CHAPTER 3 • RESOURCES

A. SCENIC RESOURCES

The scenic qualities of a community are composed of a mixture of natural and man-made features. The value or importance of these features to the public is dependent upon the visual quality of the view.

Visitors are introduced to the visual environment of Firebaugh through the City's four gateways into the city, including Avenue 7-1/2 from the east, Nees Avenue from the west, and Highway 33 from both the north and the south.

The view from the Avenue 7-1/2 is the most impressive. This entryway brings the visitor over the San Joaquin River bridge, affording a view of the City's greatest visual asset—the San Joaquin River, past the City's native heritage mural and into the downtown area.

The view entering the City on Nees Avenue west of Firebaugh is much more rural and brings the visitor through agricultural fields and by the City's airport to the commercial development located along Highway 33.

The traveler coming into Firebaugh from either north or south enters the community from Highway 33. From the south, this brings the visitor past several major irrigation canals and the high school. From the north, the visitor passes through the Del Rio area and past a large grain mill and into the city's commercial and industrial uses located along Highway 33.

B. AGRICULTURE

The economy of the Firebaugh area is very dependent upon agriculture and agriculturally-related industries. An analysis of land use within the planning area reflects this reliance. Almost 600 acres within Firebaugh's Sphere of Influence is currently used for intensive agricultural purposes. Much of the agricultural land within the planning area is considered farmland of "statewide significance" by the California Department of Conservation's Important Farmland Mapping Program.

Prime farmland is defined as land having the best combination of soil quality, growing season, and water supply. Prime farmland is generally characterized as agricultural land with soils having a Capability Class of I or II, and a Storie Index greater than 85. Farmland of statewide importance is land other than prime farmland with a good combination of physical and chemical characteristics for the production of crops. Within the planning area, agricultural land overlying soils of the Elnido series are considered to be prime farmland when it is irrigated. Agricultural land overlying soils of the Tachi and Wekoda series is considered to be farmland of statewide importance. A discussion of the characteristics of these soils and their locations is presented in Chapter 2, Physical Environment.

Water supply is the other key factor in rating the quality of farmland. Prime farmland and farmland of statewide importance must have a constant, reliable source of water. Firebaugh and the land within its Sphere of Influence is within the Central California Irrigation District (CCID). The CCID provides water for irrigation purposes to farmland within its boundaries and drinking water to the city of Dos Palos.

The CCID received water from the Central Valley Project. The bulk of this water comes from Shasta Reservoir in northern California, which flows through the Sacramento River to the Sacramento Delta. The U.S. Bureau of Reclamation (USBR) operates pumps near the City of Tracy which convey the water to the Delta-Mendota Canal. The canal delivers water south past Firebaugh to the Mendota Pool where CCID's canals begin.

The CCID has a contract with the USBR for 532,000 acre-feet of water annually. The CCID conveys an average of 3.3-acre feet of water per acre through a series of open canals. The Delta-Mendota Canal is owned by the USBR and is operated by the CCID. The CCID owns and operates three major canals in the Firebaugh area: the Poso, Main, and Outside Canals.

The primary crops grown in the Firebaugh area include fruits, vegetables, nuts and fiber crops including tomato, garlic, cantaloupes, and cotton.

Conversion of agricultural land to urban development has been very modest in Firebaugh, compared to most other

Fresno County cities. Since 1989 the city has completed four annexations converting 196.5 acres from agriculture to urban development. This represents an average annual conversion rate of approximately 11 acres per year, over the past 18 years.

Even though Firebaugh's growth has had a fairly small impact on agricultural land, the cumulative result of urban growth of all cities in the Valley on agricultural land is considerable.

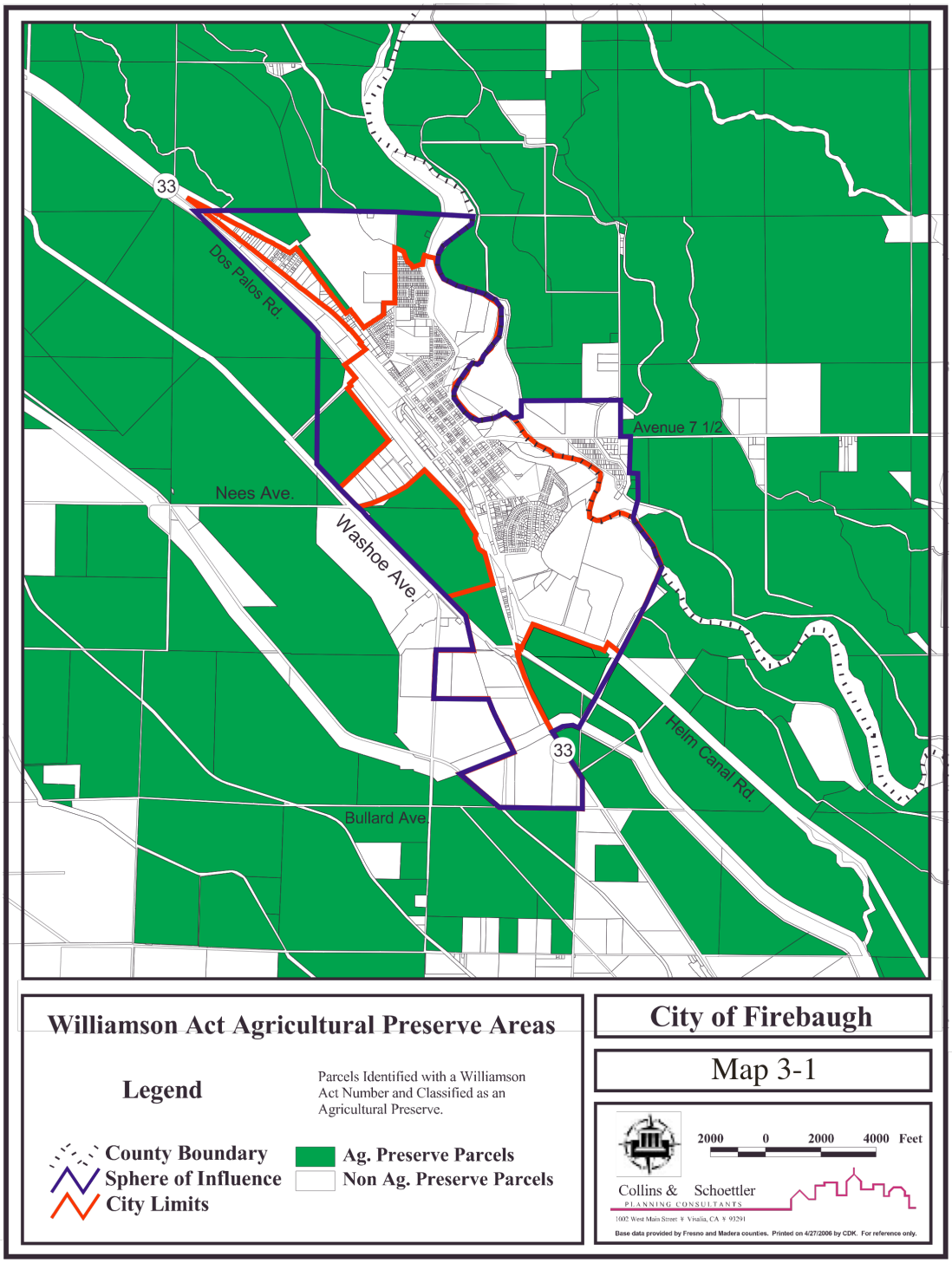
A recent report released by the State Department of Conservation indicated that between the years 2002 to 2004, 17,748 acres of prime, unique and statewide-important farmland were removed from agricultural production in Fresno County, or about 8,800 acres annually. On a regional scale, the American Farmland Trust has estimated that in the 1990's alone, the ten-county Central Valley, which includes Fresno County, has urbanized near 100,000 acres of agricultural land. On a statewide scale, between 1992-1997, California has urbanized agricultural land at an average rate of 82,660 acres per year.

The report "Farming on the Edge" by the American Farmland Trust studied the nation's most valuable farming regions and their vulnerability to the pressures of converting land from agriculture to urban development. This study identified the San Joaquin and Sacramento Valley region as the agricultural area *most* threatened by conversion of farmland to urban uses in the entire nation!

Williamson Act

The Williamson Act was legislated by the State of California in 1967 in an effort to slow the loss of prime agricultural land to urban land uses. The Act provides property tax incentives for landowners who make a commitment to maintain their land in agricultural use for a period of ten years. Williamson Act contracts are automatically renewed on an annual basis unless a Notice of Non-renewal is filed with the Fresno County Assessor. After filing a Notice of Non- renewal, a landowner must still wait a period of ten years before converting the land to non-agricultural uses.

City and County governments may immediately cancel Williamson Act Contracts only after making mandatory findings concerning the availability of other lands for


33
Dos Palos Rd.
Avenue 7 1/2
Nees Ave.
Washoe Ave.
33
Helm Canal Rd.
Bullard Ave.
Williamson Act Agricultural Preserve Areas
Legend
Parcels Identified with a Williamson Act Number and Classified as an Agricultural Preserve.
County Boundary
Sphere of Influence
City Limits
Ag. Preserve Parcels
Non Ag. Preserve Parcels
City of Firebaugh
Map 3-1
2000 0 2000 4000 Feet
Collins & Schoettler
PLANNING CONSULTANTS
1002 West Main Street ¥ Visalia, CA ¥ 93291
Base data provided by Fresno and Madera counties. Printed on 4/27/2006 by CDK. For reference only.

non-agricultural use, the effect on adjacent agricultural lands, and the public need for the land. These findings are set forth in Section 51282 of the Government Code. Government Code Section 51284 states that no contract may be canceled without holding a duly noticed public hearing on the matter.

As of March 2007, Influence, approximately 805 acres were in agricultural preserve contracts within Firebaugh's existing Sphere of Influence (SOI).

In the year 2000, the California legislature approved the Farmland Security Zones Act (also known as the "Super Williamson Act"). The Act provides for tax incentives for property owners willing to enter into 20-year contracts. The process for terminating contracts is much more difficult than that for regular Ag Preservation Contracts. Fresno County officials report that there are no Farmland Security Zone contracts within the Firebaugh SOI as of March 2007.

C. BIOTIC RESOURCES

The approximately 3,410-acre study area consists of Firebaugh's Sphere of Influence (SOI), which includes the existing city limits and adjacent agricultural lands, and is bounded on all sides by agricultural fields. The study area is generally inclusive within Lyon Road to the north, San Joaquin River to the east, Bullard Avenue to the south, and Washoe Avenue and State Highway 33 to the west, as well as portions of agricultural fields and agricultural fields adjacent to each of these roads. State Highway 33 runs north-south through the center of the site. Topographically, the site is relatively level, ranging in elevation from approximately 144 ft. (40 m) National Geodetic Vertical Datum (NGVD) along Lyon Road to approximately 157 ft. (48 m) NGVD along the western edge of First Lift Canal. It consists of urban development associated with the City of Firebaugh and agricultural fields. Areas immediately surrounding the site also consist of agricultural fields.

Thirteen soil mapping units from 10 soil series were identified within the SOI (Table 3-1). All of the soil series are slightly to moderately alkaline, and six of these soil series (Armona, Bisgani, Elnido, Tachi, Tranquility, and Wekoda) are considered hydric. Hydric soils are soils

that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part; under sufficiently wet conditions, they support the growth and regeneration of hydrophytic vegetation.

The San Joaquin Valley has a Mediterranean climate with warm to hot dry summers and cool winters. Summers are dry and typically quite warm, with daytime temperatures commonly exceeding 90º Fahrenheit. Winters are rainy and cool, with daytime temperatures rarely exceeding 60º Fahrenheit. Average annual precipitation in the general vicinity of the site is approximately 10 inches, 80% of which falls between November and March. Stormwater readily infiltrates the soils of and surrounding the site, but when field capacity has been reached, gravitational water flows off the site or into the San Joaquin River as shallow groundwater or as surface sheet flow.

