Riverside County Integrated Project

EXISTING SETTING REPORT

by LSA Associates, Inc.

Revised March 2000

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Section 1.0 - Introduction

1.1 Introduction to the Riverside County Integrated Project

In the year 2020, Riverside County will be home to approximately 2.8 million people, who will occupy approximately 918,000 dwelling units. This represents a doubling of the County's present population and housing stock. Another study by the California Department of Finance estimates that the County will continue to grow to 3.5 million people by 2030 and 4.5 million people by 2040. These residents will be located within 24 incorporated cities, as well as within numerous unincorporated areas.

Riverside County itself is large, encompassing 7,295.2 square miles, stretching across 200 miles from the eastern portion of the Los Angeles metropolitan area to the Colorado River. Bounded by Orange County on the west, San Bernardino County to the north, the State of Arizona to the east, and San Diego and Imperial Counties to the south, Riverside is the fourth largest county in California (see Figure 1.1).

Riverside is also one of the most diverse counties in the State, including well established urban, suburban, and rural communities; an extensive array of agricultural lands, lands devoted to mineral extraction, and recreational areas; rugged mountains, flat valley areas, and open desert; and expansive natural open space areas.

The crush of the coming population boom and the challenge of balancing the associated housing, transportation, and economic needs of existing and future populations with limited natural resources and the sensitivity of the natural environment required Riverside County to develop a unique planning model. This model, known as the Riverside County Integrated Project, consists of three integrated plans to determine future planning, transportation, and conservation needs for the County. The goals of the effort are three-fold:

- Update the County's General Plan.
- Create a Multiple Species Habitat Conservation Plan for the western portion of the County, and integrate an ongoing Coachella Valley Multi-Species Habitat Conservation Plan effort into the fabric of comprehensive planning for the County.
- Identify transportation corridors to meet the County's future transportation needs.

1.1.1 General Plan

Riverside County's General Plan will be a blueprint for the County's future. It will describe anticipated future growth, development, and environmental management over the long term. It is intended to act as a “constitution” for both public and private development, and serve as the foundation for Riverside County's growth and land use-related decision making. The General Plan is meant to express the community's goals with respect to both the man-made and natural environments, and set forth the policies

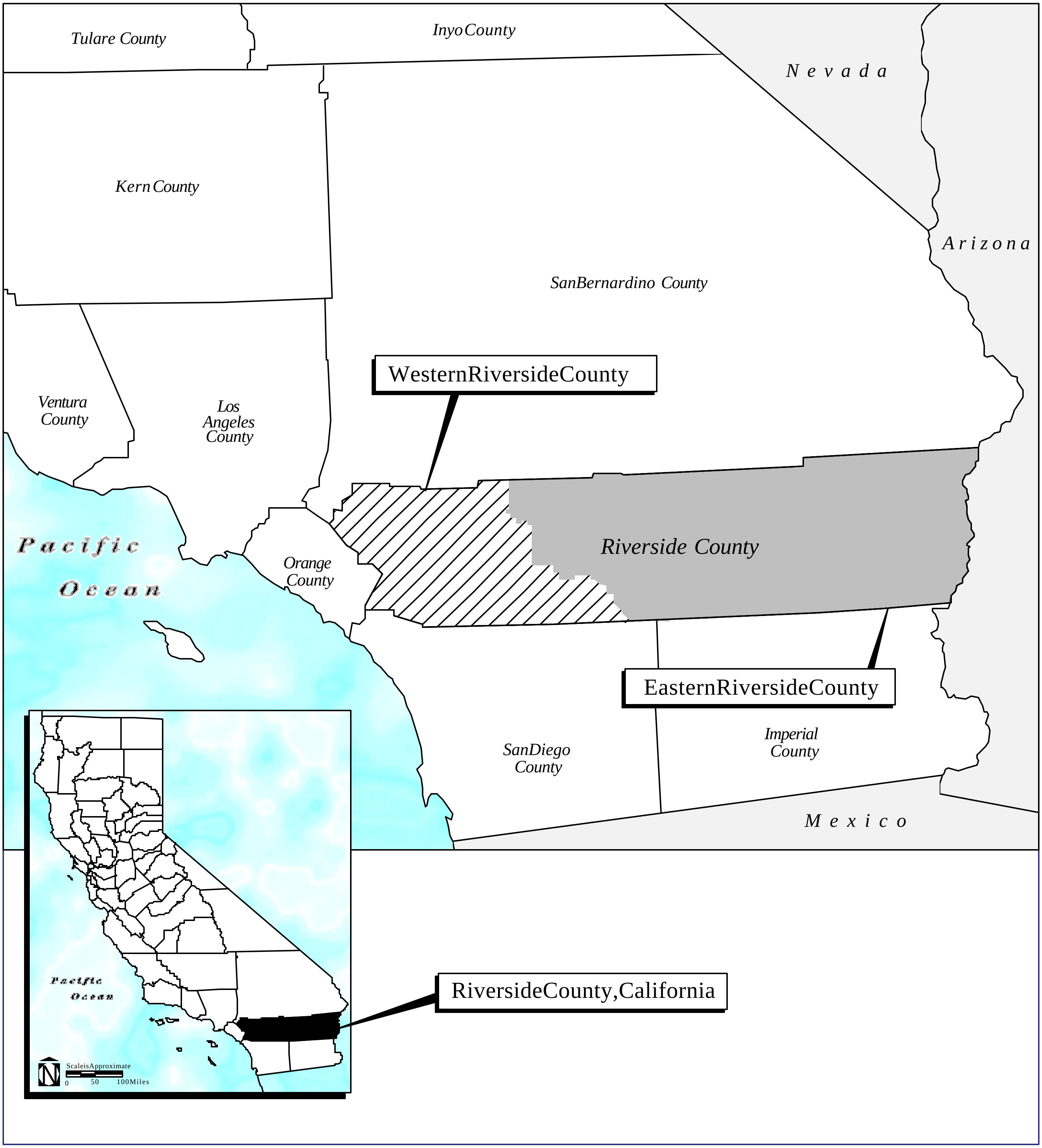

Figure 1.1

REGIONAL LOCATION

Scale is approximate
0 20 40 Miles

R:\SVC93-1Graphics\ExistingSetting\regional.cdr(7/5/02) and implementation measures needed to achieve those goals for the welfare of those who live, work, and do business in the County.

State law requires each city and County to adopt a General Plan which contains, at a minimum, the following seven "elements."[1]

- The LAND USE ELEMENT designates the general distribution and intensity of uses of the land for housing, business, industry, open space, education, public buildings and grounds, waste disposal facilities, and other categories of public and private uses.
- The CIRCULATION ELEMENT is correlated with the land use element, and identifies the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, and other local public utilities and facilities.
- The HOUSING ELEMENT is a comprehensive assessment of current and projected housing needs for all economic segments of the community, as well as groups having special housing needs (e.g., homeless, farm workers, elderly, handicapped). In addition, it embodies policy for providing adequate housing and includes action programs for this purpose.
- The CONSERVATION ELEMENT addresses the conservation, development, and use of natural resources, including water, forests, soils, rivers, and mineral deposits.
- The OPEN SPACE ELEMENT details plans and measures for preserving open space for natural resources, the managed production of resources, outdoor recreation, public health and safety, and the identification of agricultural land.
- The NOISE ELEMENT identifies and appraises noise problems within the community and forms the basis for land use distribution.
- The SAFETY ELEMENT establishes policies and programs to protect the community from risk associated with seismic, geologic, flood, and fire hazards.

In addition to these mandatory General Plan elements, the Riverside County General Plan will include an Air Quality Element which will address means to achieve and maintain good quality air throughout the County.

The Riverside County General Plan last underwent a comprehensive revision in the early 1980s. Subsequent to the adoption of the County of Riverside Comprehensive General Plan in 1984, a number of amendments were adopted, including an Air Quality Element, community plans and land use policies, and other amendments intended to accommodate specific development projects in various locations throughout the County.

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1 State law permits cities and counties to organize the information, goals, policies, and programs included in their General Plan in the manner best suited to the needs of the agency. Thus, the seven mandatory "elements" of an agency's General Plan need not be specific chapters or sections, provided that all of the subjects required by State law, are, in fact, addressed.

1.1.2 Multiple Species Habitat Conservation Plan (MSHCP)

Natural resources and their conservation are a critical part of the integrated planning process. Both nationally and at the state levels, laws exist to protect plants and animals, and to assist people to understand how they and their homes, their businesses, their movements and recreation will affect the environment. The California Natural Communities Conservation Planning Act (NCCP) of 1992 was passed in order to promulgate a collaborative conservation planning effort between the public, businesses, and government in order to address future regionwide conservation needs while it is still feasible to do so. Laws also exist which protect the rights of property owners and current land uses.

The purpose of the MSHCP is to provide for open space and nature preserves to be set aside in some areas, protecting the same sensitive habitat areas, while permitting development and growth in other, less sensitive areas. The MSHCP will address the potential impacts of urban growth, natural habitat loss, and plant and animal species endangerment. It attempts to ensure habitat conservation, species protection and management, program costs, and development certainty to the County and cities; State and federal wildlife agencies; development, agriculture, and environmental communities; and the public at large.

1.1.3 Community Environmental and Transportation Acceptability Program (CETAP)

In Southern California, transportation is an economic, quality of life, and practical issue. People need to get to and from work, businesses need to transport and receive goods, and we all have to breathe the air. Population and employment growth in Riverside County is expected to bring about traffic increases between 80 and 200 percent on existing freeway facilities in the western County and will increasingly strain the arterial system as well. The CETAP transportation program is a multi-modal planning effort that considers not only highway options, but also looks at transit and other forms of travel demand management and goods movement.

Riverside County is home to some of the busiest transportation corridors in the nation. Growth and the changes that go with it have the potential to cause a transportation nightmare that could strangle the County's economy, and reduce the quality of life of its residents. Thus, the transportation program for Riverside County will address not only today's transportation needs, but also where transportation needs will arise next.

1.2 Jurisdictional Boundaries

Riverside County encompasses approximately 7,295 square miles (4,669,167 acres) in Southern California. Approximately 10 percent of this area lies within 24 incorporated cities (see Table 1.A and Figure 1.1). Land use authority within these incorporated cities rests with the cities. The large majority of the County (90 percent) thus lies within unincorporated territory (covering 6,568 square miles or 4,203,761 acres). Of this unincorporated area, 1,335,258 acres (29 percent of unincorporated lands) are held by private landowners, while approximately 2,876,705 acres or 62 percent of the unincorporated land within the County is either held or managed by county, state, federal entities, or one of the Indian Nations. As a result, Riverside County has land use authority of less than half of the land within its boundaries, and less than one-third of the land within the County (see Table 1.B).

Table 1.A -Incorporated Cities within Riverside County

Western Riverside County	Coachella Valley	Palo Verde Valley
C Banning	C Cathedral City	C Blythe
C Beaumont	C Coachella	
C Calimesa	C Desert Hot Springs	
C Canyon Lake	C Indian Wells	
C Corona	C Indio	
C Hemet	C La Quinta	
C Lake Elsinore	C Palm Desert	
C Moreno Valley	C Palm Springs	
C Murrieta	C Rancho Mirage	
C Norco		
C Perris		
C Riverside		
C San Jacinto		
C Temecula		

Table 1.B- Land Use Authority within Riverside County

	Acreage	Percent of County	Percent of Unincorporated
Lands within Cities	465,406	10	
Unincorporated Lands	4,203,761	90	100.00
Federal Land	2,665,429	57.6	64.1
State Land	147,610	3.2	3.5
Other Public Lands	10,820	0.2	0.3
Lands in Private Ownership	1,335,258	28.9	32.1
Riverside County Total	**4,669,167**	**100.0**	

1.2.1 Spheres of Influence

Under State law, each County maintains a "Local Agency Formation Commission" (LAFCO). Among LAFCO's responsibilities are the review and approval of city and special district boundary expansion (annexation) proposals. To assist in the review of annexation proposals, state law maintains a "sphere of influence" concept. A "sphere of influence" represents the probable ultimate physical boundary of a city or special district, and thus defines the city's or special district's ultimate service area. The sphere of influence concept also helps minimize urban sprawl and prevents overlap of jurisdictions and duplication of services. Spheres of influence for cities within Riverside County are illustrated in Figure 1.1.

1.2.2 Unincorporated Communities and Communities of Interest

In addition to spheres of influence, Riverside County Local Agency Formation Commission (LAFCO) has adopted a concept of Communities of Interest (COI) within unincorporated territories in order to attain the following objectives:

- Preserve the integrity of established unincorporated communities.
- Identify significant communities within Riverside County to receive additional scrutiny concerning annexations.
- Allow specified communities a fixed-period of time to develop their long-term jurisdictional/organizational plans.
- Discourage premature or fiscally marginal proposals for changes in organization.

