resource areas located along the Kaweah River, near Lemon Cove, and a location on the Tule River between Porterville and Success. These deposits are ideal because the streams have steep gradients, which wash away soft, weak rocks allowing concentrated amounts of the desired round and hardened material in the streambed.

Projected Potential Shortages

There is estimated to be a total of 932 million tons of aggregate resources in Tulare County. This figure includes 219 million tons of reserves available for mining and 200 million tons that are located in the hard rock quarries southeast of Porterville. Of that total, 19 million tons are located in Northern Tulare County, which is expected to be



Source: Tulare County; 2003.

Tulare County General Plan Update

0 2.5 5 10 Miles

LEGEND

Major Roads
Rivers
Lakes
City Limits
County Boundary
Communities
Mineral Resource Production

FIGURE 10-1

Mineral Resources

depleted by the year 2010 unless new resources are permitted for mining. Lemon Cove has been the most highly extracted area for PCC quality aggregate supplies.

Past studies have shown that there is a strong correlation between the total amount of aggregate production and the population in a defined area. Using this correlation, the historical rate of consumption of aggregate resources in the entire county has been calculated to be 5.33 tons, per person, per year. This rate was calculated using the population and reported aggregate production record for both PCC and AC aggregate from 1960 to 1995. The population growth between 1960-1995 was 187,663. A 3-year moving average of annual aggregate production was used due to erratic variations in aggregate production year to year. The 3-year average of aggregate consumption increased by 877, 000 tons between 1960 and 1995. See Table 10-9 for the 50-year demand for aggregate resources in Tulare County. The projected consumption is based on the population projections from the California Department of Finance (1995) and the historic rate of consumption (5.33 tons/person/year). The California Department of Finance population assumptions have decreased since 1995. For example the current population projection for 2025 is 630,629. This means the projected consumption rates are lower than previously thought.

Table 10-9. Projected Aggregate Consumption from 1995 through 2044

Years	Projected Average Yearly Population	Projected Consumption of all Aggregate (tons)	Projected Consumption of PCC Aggregate (tons)	Projected Consumption of AC Aggregate (tons)
1995-1999	389,000	10,386,000	5,089,000	3,220,000
2000-2004	437,000	11,668,000	5,717,000	3,617,000
2005-2009	488,000	13,030,000	6,385,000	4,039,000
2010-2014	544,000	14,525,000	7,117,000	4,503,000
2015-2019	605,000	16,153,000	7,915,000	5,007,000
2020-2024	672,000	17,942,000	8,792,000	5,562,000
2025-2029	743,000	19,838,000	9,721,000	6,150,000
2030-2034	820,000	21,894,000	10,728,000	6,787,000
2035-2039	901,000	24,057,000	11,788,000	7,458,000
2040-2044	1,010,000	26,967,000	13,214,000	8,360,000
Totals		**176,460,000**	**86,466,000**	**54,703,000**

Source: Department of Conservation Division of Mines and Geology Mineral Land Classification of Concrete Aggregate Resources in the Tulare County Production –Consumption Region, California 1997.

The 50-year aggregate resource demand was calculated to be 86 million tons for PCC and 54 million tons for AC. The current reserves are estimated to be 219 million tons. A total of 150 million tons of aggregate will be consumed by 2044 if consumption rates stay constant and the aggregate resources are accessible. The projected population used in the report is higher than the current population estimate by the California Department of Finance. Even with the higher population number used in this report consumption rates are well below the current aggregate reserve base of 219 million tons. Other important factors to consider is that of the 219 million tons of aggregate resources in reserve 200 million tons exist in hard rock and 19 million tons exist in the Woodlake-Lemon Cove area. According to the report the Wood-Lake Lemon Cove area will be depleted by 2010. Additional resources not included in these estimates include aggregate resources from the Kings River area, Coalinga Area and the Bakersfield area.

10.4 Oil and Gas Resources

Introduction

This section describes the existing oil and gas resources that can be found in Tulare County.

Methods

The information contained in this section was compiled from consulting with the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources.

Regulatory Setting

- **California Laws for Conservation of Oil and Gas.** This document, as published by California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, includes several chapters of the California Public Resources Code, which governs the regulation of oil and gas operations.

Key Terms

The following key terms are used in this section to describe oil and gas resources.

- **Associated gas production.** Gas produced with oil.
- **Non-associated gas production.** Gas produced without oil.

Existing Conditions

Oil and gas resources have historically been an important commodity in California. However, the demand for these resources tends to fluctuate with changing market conditions. According to the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, from 1995 to 2001, oil production has decreased statewide. However, associated gas production (gas produced with oil) rose due to increase sales of natural gas in the adjacent Kern County. Non-associated gas production (gas produced without oil) declined steadily between 1999 and 2001.

According to Robert Hauser, Division of Oil, Gas and Geothermal Resources, as of 2002, Tulare County had a total of 61 active oil wells and 5 active gas wells producing a total of 39,000 barrels of oil. There are two areas where oil resources exist, and one area where gas resources exist in Tulare County. They are described as follows:

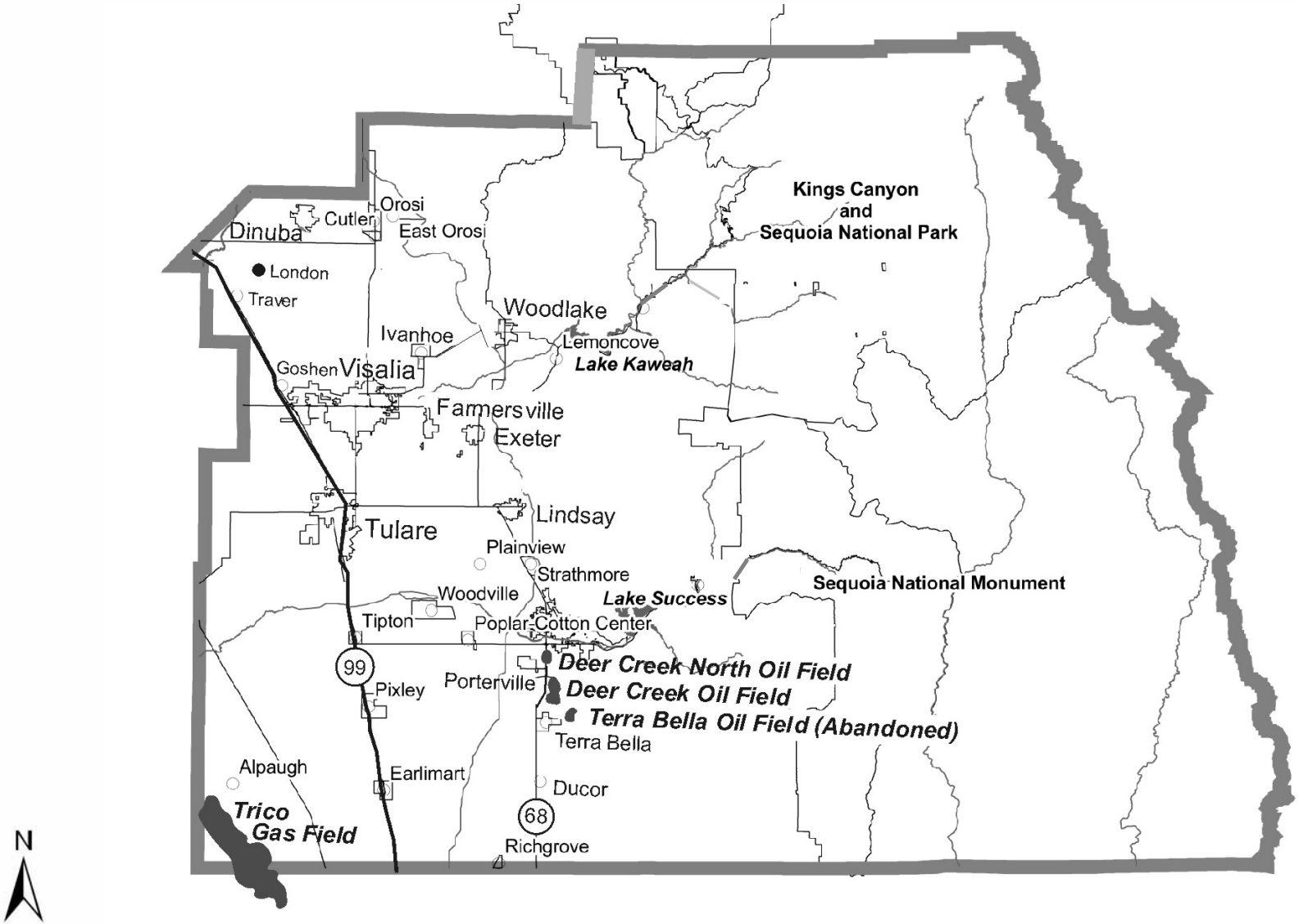
- **Deer Creek.** The Deer Creek oil fields were discovered in 1953. Peak oil production for this field occurred in 1978 when a total of 92,862 barrels were produced. As of 2004, there were a total of 68 oil wells.