TABLE 3-1. SOILS OF THE STUDY AREA (from NRCS 2006, 2007).

Soil Series/Soil	Map Unit Symbol	Parent Material	Drainage Class	Surface Permeability	Hydric?
Armona Series Armona loam, 0-1% slopes	101	Igneous and sedimentary sources	Poorly drained	Moderately slow – slow	Yes
Bisgani Series Bisgani sandy loam, 0-2% slopes	311	Alluvium derived mainly from granitic rock sources	Somewhat poorly drained	Rapid	Yes
Columbia Series Columbian fine sandy loam, 0-2% slopes Columbia loamy sandy, over temple soils, 0-1% slopes Columbia soils, channeled, 0-8%	CmA CotA CrB	Alluvium derived mainly from mixed sources	Moderately well drained	Moderately rapid	No
Elnido Series Elnido sandy loam, drained, 0-1% slopes	320	Alluvium derived mainly from granitic sources	Poorly drained soils	Moderately Rapid	Yes
Foster Series Foster loams, 0-1% slopes	FbA	Alluvium derived mainly from acid igneous sources	---	Moderat	No
Tachi Series Tachi clay, 0-1% slopes	282	Alluvium derived mainly from igneous and sedimentary sources	Very poorly drained	Very slow	Yes
Temple Series Temple clay loam, 0-1% slopes	TbA	Alluvium derived mainly from granitic sources	---	Moderately slow	No
Tujunga Series Tujunga loamy sand, 0-3% slopes	TwA	Alluvium derived mainly from granitic sources	Excessively drained soils	Rapid	No
Tranquility Series Tranguility complex, saline-sodic, 0-1% slopes	285	Alluvium derived mainly from calcareous sedimentary sources	Somewhat poorly drained soils	Very slow	Yes
Wekoda Series Wekoda clay, partially drained, 0-1% slopes	472	Alluvium from sedimentary rock sources	Poorly drained	Moderate	Yes

Over the years, the Firebaugh area has been substantially disturbed by agricultural and ancillary activities, while lands within the City itself have primarily been converted to urban development. The San Joaquin River and its associated riparian corridor are the only remaining substantial natural habitats in the region.

Like the Firebaugh area, surrounding lands up to the Sierra foothills have been highly modified for agricultural purposes (e.g., orchards, vineyards, row crops, dry farming, agricultural processing facilities, and irrigation canals/ditches and catch basins,) or otherwise developed as roads and individual residences. Even though the San Joaquin River may facilitate regional wildlife movements, sensitive plant and animal species that may utilize this river corridor would have great difficulty accessing the site due to the lack of strong connectivity between these lands and the site.

Biotic Habitats and Land Uses

The San Joaquin River and several large, nearby ponds are the only natural biotic habitats found in the study area. For the purposes of this report, these biotic habitats have been identified as "San Joaquin River/riparian" and "aquatic." The remainder of the site, identified for the purposes of this report, is categorized into six land uses: "agriculture," "canal," "waste water treatment facility," "developed," and "open/ruderal" (Figure 3). A list of the vascular plant species observed within the study area and the terrestrial vertebrates using, or potentially using, the site are provided in Appendices A and B, respectively.

San Joaquin River/Riparian

The San Joaquin River conveyed substantial flows at the time of the April 2007 survey and is characterized by vegetative and animal species indicative of a mature riparian habitat. The banks of the river were lined with cottonwoods (*Populus fremontii*), sandbar willow (*Salix exigua*), and red willow (*Salix laevigata*), which provided dense canopy cover. Shrubs occurring in this habitat included California blackberry (*Rubus discolor*) and tree tobacco (*Nicotiana glauca*), while the washes and wet areas contained Baltic rush (*Juncus balticus*), Mexican rush (*Juncus mexicanus*), cocklebur (*Xanthium strumarium*), mugwort (*Artemisia douglasiana*), rabbitsfoot grass (*Polypogon monspeliensis*), and California rose (*Rosa California*).

When wet, the San Joaquin River may provide breeding habitat for amphibians such as the pacific treefrog (*Hyla regilla*) and western toad (*Bufo boreas*). A variety of reptiles, including western fence lizards (*Sceloporus occidentalis occidentalis*), common garter snakes (*Thamnophis sirtalis*) and gopher snakes (*Pituophis melanoleucus*), likely forage within the riparian corridors.

Many bird species, both residents and winter migrants, depend on riparian corridors for foraging and breeding habitat. Mallards (*Anas platyrhynchos*) were observed paddling down the river. Several stick nests were observed in the mature cottonwoods along the river and likely belonged to Swainson's hawks (*Buteo swainsoni*) foraging nearby. Other raptors that could occur in this habitat include white-tailed kites (*Elanus caeruleus*) and red-tailed hawks (*Buteo jamaicensis*). Western scrub-jays (*Aphelocoma coerulescens*) and cedar waxwings (*Bombycilla cedrorum*) were also observed amongst the riparian canopy. Other species that may reside in this habitat include Nuttall's woodpeckers (*Picoides nuttallii*) and northern flickers (*Colaptes auratus*). Riparian vegetation provides important cover for many migrant species moving north from Mexico and Central America during the spring or moving south from the Pacific Northwest and Canada during the fall. Riparian thickets may be used as nesting habitat by spring migrants such as ash-throated flycatchers (*Myiarchus cinerascens*) and Bullock's orioles (*Icterus bullockii*). They also provides cover and foraging habitat for wintering species such as white-crowned sparrows (*Zonotrichia leucophrys*) and golden-crowned sparrows (*Zonotrichia atricapilla*).

The structural and faunal diversity of riparian zones provide an abundant food source for and attract a variety of mammalian species. The deer mouse (*Peromyscus maniculatus*) feeds on soil-dwelling larvae as well as a variety of seeds and leaves. Other constituent mammals of riparian woodlands include the brush rabbit (*Sylvilagus bachmani*), western gray squirrel (*Sciurus griseus*), and raccoon (*Procyon lotor*).

Aquatic

Three small lakes are situated at the northern end of the study area immediately west of the San Joaquin River. According to the existing Firebaugh General Plan, this area was at one time the site of a 53-acre sand and gravel quarry. After the quarry completed operation, cottonwoods and other semi-aquatic vegetation were planted. During the April 2007 survey, people were fishing at these lakes.

At the southern end of the study area, also west of the San Joaquin River, is Lake Joallan, which was formerly a sand pit, and a small seasonal wetland. These features supported such plant species as willows (*Salix sp.*), rushes

Lake Joallan

(*Juncus sp*.), sedges (*Scirpus sp*.) and tamarisk (*Tamarix chinensis*).

Animal species that utilize the San Joaquin River corridor may also occur in or near these aquatic features. During the April 2007 survey, western kingbirds (*Tyrannus verticalis*), Canada geese (*Anas canadensis*) and Swainson's hawks were observed foraging around the lake.

Agriculture

Approximately half the study area consisted of actively farmed agricultural fields. Crops could not be identified at the time of the April 2007 surveys, as fields were at the beginning of growth.

Typical farmland immediately outside Firebaugh

The fields also supported a limited number of ruderal, or weedy, grasses and forbs, mostly of European origin, including slender wild oats (*Avena barbata*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), Russian thistle (*Salsola tragus*), shepherd's purse (*Capsella bursa-pastoris*), and stinging nettle (*Urtica dioica*). There may be small, isolated patches of seasonal wetlands in these fields; however, at the level of effort put forth for this study, none were identified.

Irrigation ditches and ponds are situated alongside some of the agricultural fields and were dry at the time of the survey. The ditches were largely devoid of vegetation, but the ponds supported hydrophytic vegetation, such as rushes, pearly everlasting (*Gnaphalium californicum*), and willowherb (*Epilobium ciliatum*).

Compared to natural habitats, managed agricultural lands provide relatively low habitat value for wildlife due to the lack of understory vegetation that would typically provide food and cover for these species. Annual management practices, such as discing and harvesting, would eliminate breeding and foraging habitat for many small birds and mammals native to the region. The application of chemical pesticides may also pose a threat to such species at various times of the year.

Although none were observed, reptiles may potentially occur in the agricultural fields. The sparse cover described above, rodent burrows likely to occur in this habitat, and the presence of fluctuating populations of invertebrate and rodent prey make the site suitable for at least one native species of lizard, the western fence lizard,

and several species of snake, including the gopher snake and California kingsnake (*Lampropeltis getulus californiae*).

Resident avian species observed on or near the site's agricultural lands during the field survey include the red-tailed hawk, northern harrier (*Circus cyaneus*), killdeer (*Charadrius vociferus*), and American crow (*Corvus brachyrhynchos*). Common resident avian species expected to forage on the site include the western kingbird, northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), and western meadowlark (*Sturnella neglecta*). Cliff swallows (*Petrochelidon pyrrhonota*) and barn swallows (*Hirundo rustica*) may nest in associated agricultural maintenance buildings. Winter migrants may include the ferruginous hawk (*Buteo regalis*), rough-legged hawk (*Buteo lagopus*), merlin (*Falco columbarius*), and white-crowned sparrow.

Small mammals occur in agricultural lands such as those of the site, but populations would be highly variable depending on the condition of the fields. Freshly plowed or cultivated fields barren of vegetation provide little cover for most terrestrial vertebrates. Burrows belonging to small mammals, such as California ground squirrels (*Spermophilus beecheyi*), Botta's pocket gophers (*Thomomys bottae*), deer mice, and California meadow voles (*Microtus californicus*) were observed in the agricultural fields. Black-tailed jackrabbits (*Lepus californicus*) are also likely to be present throughout the area.

Common mammalian predators attracted to these small mammals would likely be limited to coyotes and red foxes (*Vulpes vulpes*), as these species are well-adapted to human disturbance. Various bat species, including the pallid bat (*Antrozous pallidus*) and Mexican free-tailed bat (*Tadarida brasiliensis*), may forage over the site for flying insects.

Canal

Three major irrigation canals—Main Canal, Outside Canal, and Delta-Mendota Canal—deliver water through the Central Valley and pass through the site. These natural-bottom canals were largely devoid of vegetation, but the sparse vegetation observed included cheeseweed mallow (*Malva parviflora*), duckweed (*Lemna minor*), pearly everlasting, and fringed willowherb.

Like the San Joaquin River, these irrigation canals provide habitat for amphibians such as the pacific chorus frog and western toad and for reptiles such as common garter snakes. Other species present in the surrounding agricultural fields are also like to occur along the canals.

Waste Water Treatment Facility

A wastewater treatment facility is located to the east of Helm Canal Road at the southeastern edge of the city. The treatment facility consists of several ponds, including aeration ponds, sludge lagoons, and evaporation/percolation ponds. At least four ponds were inundated at the time of the April 2007 survey. Hydrophytic vegetation observed in the ponds included saltgrass (*Distichlis spicata*) and barnyard grass (*Echinochloa crus-gali*). The ponds also appeared to support vegetation adapted to alkaline conditions, including saltbush (*Atriplex sp*.).

Amphibians such as the Pacific chorus frog and western toad may access the ponds via irrigation canals and the San Joaquin river and use the ponds for breeding. A variety of waterbirds such as lesser scaup (*Aythya affinis*), greater yellow legs (*Tringa melanolueca*), American coot (*Fulica Americana*), ruddy duck (*Oxyara jamaicensis*), common sandpiper (*Califris minutilla*), avocet (*Recurvirostra californica*), northern shoveler (*Anas clypeata*) and cinnamon teal (*Anas cyanoptera*) were observed in three of the ponds. Small mammal burrows likely belonging to ground squirrels or voles were observed along the pond edges, but because the facility is enclosed by fencing, larger mammals would not be expected to occur on these lands.