Approval of a COI designation commences a two-year study period. During the study period, the community evaluates any applicable changes of organization (remain unincorporated, incorporation as a city, annexation into an existing city, or designation as an Unincorporated Community). During the study period, annexation proposals of less than the entire COI are strongly discouraged by LAFCO. At the end of the two-year study period, the community must submit a final report to LAFCO. The report must contain the results of the community's evaluation of jurisdictional alternatives, how the results were achieved, and how the preferred alternative will be implemented.

To attain COI designation, unincorporated locales must demonstrate community support for the designation (via a petition of no less than 5 percent of registered voters within the boundaries of the proposed COI); identify some physical, historical, economic, or social integrity within the community; justify the inclusion of areas beyond the inhabited core of the community; and identify which options the community will consider in the future (unchanged status, incorporation, annexation into an existing city, or designation as an Unincorporated Community).

Four unincorporated communities are currently designated by LAFCO as a COI (see Figure 1.1):

- **COI 3: Sun City, Palm Desert**: Comprises the 1,657-acre Del Webb property in addition to property held by two other landowners along Interstate 10 (I-10). This COI was placed into the City of Palm Desert's sphere of influence. The City of Palm Desert is pursuing annexation of this property.
- **COI 11: Warm Springs**: Comprised of 20 square miles (12,800 acres) northwest of the City of Lake Elsinore, the Warm Springs COI was established in June 1996. The COI designation has been extended while LAFCO considers an Unincorporated Community designation request.
- **COI 12: Cabazon**: The 6 square miles (3,840 acres) of the Cabazon COI include lands within the former City of Cabazon and adjacent areas. COI designation was extended to June 2000.
- **COI 13: El Cerrito**: The 6.25-square-mile (4,000-acre) COI is located within the Corona sphere of influence. This area was designated as a COl on July 22, 1999.

COIs may, upon submittal of their final report, request designation as an "Unincorporated Community" (UC). The UC designation was created to identify communities which LAFCO determines should remain intact as an unincorporated entity for the long term. Thus, UC designation would prevent incremental annexations to an adjacent city. Once designated UC, a written report must be submitted to LAFCO every five years to review the appropriateness of the UC designation.

Six COIs have been designated "Unincorporated Community" (see Figure 1.1):

- **Menifee Valley**: The Menifee Valley UC, located along the I-215 corridor, is comprised of approximately 38 square miles (24,320 acres), including the communities of Sun City, Quail Valley , and Menifee. UC status was conferred to Menifee Valley in April 1997. Portions of the spheres of influence of the Cities of Perris, Murrieta, and Lake Elsinore were removed from the UC.
- **Cherry Valley:** The Cherry Valley area was granted UC status in October 1997. That portion of former COI # 4 which had been within the City of Beaumont sphere of influence was removed from the UC.
- **Banning Bench:** In June of 1997, this area comprising 1.1 square miles (700 acres), was granted UC designation and removed from the City of Banning's sphere of influence.
- **Wildomar**: UC status for the Wildomar area was granted in May 1997. Portions of the City of Lake Elsinore's sphere of influence which had overlapped the COI were removed from the UC.
- **Meadowbrook**: Comprised of 7 square miles (4,400 acres) located north and east of the City of Lake Elsinore, west of the cities of Perris, and Canyon Lake, and south of Ethanac Road, this area was granted UC status in May 1998.
- **Cleveland Ridge**: UC designation of 13.5 acres (8,640 acres) established in January 1998. Portions of the City of Lake Elsinore's sphere of influence were removed from UC boundaries.

During the development of COI policies, the subject of whether COIs and spheres of influence were mutually exclusive was addressed. LAFCO determined that since the COI was essentially a study area within a two-year study period, there was no inherent incompatibility between the two designations. On the other hand, the UC designation was determined to be incompatible with a sphere of influence designation since it would identify land as both being available *and* inappropriate for annexation. Therefore, based on the information presented during public hearings, LAFCO can either not approve a UC designation within an existing sphere of influence, conduct subsequent hearings on the matter, remove portions of a city's sphere of influence from the UC, or amend the boundaries of the UC to exclude a sphere of influence.

Several COI applications have either been denied by LAFCO, allowed to lapse, and/or were denied UC status. These include the following:

- ***COI 1: North Palm Springs***: This 10.5-square-mile (6,720-acre) COI, situated between the Cities of Palm Springs and Desert Hot Springs, and containing the communities of North Palm Springs, Painted Hills, and West Garnet, lapsed on May 22, 1997. This area no longer maintains the COI designation. A request for UC designation was denied.
- ***COI 5: Tenaja***: COI status was approved for this area of 10 square miles (6,400 acres) west of the City of Murrieta in September 1994. A request for UC designation was subsequently denied.

1.2.3 Economic Analysis Areas

To facilitate the assessment of demographic, economic, and fiscal impact conditions in Riverside County, seven "Fiscal Analysis Areas" were identified. These areas are as follows:

- ***Northwest Riverside County*** includes the cities of Riverside, Corona, Norco, Moreno Valley, and Perris, as well as the adjacent Jurupa, Lake Mathews, and Mead Valley areas. March Air Reserve Base also lies within this area. This is the area most affected by workers commuting to out-of-County jobs.
- ***Southwest Riverside County*** includes the cities of Lake Elsinore, Canyon Lake, Murrieta, and Temecula, as well as adjacent unincorporated areas such as Temescal Canyon. This area includes a substantial amount of workers commuting to out-of-County jobs.
- ***West-Central Riverside County*** includes the cities of Hemet and San Jacinto, as well as unincorporated Lakeview/Nuevo, Sun City, and Menifee areas. This area, within which Diamond Valley Lake is located, is distinctive in its concentrations of retirement housing.
- ***San Gorgonio Pass*** includes the cities of Calimesa, Banning, and Beaumont, as well as adjacent unincorporated areas, such as the Banning Bench and Cabazon.

- ***Riverside Extended Mountain Area Plan (REMAP)*** encompasses the mountain areas east of the Hemet/San Jacinto Valley, southeast of Palm Springs. This area includes Idyllwild and other mountain communities.
- ***Coachella Valley*** includes the cities of Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, Rancho Mirage, as well as unincorporated communities such as North Palm Springs, Thousand Palms, Bermuda Dunes, Thermal, Mecca, and others.
- ***Eastern Desert*** includes the desert areas east of the Coachella Valley and the Palo Verde Valley. Within this area are the City of Blythe; the communities of Desert Center, Eagle Mountain, and Ripley; and federal lands, including Joshua Tree National Park and the Chocolate Mountains Naval Gunnery Range.

1.3 Purpose of the Existing Setting Report

The *Riverside County Integrated Plan (RCIP) Existing Setting Report* is intended to provide a common factual basis for the preparation of the three components of the County's integrated planning effort: Riverside County General Plan, Western Riverside County MSHCP, and the Western Riverside County CETAP. This report also provides a single environmental baseline inventory that will be used in the preparation of subsequent environmental documents for each of the three plans comprising the RCIP.

The Existing Setting Report presents the results of an intensive research effort aimed at identifying the physical, social, and economic characteristics of Riverside County which need to be understood in order to formulate goals, objectives, and policies for the integrated planning effort. Along with the preparation of this report, an extensive and detailed computerized database was constructed. The maps contained in this report summarize the information contained in this database. Please refer to Appendix A, Map Index, for information on the information source and accuracy of each map.

1.4 Document Format

The Existing Setting Report is divided into the major sections described below.

- ***Introduction*** **-** provides a brief description of the *Riverside County Integrated Plan Existing Setting Report*, including an executive summary of the document.
- ***Land Use*** **-** describes existing land use patterns within Riverside County, as well as planned land uses based on the existing Riverside County General Plan and the General Plans of cities within the County. In addition, this section identifies the status of Riverside County Community Plans, Specific Plans, and Development Agreements.
- ***Circulation and Transportation*** **-** provides an inventory of the existing freeway and highway system serving Riverside County, including information on existing traffic conditions and levels of service. This section also describes the currently proposed

(1999) freeway and highway system for Riverside County. Finally, this section of the Existing Setting Report presents information on transit services, rail facilities, airports, major utility corridors in the County, and emergency access routes in the County.

- ***Open Space and Conservation*** - addresses management of the natural environment, including biological, water, and mineral resources. This section also discusses the role of agriculture in the County, including an inventory of lands devoted to agricultural pursuits and a discussion of agricultural protection programs. Existing cultural resources in the County, including historical, archaeological, and paleontological resources, are described in this portion of the Existing Setting Report. This section also identifies parks and recreational resources within the County, as well as visual resources. Finally, this section provides an inventory of open space lands, including publicly-owned open space lands, private lands committed to long-term open space, and existing open space lands which are not committed to long-term open space.
- ***Public Health and Safety*** - addresses natural and manmade hazards issues, including seismic and geologic hazards, structural and wildland fire hazards, flooding, wind hazards, steep slopes, and hazardous materials. This section also discusses emergency preparedness planning in Riverside County.
- ***Housing*** - describes existing and projected population, housing, and employment; population, housing, and household characteristics; and existing and projected housing needs.
- ***Noise*** - identifies existing noise characteristics in the County, including noise from existing freeways and highways, railroad lines, airports, and industrial/commercial noise sources.
- ***Public Services and Facilities*** - addresses the provision of fire protection, law enforcement, water, sewer, solid waste disposal, school, and library services to unincorporated areas within Riverside County. Included in this section is a description of agency responsibilities, as well as existing and proposed facilities.

Section 2.0 - Land Use

Existing Setting Report

Revised March 2000

2.1 Introduction

The Land Use section examines existing land use patterns, as well as the existing land use plans. The examination of existing land use patterns examines residential, business, public uses, and open lands, within both unincorporated areas and cities. Information on existing plans also includes both unincorporated areas and cities.

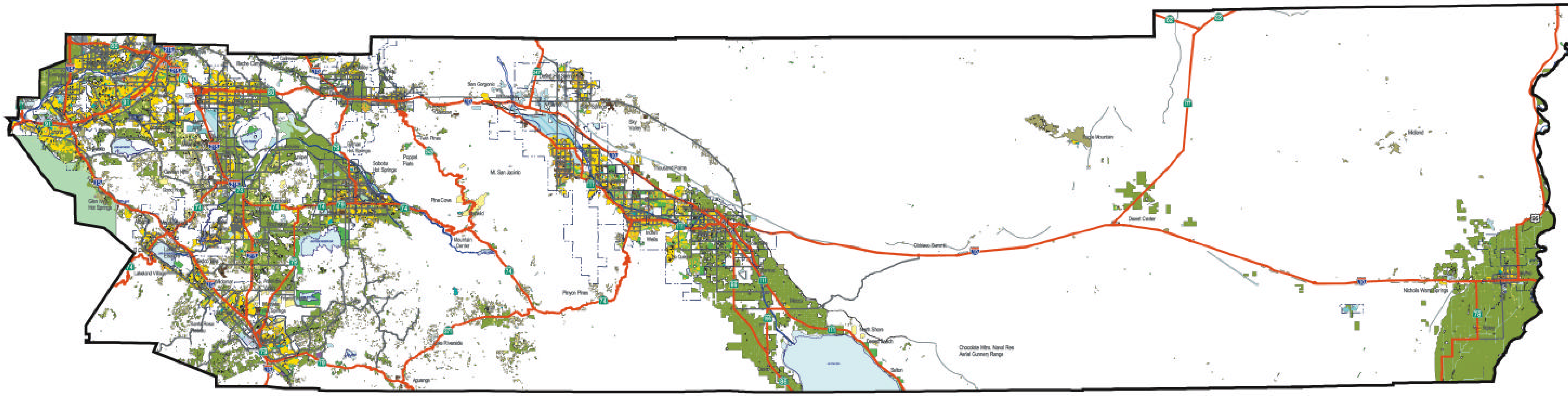
2.1.1 Historic Growth Patterns

As discussed in Section 4.6, Cultural Resources, many of the communities within Riverside County grew from agricultural service centers into suburban communities. More recently, growth has been spurred in the western portion of the County by the expansion of the Los Angeles metropolitan area. As the metropolitan area has grown, people have come to Riverside County in search of affordable housing. The availability of large areas of flat, inexpensive land, along with the location of employment growth in eastern Los Angeles and Orange counties has, since the late 1970s, been a major factor in the western County's growth. The warm inland climate of Riverside County, along with affordable housing, has also attracted a large retirement population in the area stretching from Sun City to Hemet.