- **North Deer Creek.** The North Deer Creek oil fields were discovered in 1961. Peak oil production for this field occurred in 1980, when a total of 2,915 barrels of oil were produced. As of 2004, there were a total 5 oil wells.

- **Trico.** The Trico gas fields were discovered in 1934. As of 2004, there were a total of 22 wells.

Figure 10-2 shows these oil and gas fields. In addition, the figure shows the Terra Bella oil field, which is now abandoned.

Table 10-10 shows trends in oil and gas production for Tulare County and California between 1990 and 2002. As shown in the table, the number of oil wells in production have increased slightly in Tulare County between 1990 and 2002, while the number of wells at a statewide level have decreased. During this same period the overall daily production per well has decreased at both the County and Statewide levels.



LEGEND

Major Roads
Rivers
Lakes
City Limits
County Boundary
Communities

FIGURE 10-2

Oil and Gas Resources

Table 10-10. Oil and Gas Production, Tulare County and California, 1990-2002

Oil and Gas	1990			1995			2002			Net Change (1995-2002)
	Number of Producing Wells	Daily Production per Oil Well (bbl)	Cumulative Gas (MMcf)	Number of Producing Wells	Daily Production per Oil Well (bbl)	Cumulative Gas (MMcf)	Number of Producing Wells	Daily Production per Oil Well (bbl)	Cumulative Gas (MMcf)	
Deer Creek	50	3.0	NA	47	1.8	NA	59	1.8	NA	9
Deer Creek North	5	1.0	NA	0	0.0	NA	2	0.2	NA	-3
County Oil Total:	55	2.8	NA	54	1.8	NA	61	1.8	NA	6
Tulare County Gas										
Trico	11	NA	8,707.00	NA	NA	9,059.00	22	NA	9,059.00	352
California Oil/Gas Production:	51,387	18.0		45,258	17.6		46,734	16.4		-4,653

Source: Annual Report of the State Oil and Gas Supervisor, 1995; 2000; 2002

10.5 Timber Resources

Introduction

This section describes existing timber resources and protection of these resources within Tulare County.

Methods

The information contained in this section was compiled from consulting with the U.S. Forest Service website (http://www.nps.gov/seki/) and Tulare County Zoning Ordinance.

Regulatory Setting

- **U.S. Forest Service - Giant Sequoia National Monument Management Plan.** The U.S. Forest Service has prepared the Giant Sequoia National Monument Management Plan. The Plan identifies the need to establish management direction in order to provide for the proper care and management of the Giant Sequoia National Monument Management Plan.

Key Terms

There are no key terms for this section.

Existing Conditions

Timberlands are located in the eastern portion of Tulare County in Sequoia National Forest and Sequoia and Kings Canyon National Park. There are four major types of timber vegetation in Tulare County. These include Ponderosa Pine, which is the dominant species between elevations of 3,000 and 5,000 feet above sea level, mixed conifers including Ponderosa Pine, Jeffrey Pine, Sugar Pine, White Fir and Incense Cedar, which grow between the 4,000 to 6,000 foot elevation range. It is also at this elevation range that the Giant Sequoias exist in scattered groves and form some of the oldest coniferous forests in the world. Between the 7,000 to 9,000 foot elevation range, the Red Fir and Lodgepole Pine is dominant. Foxtail Pine and Whitebark Pine exist in the cooler and drier Subalpine forests, which can be found above 9,000 feet.

Much of the Timberland areas in Tulare County are zoned as Timberland Preserve Zoning (TPZ). This designation is used in an effort to reduce property taxes and protect timberlands from the encroachment of incompatible land uses. According to the California Forest Taxation Reform Act of 1976, which created the TPZ designation, if the County has qualifying land it must adopt TPZ zoning in order to restrict the use of the land to timber production and other compatible open space land uses which protect wildlife, watersheds, and recreational uses. In addition to creating the TPZ designation, the Act also regulates the timber harvesting on private land. Since a majority of the forest land in the County is located in the Sequoia National Forest (federal jurisdiction), the TPZ designation is mainly applied to privately-owned land within the Sequoia National Forest.

According to Zoning District data compiled by Tulare County, there is a total of 9,196 acres zoned as TPZ in the Tulare County. Of that total 8,894 acres (31 lots) are currently in Timberland use according to the Tulare County Assessor's Database (2003).

In an effort to protect timberland in the Sequoia National Forest, 34 groves of ancient sequoias located in the Forest, which encompasses 327,769 acres, were designated as the Giant Sequoia National Monument in 2000 by President Clinton.

The proclamation contained the following measures:

- No portion of the Monument shall be considered to be suited for timber production, and no part of the monument shall be used for a sustained yield of timber.

- With the exception of personal use for fuel wood, tree removal can only occur if it is needed for ecological restoration and maintenance or public safety purposes.

- Preparation of a management plan for the monument. The Plan would contain measures to protect the Monument's resources. Examples include only permitting motorized vehicles on designated roads and only allowing new roads to further the purpose of the monument.

The U.S. Forest Service has recently completed the Giant Sequoia National Monument Management Plan. The U.S. Forest Service has recently completed the Giant Sequoia National Monument Management Plan. The Plan identifies the need to establish

For more information on timber resources, see Chapter 4. Agriculture, Open Space and Recreation.

management direction in order to provide for the proper care and management of the Monument. The Plan addresses two critical problems facing the giant sequoias and their ecosystems, the failure in giant sequoia reproduction, and the buildup of woody debris and surface fuels, leading to an increased hazard from severe wildfires. The Plan also identifies opportunities for scientific research, interpretation, and recreation.

11. SCENIC LANDSCAPES

11.1 Introduction

"Tulare County is Big Country" is a featured banner on a travel map of the county. Tulare County has a complex structure of scenic natural landscapes, agricultural landscapes, and urban and rural communities. It possesses many of California's most unspoiled places and is experiencing rapid population growth and the need to diversify its economy.

This chapter of the Background Report provides a qualitative overview of the county's scenic features.