Developed

Firebaugh's urban center is developed with single- and multi-family residential units, commercial units, schools, industrial and manufacturing plants and warehouses, and other developments and infrastructure associated with urbanized agricultural communities.

Developed areas supported landscape and ornamental vegetation. Landscape trees observed included pine (*Pinus* sp.), cypress (*Cupressus* sp.), cactus (*Opuntia* sp.), mulberry (*Morus alba*), and magnolia (*Magnolia* sp.). Other landscape and ornamental vegetation included bottlebrush (*Callistemon* sp.), oleander (*Nerium oleander*), and cultivated rose (*Rosa* sp.).

Scrap piles near the buildings provide suitable cover for the same reptile species that would also be found in the surrounding agricultural and ruderal areas.

The buildings and landscape trees would attract bird species common to urban landscapes, such as rock doves (*Columba livia*), mourning doves (*Zenaida macroura*), and northern mockingbirds. Raptors foraging over adjacent agricultural lands may occasionally fly over developed areas. Cliff swallows may build mud nests under the street overpasses.

Structures with accessible openings to areas having limited light and air flow, such as wooden sheds or detached garages, provide potential roosting habitat for bats. Other mammals expected to occur in developed areas include ground squirrels, coyotes, and red foxes.

Open/Ruderal
The remainder of the study area (i.e., undeveloped lands not used for farming) primarily consisted of open lands with ruderal grasses and forbs, including Bermuda grass, ice plant (*Carpobrotus edulis*), Russian thistle, curly dock (*Rumex crispus*), and fiddleneck (*Amsinckia menziesii*). Also, a remnant channel having the same constituent flora as the surrounding ruderal areas was present just west of the wastewater treatment facility. This channel historically flowed north and connected to the San Joaquin River but has since been filled and now appears to be an isolated feature.

Species occurring in adjacent agricultural fields and developed landscapes discussed above are also likely to occur in the open and ruderal areas.

Movement Corridors
Many terrestrial animals need more than one biotic habitat in order to perform all of their biological activities. With increasing encroachment of humans on wildlife habitats, it has become important to establish and maintain linkages, or movement corridors, for animals to be able to access locations containing different biotic resources that are essential to maintaining their life cycles. Terrestrial animals use ridges, canyons, riparian areas, and open spaces to travel between their required habitats.

The importance of an area as a "movement corridor" depends on the species in question and its consistent use

patterns. Animal movements generally can be divided into three major behavioral categories:

- Movements within a home range or territory;
- Movements during migration; and
- Movements during dispersal.

While no detailed study of animal movements has been conducted for the study area, knowledge of the site, its habitats, and the ecology of the species potentially occurring onsite permits sufficient predictions about the types of movements occurring in the region and whether or not proposed development would constitute a significant impact to animal movements.

The San Joaquin River serves as a movement corridor for local wildlife species that persist in agricultural lands. However, the river is expected to facilitate regional movements of only some wildlife species, as animals would have to travel through miles of marginal to poor habitat (i.e., agricultural fields and orchards) before reaching the site, which itself holds little habitat value.

As noted in Section 2.1, a number of reptiles, birds, and mammals may use the study area itself as part of their home range and dispersal movements. The movements of these species, however, do not indicate that the study area functions as a significant movement corridor. Reptiles, birds, and mammals would move through all portions of the site, as they would also do on surrounding agricultural lands.

Special Status Plants and Animals

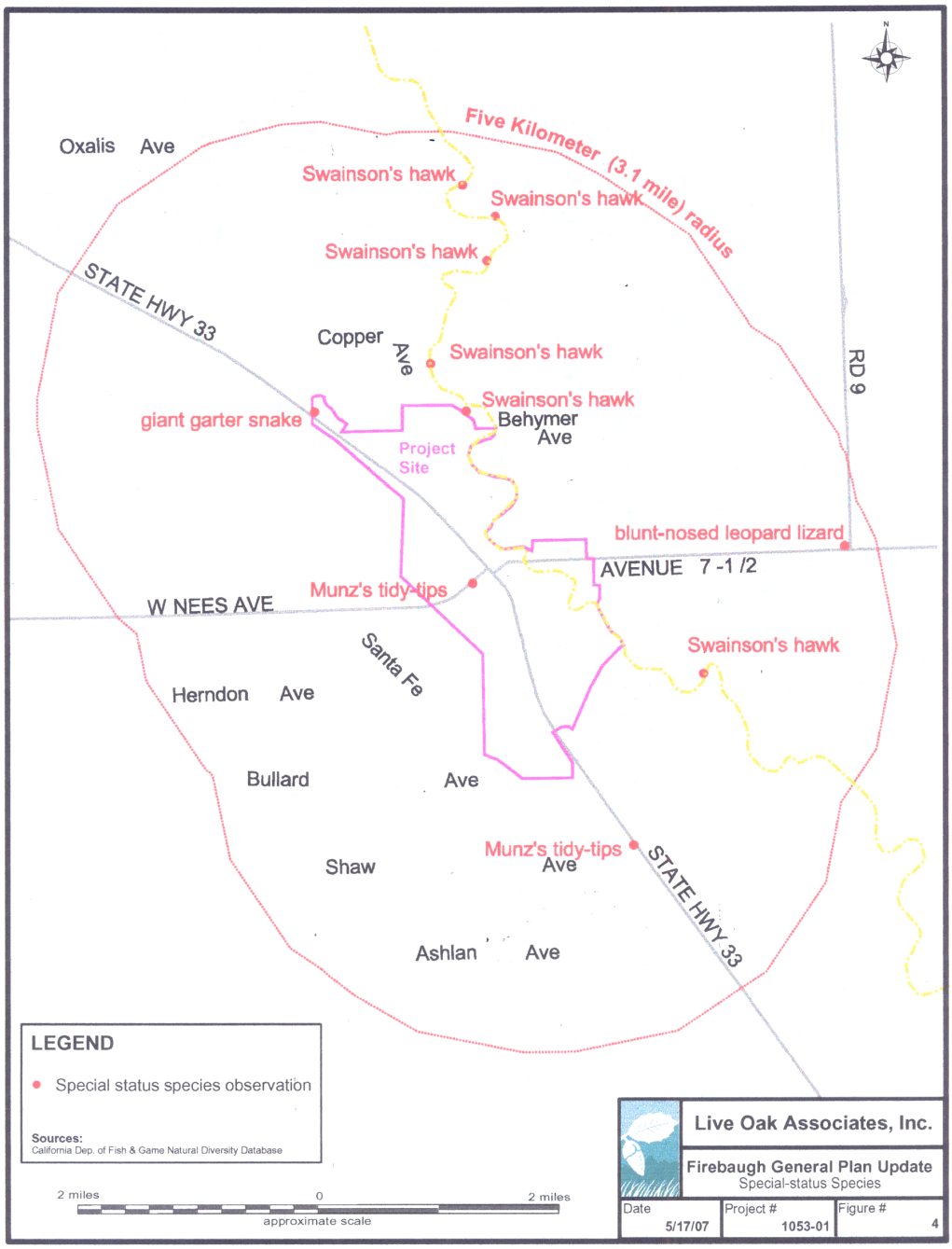
Several species of plants and animals within the state of California have low populations and/or limited distributions. Such species may be considered "rare" and are vulnerable to extirpation as the state's human population grows and the habitats these species occupy are converted to agricultural and urban uses. As described more fully in Section 3.2, state and federal laws have provided the California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS) with a mechanism for conserving and protecting the diversity of plant and animal species native to the state. A sizable number of native plants and animals have been formally designated as "threatened" or "endangered" under state and federal endangered species legislation. Others have been designated as candidates for such listing. Still others have been designated as "species

of special concern" by the CDFG. The California Native Plant Society (CNPS) has developed its own set of lists of native plants considered rare, threatened, or endangered (CNPS 2001). Collectively, these plants and animals are referred to as "special status species."

A number of special status plants and animals occur in the vicinity of the study area (Map 3-2 and 3-3). These species, and their potential to occur in the study area, are listed in Table 3-2 in the following pages. Sources of information for this table included *California's Wildlife, Volumes I, II, and III* (Zeiner et. al 1988-1990), *California Natural Diversity Data Base* (CDFG 2007), *Endangered and Threatened Wildlife and Plants* (USFWS 2007), *Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants* (CDFG 2007), and *The California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2001). This information was used to evaluate the potential for special status plant and animal species that occur onsite. It is important to note that the California Natural Diversity Data Base (CNDDB) is a volunteer database; therefore, it may not contain all known or gray literature records.

A search of published accounts for all of the relevant special status plant and animal species was conducted for the Firebaugh and Poso Farm USGS 7.5-minute quadrangle in which the planning area occurs, and for the 10 surrounding quadrangles (Bliss Ranch, Chowchilla, Firebaugh NE, Mendota Dam, Tranquillity, Broadview Farms, Coit Ranch, Chasey Ranch, Oxalis, and Santa Rita Bridge) using the California Natural Diversity Data Base Rarefind 2007. All species listed as occurring in these quadrangles on CNPS Lists 1A, 1B, 2, or 4 were also reviewed.

Map 3-2. *Special Status Species*



Map 3-3. *Kit Fox Observations*

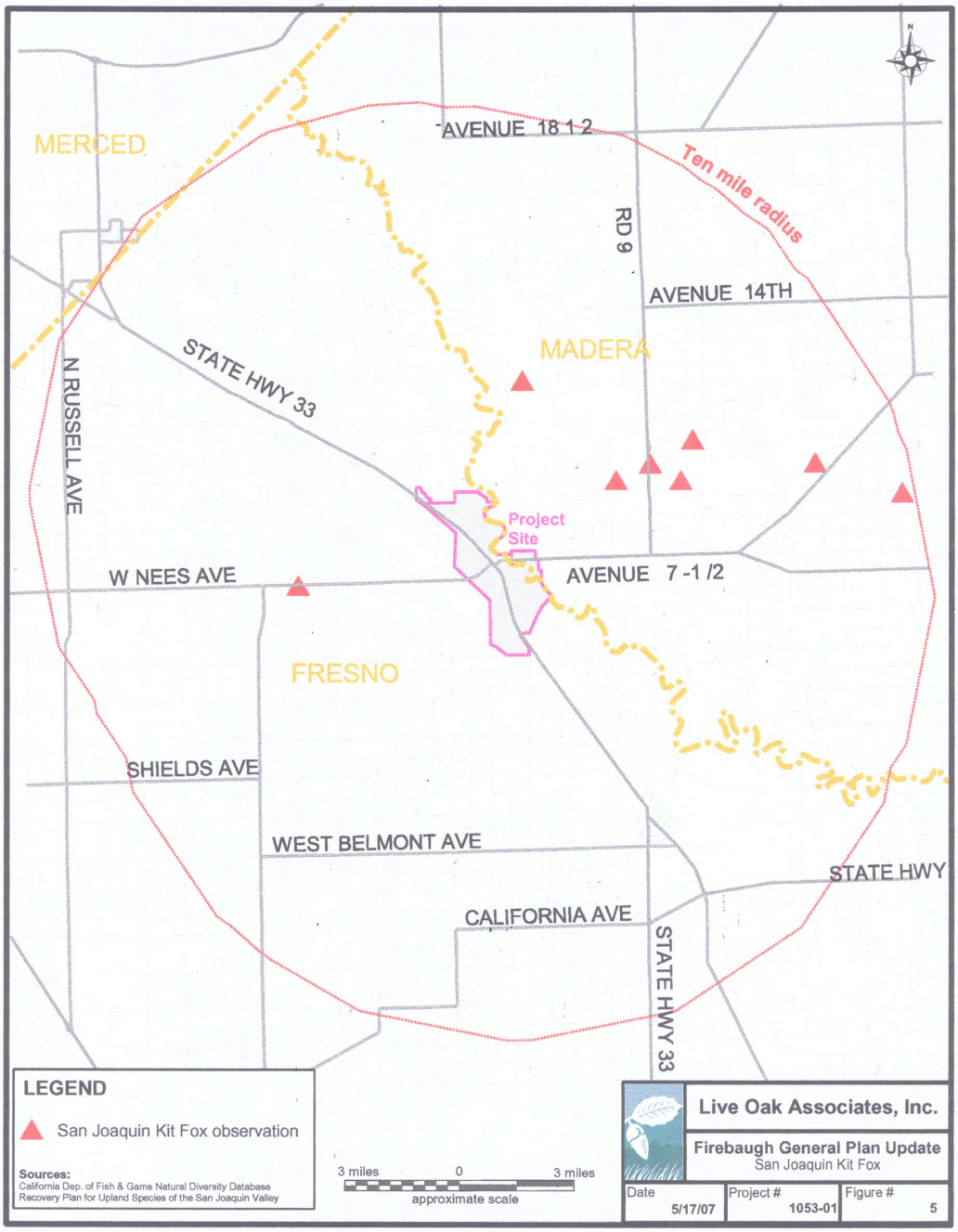


TABLE 3-2. LIST OF SPECIAL STATUS SPECIES THAT COULD OCCUR IN THE PROJECT VICINITY

PLANTS (adapted from CDFG 2007 and CNPS 2001)