Along with agriculture, growth in the Coachella Valley area has been spurred by recreation in the form of a golf course oriented residential communities. Originally oriented to a seasonal population, these large planned communities have been attracting larger numbers of permanent residents in recent years. Other major recreation oriented planned communities include Canyon Lake, Murrieta Hot Springs, and Highland Springs. Over the past 10 years, Riverside County has also seen development of residential planned communities, particularly along the I-15 and Interstate 215 (I-215) corridors within the Temecula/Murrieta, Menifee, Lake Elsinore, and Temescal Canyon areas.

2.2 Existing Land Use

Existing land use within Riverside County is a mosaic of varying types of uses, ownerships, character, and intensity. Figure 2.1 identifies generalized existing 1998 land use throughout Riverside County. This figure defines land uses into six broad categories (Residential, Commercial, Industrial/Office, Open Space, Public and Other), which are further divided in the underlying land use database into 19 land use classifications which more precisely describe land uses within each category. These descriptions are listed in sections 2.2.1 through 2.2.3. Existing (1998) land use is summarized in Tables 2.A, 2.B, and 2.C. Table 2.A identifies land uses within the County as a whole, cities and unincorporated areas, as well as the distribution of land uses between cities and unincorporated areas. Table 2.B identifies the percentage distribution of land uses within the County as a whole, as well as within cities and unincorporated areas. Table 2.C identifies the distribution of development land uses within the County as a whole, as well as within cities and unincorporated areas. As shown in these tables, the major



LEGEND

- Cities
- Highways
- Major Roads

Existing Land Use

Rural Residential	Agriculture
Single Family Detached	Water
Single Family Attached (Condo/TH)	Utilities
High Density Residential (Apt.)	Public Facilities
Mobile Home	Schools
Recreation OS	Retail/Office
Other OS	Tourist/Commercial Recreation
Heavy Industrial	Light Industrial/Business Park
Warehouse	Mineral Extraction
Vacant	

Figure 2.1

1998 GENERALIZED LAND USE

Scaleisapproximate
0 6 12Miles

R:\SVC931-Graphics\ExistingSetting\exlu.cdr(7/5/02) ity of land within Riverside County has not been developed. As is clear from Figure 2.1, vacant and open lands are predominant in the eastern desert areas. Large areas of steep slopes and lands managed by state and federal agencies also account for the predominance of open lands within the County. Overall, the majority of developed lands are within incorporated cities (see Table 2.C).

Table 2.A - Distribution of Existing (1998) Land Use between Cities and Unincorporated Areas

	Countywide (acres)	Unincorporated (acres)	% Within Unincorp.	Within Cities (acres)	% Within Cities
Residential	**184,371.22**	**80,035.70**	**43.4**	**104,335.52**	**56.6**
Rural Residential	42,989.25	38,171.51	88.8	4,817.73	11.2
Single Family Detached	104,295.98	32,525.33	31.2	71,770.65	68.8
Attached Dwelling Units	26,925.54	4,335.98	16.1	22,589.56	83.9
High Density	67.89	7.27	10.7	60.62	89.3
Mobile Homes	10,092.56	4,995.61	49.5	5,096.96	50.5
Commercial	**15,674.89**	**2,420.31**	**15.4**	**13,254.57**	**84.6**
Retail/Office	13,530.21	1,798.97	13.3	11,731.24	86.7
Tourist/Commercial Recreation	2,144.68	621.35	29.0	1,523.33	71.0
Industrial	**24,660.23**	**15,216.60**	**61.7**	**9,443.51**	**38.3**
Light Ind./ Business Park	7,496.42	1,578.30	21.1	5,918.01	78.9
Heavy Industrial	457.05	346.97	75.9	110.08	24.1
Mineral Extraction	11,760.94	10,416.27	88.6	1,344.68	11.4
Warehouse	4,945.82	2,875.07	58.1	2,070.75	41.9
Recreation/Open Space	**1,263,273.07**	**1,162,626.78**	**92.0**	**100,645.29**	**8.0**
Natural	7,132.76	5,981.42	83.9	1,151.34	16.1
Natural (Reserve)	54,386.16	51,489.91	94.7	2,896.25	5.3
Natural (USFS)	775,987.20	773,834.79	99.7	2,151.42	0.3
Recreation	26,967.39	9,489.85	35.2	17,477.54	64.8
Agriculture	339,261.84	266,926.37	78.7	72,335.46	21.3
Water	59,537.72	54,904.44	92.2	4,633.28	7.8
Public Facilities	**67,908.28**	**36,963.62**	**54.4**	**30,944.66**	**45.6**
Utilities	54,502.81	32,117.29	58.9	22,385.53	41.1
Other Public Facilities	5,579.43	3,139.25	56.3	2,440.17	43.7
Schools	7,828.04	1,707.08	21.8	6,118.96	78.2
Vacant	**3,071,672.84**	**2,869,430.17**	**93.4**	**202,242,67.67**	**6.6**
Other	**311.16**	**214.43**	**69.0**	**96.72**	**31.0**
TOTAL	**4,627,871.68**	**4,166,908.64**	**90.0**	**460,962.94**	**10.0**

Table 2.B - Distribution of Existing (1998) Land Use within Cities and Unincorporated Areas

	Countywide	Unincorporated		Cities	
	Acres	Acres	Percent	Acres	Percent
Residential	**184,371.22**	**80,035.70**	**1.92**	**104,335.52**	**22.63**
Rural Residential	42,989.25	38,171.51	0.92	4,817.73	1.05
Single Family Detached	104,295.98	32,525.33	0.78	71,770.65	15.57
Attached Dwelling Units	26,925.54	4,335.98	0.10	22,589.56	4.90
High Density	67.89	7.27	0.00	60.62	0.01
Mobile Homes	10,092.56	4,995.61	0.12	5,096.96	1.11
Commercial	**15,674.89**	**2,420.31**	**0.06**	**13,254.57**	**2.88**
Retail/Office	13,530.21	1,798.97	0.04	11,731.24	2.54
Tourist/Commercial Recreation	2,144.68	621.35	0.01	1,523.33	0.33
Industrial	**24,660.23**	**15,216.60**	**0.37**	**9,443.51**	**2.05**
Light Ind./ Business Park	7,496.42	1,578.30	0.04	5,918.01	1.28
Heavy Industrial	457.05	346.97	0.01	110.08	0.02
Mineral Extraction	11,760.94	10,416.27	0.25	1,344.68	0.29
Warehouse	4,945.82	2,875.07	0.07	2,070.75	0.45
Recreation/ Open Space	**1,263,273.07**	**1,162,626.78**	**27.90**	**100,645.29**	**21.83**
Natural	7,132.76	5,981.42	0.14	1,151.34	0.25
Natural (Reserve)	54,386.16	51,489.91	1.24	2,896.25	0.63
Natural (USFS)	775,987.20	773,834.79	18.57	2,151.42	0.47
Recreation	26,967.39	9,489.85	0.23	17,477.54	3.79
Agriculture	339,261.84	266,926.37	6.41	72,335.46	15.69
Water	59,537.72	54,904.44	1.32	4,633.28	1.01
Public Facilities	**67,908.28**	**36,963.62**	**0.89**	**30,944.66**	**6.71**
Utilities	54,502.81	32,117.29	0.77	22,385.53	4.86
Other Public Facilities	5,579.43	3,139.25	0.08	2,440.17	0.53
Schools	7,828.04	1,707.08	0.04	6,118.96	1.33
Vacant	**3,071,672.84**	**2,869,431.17**	**68.86**	**202,242,67.67**	**43.87**
Other	**311.16**	**214.43**	**0.01**	**96.72**	**0.02**
TOTAL	**4,627,871.68**	**4,166,908.64**	**100.0**	**460,962.94**	**100.0**

Table 2.C - Distribution of Existing (1998) Developed Land Uses within Cities and Unincorporated Areas

	Countywide	Unincorporated		Cities	
	Acres	Acres	Percent	Acres	Percent
Residential	**184,371.22**	**80,035.70**	**59.4**	**104,335.52**	**66.0**
Rural Residential	42,989.25	38,171.51	28.3	4,817.73	3.0
Single Family Detached	104,295.98	32,525.33	24.1	71,770.65	45.4
Attached Dwelling Units	26,925.54	4,335.98	3.2	22,589.56	14.3
High Density	67.89	7.27	0.0	60.62	0.0
Mobile Homes	10,092.56	4,995.61	3.7	5,096.96	3.2
Commercial	**15,674.89**	**2,420.31**	**1.8**	**13,254.57**	**8.4**
Retail/Office	13,530.21	1,798.97	1.3	11,731.24	7.4
Tourist/Commercial Recreation.	2,144.68	621.35	0.5	1,523.33	1.0
Industrial	**24,660.23**	**15,216.60**	**11.3**	**9,443.51**	**6.0**
Light Ind./Business Park	7,496.42	1,578.30	1.2	5,918.01	3.7
Heavy Industrial	457.05	346.97	0.3	110.08	0.1
Mineral Extraction	11,760.94	10,416.27	7.7	1,344.68	0.9
Warehouse	4,945.82	2,875.07	2.1	2,070.75	1.3
Public Facilities	**67,908.28**	**36,963.62**	**27.4**	**30,944.66**	**19.6**
Utilities	54,502.81	32,117.29	23.8	22,385.53	14.2
Other Public Facilities	5,579.43	3,139.25	2.3	2,440.17	1.5
Schools	7,828.04	1,707.08	1.3	6,118.96	3.9
Other	**311.16**	**214.43**	**0.2**	**96.72**	**0.1**
TOTAL	**4,627,871.68**	**4,166,908.64**	**100.0**	**460,962.94**	**100.0**

2.2.1 Residential

Approximately 288 square miles of land are devoted to residential use in Riverside County, nearly 57 percent of which are within incorporated cities.

- ***Rural Residential*** includes single family homes on large lots, at a density of less than 2 dwelling units per acre (du/ac). Isolated homes, including mobile homes in rural settings, are included in this category. This category accounts for 42,989 acres in the County, 89 percent of which (38,172 acres) are within unincorporated territories. Rural residential uses account for nearly half the residential acreage and more than one-quarter of the developed land within the unincorporated portions of the County.

- ***Single Family Dwellings*** include areas of low-density, single-family dwellings, at densities greater than 2 du/ac (including residential estates). A total of 104,296 acres are developed with single family residential uses, approximately two-thirds of which (71,771 acres) are within cities. Whereas single family detached areas account for slightly less than a quarter of the developed land within unincorporated areas, they account for nearly half (45 percent) of developed land within the County's cities.

- ***Attached Dwelling Units*** include medium density single-family residential areas, duplexes, triplexes, and "low-rise" (one to two stories) apartments, condominiums and townhouses, and mixed residential areas where single-family detached and multi-family attached dwellings of any type occur together. A total of 26,926 acres of land are devoted to this use, less than one-sixth of which is located within unincorporated territories (4,335.98).

- ***High Density Residential*** includes high-density apartments or condominiums (3+ stories, more than 24 du/ac). This type of development is limited within Riverside County (67 acres), 90 percent of which is within incorporated cities.

- ***Mobile Homes*** include mobile homes and trailer parks, low density trailer parks and mobile home courts, and low density mobile home subdivisions. A total of 10,092.56 acres are devoted to mobile home uses, which is almost equally divided between cities and unincorporated areas.

2.2.2 Commercial

Commercial land uses account for 15,675 acres of land within Riverside County. The large majority of commercial land within the County is located within cities, and is clustered along, adjacent, or near major transportation routes, including SR-91, I-15, I-215, SR-60, SR-74, I-10, and SR-111.

- ***Retail/Office*** includes areas of office buildings used for financial, personal, business, medical, and other professional services. Retail and commercial services including retail centers, regional malls, strip development, service stations, restaurants, offices, personal services, and associated facilities and parking areas are also included in this category. Public mini-storage, small commercial storage yards, and recreational vehicle storage areas are included in this category. A total of 13,530 acres land are devoted to retail/office use in the County, only 1,799 of which are within unincorporated areas (13.3 percent). Within unincorporated areas, retail/office lands account for only 1.3 percent of developed lands. By comparison, within the County's cities, 7.4 percent of developed lands are devoted to retail/office use.

- ***Tourist/Commercial Recreation*** includes all major hotels, motels, inns, and motor lodges. Commercial recreation facilities such as sports stadiums (not connected with schools), race tracks, drive-in theaters, amusement parks, ice and roller rinks, miniature golf courses, and fairgrounds, as well as stand-alone parking areas (those not associated with another use), attended parking areas or parking structures are included in this category. Within Riverside County, 2,145 acres are developed with tourist commercial uses. A total of 621 acres (29 percent) are within unincorporated areas

2.2.3 Industrial

A total of over 24,000 acres are devoted to industrial use in Riverside County, including light and heavy industry, warehousing, and mineral extraction. With the exception of land devoted to mineral extraction 89 percent of which is within unincorporated territories), the majority of industrial land is located within the cities of Riverside County.