This chapter is divided into the following four sections:

- Organizing Features (Section 11.2);
- Scenic Corridors and Places (Section 11.3);
- Urban Structure (Section 11.4); and
- Visual Implications of Environmental Issues (Section 11.5).

11.2 Organizing Features

Introduction

The visual and spatial organization of Tulare County has been and will continue to be typically shaped by natural forces, agricultural activities and transportation. The variety and scope of the visual texture of the county is the result of how these three overlapping features collide and coexist.

Methods

A variety of methods were used in preparing this section. The Tulare County General Plan, GIS maps and consultant analytical mapping were used to characterize the features that organize the county. Historic research relied on various books, websites, and maps. One of the most important sources of information included the perceptions

and experience of the many people that participated in community workshops who mapped and discussed valuable visual and landscape resources. General plan consultants and county staff also toured and photographed various landscapes in the county.

Key Terms

- **Working Landscapes**. These are landscapes that are utilized for agriculture. Crops, orchards, agricultural structures, and canals are distinctive visual elements in working landscapes.

- **Urban Form**. Urban form pertains to the shape, patterns and visual texture of development. It includes roads, blocks, buildings, land subdivision, and other types of historic and contemporary investment that contributes to the form of communities and cities.

Regulatory Setting

Land use policies of cities and counties particularly the General Plans of Tulare County and its cities guide construction and the resulting urban form. State and federal policies also impact farming, natural resource extraction, and environmental protection. A variety of special infrastructure districts, such as irrigation districts, have a significant impact on the urban form.

A variety of special infrastructure districts have a significant impact on the urban form. Irrigation districts create and manage water distribution systems that include canals. Water districts provide services for growing urban areas. Stormwater and drainage districts contribute to groundwater recharge and quality, and influence site and land planning standards. School districts and community college districts serve rural and urban communities.

There are two land use policy plans that protect and guide development in the Sierra portion of the county. These include the Kennedy Meadows Plan and the Great Western Divide (North ½) Plan. For the foothill areas, future growth guidance is captured in the Foothill Growth Management Plan. For the valley floor, future growth is guided by the county land use policies for this area can be found in the Rural Valley Lands Plan and Urban Boundaries Element.

Existing Conditions

Natural Landscapes

There are three principal environmental landscapes in Tulare County. These include the Sierra Nevada Mountains, the foothills, and the valley floor.

Sierra Nevada Mountains. The Sierra Nevada Mountains are landscapes of national and international importance. The two national parks, Kings Canyon and Sequoia National Parks include approximately 1,300 square miles of granite mountains, deep canyons, and forests. Mount Whitney is the highest point in North America (outside of Alaska) at 14,495 feet. The communities of Springville and Three Rivers are important gateway communities. Springville is a gateway to the Sierra and Sequoia National Monument, while Three Rivers is the gateway to Sequoia National Forest.

Foothills. Lying between the valley floor and the Sierra Nevada are the foothills. Characterized by rolling landscapes of orchards, oak woodlands and rangelands, the foothills provide the mid-range view of the mountains from many of Tulare County's communities. Their seasonal transformations of form and color add visual variety to the travel experience for eastern valley floor communities located along SR 65. The incorporated cities of Woodlake, Exeter, Lindsey and Porterville are located at the base of the foothills.

Valley Floor. About 25 percent of the county is included in the valley floor. The mountains' snowpack provides hundreds of thousands of acre-feet of water each year that is captured by an extensive system of dams and irrigations canals. The water supports a variety of crops and livestock, making Tulare County the second most productive agricultural county in California. Leading products from the valley floor include milk, cattle, grapes, and cotton. These crops and the many others grown here contribute to the landscape and character of rural communities, as well as the setting of the county's urban communities.

Working Landscapes

About half of the county is currently under agricultural production and grazing. There are three types of working landscapes including rangelands, croplands, and orchards. Within each of these landscapes,

there exist a variety of visual characteristics that reflect both the land's natural and agricultural history.

Croplands. Most cropland areas are located on the valley floor, supported by extensive irrigation systems. The western part of the county produces crops of cotton, barley, hay, vegetables, grapes, and orchards. The landscape reflects the low growing crops, tree rows and agricultural buildings framing the visible horizon.

Vineyards and Orchards. Citrus is one of the county's most important agricultural products. They are grown in the lower elevations of the foothills. The communities along the base of the hills started out as packing shed towns that developed along Southern Pacific Railroad's "Orange Belt" line. Other citrus orchards located along the foothills include the production of tangerines and lemons. Other tree crops include olives, plums, peaches, prunes, and nut crops including walnuts, almonds, and pistachio. The county's orchards provide a geometric foreground to the mountains and a spatially enclosed corridor view along country roads.

Rangelands/Livestock. Dairy and beef products are an important part of the Tulare County economy. There are about 350 dairies in the county. Beef and dairy herds are primarily located on the western side of the valley. Poultry (chickens and turkeys) are located in the northern part of the valley as well as several sheep herds. The rangelands for cattle and related stockyards provide a contrasting visual (and aromatic) atmosphere. The open lands are beautiful but the stockyards and dairy facilities are not always visual and aromatic amenities.

Irrigation, Railroads, and Highways. The story of Tulare County's city and working landscapes cannot be told without examining the role of railroads and highways in shaping settlement patterns. Early routes used by the Spaniards and early explorers included the Tulare Trail that generally follows the SR 65 alignment. The gold rush era Tulare Trail became the part of the Stockton-Los Angeles Road used by early stage lines. An important stage stop named Porter's Station became Porterville. These early roads and trails were precursors to the transformation of the county due to these irrigation and railroad investments.

Surface Water. At one time, Tulare Lake was the largest body of fresh water west of the Mississippi River. The lake was 200,000 acres in size at its peak and it was the transient home of millions of migratory

birds and elk herds. The lake, as much of the valley floor, was transformed by agriculture.

Tulare Lake could flood to 500,000 acres engulfing Kern and Buena lakes to the south in Kern County. Fed by snowfall in the Sierra Nevada Mountains via Kings, Kaweah, White and Tule Rivers, the lake was large enough to move freight with steamboats. Flood control dams have, except for rare periods of heavy rains, ended the seasonal formation of the lake. The lakebed now is covered with cotton and safflower crops.

Dams and Sources. There are four primary natural watercourses in Tulare County (Figure 11-1). These include the Kings River, Kaweah River, White River and the Tule River. All except the Kern River transport water to Tulare County's valley floor. The Kings River Dam has created Pine Flat Lake; damming of the Kaweah River has resulted in Lake Kaweah; and Lake Success is fed by the Tule River.

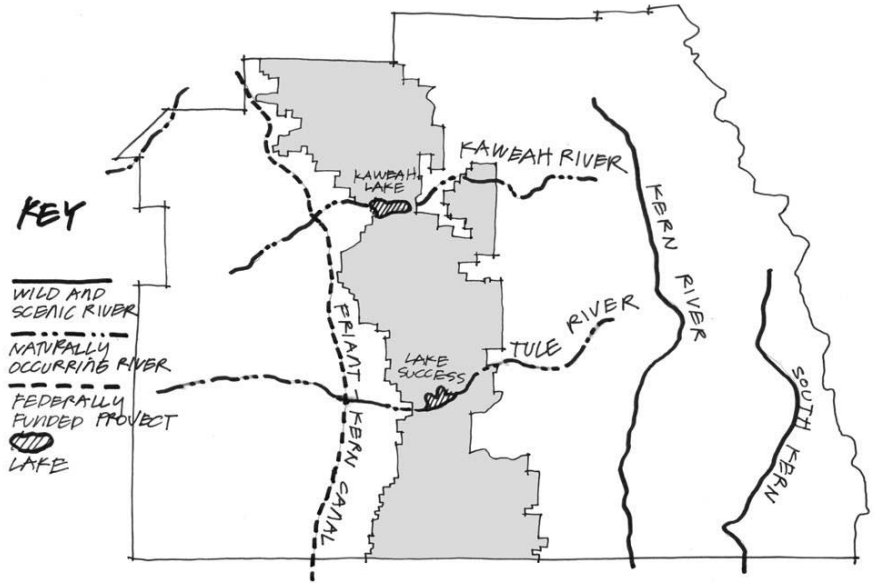


Figure 11-1. Rivers in Tulare County

There are two major water transmission facilities that trend north-south through the Central Valley. The state-funded Friant-Kern Canal is located in Tulare County and the California Aqueduct is to the east in Kings County.