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence in the Study Area
Palmate-bracted bird's-beak (*Cordylanthus palmatus*)	FE, CNPS 1B	Chenopod scrub and valley and foothill grassland at elevations between 5 and 155 meters. Blooms May-October.	**Absent.** Suitable habitat for this species is absent from the site. Any suitable habitat that may have once been present has been highly modified for human use.
San Joaquin woolly threads (*Monolopia congdonii*)	FT, CNPS 1B	Chenopod scrub and valley and foothill grassland at elevations between 60 and 800 meters. Blooms Februray-May.	**Absent.** Suitable habitat for this species is absent from the site. Any suitable habitat that may have once been present has been highly modified for human use.

Other special status plants listed by CNPS

Species	Status	Habitat	*Occurrence in the Study Area
Heartscale (*Atriplex cordulata*)	CNPS 1B	Chenopod scrub, cismontane woodland, and valley and foothill grassland of the San Joaquin Valley at elevations between 1 and 375 meters. Blooms April-October.	**Absent.** Suitable habitat for this species is absent from the site. Any suitable habitat that may have once been present has been highly modified for human use. This species has not been documented within three miles of the site.
Brittlescale (*Atriplex depressa*)	CNPS 1B	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools on alkaline and clay soils at elevations between 1 and 320 meters. Blooms May-October.	**Absent.** Suitable habitat for this species is absent from the site. The alkaline soils occurring onsite have been heavily modified for human use and would likely not support this species.
Lesser saltscale (*Atriplex minuscula*)	CNPS 1B	Chenopod scrub, playas, valley and foothill grassland in alkaline and sandy soils at elevations between 15 and 200 meters. Blooms May-October.	**Absent.** Suitable habitat for this species is absent from the site. The alkaline soils occurring onsite have been heavily modified for human use and would likely not support this species.
Subtle orache (*Atriplex subtilis*)	CNPS 1B	Occurs in valley and foothill grasslands of the San Joaquin Valley at elevations between 40 and 100 meters. Blooms August-October.	**Absent.** Suitable habitat for this species is absent from the site.
Lost Hills crownscale (*Atriplex vallicola*)	CNPS 1B	Chenopod scrub, valley and foothill grassland, vernal pools in alkaline soils at elevations between 50 and 635 meters. Blooms April-August.	**Absent.** Suitable habitat for this species is absent from the site. The alkaline soils occurring onsite have been heavily modified for human use and would likely not support this species.
Hoover's cryptantha (*Cryptantha hooveri*)	CNPS 1B	Valley and foothill grassland on sandy soils at elevations	**Absent.** Habitats required by this species do not occur onsite. The sandy soils

		between 3 and 150 meters. Blooms April-May.	occurring onsite have been heavily modified for human use and would likely not support this species.

Table 3-2: PLANTS – cont'd.

Other special status plants listed by CNPS

Species	Status	Habitat	*Occurrence in the Study Area
Recurved larkspur (*Delphinium recurvatum*)	CNPS 1B	Chenopod scrub, cismontane woodlands, and alkaline soils of valley and foothill grasslands at elevations between 3 and 750 meters. Blooms March-May.	**Absent.** Habitats required by this species do not occur onsite. The alkaline soils occurring onsite have been heavily modified for human use and would likely not support this species.
Munz' tidy-tips (*Layia munzii*)	CNPS 1B	Chenopod scrub, valley and foothill grassland in alkaline clay at elevations between 150 and 700 meters. Blooms March-April.	**Unlikely.** This species was documented on the site in 1941, and second occurrence was documented less than two miles south of the site that same year. However, the alkaline soils occurring onsite have been heavily modified for human use and likely no longer support this species.
Panoche pepper-grass (*Lepidium jaredii* ssp. *album*)	CNPS 1B	Valley and foothill grassland in alluvial fans and washes at elevations between 185 and 275 meters. Blooms February-June.	**Absent**. Habitats required by this species have been heavily modified for human use and would likely not support this species.
Sanford's arrowhead (*Sagitarria sanfordii*)	CNPS 1B	Marshes and swamps at elevations of up to 610 meters. Blooms May-October	**Absent.** Marshes and swamps are absent from the site. Ponds occurring on the site would not

ANIMALS (adapted from CDFG 2007 and USFWS 2007)

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence in the Study Area
California Tiger Salamander (*Ambystoma californiense*)	FT, CT	Breeds in vernal pools and stock ponds of central California; adults aestivate in grassland habitats adjacent to the breeding sites.	**Absent.** No vernal pools occur onsite, and the lakes and wastewater treatment ponds would not be expected to dry. CTS have not been documented within twenty miles of Firebaugh.
Blunt-nosed leopard lizard (*Gambelia silus*)	FE, CE, CP	Frequents grasslands, alkali meadows and chenopod scrub of the San Joaquin Valley from Merced south to Kern County.	**Unlikely.** Habitats required by this species have been highly disturbed or eliminated as a result of agricultural activities and urban development. The nearest documented sighting of this species occurs approximately three miles east of the site in 1989.

Table 3-2: ANIMALS – cont'd.

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence in the Study Area
Giant garter snake (*Thamnophis gigas*)	FT, CT	Habitat requirements consist of (1) adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter.	**Possible.** Suitable breeding and overwintering habitat is available along the San Joaquin River and major irrigation canals. This species was observed at the north end of the site in 1976.
Swainson's hawk (*Buteo swainsoni*)	CT	Breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah. Requires adjacent suitable foraging areas such as grasslands or alfalfa fields supporting rodent populations.	**Present.** A pair of Swainson's hawks was observed foraging over the agricultural fields and roosting in the riparian gallery forest of the San Joaquin river.
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	FC, CE	Breed in large blocks of riparian habitats, particularly woodlands with cottonwoods and willows.	**Possible.** Breeding and foraging habitat is available along the San Joaquin River riparian corridor.
Bank swallow (*Riparia riparia*)	CT	Locally common only in restricted portions of California where sandy, vertical bluffs or riverbanks are available for the birds to dig their burrows and nest in colonies.	**Absent.** Nesting habitat is absent from the Firebaugh study area. Vertical banks suitable for nesting are absent from the reach of the San Joaquin River occurring on the site.
Nelson's antelope squirrel (*Ammospermophilus nelsoni*)	CT	Frequents open shrublands and annual grassland habitats.	**Absent.** Habitats required by this species are absent because they have been heavily modified for human use.
Giant kangaroo rat (*Dipodomys ingens*)	FE, CE	Inhabits grasslands on gentle slopes of generally less than 10°, with friable, sandy-loam soils.	**Absent**. Habitats required by this species are absent because they have been highly modified for human use. The nearest documented occurrence of this species is more than ten miles from the site.
Fresno kangaroo rat (*Dipodomys nitratoides exilis*)	FE, CE	Inhabits grassland on gentle slopes of generally less than 10°, with friable, sandy-loam soils.	**Absent.** Habitats required by this species are absent from the site. The nearest documented occurrence of this species is more than ten miles from the site.

Table 3-2: ANIMALS – cont'd.

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence in the Study Area
San Joaquin kit fox (*Vulpes macrotis mutica*)	FE, CT	Frequents desert alkali scrub and annual grasslands and may forage in adjacent agricultural habitats. Utilizes enlarged (4 to 10 inches in diameter) ground squirrel burrows as denning habitat.	**Unlikely.** Burrows observed on the site during the April 2007 field survey were not of suitable size for the kit fox. The site has been highly modified for agricultural use and, as a result, provides marginal to poor foraging habitat for the kit fox. There have been four documented sightings, the most recent occurring in 1990, and two additional documented occurrences of kit fox evidence within ten miles of the site. Therefore, while kit foxes are not expected to breed and only rarely (if at all) forage on the site, a dispersing individual may rarely traverse the site. Given its disturbed nature and isolation from regional populations, the site is not expected to function in any significant way as to provide denning, foraging, or dispersal habitat for the species and, in fact, would more likely operate as a biological sink for this species.

State Species of Special Concern

Species	Status	Habitat	*Occurrence in the Study Area
Western spadefoot (*Scaphiopus hammondii*)	CSC	Primarily occurs in grasslands, but also occurs in valley and foothill hardwood woodlands. Requires vernal pools or other temporary wetlands for breeding.	**Absent.** There are no vernal pools or wetlands on the site. Therefore, suitable breeding habitat is absent.
Western pond turtle (*Clemmys marmorata*)	CSC	Intermittent and permanent waterways including streams, marshes, rivers, ponds and lakes.	**Possible.** Habitat for this species is available along the San Joaquin River, in the small lakes in the northern portion of the site, and in Lake Joallan and the wastewater treatment ponds at the south end of the site.
Silvery legless lizard (*Anniella pulchra pulchra*)	CSC	Occurs in sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks.	**Unlikely.** Suitable habitat is available along the San Joaquin River bed. However, the nearest documented occurrence of this species is more than ten miles southeast of the site.
Coast horned lizard (*Phrynosoma coronatum*)	CSC	Grasslands, scrublands, oak woodlands, etc. of central	**Unlikely.** Marginal habitat is available along the San Joaquin River. However,

		California. Common in sandy washes with scattered shrubs.	the nearest documented occurrence of this species is more than ten miles southeast of the site.

Table 3-2: ANIMALS – cont'd.