- ***Light Industrial/Business Park*** includes design, assembly, finishing, packaging, and storing of products or materials which have usually been processed at least once. These activities are generally characterized as "clean," since they produce relatively small amounts of smoke or other effluents, noise, and dust. Also included in this category are industrial areas devoted to the design, development, and research of products and/or technology. Areas with a mixture of commercial and industrial uses together or in close proximity where neither use predominates have been assigned to this category. Approximately 1/5 of the light industrial land within Riverside County is located within unincorporated territories (1,578 acres or 21.1 percent of the County's total acreage).

- ***Heavy Industrial*** includes large-scale industrial and manufacturing activity involving the processing of raw materials. These industries are sometimes considered "dirty" since waste products such as smoke, slag, dust, and liquid effluent, as well as noise are often generated, often in significant quantities. Specific uses include packing houses and grain elevators, oil refineries, petrochemical plants, and metal and chemical processing plants and associated facilities (slag heaps, storage areas, and smoke stacks). Heavy industrial uses are limited within the County. Of the 457 acres devoted to heavy industrial use, 347 (76 percent) are located within unincorporated territories.

- ***Warehouse*** includes storage or distribution warehousing or wholesale shipping centers other than those which are integral parts of airports or transportation centers. Wrecking yards, junk yards, heavy equipment storage yards, the outdoor storage of light or heavy industrial products, and salvage and recycling are included within this category. The majority of warehousing lands within the County (2,875 acres or 58 percent) are located within unincorporated territories. These areas are largely clustered along the Pomona Freeway in the western portion of the County. This represents an expansion of warehousing facilities easterly from the Ontario Airport area.

- ***Mineral Extraction Areas*** are those areas devoted to the extraction of mineral and rock products, oil, and natural gas. All related above-ground quarries, pits, trailing piles, borrow areas, and equipment and storage facilities are identified within this category. Nearly 12,000 acres of land are devoted to mineral extraction within the County, 10,416 acres of which (89 percent) are within unincorporated lands.

2.2.4 Recreation and Open Space

Due to Riverside County's collection of physical, biological, and historical resources, a vast amount of land (1,313,073 acres or 28 percent of the County total) is in open space use, and provides for recreation, agriculture, scientific opportunity, and wild land preservation.

- ***Natural*** includes public and private lands which have not been developed and/or formerly disturbed lands in the process of returning to a pre-development, natural or naturalized state. This land use type may include wildlife preserves, sanctuaries, and areas formerly utilized for agricultural pursuits. Nearly 6,000 acres are categorized as natural open space, 84 percent of which are on unincorporated lands.

- ***Recreation*** encompasses developed open areas within urban settings and non-urban areas developed for recreational activities. Recreation areas are those lands such as parks, golf courses, and driving ranges, open space, and beaches. All facilities within the park, such as campgrounds, marinas or boat launching facilities are included in this category. Camps, campgrounds, outdoor shooting ranges, ski areas, marinas, and maintained grasses areas not used as a local park are included within this land use category. Nearly 27,000 acres within the County are devoted to recreational uses. Of this, 9,489 acres are within unincorporated territories.

- ***Agriculture*** includes crop lands (irrigated and dry farmed), improved pasture land, orchards and vineyards, nurseries, dairy and poultry operations, horse ranches, and related agricultural uses. Over 3/4 of the County's 339,262 acres of agricultural lands are located within unincorporated territories (266,926 acres).

- ***Water*** includes all perennially, open bodies of water greater than 5 acres in area, which are not associated with municipal water storage, as well as all water bodies associated with water storage that are greater than 10 acres in size. Based on these descriptions, approximately 60,038 acres (1.3 percent) of the County are identified as "water."

2.2.5 Public Facilities

A variety of public lands exist within Riverside County, and these lands are managed by a multitude of local, County, state, and federal agencies. Approximately 106 square miles of land are devoted to various public facilities within Riverside County.

- ***Utilities*** include a wide variety of utility and transportation related structures and facilities. Examples of these facilities include (but are not limited to) air fields; railroads; freeways; waste disposal facilities; natural gas, petroleum and electrical generation and transmission facilities; small (less than 10 acres in area) reservoirs or water storage tanks; dams, aqueducts, and water transfer facilities; flood control channels; transportation terminals, park and ride lots, and the storage, maintenance, and ancillary facilities associated with such uses. A total of 54,502 acres are devoted to utilities within the County, 32,117 acres of which (59 percent) are located outside of cities.

- ***Public Facilities*** include government offices, police and fire facilities, correctional facilities, military installations, museums, convention centers, libraries, theater facilities, cemeteries, convalescent and rehabilitation facilities, short- and long-term custodial facilities (orphanages, mental health facilities), non-profit fraternal and community service organizations (YMCA, Salvation Army), and non-attended public parking facilities. More than half (56 percent) of the County's 5,579 acres devoted to public facilities are located within unincorporated territories.

- ***Schools*** encompass a wide-ranging assortment of educational institutions including preschools and day-care centers, K-12 schools, trade schools, and colleges and universities. Included in this category are the dormitories, athletic venues, parking areas, and other facilities ancillary to these uses. Over 12 square miles of land within the County are devoted to educational facilities. Within unincorporated lands, 1,707 acres are devoted to schools.

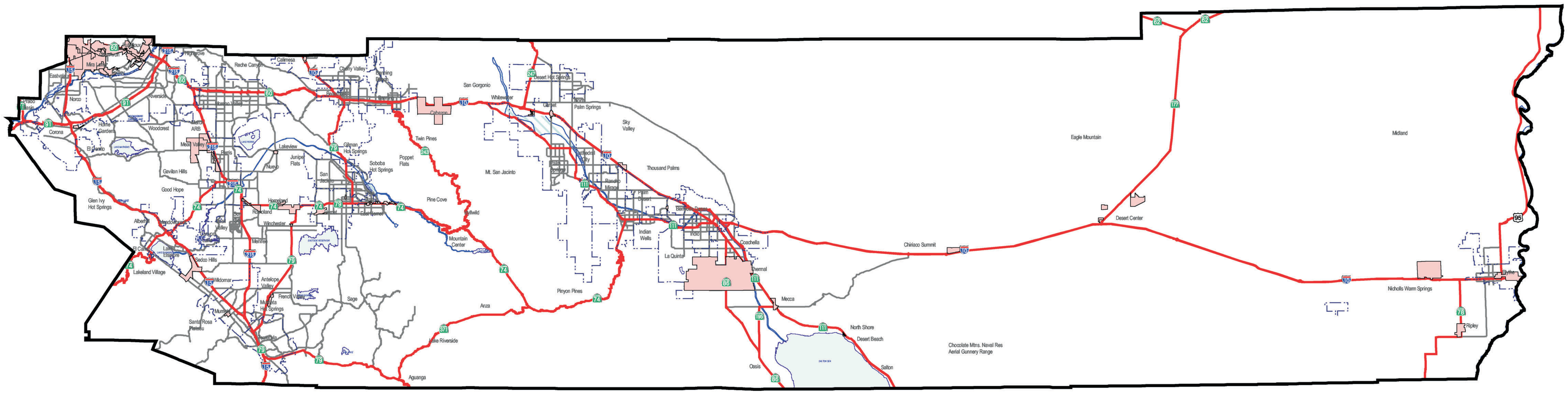
2.2.6 Other

This land use category includes vacant lands, areas which are under construction, abandoned orchards and vineyards (trees or vines must be present), and vacant land with limited improvements (areas where streets are laid in a subdivision pattern but no other development has occurred over time).

2.2.7 Redevelopment Areas

The overall objective of "redevelopment" is to provide for the elimination or alleviation of physical and economic blight. Blight conditions include physical deterioration of public and private buildings and facilities; inadequate public improvements and facilities that are essential to the health and safety of local residents and businesses, areas of incompatible land uses; lots of irregular form and shape and of inadequate size for proper developments; parcels suffering from depreciated values and impaired investments; and a variety of other conditions that are a threat to the health, safety and welfare of the public. To achieve these goals, specific redevelopment areas may assist in the rehabilitation of residential and commercial structures, promote the improvement and centralization of commercial, industrial, and residential areas to make the provision of services and utilities more efficient, and encourage investment in the redevelopment project area.

To date, Riverside County has designated six redevelopment areas, encompassing approximately 58,370 acres. These areas, which are identified in Figure 2.2, include the following:



LEGEND

- Cities
- Highways
- Major Roads
- Redevelopment Areas

Figure 2.2

5 0 5 10 Miles

REDEVELOPMENT AREAS

- ***Project Area 1*** is made up of 350 acres encompassing portions of Home Gardens and Murrieta, as well as 2,859 acres in the Lakeland Village/Wildomar area.

- ***Jurupa Valley Project Area*** comprises 15,228 acres in the communities of Mira Loma, Glen Avon, Rubidoux, and Pedley.

- ***Mid-County Project Area*** encompasses 7,047 acres in the communities of Garnet, Valle Vista, West Garnet, Winchester, Homeland, Green Acres, North Hemet, and Cabazon.

- ***Desert Communities Project Area*** includes 27,588 acres in the communities of East Blythe, Mecca, North Shore, Palm Desert, Ripley, Thermal, Thousand Palms, and Desert Center,. This Project Area also includes airports in Blythe, Chiriaco Summit, Desert Center, as well as Flabob Airport in Rubidoux, French Valley Airport, and Hemet Ryan Airport.

- ***Project Area 5*** is comprised of 4,442 acres in the communities of Calimesa, Lakeview, Mead Valley, Romoland, and Highgrove.

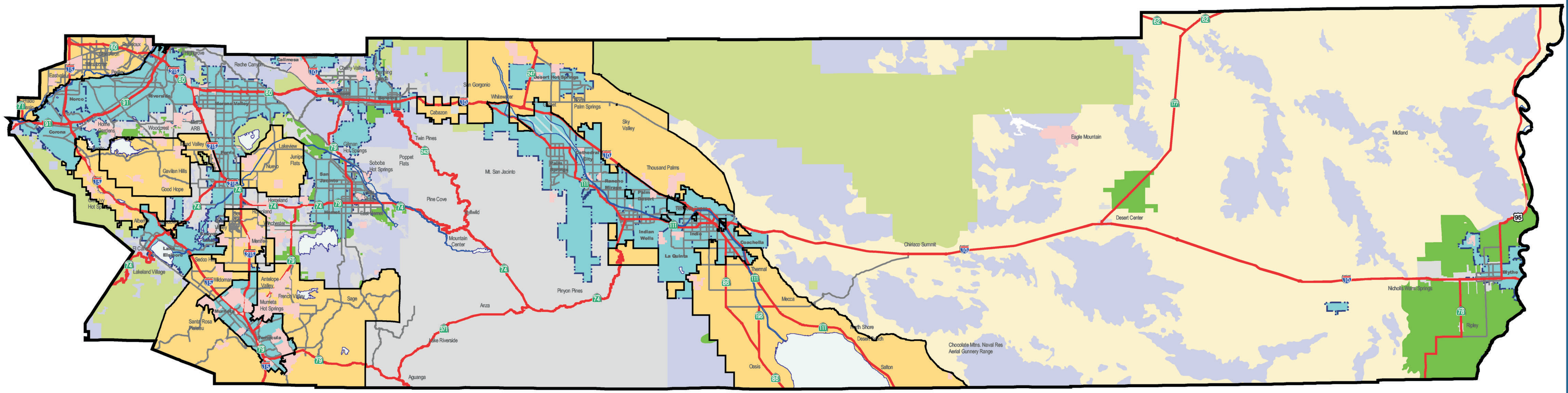
- ***Project Area 5-1987*** encompasses 856 acres in Mead Valley.

The redevelopment plan for each of these project areas sets forth a list of proposed physical improvements which would be constructed with tax increments accruing to the Riverside County Redevelopment Agency from the project area. In general, these improvements consist of public works, beautification, and infrastructure projects. The land use component of each redevelopment plan requires that land uses within the redevelopment project area be in conformance with the Comprehensive General Plan and the Zoning Ordinance of the County of Riverside.

2.3 Planned Land Use within Riverside County

Figure 2.3 illustrates planned land uses throughout the County. A large number of land use categories exist within the General Plans of the 24 cities within the County, in unincorporated areas, in community plans, and in specific plans. For land use within cities, community plans, and specific plans, please refer to the appropriate document as listed in the bibliography. [1]

[1] It should be noted that the General Plan land use maps of the cities within Riverside County generally extend beyond their city limits to encompass their spheres of influence, as well as such additional lands cities may have determined appropriate. These extensions are for planning purposes only; land use regulatory authority for all private lands outside actual city limits rests with the County.