Irrigation. The Fraint-Kern Canal feeds irrigation districts serving Tulare County's agricultural lands. The canals have transformed the valley floor. Prior to irrigation in the mid 1880s, farming focused on

dryland wheat. Besides creating a lush working landscape, the canals themselves are an important part of the scenery. They intersect the landscape adding movement and edges to the valley.

Railroads. The railroad brought new prosperity to Tulare County's towns and farms. Tulare was the division headquarters for Southern Pacific Railroad from 1872 to 1891. The Southern Pacific Railroad (now Union Pacific Railroad) and Atchison Topeka & Santa Fe Railroad are the two major railroad lines serving Tulare County communities (Figure 11-2).

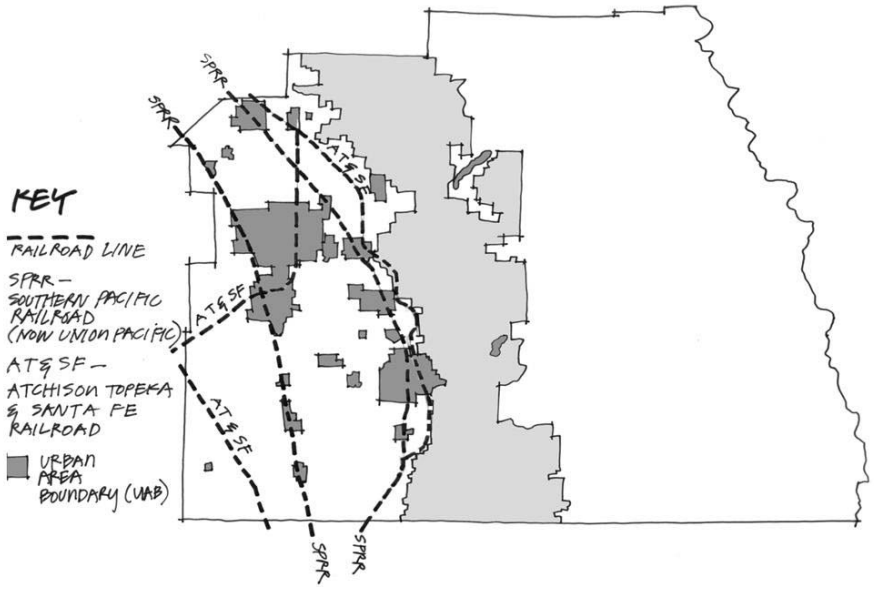


Figure 11-2. Railroads in Tulare County

SPRR/UPRR has two major lines, which roughly parallel Highway 99 and SR 65. The AT & SF lines roughly follow SR 65, SR 43 and SR 63. The railroads collected farm produce and provided transportation between the county's small communities and regional and national markets. The cities and communities in the county have distinctive urban forms where their historic edges where planned around packaging and loading produce onto rail cars. The packing shed is an important vernacular building type and symbol throughout the valley.

Highways. Tulare County has been shaped by highways and roads, like much of post war California. Highway 99, state routes and county routes connect and serve rural and urban centers (Figure 11-3).

According to the Caltrans Website, Highway 99 was developed in the 1950s. It has served as a regional connection for residents and as a

critical economic development facility for the county's agricultural industry. There are efforts underway by Caltrans to prepare a master plan for the highway to improve its appearance and performance. There is a goal of designing Highway 99 to "foster a valley-wide identity."

There are eight other state routes (SR) in Tulare County: SR 65, 63, 43, 137, 245, 201, 190, and 198. These routes, primarily two lane roads, offer some of the most enjoyable and diverse scenic driving experiences in the county.

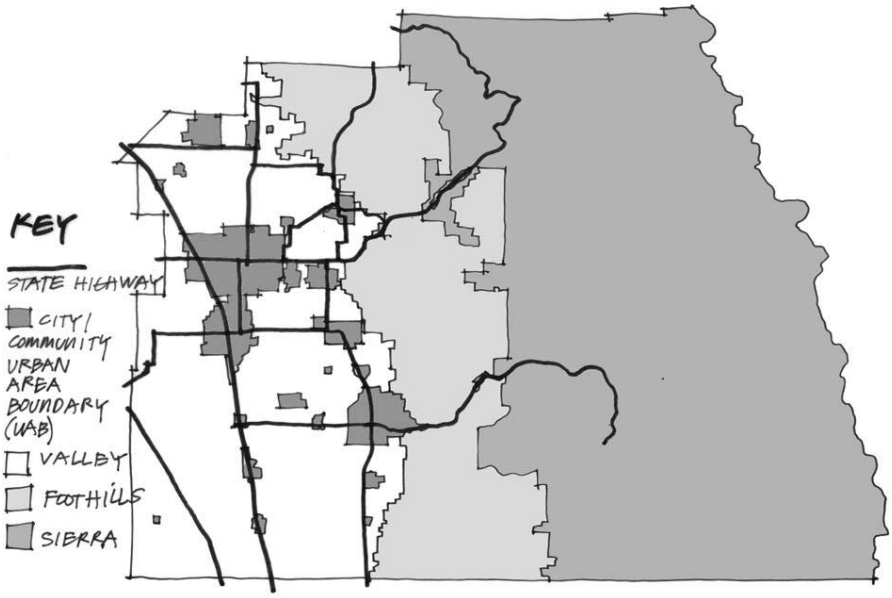


Figure 11-3. State Highways in Tulare County

County routes cross the rural portions of Tulare County connecting smaller communities. These roads exhibit rural character and are the conduit to serve more isolated, and scenic parts of the valley floor, foothills and mountains.

Airports. Visalia has the largest airport in the county and is the only facility with scheduled commercial service. There are several other general aviation airports that serve industrial tenants, such as Porterville. Smaller county-owned airports, such as Pixley, are located throughout the valley portions of the county. Whether large commercial or small general aviation facilities, airports shape cities. Development in the noise contours or flight path is restricted to open space or nonresidential uses.

11.3 Scenic Corridors and Places

Introduction

Traveling through the county reveals a wide variety of natural and historic resources. The county's eligible scenic highways, gateway communities to the Sierra Nevada Mountains, and other historic settlements contribute to a rich pallet of visual and cultural assets.

Methods

Methods used to research Section 11.3 included the review of the county history in books and websites, reviewing existing policies and maps of the Tulare County General Plan, and analytical mapping.

Key Terms

- **Scenic Highways.** Scenic highways exhibit unique natural beauty viewed by travelers. They are considered eligible or designated by the State of California based on criteria established in Section 260 et seq. of the Streets and Highway Code. Benefits of "scenic highway" status include protecting environmental assets that encourage tourism and inclusion on travel maps produced by the State Division of Tourism. There are also national and local scenic highway programs.