State Species of Special Concern

Species	Status	Habitat	*Occurrence in the Study Area
San Joaquin whipsnake (*Masticophis flagellum ruddocki*)	CSC	Open, dry habitats with little or no tree cover. Found in valley grasslands and saltbush scrub in the San Joaquin Valley.	**Absent.** Habitats required by this species are absent because they have been heavily modified for human use. The nearest documented occurrence of this species is more than ten miles southeast of the site.
White-faced ibis (*Plegadis chihi*)	CSC	Salt and freshwater marsh.	**Absent.** Habitat required for this species is absent from the site.
Northern harrier (*Circus cyaneus*)	CSC	Frequents meadows, grasslands, open rangelands, freshwater emergent wetlands; uncommon in wooded habitats.	**Present.** Harriers were observed foraging over agricultural fields within the study area.
White-tailed kite (*Elanus leucurus*)	CP	Open grasslands and agricultural areas throughout central California.	**Possible.** Suitable breeding and foraging habitat occurs onsite for this species.
Ferruginous hawk (*Buteo regalis*)	CSC	Breeds in the Pacific Northwest and Canada. Winters in a variety of California habitats, including grasslands, savannahs, and wetlands.	**Possible.** Wintering individuals may occasionally pass over or forage on the site. However, breeding habitat is absent.
Sharp-shinned hawk (*Accipiter striatus*)	CSC	Breeds in the mixed conifer forests of the northern Sierra Nevada. This species winters in a variety of habitats of the state.	**Possible.** Wintering individuals may occasionally pass over or forage on the site. However, breeding habitat is absent.
Cooper's hawk (*Accipiter cooperii*)	CSC	Breeds in oak woodlands, riparian forests and mixed conifer forests of the Sierra Nevada, but winters in a variety of lowland habitats.	**Possible.** Individuals may occasionally pass over or forage on the site. However, breeding habitat is absent.
Merlin (*Falco columbarius*)	CSC	Frequents open habitats at low elevation near water and tree stands. Favors coastlines, lakeshores, and wetlands. Breeds in Alaska and Canada.	**Possible.** Wintering individuals may occasionally pass over or forage on the site. However, breeding habitat is absent.
Prairie falcon (*Falco mexicanus*)	CSC	Frequents dry, open terrain. Breeding sites are located on cliffs.	**Possible.** Marginal foraging habitat occurs onsite for this species. However, breeding habitat is absent.
Mountain plover (*Charadrius montanus*)	CSC	Forages in short grasslands and freshly plowed fields of	**Possible.** The site provides suitable winter foraging habitat for this species.

		the Central Valley.	
Burrowing owl (*Athene cunicularia*)	CSC	Frequents open, dry annual or perennial grasslands, deserts, and scrublands characterized by low growing vegetation. Dependent upon burrowing mammals, most notably the California ground squirrel, for nest burrows.	**Possible.** Nesting habitat in the form of ground squirrel burrows exist onsite for the burrowing owl. Burrowing owls may also forage on the site.

Table 3-2: ANIMALS – cont'd.
State Species of Special Concern

Species	Status	Habitat	*Occurrence in the Study Area
Black swift (*Cypseloides niger*)	CSC	Migrants found in many habitats of state; in Sierra nests are often associated with waterfalls.	**Absent.** The site does not provide suitable breeding or foraging habitat for this species.
Vaux's swift (*Chaetura vauxi*)	CSC	Migrants move through the foothills of the western Sierra in spring and late summer. Some individuals breed in the region.	**Absent.** The site does not provide suitable breeding or foraging habitat for this species.
California horned lark (*Eremophila alpestris actia*)	CSC	Found in a variety of open habitats where trees and shrubs are absent; breeds in grasslands and fallow fields.	**Possible.** The site provides suitable breeding and foraging habitat for this species.
Loggerhead shrike (*Lanius ludovicianus*)	CSC	Frequents open habitats with sparse shrubs and trees, other suitable perches, bare ground, and low herbaceous cover. Can often be found in cropland.	**Present.** This species was observed perching on the perimeter fence for the wastewater treatment facility.
Tricolored blackbird (*Agelaius tricolor*)	CSC	Breeds near fresh water, primarily emergent wetlands, with tall thickets. Forages in grassland and cropland habitats.	**Unlikely.** Suitable foraging occurs onsite for this species but is not in close proximity to suitable breeding habitat.
Tulare grasshopper mouse (*Onychomys torridus*)	CSC	Arid shrubland communities in hot, arid grassland and scrub desert associations. These include blue oak woodlands at 450 m (1476 feet); upper sonoran subshrub scrub community; alkali sink and mesquite associations on the valley floor; and grasslands associations on the sloping margins of the San Joaquin Valley and Carrizo Plain region.	**Absent.** Suitable shrubland habitat is not present on site.

San Joaquin pocket mouse (*Perognathus inornatus inornatus*)	CSC	Inhabits arid grasslands, desert scrub and fine soils.	**Absent.** Suitable grassland and desert scrub habitat is not present on the site.
Pale big-eared bat (*Corynorhinus townsendii pallescens*)	CSC	Primarily a cave-dwelling bat, which may also roost in buildings. Occurs in a variety of habitats.	**Possible.** Suitable roosting and foraging habitat for this species is present on the site.
Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*)	CSC	Primarily a cave-dwelling bat that may also roost in buildings. Occurs in a variety of habitats.	**Possible.** Suitable roosting and foraging habitat for this species is present on the site.

Table 3-2: ANIMALS – cont'd.

State Species of Special Concern

Species	Status	Habitat	*Occurrence in the Study Area
Pallid bat (*Antrozous pallidus*)	CSC	Roosts in rocky outcrops, cliffs, and crevices with access to open habitats for foraging. May also roost in caves, mines, hollow trees and buildings.	**Possible.** Suitable roosting and foraging habitat for this species is present on the site.
California mastiff bat (*Eumops perotis* ssp. *californicus*)	CSC	Frequents open, semi-arid to arid habitats, including conifer, and deciduous woodlands, coastal scrub, grasslands, palm oasis, chaparral and urban. Roosts in cliff faces, high buildings, trees and tunnels.	**Possible.** Suitable roosting and foraging habitat for this species is present on the site.
American badger (*Taxidea taxus*)	CSC	Found in drier open stages of most shrub, forest and herbaceous habitats with friable soils.	**Possible.** This species may establish burrows on the site in fields with sparse to moderately dense vegetation.
Ringtail (*Bassariscus astutus*)	CP	Riparian and heavily wooded habitats near water.	**Possible.** Suitable habitat for this species is present along the San Joaquin River.

Notes to Table 3-2

***Explanation of Occurrence Designations and Status Codes**
Present: Species observed on the sites at time of field surveys or during recent past.
Likely: Species not observed on the site, but it may reasonably be expected to occur there on a regular basis.
Possible: Species not observed on the sites, but it could occur there from time to time.
Unlikely: Species not observed on the sites, and would not be expected to occur there except, perhaps, as a transient.
Absent: Species not observed on the sites, and precluded from occurring there because habitat requirements not met.

STATUS CODES

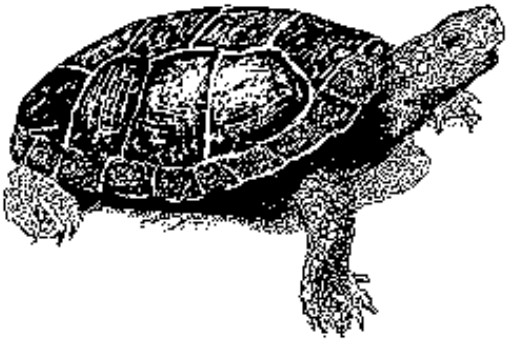
FE	Federally Endangered	CE	California Endangered
FT	Federally Threatened	CT	California Threatened
FPE	Federally Endangered (Proposed)	CR	California Rare

FC	Federal Candidate	CP	California Protected
		CSC	California Species of Special Concern
CNPS	California Native Plant Society Listing		
1A	Plants Presumed Extinct in California	3	Plants about which we need more information – a review list
1B	Plants Rare, Threatened, or Endangered in California and elsewhere	4	Plants of limited distribution – a watch list
2	Plants Rare, Threatened, or Endangered in California, but more common elsewhere		

Endangered, threatened, or special status plant and animal species meriting further discussion

Western Pond Turtle (*Clemmys marmorata*). Federal Listing Status: None; State Listing Status: Species of Special Concern.

Life history and ecology. The western pond turtle is the only native aquatic, freshwater turtle in California and normally associates with permanent or nearly permanent aquatic habitats, including streams, lakes, and ponds. Historically, this species occurred in Pacific Coast drainages from Washington to Mexico. This species occurs in aquatic habitats with 1) basking sites such as rocks and logs, 2) dense stands of submergent or emergent vegetation, 3) abundant aquatic invertebrate resources, 4) suitable nearby nesting sites, and 5) the lack of native and exotic predators (Bury 1972; Jennings and Hayes 1994; Bury and Holland, in press). This species can move along streams up to 3.1 miles (5 kilometers) in a short period of time, and they can tolerate at least 7 days without water (Jennings and Hayes 1994; Bury and Holland, in press).



Potential to occur onsite. Western pond turtles were not observed on the site during the April 2007 survey and have not been documented in the vicinity of Firebaugh, but they are known to occur at Mendota Dam less than six miles southeast of the site. The three small lakes at the northern end of the site, and Lake Joallan and the wastewater treatment ponds at the south end of the site, provide suitable habitat for this species. The San Joaquin River serves as a movement corridor and provides suitable habitat for the western pond turtle when water is present.

Blunt-Nosed Leopard Lizard (*Gambelia silus*). Federal Listing Status: Endangered; State Listing Status: Endangered; California Protected.

In addition to being state- and federally-endangered, the blunt-nosed leopard lizard (BNLL) is one of less than forty species that has a "fully protected" status through provisions of the California State Fish & Game Code. The CDFG cannot issue a "take" permit for fully protected species, and projects with fully protected species are required to completely avoid direct "take" of the species. In this instance, "take" refers to direct harm, injury, or killing of an individual, not to habitat modifications.

Life history and ecology. The blunt-nosed leopard lizard is a large, long-lived lizard whose short, blunt snout and pale crossbars on its back and tail give it its common name. It inhabits sparsely vegetated plains, alkali flats, low foothills, grasslands, canyon floors, large river washes, and arroyos. These opportunistic foragers feed primarily on insects—particularly grasshoppers, crickets and moths—other lizards, and occasionally plant material (CDFG 2004).

The species was originally found throughout the San Joaquin Valley and adjacent foothills, from San Joaquin County southward and into eastern San Luis Obispo County. Its distribution has been reduced by conversion of habitat to cropland. The blunt-nosed leopard lizard now occurs in scattered locations in the valley and in the eastern portions of the Coast Ranges, including the Antelope and Carrizo Plains and Cuyama Valley.

Potential to occur onsite. The blunt-nosed leopard lizard is known to occur within the vicinity of Firebaugh. Numerous sightings of this species have been documented east of Firebaugh, the nearest being made in 1989 approximately three miles northeast of the city (Figure 4). While most of the site consists of agricultural fields and urban development and, therefore, is not suitable habitat for the blunt-nosed leopard lizard, the sandy washes of the San Joaquin River and ruderal upland habitat around Lake Joallan provide potential, albeit poor, habitat for this species.

Giant Garter Snake (*Thamnophis gigas*). Federal Listing Status: Threatened; State Listing Status: Threatened.

By the time it was listed as federally threatened on October 20, 1993, the giant garter snake population had suffered severe declines as a result of habitat loss due to urbanization and agricultural activities. A draft recovery plan was submitted for the giant garter snake in 1999, but a final recovery plan has not been adopted to date.

Life history and ecology. The giant garter snake is one of the largest garter snakes, reaching a total length of at least 63 inches. Females typically weigh 1 to 1.5 pounds and tend to be slightly longer and proportionately heavier than males. Dorsal background coloration varies from brownish to olive with a checkered pattern of black spots, separated by a yellow dorsal stripe and two light colored lateral stripes. Background coloration and prominence of a black checkered pattern and the three light stripes are geographically and individually variable. The ventral surface (the snake's underside) is cream to olive or brown and sometimes infused with orange, especially in northern populations. Giant garter snakes feed primarily on small fishes, tadpoles, and frogs (USFWS 2007).