LEGEND

Highways
Major Roads

Planned Land Use

- Specific Plans
- Cities
- Community Plans
- Areas not designated
- Open Space
- Mountainous Areas
- Desert Areas
- Agriculture

Community Plans

1 Cabazon
2 East Coachella Valley
3 Jurupa/Eastvale
4 Lake Matthews
5 Lakeview/Nuevo
6 Mead Valley
7 North Side
8 Southwest Area
9 Suncity/Menifee
10 Temescal Canyon
11 Western Coachella Valley

5 0 5 10 Miles

Figure 2.3

PLANNED LAND USES

2.3.1 Land Use Determination System for Unincorporated Areas Outside of Adopted Community Plans

Unlike the cities within the County, Riverside County's General Plan does not contain a traditional land use map, except in those areas for which a "Community Plan" was adopted by the Board of Supervisors. The following discussion details the current system of determining land use within those portions of unincorporated Riverside County that are outside of adopted Community Plans.

Permitted land uses are determined through a four-step Land Use Determination System which is summarized in Table 2.D. Depending on the location of a particular parcel, its assignment into a specific Land Use category may occur at any point in the four-step process.

Table 2.D - Riverside County Land Use Determination System

Step One	The site in question is located on the County's Open Space and Conservation Map. If the site is not within an adopted Community Plan or designated as a specific open space or conservation land, adopted Specific Plan or RE-MAP, the second step of the Land Use Determination System is consulted.
Step Two	The second step in this process is a review of the Composite Hazards Map, the Composite Resources Map, and potential noise impacts. This review will provide information regarding the potential of a site to be affected by environmental hazards and/or resources, and by high noise levels. If this review indicates that a hazard or resource may affect the site, adequate and appropriate mitigation may be required if the site is to be developed.
Step Three	The site is reviewed against the Land Use Planning Area Index Map, in order to identify in which Land Use Planning Area the site is located. Within each Land Use Planning Area there may be communities for which there are unique community land use policies. These policies are included within the Land Use Planning Area profiles.
Step Four	The site is assessed to determine which land use category requirements are met on site. This assessment determines the land use category appropriate for the site. After the site's Land Use Category is determined, the specific locational policies for each land use within the assigned category are reviewed. The resulting land use determination is the General Plan's land use designation for the site.

2.3.1.1 Existing Riverside County Comprehensive General Plan Land Use Categories

The current Riverside County Comprehensive General Plan identifies five land use categories to define appropriate land use types and intensities. These five categories – Heavy Urban, Urban, Rural, Outlying Areas, and Planned Community – are not mapped, but are determined based on relevant General Plan policies. These determinations are made on a project-by-project basis. Each category includes a general description of permitted residential, commercial, and industrial land uses and intensities which correspond to the level of public facilities that are required to be provided.

- ***Category I (Heavy Urban)*** land uses are characterized by intensive commercial and industrial uses and higher residential densities (8 to 20 du/ac). Category I land uses include regional and community commercial centers, heavy industrial operations, and increased residential densities. These uses are generally located within or are extensions of existing communities, require a full range of public services, and must be located within an area containing a major transportation corridor. Proposed land uses within this category must be compatible with existing and approved land uses.

- ***Category II (Urban)*** land uses represent a broad mix of industrial, commercial, and residential (2 to 8 du/ac) uses. These uses require a full range of public services and are generally located within existing communities or within cities' spheres of influence. The circulation system serving these areas must provide adequate capacity to accommodate the projected traffic increase generated by these land uses.

- ***Category III (Rural)*** is characterized by rural land uses including lower residential densities (0.2 to 2 du/ac) and fewer public facilities and improvements. This category often includes agricultural uses, small scale commercial uses, and light industrial uses. These uses are located away from existing urban centers and for the most part have a distinctive cultural atmosphere or identity.

- ***Category IV (Outlying Area)*** contains the least intensive land use of any of the County's five land use categories. These areas are generally located near large tracts of publicly owned land and are often used for agriculture, mining, industry, and low density residential (less than 0.2 du/ac). These areas are located in outlying areas away from urban centers, lack improvements, and are generally "self-sufficient" in terms of water supply, sewage disposal, commercial needs, and reliance on other public facilities and services. Circulation systems in these areas consist mainly of local roads, most of which are paved (although some may be unpaved).

- ***Category V (Planned Community)*** has been established as a unique land use category which provides for the development of new towns and communities within the County. Planned Communities are large scale, balanced projects which contain a variety of residential, commercial, industrial, and open space uses. The land uses are largely self-supporting, providing the highest level of public services consistent with an urban type of land use. Projects classified as a Category V land use must consist of at least 640 acres.

2.3.2 Community Plans Adopted as Part of the Riverside County Comprehensive General Plan

The concept of "Community Plans" was developed as part of the Riverside County General Plan to look at the unique aspects of unincorporated communities, as well as to provide a traditional General Plan land use map. Community Plans present policies for preserving, enhancing or developing unincorporated areas in a manner compatible with the values, resources, and aspirations of the community. These plans are developed though citizen input, and are intended to reflect community needs and desires. Community Plan boundaries are identified in Figure 2.4.

2.3.2.1 Jurupa Community Plan

The Jurupa Community Plan area consists of approximately 63 square miles (40,320 acres) in the northeastern corner of Riverside County. The Jurupa Community Plan area, is for the most part, separated from the cities of Riverside, Norco, and Corona by the Santa Ana River located to the east and south. The predominant features of the area are the Jurupa Hills, along the northerly boundary, the Pedley Hills, and the Santa Ana River. The remainder of the Jurupa Community Plan area consists of alluvial plains. Over 80 percent of the area has a natural slope of less than 12 percent.

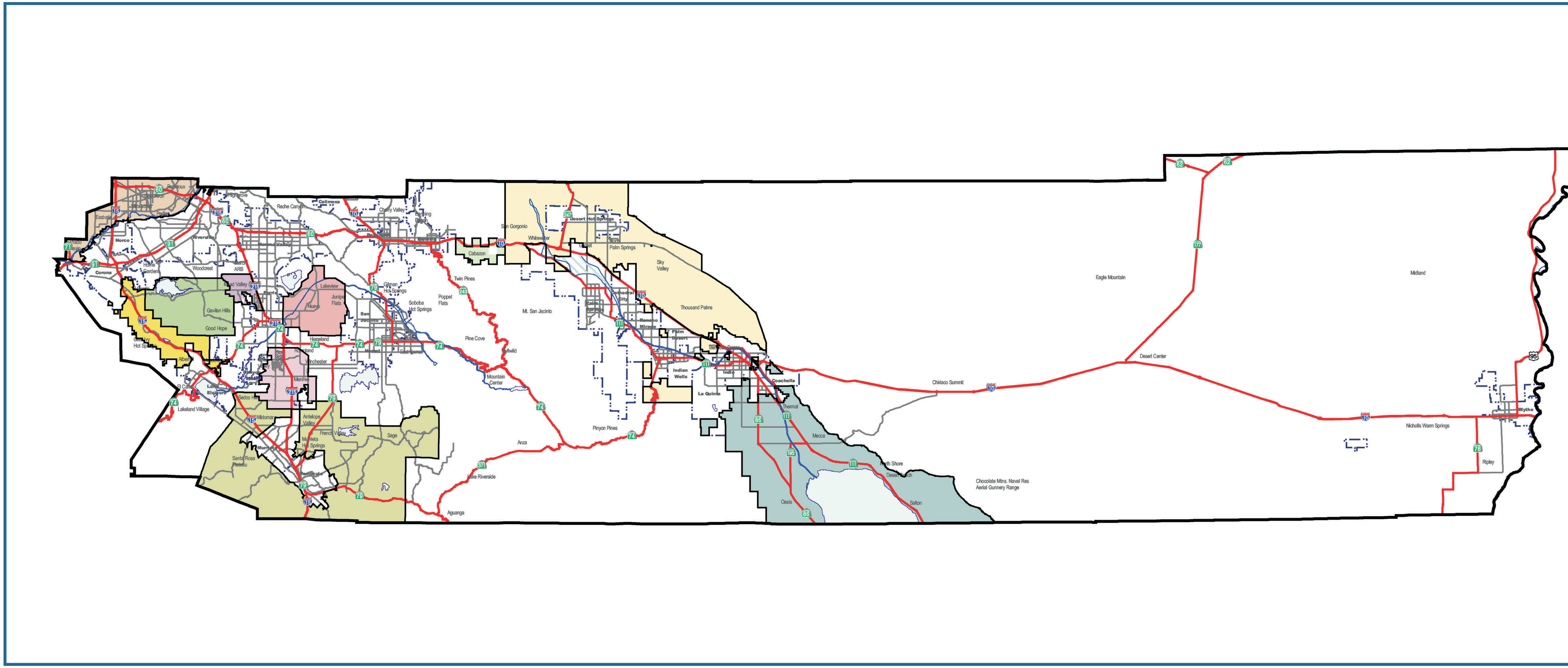
2.3.2.2 Northside Community Plan

The Northside Community Plan encompasses approximately 3square miles (1,904 acres) of City and County lands generally bounded by I-215 on the east, SR-60 on the south, the Santa Ana River of the west, and San Bernardino County and the City of Colton on the north. Approximately 20 percent of the community plan area lies within San Bernardino County due to that area's strong physical relationship to properties in the City and County of Riverside.

2.3.2.3 Highgrove Community Plan *(Adopted March 28, 2000)*

The Highgrove Community Plan area contains approximately 3.5 square miles (2,250 acres) of unincorporated land on the east side of I-215, located immediately south of the San Bernardino County line. The community plan stretches eastward to the Box Springs Mountains and southward to the Riverside City limits.

The major concerns of Highgrove residents relate to the changing character of the community. A rural community whose economic focus was citrus production, Highgrove is today a community split between residents who want to keep the area the way it has always been, those who have sought to promote Highgrove's potential, and others who recognize that changes will occur in Highgrove, but are concerned about the effect of these changes on their traditional lifestyle.



LEGEND

- Cities
- Highways
- Major Roads

Community Plans

- Cabazon
- Eastern Coachella Valley Plan
- Jurupa
- Lake Mathews
- Lakeview/Nuevo
- Mead Valley
- North Side
- Southwest Area
- Suncity / Menifee Valley
- Temescal / El Cerrito
- Western Coachella Valley Plan

Figure 2.4

5 0 5 10 Miles

COMMUNITY PLANS

2.3.2.4 Sun City/Menifee Valley Community Plan

The Sun City/Menifee Valley Community Plan occupies approximately 43.5 square miles (27,857 acres) of the unincorporated portion of the greater Menifee Valley and the Sun City area located northeast of the City of Lake Elsinore, east of the City of Canyon Lake, and south of the City of Perris in western Riverside County.

2.3.2.5 Lake Mathews Community Plan

The Lake Mathews Community Plan, encompassing approximately 66.2 square miles (42,386 acres), is located south of the City of Riverside, west of the City of Perris and northeast of the City of Lake Elsinore. The Lake Mathews Community Plan lies within the City of Riverside's sphere of influence. Lake Mathews, owned by the Metropolitan Water District (MWD) (part of the Colorado River Project), lies in the Lake Mathews Community Plan area.

2.3.2.6 Mead Valley Community Plan

Consisting of approximately 11.8 square miles (7,545 acres) of unincorporated land, the Mead Valley Community Plan is bordered on the north by March Air Reserve Base, on the east by I-215, on the west by the Lake Mathews Community Plan, and on the south generally by the City of Perris, the Motte Rimrock Core Reserve and the southern border of the First Supervisorial District (between Old Elsinore Road and I-215) and Orange Avenue (between Brown Street and Old Elsinore Road). The Mead Valley area is similar in many respects to a number of other rural communities in the County. It is characterized by scattered large lot residential development, agricultural uses and local, service related commercial uses. The area has a limited circulation system and noise problems due to flight operations at March Reserve Air Base. This area has been experiencing slight growth pressures.

2.3.2.7 Lakeview/Nuevo Community Plan

Located in the central part of Western Riverside County, the Lakeview/Nuevo Community Plan encompasses 47 square miles (approximately 30,080 acres), lying east of the City of Perris, south of Lake Perris, west of the cities of San Jacinto and Hemet, and north of the communities of Romoland and Homeland. The dominant topographical feature of the Lakeview/Nuevo Community Plan is the Lakeview Mountains which occupy approximately one-third of the planning area along the southeastern boundary. The remaining two-thirds of the area is predominantly flat with the exception of the Bernasconi Hills in the northeast area. The San Jacinto River runs northeast to southwest through the central region of the Lakeview/Nuevo Community Plan area.

2.3.2.8 Temescal/El Cerrito Community Plan

The Temescal/El Cerrito Community Plan area consists of approximately 46 square miles (29,516 acres) located in western Riverside County. The Community Plan is located northwest of the City of Lake Elsinore, west of the Lake Mathews area, east of the Cleveland National Forest, and southeast of the City of Corona. The Temescal/El Cerrito Community Plan is located within the spheres of influence of Corona, Riverside, and Lake Elsinore. In general the community plan area consists of four historically distinct communities: El Cerrito, Glen Ivy, Alberhill, and Warm Springs Valley.