- **Historic Places.** There are official national, state and local historic landmark programs. They identify and acknowledge places of important historical, cultural and/or architectural importance. A detailed description of these can be found in Section 9 of the Background Report.

Regulatory Setting

Because the designation of scenic highways and historic places can occur at the national, state or local level, there are a variety of jurisdictions that have approval of their eligibility. However, the groundwork and implementation for acceptance often falls upon the local jurisdictions and their commitment to implementing scenic enhancement and protection policies.

Existing Conditions

Scenic Highways

Tulare County's existing General Plan identifies state designated scenic highways and county designated eligible highways. There are three highways designated as eligible by the state. These include Highway 198 from Visalia to Three Rivers, Highway 190 from Porterville to Ponderosa, and extending through the northern portion of Tulare County.

Gateway Communities

Three Rivers (located on Highway 198) and Springville (located on Highway 190) are important gateway communities to the Sierra Nevada Mountains. These historic towns once provided commercial services for the Sierra logging and resource mining activities. Now, the communities support visitor and tourism and provide locations for second homes, according to the Springville Chamber of Commerce Website. The image and character of these two gateway communities are an important part of the travel experience and economic development opportunities that showcase Tulare County's natural beauty.

Historic Settlements and Places

For more information on historic resources, please see Chapter 9.

Visalia, the county's largest city, was established in 1852 and has the distinction of being the first community established between Stockton and Los Angeles. At that time, Tulare County included all of the area between Mariposa and Los Angeles Counties, and stretched from the Coastal Mountain Range to the State of Nevada. Through the years - the Counties of Fresno, Tulare, Kings, Kern, and Inyo have been formed out of what was once that original territory.

Initially, a number of farming "colonies" were established in the county. These small communities, such as Mt. Whitney, Orosi, Oakview, Holliday, Vina, and McCall's, took advantage of affordable land and water. Communities along railroads grew to become the county's larger cities such as Tulare, Visalia, and Porterville. Visalia, the county seat, became the service, processing, and distribution center for the growing numbers of farms, dairies, and cattle ranches.

The Tulare County Historical Society has placed 25 markers throughout the county designating important historic places (Figure 11-4). These markers reflect the historic places, important events, and

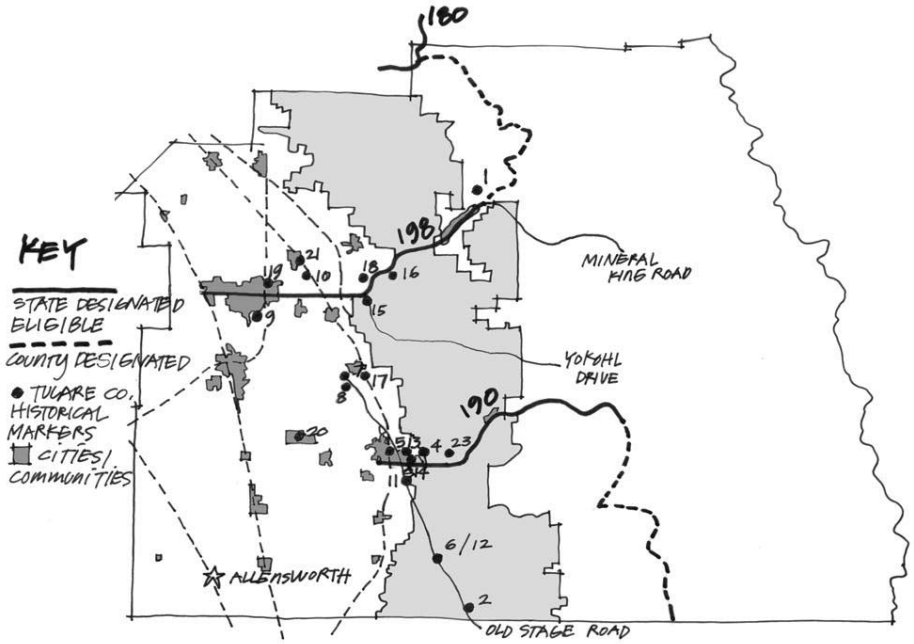


Figure 11-4. Historical Markers, Roads, Railroads, Highways, and Cities

scenery. They mark both visual assets and cultural features. When combined with the scenic travel experience of Tulare County's rural roads and highways, these places provide "points-of-interest."

The Biological, Archeological, and Historical Resources (Chapter 9), provides a complete summary of official national, state and local cultural resources.

Tulare County Historical Society Historical Sites

Since 1948, Tulare County Historical Society members have identified historical sites and placed 25 markers, some as joint projects with other groups. The following markers commemorate early sites, individuals and groups throughout Tulare County. Additional details regarding each marker's location and its dedication can be found in "Los Tulares" (a quarterly publication by the Tulare County Historical Society) issues, as noted.

- **Kaweah Colony.** Placed October 24, 1948 (Los Tulares #2). Kaweah was a utopian project started in 1886, which for several years attracted international attention. Unable to secure title to the land and because of internal difficulties, the organization ceased to exist after 1892. The Kaweah Post Office is a tangible reminder of the colony.

- **Tailholt.** Placed May 15, 1949 (Los Tulares #9, #85). Tailholt began as a gold mining camp about 1856, during the Kern River gold rush. Mining has been carried on here intermittently since the time of discovery.

- **Election Tree.** Placed July 10, 1949 (Los Tulares #44). At this tree, a party commanded by Major James D. Savage conducted the election on July 10, 1852, by which Tulare County was organized. Woodsville, the first permanent settlement, was located south of the monument.

- **Tule River Indian Reservation.** Placed October 16, 1949 (Los Tulares #32, #139). Was originally established in 1857. Indians from a widespread area were brought here. The marker is on the grounds of the Alta Vista School.

- **Butterfield Stage Station (Tule River).** Placed October 11, 1953 (Los Tulares #17). Here Peter Goodhue operated an emigrant trail stopping place on the bank of the Tulare River, until the river changed its course in 1862. It was a Butterfield Stage Station 1858-1861.

- **Fountain Springs.** Placed in 1958 (Los Tulares #112). The marker is at the road intersection seven miles east of Ducor, about a mile and a half south of the old settlement, which dates back to at least 1855. It was a station on the Butterfield Route.

- **Butterfield Overland Mail Route.** Placed in 1958 (Los Tulares #63). Highway 65 west of Lindsay followed the old Los Angeles-Stockton Road, established about 1853. It was used by the Butterfield Stages from1858-1861.

- **Fremont Trail.** Placed in 1958 (Los Tulares #39). The Fremont Trail used by John Charles Fremont on his famous exploring expedition to California. The date on the marker should be 1844. It is located next to the Butterfield Stage Station marker (above), west of Lindsay.

- **Mooney Grove.** Placed October 26, 1958 (Los Tulares #38). This marker is a memorial to those who have preserved a part of the Valley Oaks that formerly covered the Kaweah Delta. The area was visited by early explorers. Benjamin Willis settled here in 1852. The grove was owned by the Mooney

family until purchased by Tulare County for park purposes in 1909.

- **Lone Oak Cemetery.** Placed October 19, 1975 (Los Tulares #108). This is probably the oldest cemetery in the southern San Joaquin Valley. The marker is located on Avenue 324, off of Road 168, east of Ivanhoe.

- **Plano.** Placed May 25, 1975 (Los Tulares #106). This marker overlooks the former pioneer village of Plano, first settled in 1861 by a wagon train of settlers from Texas who followed the Butterfield Stage Route west. This town became a way-station on the stage routes of the 1860s. The marker is two miles south of Porterville on Plano Road.