The giant garter snake inhabits small mammal burrows and other soil crevices above prevailing flood elevations throughout its winter dormancy period. Giant garter snakes typically select burrows with sunny exposure along south- and west-facing slopes. Their breeding season extends through March and April, and females give birth to live young from late July through early September. Brood size is variable, ranging from 10 to 46 young, who immediately scatter into dense cover and absorb their yolk sacs, after which they begin feeding on their own. Sexual maturity averages three years for males and five years for females (USFWS 2007).

In April 2002, Dr. Mark Jennings, who served on the technical subteam writing the recovery plan for the giant garter snake, determined that habitats of the San Joaquin River were still suitable for the giant garter snake, and that this species could forage in upland habitats adjacent to the San Joaquin River. The Mendota area, less than seven miles southeast of Firebaugh, represents one of only thirteen Central Valley locations in which a giant garter snake population is thought to be present (USFWS

1999). Although giant garter snakes generally remain in close proximity to aquatic and wetland habitats, they have been observed foraging or dispersing through upland habitats up to 800 feet from marshes and pools. The giant garter snake is generally inactive during the winter and seeks cover in rodent burrows that may be as much as 800 feet from marshes and ponds.

Potential to occur onsite. As has been previously noted, the Firebaugh area has been highly disturbed by agricultural activities and urban development. A giant garter snake was observed in the area about thirty years ago along Highway 33 and Douglas Avenue at the north end of the site (Figure 4). Ongoing anthropogenic disturbances have not, however, resulted in any barriers to giant garter snake movement along the San Joaquin River and major irrigation canals, where it would be expected to occur. Furthermore, rodents have maintained limited overwintering habitat in the form of burrows for this species. It is reasonable to conclude, therefore, that the giant garter snake could pass through the site or overwinter on portions of it.

Swainson's Hawk (*Buteo swainsoni*). Federal Listing Status: None; State Listing Status: Threatened.

The Swainson's hawk is designated as a California Threatened species. The loss of agricultural lands (i.e., foraging habitat) to urban development and additional threats such as riverbank protection projects have contributed to its decline.

Life history and ecology. Swainson's hawks are a large, broad-winged, broad-tailed hawks. Male and female Swainson's hawks have similar body types, with a length generally between 17 and 22 inches and a wingspan between 47 and 57 inches. They weigh up to 2.5 pounds.

Swainson's Hawks have a high degree of mate and territorial fidelity. They arrive at their nesting sites in March or April, and their nests, measuring three to four feet in diameter, can take up to two weeks to complete. The nest is likely to be in a low tree, or giant cactus, ledges, or on the ground. The female will lay and incubate two to four eggs for approximately 28 to 35 days. The male helps with incubation when the female leaves the nest to feed. The young hatch sometime between March and July and do not leave the nest until

some 4 to 6 weeks later. The young hawks chase grasshoppers and crickets on the ground before they learn how to catch other kinds of prey.

These birds patrol open areas or scan for prey from a perch; they may also catch insects in flight. Swainson's hawks are unique in switching from a diet of primarily small mammals when raising young to insects when migrating or wintering. As a soaring, open-country hunter, it often hunts from perches such as tree tops, poles or posts, rocks, and elevated ground.

In the Central Valley, Swainson's hawks typically nest in large trees in or peripherally to riparian systems adjacent to suitable foraging habitats. Other suitable nest sites include lone trees, groves of trees such as oaks, other trees in agricultural fields, and mature roadside trees. Swainson's hawks forage in large, open fields with abundant prey, including grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands.

Potential to occur onsite. Swainson's hawks are known to breed along the San Joaquin River. Six documented sightings of this species occur within three miles of Firebaugh, and a pair of Swainson's hawks was observed flying over the river and adjacent agricultural fields during the April 2007 survey. They were also observed perching in a mature cottonwood along the river near a large stick nest.

Burrowing Owl (*Athene cunicularia*). Federal Listing Status: None; State Listing Status: Species of Special Concern.

The burrowing owl is designated as a California Species of Special Concern. This designation was based on the species' declining population within the state over the past 40 years. The population decline is mainly due to habitat destruction resulting from development and agricultural practices.

Life history and ecology. The burrowing owl is a small, long-legged, semi-fossorial bird that averages a height of 9.5 inches, has an average wingspan of 23 inches, and weighs an average of 5.25 ounces. Burrowing owls are unique in that they are the only owl that regularly lives and breeds in underground nests. In California, these

birds typically occur in the Central and Imperial Valleys, primarily utilizing ground squirrel burrows (or the burrows of other animals, e.g., badgers, prairie dogs and kangaroo rats) found in grasslands, open shrub lands, deserts, and, to a lesser extent, grazed and agricultural lands. Burrowing owls in this region are typically found at elevations below 250 ft. and exhibit strong site fidelity. Pairs have been known to return to the same area year after year, and some pairs are known to utilize the same burrow as the previous year. Burrowing owls are colonially nesting raptors, and colony size is indicative of habitat quality. It is not uncommon to find burrowing owls in developed and cultivated areas where California ground squirrels are active.

Burrowing owls feed on various small mammals including deer mice, voles, and rats. They also prey on various invertebrates including crickets, beetles, grasshoppers, spiders, centipedes, scorpions and crayfish. Peak hunting periods occur around dusk and dawn.

Potential to occur onsite. As noted in Table 2, no burrowing owls or their sign were observed within the study site. However, the study area provides suitable habitat for this species in the form of California ground squirrel burrows present in the agricultural fields as well as in ruderal and developed areas. Given their propensity to establish nest burrows in agricultural areas, breeding pairs may periodically nest in the fields during the spring.

San Joaquin Kit Fox (*Vulpes macrotus mutica*). Federal Listing Status: Endangered; State Listing Status: Threatened.

By the time the U.S. Fish and Wildlife Service listed it as an endangered species under the authority of the Federal Endangered Species Act on 11 March 1967, the San Joaquin kit fox had been extirpated from much of its historic range. In 1998, the USFWS adopted a final recovery plan for the San Joaquin kit fox. On 27 June 1971, the State of California listed the kit fox as a threatened species.

Life history and ecology. The San Joaquin kit fox, the smallest North American member of the dog family (Canidae), historically occupied the dry plains of the San Joaquin Valley, from San Joaquin County to southern Kern County (Grinnell et al. 1937). Critical habitat has

yet to be established for the San Joaquin kit fox. Local surveys, research projects, and incidental sightings indicate that kit foxes currently occupy available habitat on the San Joaquin Valley floor and in the surrounding foothills.

Kit foxes prefer habitats of open or low vegetation with loose soils. In the northern portion of their range, they occupy grazed grasslands and, to a lesser extent, valley oak woodlands. In the southern and central portion of the Central Valley, kit foxes are found in valley sink scrub, valley saltbrush scrub, upper Sonoran subshrub scrub, and annual grassland (USFWS 1998). Kit foxes may also be found in grazed grasslands, urban settings, and in areas adjacent to tilled or fallow fields (USFWS 1998).

Kit fox diets vary geographically, seasonally, and annually. In the central portion of their range, which includes lands around the study area, known prey includes white-footed mice, insects, California ground squirrels, black-tailed hares, San Joaquin antelope squirrels, kangaroo rats, desert cottontails, and ground-nesting birds (Archon 1992; Jensen 1972).

The kit fox requires underground dens to raise pups, regulate body temperature, and avoid predators and other adverse environmental conditions (Golightly and Ohmart 1984). In the central portion of their range, they usually occupy burrows excavated by small mammals, such as ground squirrels. Denning habitat consists of ground squirrel complexes in which some burrows have been enlarged to 4 to 6 inches in diameter for the length of a human arm (approximately 2 ft.).

Potential to occur onsite. Areas surrounding the planning area consist of farmland and the State Route 33 corridor. These are land uses that are not generally suitable for the San Joaquin kit fox. The planning area itself has been heavily managed for agricultural uses or has been converted to urban development, rendering onsite habitat for this species marginal, at best.

Suitable denning habitat for kit foxes was not observed on the planning area during the April 2007 field survey; however, protocol-level surveys consisting of 100% visual coverage were not conducted. Denning habitat consists of ground squirrel complexes in which some burrows have been enlarged to 4 to 10 inches in diameter for the length of a human arm (approximately 2 ft.). A

number of ground squirrel burrows were observed throughout the agricultural fields, but none possessed the dimensions suitable for kit foxes.

Having been modified for agricultural and urban use, the study area provides a limited prey base and, therefore, marginal to poor foraging habitat for kit foxes. Intensive farming practices have also limited the onsite occurrence of ground-nesting birds that sometimes constitute prey for this species.

Of primary interest for this project are kit fox records from the vicinity of the proposed Firebaugh Sphere of Influence. According to the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the CNDDB (CDFG 2007), there have been a total of six direct and indirect sightings within ten miles of the site miles of the site (Figure 5. The planning area itself is completely surrounded by agricultural fields and is situated along SR 33. As such, the planning area is isolated from any extant subpopulations of kit fox. Based on the area's location and the distribution of kit fox occurrences in its vicinity, the planning area is not essential to the regional movement of kit fox populations. The San Joaquin River and three large irrigation canals run through the planning area; however, should a kit fox utilize these corridors, it would have to travel through miles of marginal to poor habitat (i.e., agricultural fields and orchards) before reaching the area, which itself holds little habitat value. For all intents and purposes, the planning area would tend to function more as a dispersal sink (i.e., a habitat in which a population is expected to decline to extinction due to sub-optimal foraging and breeding conditions) than as an area that would facilitate movements or aid in successful breeding.

In summary, although six historical kit fox sightings occur within ten miles of the planning area, the area has been modified for agricultural or urban use, and lands surrounding the planning area in all directions consist of agricultural fields, presenting significant barriers to movement. Considering the highly disturbed condition of the planning area, its isolation from extant kit fox populations, and its marginal to poor suitability as foraging or denning habitat, there is little likelihood that a dispersing fox traveling from any regional subpopulation would access the planning area except as an incidental occurrence.

Jurisdictional Waters

Jurisdictional waters include rivers, creeks, and drainages that have a defined bed and bank and which, at the very least, carry ephemeral flows. Jurisdictional waters also include lakes, ponds, reservoirs, and wetlands. Such waters may be subject to the regulatory authority of the U.S. Army Corps of Engineers (USACE), the California Department of Fish and Game (CDFG), and the California Regional Water Quality Control Board (RWQCB). See Section 3.2.4 of this report for additional information.

The San Joaquin River would be considered Waters of the United States and Waters of California. This drainage is characterized as having a defined bed and bank and is hydrologically connected to other Waters of the U.S., is it empties into the San Francisco Bay. The limit of USACE jurisdiction, as well as that of the RWQCB, would be the ordinary high water (OHW) level. The river would also likely be subject to the jurisdiction of the CDFG up to the top of bank or the edge of associated riparian vegetation, whichever is greater.

Although it was part of a historic USGS blue line, it is not believed that the remnant channel occurring near Lake Joallan would be considered jurisdictional by the USACE, as it is no longer hydrologically connected to other Waters of the U.S., although it still may be regulated by the RWQCB and CDFG.

Three major irrigation canals—Main Canal, Outside Canal, and Delta-Mendota Canal—run through the planning area. While artificial waterways such as canals are typically not claimed by the agencies, these canals are connected to Waters of the U.S. via the Mendota Pool and the O'Neill forebay and, thus, may be claimed as jurisdictional by the USACE and RWQCB.

Additionally, the three small lakes at the northern end of the study site and Lake Joallan and the small seasonal wetland at the southern end, might meet the three wetland criteria (i.e., vegetation, hydrology, and soils). These sites occur just west of the San Joaquin River but appear to be hydrologically isolated from the river. Due to their apparent isolation, if portions of these features met the three technical criteria for jurisdictional wetlands, then the USACE would not exert jurisdiction over them.