The Temescal/El Cerrito Community Plan area consists of a predominantly rural valley located along a major transportation corridor. The Temescal/El Cerrito Community Plan is located between the rapidly growing cities of Corona and Lake Elsinore. Along with the current areas of mineral extraction, areas along I-15 accommodate industrial uses. The large-scale planned development within the Temescal/El Cerrito Community Plan has intensified residential densities in the area. Consequently, portions of the Temescal/El Cerrito Community Plan area are in transition from outlying and rural to urban.

2.3.2.9 Southwest Area Plan (SWAP)

The SWAP area is generally located north of the San Diego County line, east of Cleveland National Forest, south of Keller Road and west of the REMAP boundaries. This area, which surrounds the cities of Murrieta and Temecula, encompasses approximately 329.2 square miles (210,700 acres). Currently, this is one of the fastest growing areas of the County, and is dominated by a number of large planned community developments.

2.3.2.10 Cabazon Community Plan

The Cabazon Community Plan applies to 11.7 square miles (7,490 acres) of unincorporated land on both sides of Interstate 10 (I-10) in the vicinity of Cabazon, excluding the Morongo Indian Reservation. The boundaries of the Cabazon Community Plan are generally Martin Road on the north, Fields Road on the west, Rushmore Avenue on the east, and the San Bernardino National Forest on the south. The major concerns of area residents include business development, flooding, refuse disposal, and rail crossings. Both the flooding and rail crossing concerns relate to the accessibility of developed areas to emergency vehicles.

2.3.2.11 Riverside Extended Mountain Area Plan (REMAP)

REMAP was incorporated into the Riverside County Comprehensive General Plan as the instrument for determining permitted land uses and land use densities for the area generally centered on the San Jacinto Mountains and is bounded on the north by the

San Gorgonio Pass, on the south by San Diego County, on the east by the Western Coachella Valley Community Plan, and on the west by the Southwest Area Community Plan. Most of the REMAP area is contained within the 807-square-mile (516,480-acre) Idyllwild Census Division. A combination of Bureau of Land Management (BLM) lands, tribal lands, or State and/or National Forest lands comprise most of this area. The ruggedness and remoteness of land within much of this area, along with the preponderance of federal/state land serve to preclude the chance for significant growth to occur in this area. Although this area does not contain any incorporated cities, it does contain a number of unincorporated communities including Idyllwild, Anza, Aguanga, Cahuilla, Alandale, Pine Cove, Fern Valley and Garner Valley. Unlike other community plans, the REMAP land use map was adopted as an "advisory" map.

2.3.2.12 Eastvale Community Plan *(Not Adopted)*

The Eastvale Community Plan area is located in the northwest corner of Riverside County, bordered by the Jurupa area and the community of Mira Loma to the east, the Santa Ana River to the south and San Bernardino County to the west and north. The approximately 13.0-square-mile (8,300-acre) area includes the growing community of Eastvale and portions of the Prado Dam Flood Control Basin. Agriculture, public facilities, industrial, and scattered residential districts are the primary land uses in the area.

2.3.2.13 Eastern Coachella Valley Plan

The Eastern Coachella Valley Plan area, encompassing 314.6 square miles (201,367 acres), is located within the southeast potion of the Coachella Valley, south of the City of Indio. The Eastern Coachella Valley Plan area is bounded by the All-American Canal to the east, the City of La Quinta and the Santa Rosa Mountains to the west, and Imperial County to the south.

The Eastern Coachella Valley Plan area is one of the largest agricultural producing areas in the state. Existing communities in the Eastern Coachella Valley Plan include Mecca, North Shore, Valerie, Jean, and Thermal. Three County parks and the Salton Sea State Recreation Area are located within the Eastern Coachella Valley Plan area, providing recreational opportunities to residents and visitors alike. The Desert Center Airport, a County owned facility, is located at the northern end of the Eastern Coachella Valley Plan.

2.3.2.14 Western Coachella Valley Plan

The Western Coachella Valley Plan area, encompassing 319.6 square miles (204,542 acres) is located within the northwestern portion of the Coachella Valley, northeast of the City of Palm Springs. The Western Coachella Valley Plan is bounded on the north by the San Bernardino-Riverside County line; on the south by the cities of Indio, Coachella, La Quinta, Indian Wells, Palm Desert, Rancho Mirage, Cathedral City, and

Palm Springs; on the west by the San Gorgonio Pass area; and on the northeast by Joshua Tree National Park. Unincorporated areas of the Western Coachella Valley Plan are primarily vacant or rural with development occurring south of I-10 and in the Desert Hot Springs area. In addition to County park facilities, the BLM manages thousands of acres in the Western Coachella Valley Plan.

2.4 Specific Plans and Development Agreements

2.4.1 Specific Plans

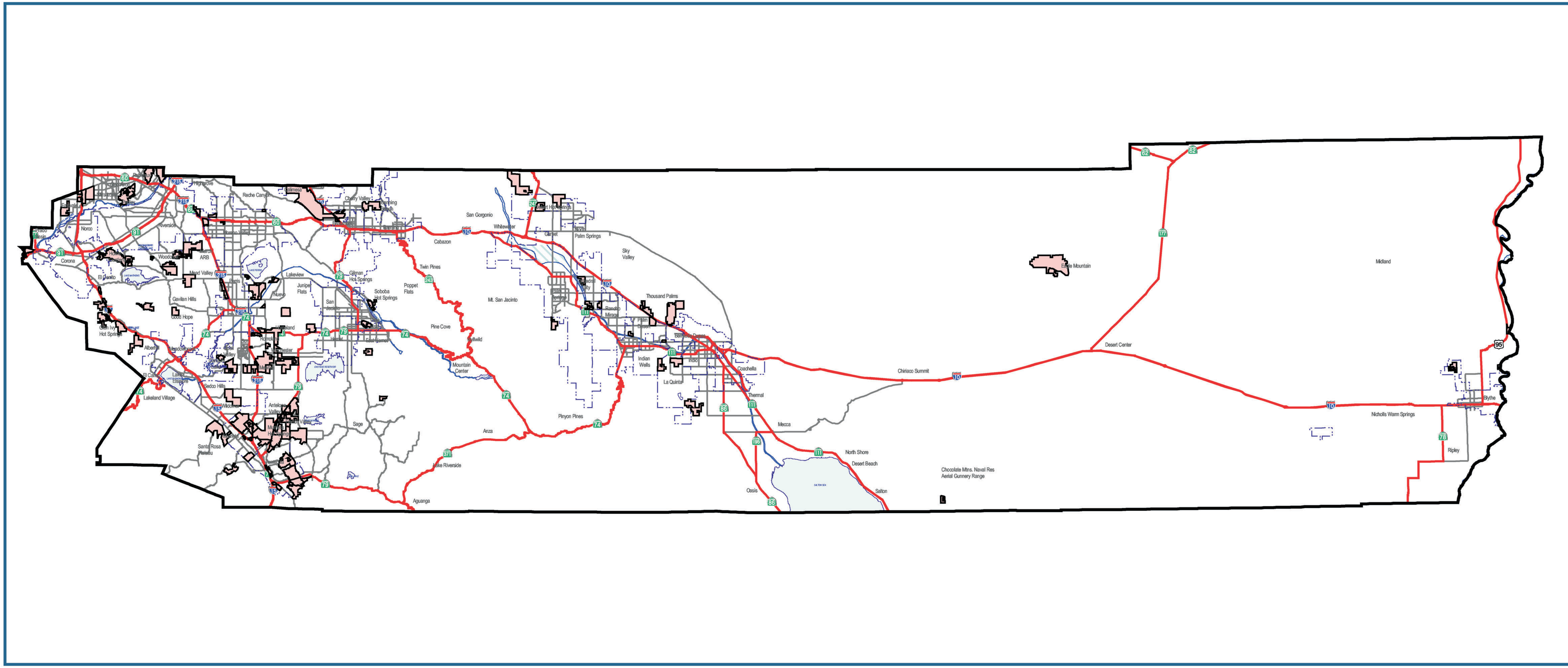
A specific plan is a combination policy statement and implementation tool that can be used to address a single project such as infill development or large multiple use projects. As a result, emphasis is on concrete standards and development criteria in the review of subsequent site plans. The California Government Code (Section 65450) permits the use of specific plans to regulate site development, including permitted uses, density, building size, and building placement. Specific plans also govern the type and extent of open space, landscaping, roadway configuration, and the provision of infrastructure and utilities. Since the development guidelines established in a specific plan focus on the unique needs and characteristics of a specific area, specific plans allow for greater flexibility than is possible with conventional zoning.

In unincorporated Riverside County, there are currently 77 approved specific plans. These documents range from a specific plan for a 25-acre commercial center (No. 177, Plaza del Sol near Sun City) to specific plans such as the Eagle Mountain Landfill Specific Plan (No. 305). The location of adopted specific plans is shown in Figure 2.5. Specific Plans encompass 65,470 acres (or 1.4 percent) of unincorporated Riverside County, clustered primarily in the western and southwestern portions of the County.

2.4.2 Development Agreements

To strengthen the public planning process, encourage private participation and comprehensive planning, and reduce the economic risk of development, the Legislature of the State of California adopted the Development Agreement Act. The act authorizes cities and counties to enter into binding "development agreements," establishing certain development rights and obligations in real property with persons having legal or equitable interest in such property. These agreements generally allow the applicant to proceed with the project in accordance with the existing policies, rules and regulations, and subject to conditions of approval, upon approval of the project. Because the effect of a development agreement is to provide legal "vesting" of a development approval, and to generally freeze current development regulations in place, in approving a development agreement, public agencies are permitted to seek fees and infrastructure improvements from developers in excess of what otherwise might be sought. Thus, development agreements provide benefits to both the County and developers.

During the late 1980s, facing the prospect of stringent growth management initiatives, a large number of developers sought development agreements for their projects. For a



LEGEND

- Cities
- Highways
- Major Roads
- Specific Plans

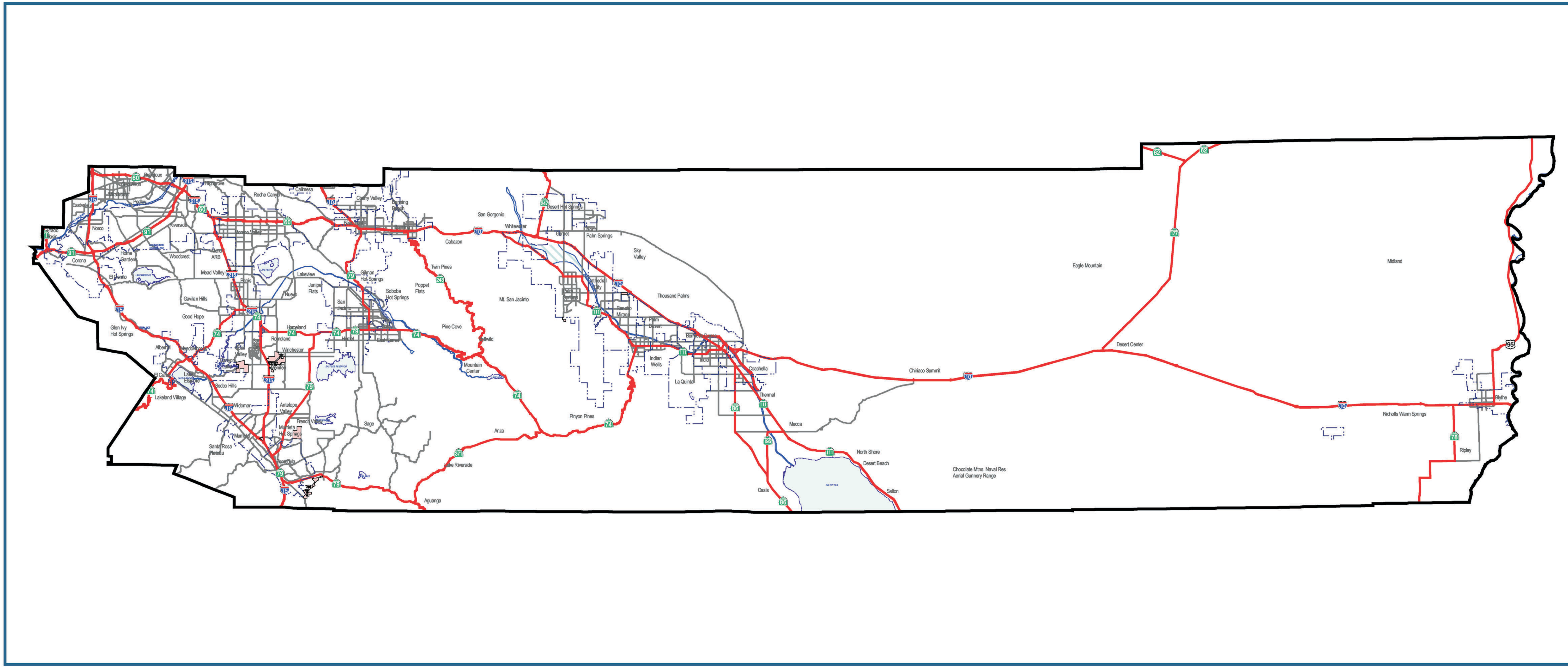
Figure 2.5

5 0 5 10 Miles

ADOPTED SPECIFIC PLANS

variety of reasons, many of these development agreements have subsequently expired. Several more have been amended and have been granted an extension on the agreement's expiration date. Existing development agreements within unincorporated portions of the County include the following (see Figure 2.6):

- Specific Plan No. 209, Audie Murphy Ranch, (Expires October 28, 2001)
- Specific Plan No. 217 (Amended), Red Hawk (Expires November 8, 2003)
- APN 673-120-001/004/005 (Expires August 17, 2005)
- Specific Plan No.158 (Amended), Menifee Village (Expires June 25, 2006)
- Specific Plan No. 211 (Amended), Andreas Cove (Expires November 4, 2006)
- Specific Plan No.184 (Amended), Rancho Bella Vista (Expires July 2, 2017)
- Specific Plan No. 172, Walker Basin (Expires October 28, 2000).