- **Old Stage Road.** Placed October 24, 1976 (Los Tulares #112). Running north and south, following an older Indian trail, is the route taken by many Spanish expeditions, American trappers, traders and parties of exploration. The Old Stage Road was the major inland route of gold seekers to the northern and southern mines, and was the first public road in Tulare County. The marker is located at Fountain Springs, east of Ducor, on Avenue 56.

- **Ina Stiner Home.** Placed January 1, 1976 (Los Tulares #109). Former home site of historian Ina Stiner. The plaque is placed in the sidewalk of the Ina Stiner home on "E" Street, Porterville.

- **Flour Mill.** Placed April 25, 1976 (Los Tulares #110). From 1868-1912, flour gristmills operated on this site, which were very important to this area. Using an extension of a ditch from the Monache Reservation to provide water power—dug by Indian labor in 1863, and water taken from the Tule River five miles upstream—the first mill was built by John Fleck and Henry Clarke, to grind grain produced in the surrounding area and provide food for the community. The marker is located at East Putnam Avenue (between Plano Street and Leggett Drive).

- **Jordan Trail.** Placed April 17, 1977 (Los Tulares #113, #114). When gold was discovered in the Coso Range on the east side of Owens Valley, there was a need of a short route to the supply town of Visalia. John Jordan, who had settled in the

lower Yokohl Valley in 1861, petitioned the Tulare County Board of Supervisors for the right to build a toll trail across the Sierra. The marker is at the side of the Yokohl Road, near the intersection with Highway 198. Rocky Hill Inc. granted an easement for placing the monument.

- **Pogue Hotel.** Placed May 8, 1977 (Los Tulares #114). The hotel and home was built in 1879 by J.W.C. Pogue and his partners. The Pogues came to the Lime Kiln area in 1865 and planted the first citrus in the foothill district. It is the first house in the Lemon Cove townsite, laid out by J.W.C. Pogue in 1894.

- **George S. Berry.** Placed March 12, 1978 (Los Tulares #118). The George Stockton Berry marker is placed on the grounds of the Lindsay High School. Berry was among the first to plant oranges and olives in the Lindsay area and had a vineyard. He was a member of the California Assembly in 1888, and was elected to the State Senate in 1890. He was a member of the Lindsay School Board in the 1890s.

- **Hog Wallow Preserve.** Placed April 22, 1979 (Los Tulares #123). Located at Avenue 314 and Road 220 in Exeter, this plaque was donated by Carol Buckman and her father, Phillip E. Buckman, MD. The rough, mounded land is typical of what much of the Tulare County prairie along the base of the Sierra looked like before farming began.

- **Fort Visalia.** Placed February 21, 1981 (Los Tulares #130). This fort is located on Garden Street, between School and Oak Streets in Visalia. This is the site where pioneer settlers first built a log stockade and lived during the fall and winter of 1852-1853.

- **Woodville School.** Placed March 24, 1981 (Los Tulares #132). The marker is placed at the Woodville Memorial Building and commemorates the centennial of the district.

- **Klink Station.** Placed October 25, 1986 (Los Tulares #154). The marker is placed near the fire station in Ivanhoe, and is dedicated to the founding of present day Ivanhoe.

- **Artesian Well, Pixley.** Placed March 12, 1989 (Los Tulares #163). Marks the artesian well at Artesia, south of Waukena (now in Kings County). By 1885, there were 250 artesian wells

in the county, all of which helped develop the semi-arid west side for agriculture.

- **Wilcox Family Monument.** Placed March 4, 1990 (Los Tulares #167). Overlooking Lake Success in Porterville, this marker is dedicated to the early pioneers of Tulare County east of Porterville.

- **Allen I. Russell Tree.** Placed June 23, 1991 (Los Tulares #173). This dedication grew from the many campers at Balch Park and the people who knew of Allen I. Russell's hard work in improving Balch Park during his assignment there from 1961-1990.

- **Liberty Elementary School.** Placed November 1, 1992 (Los Tulares #178). The marker commemorates the 125th anniversary of the school's founding, and is located at Mooney Boulevard and Liberty Road in Visalia.

In addition to these places, there are a number of important cultural sites and districts with historic character in the county. Allensworth was an important African American farming community established in the early 1900s. Woodsville was the first county seat. The tree no longer exists, but the Charter Oak, the place where Tulare County was organized, remains. The county's smaller unincorporated communities have traditional commercial storefront districts. They also have institutional structures, such as churches and schools that are visual landmarks and cultural resources. The larger communities, such as Visalia, Tulare, Porterville, and Exeter have historic central districts and neighborhoods. Connected by rural roads, these places provide a visual framework and fabric that makes traveling in Tulare county a unique experience.

11.4 Urban Structure

Introduction

Interspersed around the natural and working landscapes are the towns and cities that define the character of urban and rural edges and the travel experience. Over time, policies about the direction, amount and quality of urban development continue to change the visual character of both rural and urban regions.

Methods

Section 11.3 involved preparing analytical maps based on tours of the county and existing General Plan policies. Information from state agency and historical society websites was also used.

Key Terms

- **Core Areas.** The traditional centers of cities (downtowns and historic neighborhoods) and communities are "core" or original centers of these regions. These areas often have many cultural, governmental, economic and residential activities that serve the surrounding area.

- **Compatible Development.** This includes new public or private development, such as buildings and infrastructure, which is harmonious with natural and historic structures.

- **Edge Conditions.** This refers to the way urban uses interface with rural and agricultural landscapes.

- **Rural-Urban Separators.** Rural-urban separators maintain natural and working landscapes between urban areas. They are used to enhance definition of individual communities and maintain their identity.

Regulatory Setting

Policies and regulations that define the shape of community growth and investment are prepared by a variety of sources. These include incorporated cities, the county, state agencies, and the federal government. Local Agency Formation Commissions (LAFCOs), comprised of local and regional governments and agencies, establish growth and service boundaries. These boundaries reflect a complex system of policies, economic forces, environmental constraints and growth projections. Tulare County is an important partner in the establishment and implementation of policies that impact the location and nature of urban uses.

Existing Conditions

City and Community Centers

The county's cities, unincorporated communities, and rural communities provide land and infrastructure resources that can

support the future land requirements for growth while enhancing its image. These places provide for the social and economic focus of communities and the rural lands they serve. Revitalization policies for "core areas" of communities are directly linked to the need for urban expansion at the edges.

The need to expand urbanized uses onto farmland can be reduced by developing and redeveloping land in the core areas of communities. For every 100 acres of urban land developed with a mix of single family homes, townhouses, and apartments (assuming an average density of 20 units per acre), 500 acres of farmland can be saved at the edges (assuming a typical density of 4 units per acre (suburban character).

Incorporated Cities. Tulare County's fastest growing and larger communities are located along Highway 99 and SR 65. Fueled by inexpensive land, the vast majority of new housing and commercial development has targeted the edges of the two major cities on the Highway 99 corridor. While both Visalia and Tulare have the capacity for infill development, the market interest has focused on developing additional suburban-level homes with a corresponding low density. While the downtown and traditional community centers are experiencing increased interest by professional and specialty businesses, this trend has not yet translated to higher residential densities at a scale that can make a difference at the urban-agricultural edge. Between 1998 and 2000 (on 22 occasions) Visalia converted irrigated farmland to residential and business uses. There were also five urban additions (annexations) to the Tulare Urban area. New regional shopping centers detract from the surrounding shopping areas and encourage surrounding land development.