However, the RWQCB would still likely regulate these features. The CDFG typically only claims jurisdiction over natural drainages and, therefore, is unlikely to regulate wetlands or manmade irrigation features such as the canals mentioned above.

At the level of effort put forth for this study and with the exception of the seasonal wetland next to Lake Joallan, no seasonal wetlands were identified in any of the other agricultural fields. However, because they were not fully accessible, small, isolated patches of seasonal wetlands may exist in agricultural fields within the study area.

The remaining irrigation ditches and retention ponds would likely not be considered Waters of the U.S. or fall under the CDFG's jurisdiction due to the fact that they are manmade and do not replace the functions and values of historic waters. As such, alteration of these features is unlikely to be regulated by the USACE, CDFG, or RWQCB but would need to be evaluated on a case-by-case basis as to their jurisdiction.

The wastewater treatment ponds would not be regulated by the USACE or RWQCB, as such features are excluded from their jurisdiction.

However, it is important to note that these three agencies are the final arbiters and could claim jurisdiction over some or all of these features.

D. CULTURAL AND HISTORICAL RESOURCES

Human presence in the southern San Joaquin Valley probably dates back as far as 10,000 - 12,000 years. Artifacts found along the southern shore of Tulare Lake are similar to the Clovis points associated with the big game hunters of the Great Plains. Excavations of a site at Buena Vista Lake in Kern County indicate that it may have been continuously occupied for more than 8,000 years. These cultures may represent the penetration of Penutian speaking people into Central California.

The Yokuts Indians occupied the entire San Joaquin Valley at the time of European contact. The Tachi tribe of the Southern Valley Yokuts occupied the northern and western shores of Tulare Lake and probably ranged as far as the eastern edge of the coast ranges. The Southern

Valley Yokuts subsisted on fish, waterfowl, and mollusk gathered in the wetlands formed by Tulare, Buena Vista and Kern Lakes.

European history in central California has occurred over the past 300 years. The Spanish generally viewed the Central Valley as a vast wasteland and made few forays into the area. Other European descendents visited the area on explorations of the valley and Sierra Nevada. Individuals searching for minerals, cowboys running animal herds and fur trappers were eventually followed by farmers who planted grain crops in the region.

The site of Firebaugh was originally part of land held by Miller & Lux, which began aquiring land on the west side of the San Joaquin Valley in the early 1860's. They employed 2,400 men and organized camps of laborers to build a system of irrigation canals, allowing the dry plains around Firebaugh to become productive farm lands. Grains, alfalfa, grapes and other fruits were grown during these early years of farming.

In 1879, the San Joaquin and Kings River Canal Company bought out the land around Las Juntas. This purchase combined with the offer of $1-town lots forced 200 people to moved from Las Juntas to Firebaugh. In 1890, the Southern Pacific Railroad line through Firebaugh was completed. Almost two decades later, the city of Firebaugh was incorporated with a population of 700.

A records search at the Southern San Joaquin Valley Information Center (RS# 165, 6/7/91) indicated one known archaeological site in the planning area. It was reported during the construction of the Delta-Mendota canal in 1951 and contained human bone from at least two individuals, a large obsidian "point" and other artifact fragments. The site is now under water.

E. AIR QUALITY

Regional Setting

The topography around Firebaugh includes foothills and mountains to the east, west, and south. These mountain ranges direct air circulation and dispersion patterns. Temperature inversions can trap air within the Valley,

thereby preventing the vertical dispersal of air pollutants. In addition to topographic conditions, the local climate can also contribute to air quality problems. Climate in the Fresno County is classified as Mediterranean, with moist cool winters and dry warm summers. The City of Firebaugh is located on the valley floor at an elevation of approximately 151 feet above sea level with the surrounding area mostly flat.

Ozone, classified as a "regional" pollutant, often afflicts areas downwind of the original source of precursor emissions. Ozone can be easily transported by winds from a source area. Peak ozone levels tend to be higher in the southern portion of the Valley, as the prevailing summer winds sweep precursors downwind of northern source areas before concentrations peak. The separate designations reflect the fact that ozone precursor transport depends on daily meteorological conditions.

Other primary pollutants, CO, for example, may form high concentrations when wind speed is low. During the winter, Firebaugh experiences cold temperatures and calm conditions that increase the likelihood of a climate conducive to high CO concentrations.

Precipitation and fog tend to reduce or limit some pollutant concentrations. Ozone needs sunlight for its formation, and clouds and fog block the required radiation. CO is slightly water-soluble so precipitation and fog tends to "reduce" CO concentrations in the atmosphere. PM-10 is somewhat "washed" from the atmosphere with precipitation. Precipitation in the Valley is strongly influenced by the position of the semi-permanent subtropical high-pressure belt located off the Pacific coast (Pacific High). In the winter, this high-pressure system moves southward, allowing Pacific storms to move through the Valley. These storms bring in moist, maritime air that produces considerable precipitation on the western, upslope side of the Coast Ranges. Significant precipitation also occurs on the western side of the Sierra Nevada. On the Valley floor, however, there is some downslope flow from the Coast Ranges and the resultant evaporation of moisture from associated warming results in a minimum of precipitation. Nevertheless, the majority of the precipitation falling in the Valley is produced by those storms during the winter. Precipitation during the summer months is in the form of convective rain showers and is rare. It is usually associated with an influx of moisture into the Valley

through the San Francisco area during an anomalous flow pattern in the lower layers of the atmosphere. Although the hourly rates of precipitation from these storms may be high, their rarity keeps monthly totals low.

Precipitation on the Valley floor and in the Sierra Nevada decreases from north to south. Stockton in the north receives about 20 inches of precipitation per year, Fresno in the center, receives about 10 inches per year, and Bakersfield at the southern end of the valley receives less than 6 inches per year. This is primarily because the Pacific storm track often passes through the northern part of the state while the southern part of the state remains protected by the Pacific High. Precipitation in the San Joaquin Valley Air Basin (SJVAB) is confined primarily to the winter months with some also occurring in late summer and fall. Average annual rainfall for the entire Valley is 9.25 inches on the Valley floor.

Snowstorms, hailstorms, and icestorms occur infrequently in the Valley and severe occurrences of any of these are very rare.

The winds and unstable air conditions experienced during the passage of storms result in periods of low pollutant concentrations and excellent visibility. Between winter storms, high pressure and light winds allow cold moist air to pool on the Valley floor. This creates strong low-level temperature inversions and very stable air conditions. This situation leads to the Valley's famous Tule Fogs. The formation of natural fog is caused by local cooling of the atmosphere until it is saturated (dew point temperature). This type of fog, known as radiation fog, is more likely to occur inland. Cooling may also be accomplished by heat radiation losses or by horizontal movement of a mass of air over a colder surface. This second type of fog, known as advection fog, generally occurs along the coast.

Conditions favorable to fog formation are also conditions favorable to high concentrations of CO and PM-10. Ozone levels are low during these periods because of the lack of sunlight to drive the photochemical reaction. Maximum CO concentrations tend to occur on clear, cold nights when a strong surface inversion is present and large numbers of fireplaces are in use. A secondary peak in CO concentrations occurs during morning commute

hours when a large number of motorists are on the road and the surface inversion has not yet broken.

The water droplets in fog, however, can act as a sink for CO and nitrogen oxides (NOx), lowering pollutant concentrations. At the same time, fog could help in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor of winter season violations of the PM-10 and PM-
2.5 standards.

Regulatory Agencies and Responsibilities

Air quality within the Firebaugh area is addressed through the efforts of various federal, state, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies primarily responsible for improving the air quality within Fresno County are discussed below along with their individual responsibilities.

U.S. Environmental Protection Agency

The federal Clean Air Bill first adopted in 1967 and periodically amended since then, established federal ambient air quality standards. A 1987 amendment to the Bill set a deadline for the attainment of these standards. That deadline has since passed. The other federal Clean Air Bill Amendments, passed in 1990, share responsibility with the State in reducing emissions from mobile sources. U.S. Environmental Protection Agency (U.S. EPA) is responsible for enforcing the 1990 amendments.

The Federal Clean Air Act (CAA) and the national ambient air quality standards identify levels of air quality for six "criteria" pollutants, which are considered the maximum levels of ambient air pollutants considered safe, with an adequate margin of safety, to protect public health and welfare. The six criteria pollutants include ozone, CO, nitrogen dioxide, sulfur dioxide, particulate matter 10 microns in size and smaller (PM_{10}), and lead.

The U.S. EPA requires each state to prepare and submit a State Implementation Plan (SIP) that describes how the

state will achieve the federal standards by the specificed dates, depending on the severity of the air quality within the state or basin. Based on the provisions contained in the 1990 amendment, EPA designated the entire San Joaquin Valley as non-attainment for two pollutants: ozone and particle matter less than 10 microns in size or PM_{10}.

More recently, on April 24, 2004, the EPA reclassified the San Joaquin Valley ozone nonattainment area from its previous severe status to "extreme" at the request of the San Joaquin Air Pollution Control District Board. On December 17, 2004, EPA took action to designate attainment and non-attainment areas under the more protective national air quality standards for fine particles or $PM_{2.5}$.

Fresno County is considered to be in non-attainment of ozone, PM_{10} and $PM_{2.5}$ standards.

California Air Resources Board

The California Air Resources Board (ARB) is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing its own air quality legislation called the California Clean Air Act (CCAA), adopted in 1988. The ARB was created in 1967 from the merging of the California Motor Vehicle Pollution Control Board and the Bureau of Air Sanitation and its Laboratory.

The ARB has primary responsibility in California to develop and implement air pollution control plans designed to achieve and maintain the NAAQS established by the EPA. Whereas the ARB has primary responsibility and produces a major part of the SIP for pollution sources that are statewide in scope, it relies on the local air districts to provide additional strategies for sources under their jurisdiction. The ARB combines its data with all local district data and submits the completed SIP to the EPA. The SIP consists of the emissions standards for vehicular sources and consumer products set by the ARB, and attainment plans adopted by the APCDs and AQMDs and approved by the ARB.

States may establish their own standards, provided the state standards are at least as stringent as the NAAQS. California has established California Ambient Air Quality Standards (CAAQS) pursuant to California Health and

Safety Code (CH&SC) [§39606(b)] and its predecessor statutes.

The CH&SC [§39608] requires the ARB to "identify" and "classify" each air basin in the state on a pollutant-by-pollutant basis. Subsequently, the ARB designated areas in California as nonattainment based on violations of the CAAQSs. Designations and classifications specific to the SJVAB can be found in the next section of this document. Areas in the state were also classified based on severity of air pollution problems. For each nonattainment class, the CCAA specifies air quality management strategies that must be adopted. For all nonattainment categories, attainment plans are required to demonstrate a five-percent-per-year reduction in nonattainment air pollutants or their precursors, averaged every consecutive three-year period, unless an approved alternative measure of progress is developed. In addition, air districts in violation of CAAQS are required to prepare an Air Quality Attainment Plan (AQAP) that lays out a program to attain and maintain the CCAA mandates.

Other ARB duties include monitoring air quality. The ARB has established and maintains, in conjunction with local air pollution control districts (APCDs) and air quality management districts, a network of sampling stations (called the State and Local Air Monitoring [SLAMS] network) that monitor what the pollutants levels are actually present in the ambient air.

Fresno County is in the CARB-designated SJVAB. A map of the California Air districts is provided in Figure 2. In addition to Fresno County, the SJVAB includes San Joaquin, Fresno, Kings, Madera, Merced, Stanislaus, and Kern Counties.

Federal and State standards for criteria pollutants are provided in Table 3-3.