LEGEND

- Cities
- Highways
- Major Roads
- Development Agreements

5 0 5 10 Miles

Figure 2.6

EXISTING DEVELOPMENT AGREEMENTS

Section 3.0 - Circulationand Transportation

3.1 Introduction

Riverside County's existing circulation and transportation system is composed of a series of separate modes or types of passenger travel and goods movement. These modes of travel and goods movement include passenger vehicles and truck freight, transit, passenger and freight rail, passenger and cargo air, non-motorized systems (bicycle facilities, pedestrian facilities, equestrian facilities) and major utility corridors.

3.2 Existing Transportation/Circulation Conditions

Riverside County's transportation system is composed of numerous State highways, (both freeways and arterial highways), as well as numerous County and city routes. The public transit system includes fixed route public transit systems, common bus carriers, AMTRAK (intercity rail service), MetroLink (commuter rail service), and other local agency transit and paratransit services. In addition, the County transportation system includes general aviation facilities, limited passenger air service within the County, extensive air passenger facilities in the Southern California and San Diego regions, freight rail service, bicycle facilities, and other non-motorized forms of transportation (pedestrian and equestrian trails).

Travel within the County is a function of the size and spatial distribution of population and economic activity and the relationship to other major activity centers within the Los Angeles Basin or the Southern California Region (such as those located in Los Angeles, Orange, Ventura, San Bernardino, and Imperial Counties). Outside the Los Angeles Basin, other major urban centers that interact with Riverside County include those in San Diego County to the south and Kern County located in the San Joaquin Valley to the north. In addition, there is some travel between the western and eastern portions of the County (i.e., between Riverside and Blythe). The distance between these two subregions of Riverside County is greater than the distance between the City of Riverside and the City of Oxnard in the northernmost portion of the Southern California Region (approximately three hours by car).

Due to the interrelationship of urban and rural activities (employment, housing and services), and the low average density of existing land uses, the private automobile is the dominant mode of travel within Riverside County. Trips by transit currently represent less than two percent (2 percent) of all trips made in the County. Public transportation, where service is available, is utilized primarily by a transit-dependent population (senior citizens, students, low-income residents, and the physically disabled) that generally do not have access to automobiles.

The County's industrial and agricultural economies depend on safe and efficient goods movement. The County is responsible for maintaining an extensive network of low volume rural roads in sparsely settled areas to service goods movement and the agricultural industry. Large trucks are the primary means of transporting such goods. In addition, freight rail is an important backbone of the goods movement industry in Riverside County.

Non-motorized forms of transportation are also prevalent in Riverside County including numerous bikeways, pedestrian facilities, and equestrian amenities.

3.2.1 Existing Street and Highway System

3.2.1.1 Regional Setting

Figure 3.1 illustrates the relationship of Riverside County's roadway system to the State highway system, nearby counties, and major cities. The street and highway system provides a rather dense definition of roads of Countywide significance. The County's highway network, which is more dense in the western portion of the County, is composed of three interstate routes (I-10, I-15, and I-215), one U.S. route (US 95), and numerous State Routes (SRs 60, 62, 71, 74, 78, 79, 86, 91, 111, 177, 195, 243, and 371).

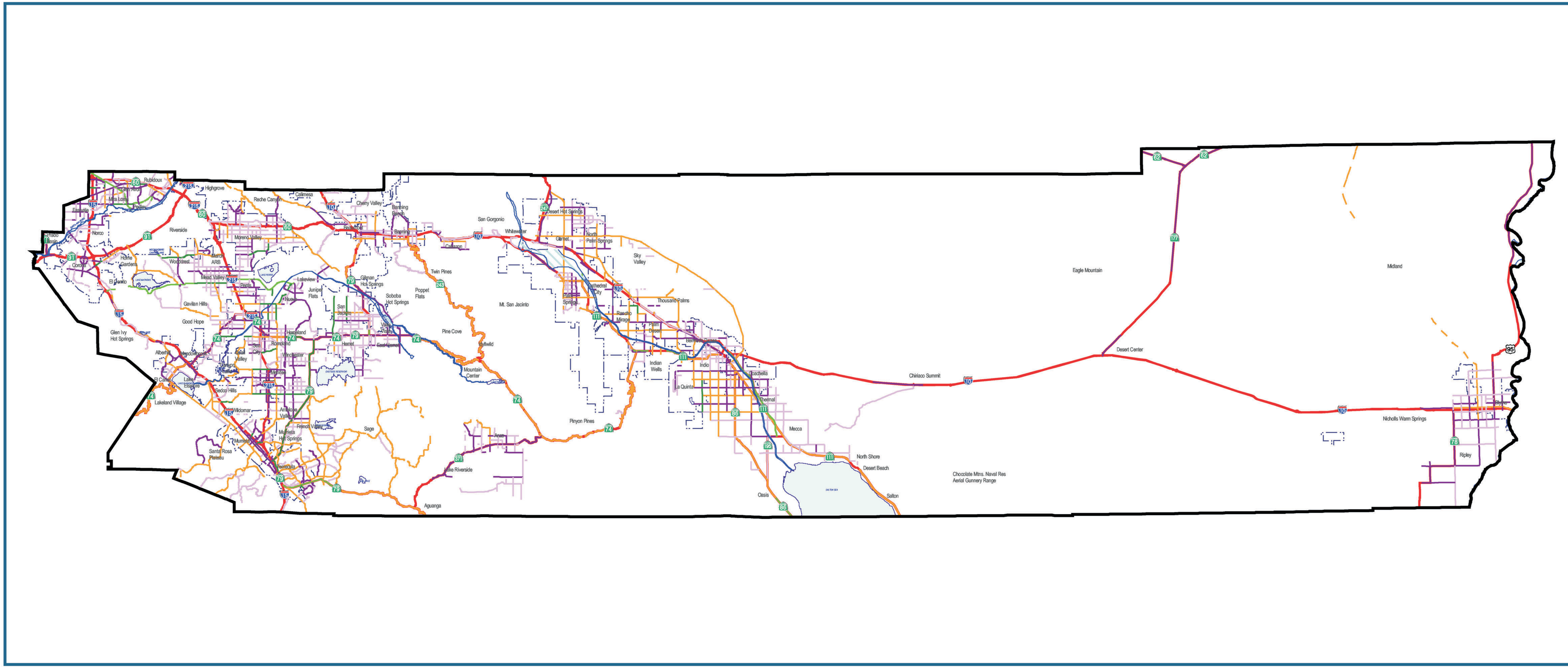
In addition, the highway system includes numerous County roadways, as well as roadways within each of the 24 cities in the County. Some of the major roadways in the County include Alessandro Boulevard, Arlington Avenue, Gene Autry Trail, La Sierra, Limonite, Magnolia Avenue, Market Street, Mission Boulevard, Monterey Avenue, Palm Drive, Perris Boulevard, Ramon Road, Ramona Expressway, Rancho California Road, San Jacinto Road, Van Buren Boulevard, and Washington Street.

Riverside County is linked to Los Angeles and Orange Counties principally by SR 60 (Pomona Freeway), I-10 (San Bernardino Freeway), SR 91 (Riverside Freeway), and SR 74 (Ortega Highway). The I-15 freeway and other minor conventional highways provide links to San Diego County. Links to San Bernardino County are provided by I-15 and I-215, as well as by other major and minor local roadways. The I-10 freeway also provides connection to destinations in Arizona, and I-15 and I-215 provide access through San Bernardino County to Nevada including its primary recreation areas (the City of Las Vegas and Lake Mead). In addition, I-15 provides access south to San Diego and it's many tourist and recreational amenities, and to Mexico via I-5, I-15 and I-805.

3.2.1.2 Functional Classification System

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the type of service they are intended to provide. Fundamental to this process is the recognition that individual streets and highways do not serve travel independently in any major way. Rather, most travel involves movement through a network of roads.

The following sections define roadway classification systems currently used by the Federal Highways Administration (FHWA), the County, and local agencies. Since issues related to the classification of roadways range from funding to operational considerations, each agency has its own classification system. These sections define and clarify the role of each system, and present the classification system used in this Element. A description of how the County roadway classification system relates to the



LEGEND

Cities
Highways

Road Type Classifications

- Secondary
- Major
- Arterial
- Urban Arterial
- Expressway
- Mountain Arterial

5 0 5 10 Miles

Figure 3.1

EXISTING ROADWAYS

others is provided in Appendix B. Referencing the information, for the most part, County road standards are generally consistent with those adopted by the local agencies in the County.

Travel should be controlled along the street and highway system in a logical and efficient manner. Functional classifications define the channelization process by defining the area that a particular street or highway should service through a circulation network. Table 3.A defines the general functional classes in urban areas of Riverside County and Table 3.B defines general functional classes in rural areas of the County.

Federal Functional Classifications

Federal functional classifications, designated for both the rural and urban areas, are as follows:

Rural	*Urban*
Interstate and Other	Interstate and Other
Principal Arterial	Freeways and Expressways
Minor Arterials	Other Principal Arterials
Major Collectors	Minor Arterials
Minor Collectors	Collectors

Table 3.A - Generalized Urban Functional Classification System - Definitions

Classification	Primary Function	Direct Land Access	Speed Limit	Parking
Freeway/ Expressway	Traffic Movement	None Allowed	45-65	Prohibited
Major Arterial	Traffic Movement/ Land Access	Limited Access to Adjoining Parcels	35-45	Generally Prohibited
Other Arterial	Traffic Movement/ Land Access	Restricted Access to Adjoining Parcels	30-35	Limited
Collector	Distribute Traffic Between Local Streets & Arterials	Safety Controls (such as Stop Signs), Limited Regulation or Control	25-30	Limited
Local	Land Access	Safety Controls Only, Unlimited Access in Accordance with	25	Permitted

Table 3.B - Generalized Rural Functional Classification System - Definitions

Classification	Primary Function	Direct Land Access[1]	Speed Limit[2]	Parking[3]
Freeway/ Expressway	Traffic Movement	Safety Controls Only, Unlimited Access in Accordance with Design	55-70	Prohibited
Major & Other Arterial	Traffic Movement/ Land Access	Safety Controls Only, Unlimited Access in Accordance with Design	55	Permitted
Collector	Distribute Traffic Between Local Streets & Arterials	Safety Controls Only, Unlimited Access in Accordance with Design	55	Permitted
Local	Land Access	Safety Controls Only, Unlimited Access in Accordance with Design	55	Permitted

Notes: [1] Access to arterials is generally limited or restricted if it provides access to a land subdivision or an industrial, commercial or multi-family use. Access is granted on a controlled basis to parcels fronting on expressways where there is not a frontage road or access to another road.

[2] All County roads have a 55 mph operating speed unless otherwise indicated

[3] Parking is permitted on all County roads unless otherwise indicated.

Functional Classifications as Applied in the Riverside County General Plan Update

To identify roadway infrastructure needs, several broad roadway classifications have been identified. These roadway classifications, though not as detailed or specific as those used for some of the cities in the County, nevertheless are sufficient to identify roadway infrastructure needs from the County's perspective. The design standards for roadway classifications used in the existing conditions analyses are shown in Appendix A. The potential exists to modify the functional classification system during further development of the Circulation Element of the General Plan.