In the SR 65 corridor, cities are also growing at a brisk pace, including Porterville. Located along the edge of the foothills, these communities have typically expanded west utilizing the relatively flat, easy to develop land. This asymmetrical growth pattern encroaches on croplands while sparing the foothills' orchards. The traditional downtown areas are losing their literal and perceived central focus as cities grow to the west. Fractional and dispersed patterns of growth strain the social and economic threads that the downtown areas use to create the every day experience of its residents, employers and visitors.

Unincorporated Communities. The unincorporated communities of Tulare County could take on a larger role in providing land for urban

uses. Many communities need infrastructure improvements, but the existing lot and block patterns and vacant and underutilized land provide a pre-existing structure to build upon. If land use policies are adopted to encourage growth in these communities, accompanying them with community image and design policies can increase the likelihood of creating viable towns with distinctive character and identities.

Along Highway 99 are a string of unincorporated communities that have significant highway visibility and access. These areas may likely be the first to have an opportunity to undergo significant growth. Traver, Goshen, Pixley, and Earlimart have designated redevelopment areas where efforts are underway to improve their infrastructure, including needed sidewalks, shade trees, parks, and utility infrastructure. Each improvement presents an opportunity to enhance the image of the community. Other unincorporated places such as Cutler-Orosi require a similar level of consideration.

The importance of the foothill gateway communities (Three Rivers and Springville) to the county's image was discussed earlier. They are also under pressure to grow and policies regarding their economic role and commitment to compatible development will certainly have an impact on their character and livability.

Rural Settlements. Scattered throughout the county are rural settlements. Some exhibit a few commercial uses or a post office, like Alpaugh. Others are clusters of older houses, farm buildings and vacant commercial buildings. Their existence has provided affordable housing and a reminder of how a shifting economy can change the future of small places. In some cases, these rural places are experiencing the growth impacts from larger communities and can take advantage of economic opportunities created by new visitor or urban traffic. Cultural policies for these areas are important as well; they can make the difference between restoring a historic commercial building or razing it for a mini-mart.

Urban Expansion—Edges

According the California Department of Conservation, about 55% of Tulare County land area is designated farmland and about 3% of the land area is urbanized. The California Department of Conservation Website reported that 2,745 acres are to be urbanized, 1,354 acres of which is prime farmland. A total of approximately 2,727 acres of land was urbanized in the county between 1996 and 2000 according to the

California Department of Conservation 2002 Farmland Mapping and Monitoring Field Report. As the county continues to add population and urbanize land, there will be policy choices made regarding the pattern, edge conditions and the differentiation between communities.

Urbanization Pattern. The growth policies of existing and future designated cities will have a major impact on farmland and the overall image of the county as a place to live. If land use policies permit building out to the existing urban area boundaries, there will be a large urban region in the center of the valley lands area (Figure 11-5). If growth continues to be organized by state roads, there is a possibility of an urbanized area stretching between Visalia, Tulare, Farmersville, and Exeter; and south to Lindsey, Strathmore, and Porterville.

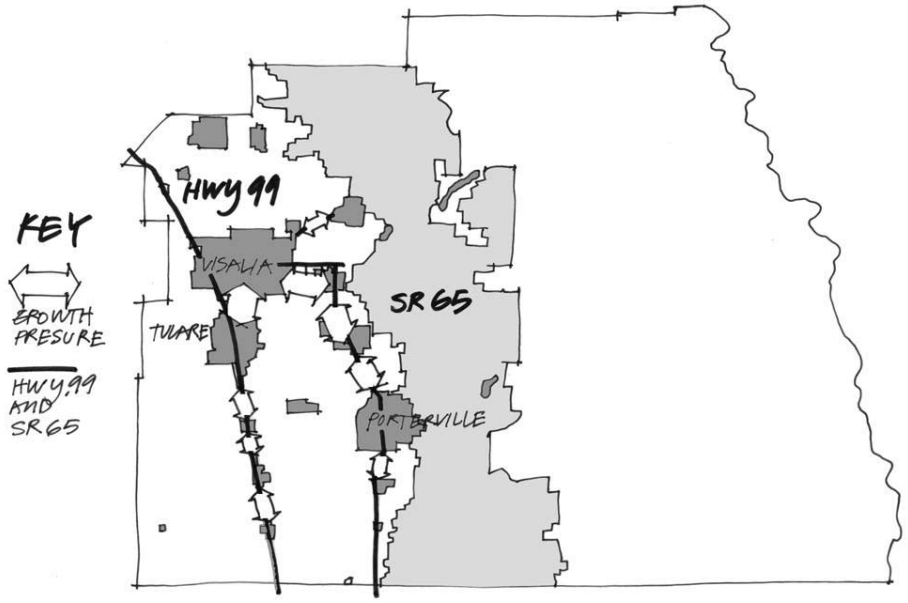


Figure 11-5. Diagram Indicating How Growth Pressure Could Grow Cities Together Along Highway Corridors

Edge Conditions. The interface between farm and urban lands is a continuously shifting condition. Generally, cities are expanding through lower density residential development at the edges. Schools and other institutional uses are also locating where land is cheap and available in approximate 10-acre parcels. Low-density subdivisions and schools are difficult neighbors for farms due to dust, noise, truck traffic and other environmental conditions necessary to cultivate the fields and manage livestock. Complaints about these issues are not uncommon from new residents at the city-edge. The sight of long

sound walls and commercial centers are in stark contrast to both the rural travel experience outside cities and formal blocks and neighborhoods of the traditional core areas. The "sameness" of the suburban edges blurs the distinctiveness of Tulare County's communities and landscapes.

Rural Separators. Urban Area Boundaries (UABs) and Spheres of Influence (SOI) provide policy directions to guide how a city grows. A majority of these areas are unincorporated county lands requiring consistent policies among cities and the county in terms of the timing and character of these areas. For example, SR 63 (Mooney Boulevard) between Visalia and Tulare could easily be urbanized allowing the communities to grow together along a commercial corridor. Or, the road could be retained as a rural separator between the two cities. The same alternative scenarios pertain to Highway 198 east of Visalia and the unincorporated communities along Highway 99. Maintaining distinctive communities is a policy choice that will require city and county cooperation.

Highway Commercial. The Central Valley's travel experience is transforming into franchise architecture, billboards and internally lit tenant pole signs. In contrast, Tulare County has not developed along Highway 99 in the same manner as other Central Valley counties. Maintaining the county's landscape and image along highways and scenic routes is a policy choice that can be made now to retain its desired character. Figure 11-6 shows corridors that have yet to experience widespread highway commercial development.

Highway 99. Highway 99 has maintained a rural character in the county. The rural land uses, large eucalyptus trees, and limited billboards allow the Highway 99 scenery to reflect the economic importance of Tulare County's agricultural economy. However, the desire for job creation, increasing the sales tax base and providing commercial services for rural unincorporated communities makes them susceptible to highway commercialization. Tulare is the only incorporated city that has significant amounts of Highway 99 frontage. The balance of the frontage along Highway 99 is currently in agricultural use or part of an unincorporated community.