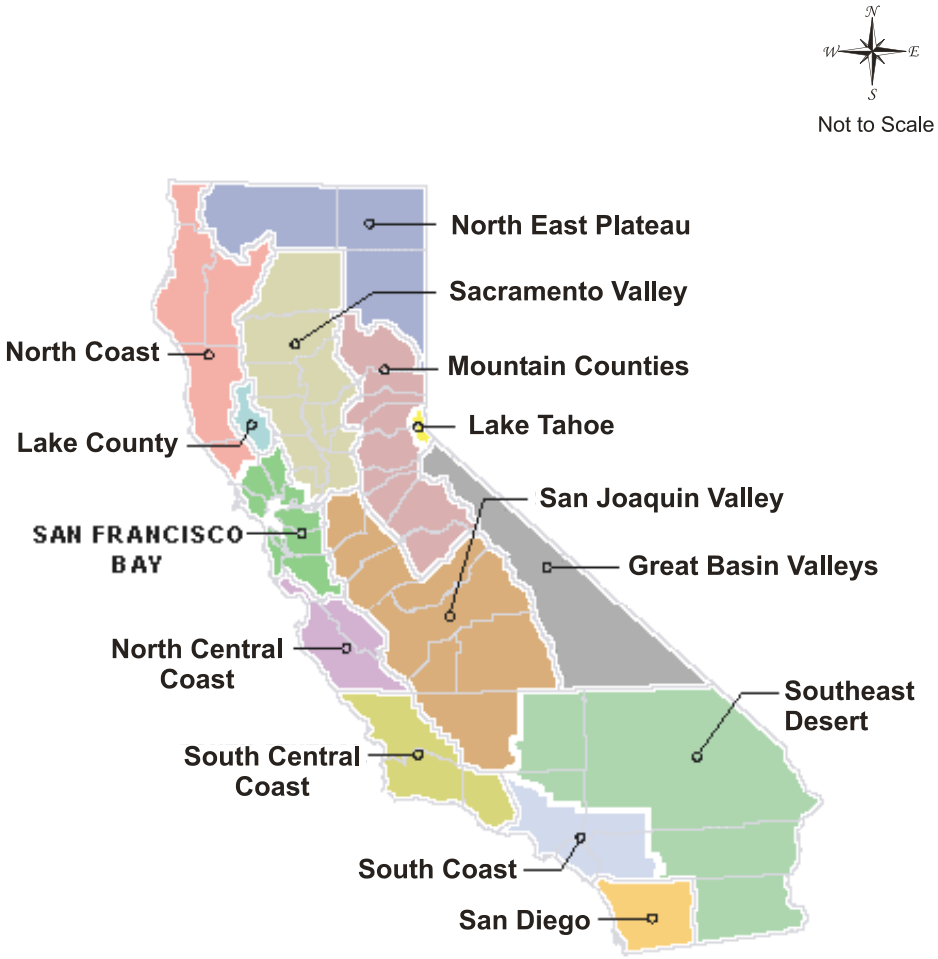
San Joaquin Valley Air Pollution Control District

The San Joaquin Valley Air Pollution Control District (SJVAPCD or District) is the agency responsible for monitoring and regulating air pollutant emissions from stationary, area, and indirect sources within Fresno County and throughout the SJVAB. The District also has responsibility for monitoring air quality and setting and enforcing limits for source emissions. CARB is the

agency with the legal responsibility for regulating mobile source emissions. The District is precluded from such activities under State law.

The District was formed in mid-1991 and prepared and adopted the San Joaquin Valley Air Quality Attainment Plan (AQAP), dated January 30, 1992, in response to the requirements of the State CCAA. The CCAA requires each non-attainment district to reduce pertinent air contaminants by at least five percent (5%) per year until new, more stringent, 1988 State air quality standards are met.

The District is the agency empowered to regulate air pollutant emissions. The District regulates air quality through its permit authority for most types of stationary emission sources and through its planning and review activities for other sources. Table 3-3 contains the ambient air quality classifications for the Firebaugh area.



California Air Quality Districts

Map 3-4

Legend

VRPA Technologies, Inc.

TABLE 3-3

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.08 ppm (157 µg/m^3)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2) *	Annual Arithmetic Mean	0.030 ppm (56 µg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (338 µg/m^3)		—		
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m^3)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	1 Hour	0.25 ppm (655 µg/m^3)		—	—	—
Lead[8]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[8]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

* The Nitrogen Dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hr standard to 0.18 ppm and establish a new annual standard of 0.030 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.

See footnotes on next page …

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (02/22/07)**

Notes to Table 3-3

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calender year with a 24-hour average concentration above 150 µg/m3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

8. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
SOURCE: CARB 2007a

Table 3-4
San Joaquin Valley Air Basin – District Attainment Status

Pollutant	Designation/Classification	
	Federal Standards	**State Standards**
Ozone- 1 Hour	No Designation	Non-attainment/Severe
Ozone - 8 Hour	Non-attainment/Serious	No State Standard
PM_{10}	Non-attainment/Serious	Non-attainment
$PM_{2.5}$	Non-attainment	No State Standard
Carbon Monoxide	Unclassified/Attainment	Attainment
Nitrogen Dioxide	Unclassified/Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead Particulates	No Designation	Attainment

Source: SJVAPCD, 2007

Air Pollution Sources and Current Air Quality

Motor vehicles account for significant portions of regional gaseous and particulate emissions. Local large employers such as industrial plants can also generate substantial regional gaseous and particulate emissions. In addition, construction and agricultural activities can generate significant temporary gaseous and particulate emissions (dust, ash, smoke, etc.).

The principal factors that affect air quality in and around Firebaugh are: (a) the sink effect, climatic subsidence and temperature inversions and low wind speeds; (b) automobile and truck travel and (c) increases in mobile and stationary pollutants generated by local urban growth.

Ozone Emissions

The most severe air quality problem in the SJVAB is the high level of ozone. Ozone can cause eye irritation and impair respiratory functions. Accumulations of ozone depend heavily on weather patterns and thus vary substantially from year to year. Ozone is produced in the atmosphere through photochemical reactions involving

reactive organic compounds (ROG) and nitrogen oxides (NO_X). Numerous small sources throughout the region are responsible for most of the ROG and NO_X emissions in the SJVAB.

Suspended PM_{10} Emissions

PM_{10} refers to particulate matter less than 10 microns in diameter - those that can be inhaled and cause health effects. Common sources of particulate include demolition, construction activity, agricultural operations, traffic and other localized sources such as from fireplaces. Very small particulate of certain substances can cause direct lung damage, or can contain absorbed gases that may be harmful when inhaled. Particulate can also damage materials and reduce visibility.

Fine Particles $PM_{2.5}$

Particles less than 2.5 micrometers in diameter are called "fine" particles. These particles are so small they can be detected only with an electron microscope. Sources of fine particles include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes.

Carbon Monoxide (CO)

Because CO is emitted primarily by motor vehicles and is non-reactive, ambient CO concentrations normally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are also influenced by meteorological factors such as wind speed and atmospheric mixing. High levels of CO can impair the transport of oxygen in the bloodstream and thereby aggravate cardiovascular disease and cause fatigue, headaches, and dizziness. The California Air Resources Board (CARB) found CO standards in Fresno County in attainment of federal and State standards.

Nitrogen Dioxide (NO_2)

The major sources of nitrogen dioxide (NO_2), essential to the formation of photochemical smog, are vehicular, residential, and industrial fuel combustion. NO_2 is the "whiskey brown" colored gas evident during periods of heavy air pollution. NO_2 increases respiratory disease and irritation and may reduce resistance to certain infections.

The standards for NO_2 are being met in the SJVAB and the District does not expect that the standards will be exceeded in the near future.

Sulfur Dioxide (SO_2)

The major source of sulfur dioxide (SO_2) is the combustion of high-sulfur fuels for electricity generation, petroleum refining and shipping. In humid atmospheres, sulfur oxides can react with vapor to produce sulfuric acid, a component of acid rain. SO_2 can irritate the lungs, damage vegetation and materials and reduce visibility. The standards for SO_2 are being met in the SJVAB and the District does not expect that the standards will be exceeded in the near future.

Lead (Pb)

Gasoline-powered automobile engines are a major source of airborne lead, although the use of leaded fuel is being reduced. Lead can cause blood effects such as anemia and the inhibition of enzymes involved in blood synthesis. Lead may also affect the central nervous and reproductive systems. Ambient lead levels have dropped dramatically as the percentage of motor vehicles using unleaded gasoline continues to increase. The standards for lead are being met in the SJVAB and the District does not expect that the standards will be exceeded in the future.

Local Air Monitoring Stations

One monitoring station located close to the project study area is located at the City of Madera Pump Yard Station. The station monitors particulates, ozone, carbon monoxide, and nitrogen dioxide. Monitoring data for the past three years is summarized in Table 3.

Table 3-5
Maximum Pollutant Levels at Madera's Pump Yard Monitoring Station

Pollutant	Time Averaging	2004 Maximums	2005 Maximums	2006 Maximums	Standards National	Standards State
Ozone (O_3)	1 hour	0.097 ppm	0.095 ppm	0.113 ppm	0.12 ppm	0.09 ppm
Ozone (O_3)	8 hour	0.084 ppm	0.081 ppm	0.095 ppm	0.08 ppm	-
Carbon Monoxide (CO)*	8 hour	2.84 ppm	2.95 ppm	3.20 ppm	9.0 ppm	9.0 ppm
Nitrogen Dioxide (NO_2)	1 hour	0.053 ppm	0.057 ppm	0.051 ppm	-	.025 ppm
Nitrogen Dioxide (NO_2)	Annual Average	0.010 ppm	0.010 ppm	0.011 ppm	0.053 ppm	-
Particulates (PM_{10})*	24 hour	54 mg/m^3	106 mg/m^3	117 mg/m^3	150 mg/m^3	50 mg/m^3
Particulates (PM_{10})*	Federal Annual Arithmetic Mean	30.9 mg/m^3	32.6 mg/m^3	37.7 mg/m^4	50 mg/m^3	20 mg/m^3
Particulates ($PM_{2.5}$)*	24 hour	71.0 mg/m^3	86.0 mg/m^3	71.0 mg/m^3	65 mg/m^3	-
Particulates ($PM_{2.5}$)*	Federal Annual Arithmetic Mean	16.4 mg/m^3	16.9 mg/m^3	16.8 mg/m^4	15 mg/m^3	12 mg/m^3

Source : CARB Website, 2007
* Fresno's 1st Street Monitoring Station

Planning for Air Quality

The San Joaquin Valley Unified Air Pollution Control District recommends a number of strategies for cities to create development patterns that protect air quality. The publication "A Guide for Assessing and Mitigating Air Quality Impacts" has the following recommendations:

- Encourage the development of higher density housing and employment centers near existing and planned transit routes.
- Encourage compact development featuring a mix of uses that locates residences near jobs and services.
- Provide neighborhood retail within or adjacent to large residential dev elopments.
- Provide services, such as restaurants, banks, copy shops, post office, etc., within office parks and other large employment centers.
- Encourage infill of vacant and redevelopment sites.
- Ensure that the design of streets, sidewalks and bike paths/routes within a development encourages walking and biking.

- Orient building entrances towards sidewalks and transit stops.
- Provide landscaping to reduce energy demand for cooling.
- Orient buildings to minimize energy required for heating and cooling.
- Encourage changes in zoning regulations to allow for upper story residential and/or office uses in neighborhood shopping areas.

Additional strategies for creating air quality friendly development patterns are discussed in the section of the General Plan entitled "A Smart Growth Primer".

F. WATER QUALITY

The aquifer underlying Firebaugh has been affected by certain contaminants, which requires the City to operate a water treatment plant. Contaminants have included iron, manganese and arsenic. Because of this problem, the City operates a water treatment plant where it utilizes chemical treatment and booster filters to remove these chemicals. After treatment, testing is done to ensure the resulting blended water is within public health parameters established by the State.