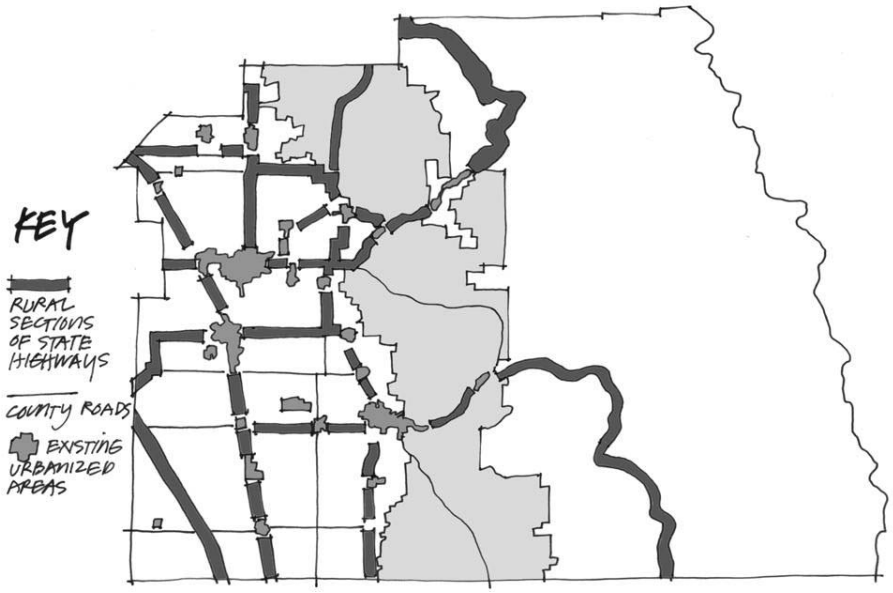


Figure 11-6. Diagram Indicates Sections of Highways that Pass Through Rural Landscapes

State Route 198. Historic photos of the oak-lined entry to Visalia from the west illustrate why the existing General Plan designates, as a candidate, State Route 198 a Scenic Highway. The new freeway design and overpasses have forever changed that the city's gateway. The increased traffic and pressure to develop the freeway interchanges typifies the evolution of rural highways. The future protection of this area as an open space and rural entry is under review by the City of Visalia. The Kaweah Oaks Preserve is located east of Visalia. This beautiful drive is an urbanizing corridor between Visalia and the growing SR 65 corridor communities. Highway commercial uses in this area, particularly convenience centers, interrupt the rural landscape. Beyond SR 65, Highway 198 winds up the foothills to Lake Keweah Recreation Area and Three Rivers. This scenic drive is one of the national park gateways. The image of the small communities and the county's commitment to accept only compatible investment will protect this area from insensitive highway oriented uses.

State Route 190. Highway 190, with the exception of the Porterville segment, is a rural experience that cuts a section through the valley floor's croplands, foothill's orchards, and into the Lake Success Recreation Area on the way to Springville. Cooperation with the City of Porterville and continued efforts to protect the scenic drive from

insensitive highway commercial uses is a policy that Tulare County should consider.

State Route 63 and State Route 65. North-south state roads connect many of the valley floor communities. The auto-oriented services and commercial uses along these routes blur the edges of communities. Along SR 65, the smaller unincorporated communities have been "packing shed" towns focused on transporting produce onto the Southern Pacific "Orange Belt" Railroad. These communities do not have a tradition for highway commercial uses. As the county's population grows, there could be pressure to take advantage of the SR 65 frontage, similar to what has occurred along SR 63 between Visalia and Tulare. The northern portion of SR 63 may also present policy choices regarding the proliferation of highway commercial uses.

11.5 Visual Implications of Environmental Issues

Introduction

In addition to typical urban design and regional identity issues, there are several environmental issues that can have long-term impacts on the scenic beauty of Tulare County.

Methods

These issues were identified in community workshops and viewed during tours. The 2003 Public Policy Institute of California (PPIC) survey of southern San Joaquin Valley residents identified air quality as the number one issue facing the region.

Key Terms

There are no key terms for this section.

Regulatory Setting

Many of the environmentally related conditions facing Tulare County are the result of its unique geology and federal and state polices. Air quality regulations, natural resource policies, economic trade, The Endangered Species Act (ESA), and other laws and regulations shape the choices that can be made locally to resolve environmental conditions.

Existing Conditions

Air Quality. Not only is it an important health and economic issue, the San Joaquin Valley's air quality is impacting Tulare County's scenic vistas. Clear views of the mountains and foothills are becoming increasingly rare. Clear days in the county remind its residents of their proximity and connectedness to the snowpacks, watersheds and habitats of the mountains, foothills and valley floor. These views are also a major economic asset and the primary reason that thousands visit Tulare County each year in search of an original California experience with spectacular beauty.

Forestry. Not the important economic component now, forestry and mining nonetheless have historically transformed large parts of the county. Current federal policies regarding logging and thinning practices to reduce fire danger can impact their scenic quality. Natural and man-induced fire events can also have direct and indirect impacts on forests for generations.

Mining. Sand and gravel mining are large operations that not only alter the natural landscape, but all foster indirect impacts on forests, water resources, and roads. Visible equipment, dust and noise generate local impacts on the experience of traveling in rural portions of the county.

Billboards. Due to the presence of highway corridors, the Central Valley's landscape is a magnet for billboards. Policies regarding off-site advertising are complicated and political. However, the visual blight of billboards can effectively diminish the rural travel vistas in the county.

Highway 99 Corridor Plan. Local and state policies can greatly impact the travel experience of Highway 99. Caltrans is preparing a transportation master plan for Highway 99. It explores various futures for the facility. If it becomes an Interstate, new standards will apply significantly changing its design character. In addition, a collaborative nonprofit effort to map the corridor's visual conditions is underway. The mapping identifies visual assets and character in Tulare County and other southern San Joaquin Valley counties.

Environmental Issues and the Visitor Industry. Environmental implications of the before-mentioned environmental issues can have a significant impact on the desirability of Tulare County's traditional and potential to expand economic development opportunities related to the visitor industry. Federal, state, and local policy choices that

adversely impact the visual beauty of Tulare County will have a detrimental economic impact.

Please see next page

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12.2 Personal Communications

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Bromley, Collin S., Superintendent/Principal, Pleasant-View Elementary School District

Brown, Norman, District Superintendent, Springville Union School District

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Cannon, Paul, Superintendent/Principal, Alta Vista Elementary School District

Corley, Del, Director of Construction, Lindsay Unified School District

Durborow, Richard, Superintendent, Sequoia Union Elementary School District

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Groth, Gary, Superintendent, Kings River Elementary School District

Haggard, Harold, Superintendent, Saucelito Elementary School District

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Jones, Janet, Superintendent, Farmersville Unified School District

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Manning, John, Superintendent, Palo Verde School District

Mebane, Mary, Administrator, Linns Valley Poso Flat School District

Meier, Scott, Ed.D., Superintendent, Dinuba Unified School District

Monaco, Jeff, Solid Waste Manager, County of Tulare Resource Management Agency,

Solid Waste Division

Neve, Ron, Tulare County

Nord, George M., Superintendent/Principal, Traver School District

Polak, Rudy, Sergeant, Tulare County Sheriffs Department

Probasco, Ronald, W., Director, Tulare County Health and Human Services Agency

Spencer, Rosemary, Principal/Superintendent, Liberty Elementary School District

Stevens, Wolfgang Ph.D., Principal/Superintendent, Ducor Elementary School District

Thomas, Lori, , City of Porterville

Tietjen, Steve M., Ed.D., Superintendent, Woodlake Union School Districts

Trujillo, Roger Z., Superintendent, Earlimart School District

Turk, Clifford P., Ph.D., Superintendent, Woodville Union School District

Valentino, Lorene, Administrator, La Sierra High School

Whitlock, Mike, Flood Control / Subdivision Engineer, Tulare County

Whitson, Renee, Superintendent, Exeter Union High/Elementary School District

Williamson, Carol, Administrative Assistant/Chief Business Officer, Clay Joint Elementary School District