- ***Freeways***. A freeway is a divided, limited access highway (access is provided at grade separated interchanges. Other vehicular crossings of these facilities are provided at grade separations). Freeways are designed to carry large volumes of traffic traveling long distances, although localized use of freeways occurs in urban areas. The planned freeway right-of-way varies depending on the needs of the facility.

  The California Department of Transportation (Caltrans) designs and constructs all freeways to federal (if federal monies are being used to fund or partially fund the facility) and State design standards. Alignments and key design details such as interchange locations are determined in consultation with local and federal authorities. Nothing actually precludes local jurisdictions from building their own freeways; however, Caltrans' State Highway System contains virtually all candidate routes for freeways.

The high cost of freeways has historically made it impractical for any agency other than Caltrans to construct new freeways. This situation changed in the late 1980s when "self-help" counties began generating transportation funds from local sources with an increase in the sales tax. In 1988, voters in Riverside County approved Measure A – the ½ percent sales tax increase for transportation improvements. These funds have been and are currently being programmed by the Riverside County Transportation Commission (RCTC) to improve the local transportation system, including new and improved freeway and passenger rail facilities.

- ***Expressways***. These are highways that carry large volumes of traffic relatively long distances within or through an urban or rural area. They also often serve considerable local traffic traveling over short distances. Along these facilities, priority is placed on through traffic mobility rather than access to fronting property. Direct access to individual fronting parcels is not allowed -- fully controlled frontage access is required. Expressways should be continuous through the urban or rural community they serve and link to arterial routes. The designated right-of-way for Expressways in Riverside County is currently 142 feet. Additional right-of-way may be required at some intersections.

- ***Urban Arterials***. These are highways carrying moderately high volumes of long distance and local traffic. Although access to abutting property is permitted, priority is given to through traffic mobility. The right-of-way standard for these facilities is 134 feet, and additional right-of-way at intersections may be required.

- ***Arterials and Mountain Arterials***. These are highway routes intended to link urban and rural areas as well as serve through traffic movements across the County. The right-of-way standard for arterials and mountain arterials is 110 feet. Additional right-of-way may be required at some intersections.

- ***Major Highways***. Major highways complement the Arterial system. They normally link smaller communities and may be continuous over shorter distances than arterials. Right-of-way for these facilities is 100 feet, and additional right-of-way at intersections may be required.

- ***Secondary Highways***. These are highways that are intended to carry local traffic between the local street system and the arterial highway system. In urban areas, secondary highways may serve average daily traffic (ADT) volumes in excess of 10,000 although volumes are normally less. In rural areas, secondary highways generally serve less than 10,000 ADT. The right-of-way standard for these facilities is 88 feet, and additional right-of-way may be required at some intersections.

- ***Collectors and Local Roads*****.** These roads provide access to abutting property and activity nodes. The facilities also link properties to the secondary or major system. All County roads not shown on the Circulation Element Map are considered to be collectors or local roads.

The intent of the functional classification system which is used in the County General Plan and in city and community circulation elements is to describe the intensity and character of traffic using each type of facility. The intent is also to describe the character of abutting uses, the priority placed on access to abutting property versus through traffic mobility, and the designation of roadway right-of-way standards. The intent of the Federal Functional Classification System described previously is to identify what types of TEA-21 funding (TEA-21 is the Transportation Equity Act for the 21st Century) each type of facility is eligible to receive.

3.2.1.2 Existing Roadway and Highway Capacity Analysis (Street and Highway Level of Service)

The first step toward analyzing a functional street and highway system is to thoroughly assess existing traffic conditions. To accomplish this task, level of service (LOS) analysis was conducted for existing roadway segments. LOS standards are used by Riverside County, Caltrans, and local agencies to quantitatively assess the street and highway system's performance. To determine the type and number of transportation projects that may be necessary to accommodate Riverside County’s expected growth; the existing LOS was assessed along selected freeway, expressway, arterial, and collector facilities.

According to the 1997 Highway Capacity Manual (HCM), LOS is categorized by two parameters of traffic, uninterrupted and interrupted flow. Uninterrupted flow facilities do not have fixed elements such as traffic signals that cause interruptions in traffic flow. Examples of such facilities would be freeways, including SR 91 and I-10. Interrupted flow facilities have fixed elements that cause an interruption in the flow of traffic, such as stop signs and signalized intersections along arterial roads. Examples of such facilities include Alessandro Boulevard, Etiwanda Avenue, Ramona Expressway, Van Buren Boulevard and many other arterial streets within Riverside County. The difference between uninterrupted flow and interrupted LOS is defined in Table 3.C and in Tables 3.D and 3.E.

An important goal when planning the transportation system is to maintain acceptable levels of service along the interstate and State highways and the streets and roads network. To accomplish this, Caltrans, the County, and local agencies adopt minimum levels of service in an attempt to control congestion that may result as new development occurs. According to goals, objectives, and policies described in the current Circulation Element, the goal is to maintain acceptable levels of service along the highways, streets, and roads network. For purposes of this analysis, and until new goals, objectives and policies are prepared during the next phase of General Plan process, the current County of Riverside Circulation Element goal to maintain a minimum LOS of C along the designated street and highway system was assumed.

The minimum LOS for purposes of the Riverside County Congestion Management Program (CMP) System is LOS E unless it was already at LOS F in 1991. To insure consistency with, and to address CMP requirements, CMP standards will be addressed by the Circulation Element Update.

Table 3.C - Level of Service Criteria

		Uninterrupted Flow 70 mph Freeway Speed Design			Interrupted Flow Urban and Suburban Arterial 2 and 4 Lanes Signalized				
								Arterial ADT[5]	
LOS	Density (PC/MI/LN)[1]	Speed (mph)	V/C[2]	MSF[3] (PC/H/L)[4]	Speed (mph)	V/C[2]	Delay (sec)	2-Lane	4-Lane
A	#10	$70	.318/ .3045	700	$35	0 - .60	#5.0	5,000	18,000
B	#16	$70	.529/ .487	1,100	$28	.51 - .70	5.1 - 15	8,000	21,000
C	#24	$68.5	.747/ .715	1,550	$22	.71 - .80	15.1 - 25	10,000	24,000
D	#32	$63	.916/ .876	1,850	$17	.81 - .90	25.1 - 40	12,000	27,000
E	#36.7/ 39.7	$60.0/ 58.0	1.0000	2,000	$13	.91 - 1.00	40.1 - 60	13,000	30,000
F	Varies	Varies	Varies		<13	>1.00	>60		

Notes:
1 PC/MI/LN: passenger cars per mile per lane.
2 V/C: Ratio of traffic volume to capacity.
3 MSF: maximum service flow rate per lane under ideal conditions (cj [capacity under ideal conditions]
v/c = MSF)
4 PC/H/L: passenger cars per hour per lane.
5 ADT: average daily traffic. These figures are affected by an intersection's degree of access control, the type of roadway, grades, design, geometrics, percent truck traffic, etc.

Source: 1997 Highway Capacity Manual.

Table 3.D - Uninterrupted Traffic Flow Facilities Level of Service

Level of Service	Definition
A	Represents free flow. Individual vehicles are virtually unaffected by the presence of others in the traffic stream.
B	Is in the range of stable flow, but the presence of other vehicles in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver.
C	Is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual vehicles becomes significantly affected by interactions with other vehicles in the traffic stream.
D	Is a crowded segment of roadway with a large number of vehicles restricting mobility and a stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.
E	Represents operating conditions at or near the level capacity. All speeds are reduced to a low, but relatively uniform value. Small increases in flow will cause breakdowns in traffic movement.
F	Is used to define forced or breakdown flow (stop-and-go gridlock). This condition exists when the amount of traffic exceeds the amount that can travel to a destination. Operations within the queues are characterized by stop and go waves, and they are extremely unstable.

Table 3.E - Interrupted Traffic Flow Facilities Level of Service

Level of Service	Definition
A	Describes operations with average intersection stopped delay of five seconds or less (how long a driver must wait at a signal before the vehicle can begin moving again).
B	Describes operations with average intersection stopped delay in the range of 5.1 to 15.0 seconds per vehicle, and with reasonably unimpeded operations between intersections.
C	Describes operations with higher average stopped delays at intersections (in the range of 15.1 to 25.0 seconds per vehicle). The stable operations between locations may be restricted given the ability to maneuver and change lanes at mid-block locations. These conditions can be more restrictive than LOS B. Further, the longer queues and/or adverse signal coordination may contribute to lower average speeds.
D	Describes operations where the influence of delay is more noticeable (25.1 to 40.0 seconds per vehicle). Intersection stopped delay is longer and the range of travel speed is about 40 percent below the free flow speed. This is caused by inappropriate signal timing, high volumes, and some combinations of both.
E	Is characterized by significant approach stopped delay (40.1 to 60.0 seconds per vehicle), and average travel speeds of one-third the free flow speed or lower. These conditions are generally considered to represent the capacity of the intersection or arterial.
F	Characterizes arterial flow at extremely low speeds, with high intersection stopped delay (greater than 60 seconds per vehicle). Poor progression, long cycle lengths, and high traffic demand volumes may be a major contributing factor to this condition. Traffic may be characterized by frequent stop-and-go conditions.

To determine the existing LOS for each segment along the street and highway network (including the CMP System), segment LOS was identified using the *Link Volume Capacities for Riverside County General Plan Roads* (Capacity Table). The Capacity Table was originally developed by Riverside County and revised by VRPA Technologies for purposes of this Circulation Element Update. Revisions to the Capacity Table (reference Table 3.F Riverside County Roadway Capacity Table) were primarily a result of information developed through application of the Florida Department of Transportation Arterial LOS Tables updated in September 1998. The Florida Tables (or Modified HCM LOS Tables) are based on the 1997 HCM and are approved for LOS analysis by the Riverside County CMP. Numerous other counties in California utilize the Tables to quantify segment LOS. Modified HCM LOS Table default values for Riverside County were developed to represent travel characteristics in the Inland Empire versus the State of Florida (reference Appendix D). It should be noted that link capacities contained in Table 3.F are comparable to those adopted by other counties in the Southern California Region.

The Modified HCM Tables consider the capacity of individual street and highway segments based on numerous roadway variables (freeway design speed, signalized intersections per mile, number of lanes, saturation flow, etc.). These variables were identified and applied to reflect existing traffic LOS conditions in Riverside County. The variables are consistent with HCM variables referenced in Table 3.C. A complete description of the Modified Tables applied to calculate existing LOS is included in Appendix E. It is important to note that there are many factors that influence the capacity of an individual segment of roadway. The Riverside County Capacity Table is a planning-level categorization and may not be sufficiently refined for more detailed types of analyses. In addition, certain roadway segments may exceed or fall below these thresholds because of their particular characteristics.

Table 3.F - Riverside County Roadway Capacity Table (Level of Service 10/1/99)[1]

Roadway Classification	Number of Lanes	Maximum Two-Way Average Daily Traffic (ADT)[2]		
		LOS C	LOS D	LOS E
Collector	2	10,400	11,700	13,000
Secondary	4	20,700	23,300	25,900
Major	4	27,300	30,700	34,100
Arterial[3]	2	14,400	16,200	18,000
Arterial	4	28,700	32,300	35,900
Mountain Arterial[3]	2	12,900	14,500	16,100
Mountain Arterial	3	16,700	18,800	20,900
Mountain Arterial	4	29,800	33,500	37,200
Urban Arterial	4	28,700	32,300	35,900
Urban Arterial	6	43,100	48,500	53,900
Urban Arterial	8	57,400	64,600	71,800
Expressway[4]	4	32,700	36,800	40,900
Expressway[4]	6	49,000	55,200	61,300
Expressway[4]	8	65,400	73,500	81,700
Freeway	4	61,200	68,900	76,500
Freeway	6	94,000	105,800	117,500
Freeway	8	128,400	144,500	160,500
Freeway	10	160,500	180,500	200,600

Notes:
[1] All capacity figures are based on optimum conditions and are intended as guidelines for planning purposes only.
[2] Maximum two-way ADT values are based on the 1999 Modified Highway Capacity Manual Level of Service Tables as defined in the Riverside County Congestion Management Program.
[3] Level two-lane arterials are analyzed as arterials.
[4] There are currently no roadways in Riverside County that match this category, but capacity values are needed for future conditions analysis.

Existing Traffic Counts and Roadway Geometrics

Traffic volumes used to develop LOS calculations were obtained from Caltrans, the County of Riverside, the Coachella Valley Association of Governments (CVAG), and various cities within the County (reference Appendix A). Traffic volumes were available from these agencies for years 1993 through 1999.

To reflect 1999 traffic along the existing street and highway system in the County, traffic counts (other than 1999 counts) were adjusted based on an assumed 2 percent annual increase. The percentage increase applied is consistent with historical annual growth rates in vehicle trips in Riverside County.

Segment Level of Service Analysis

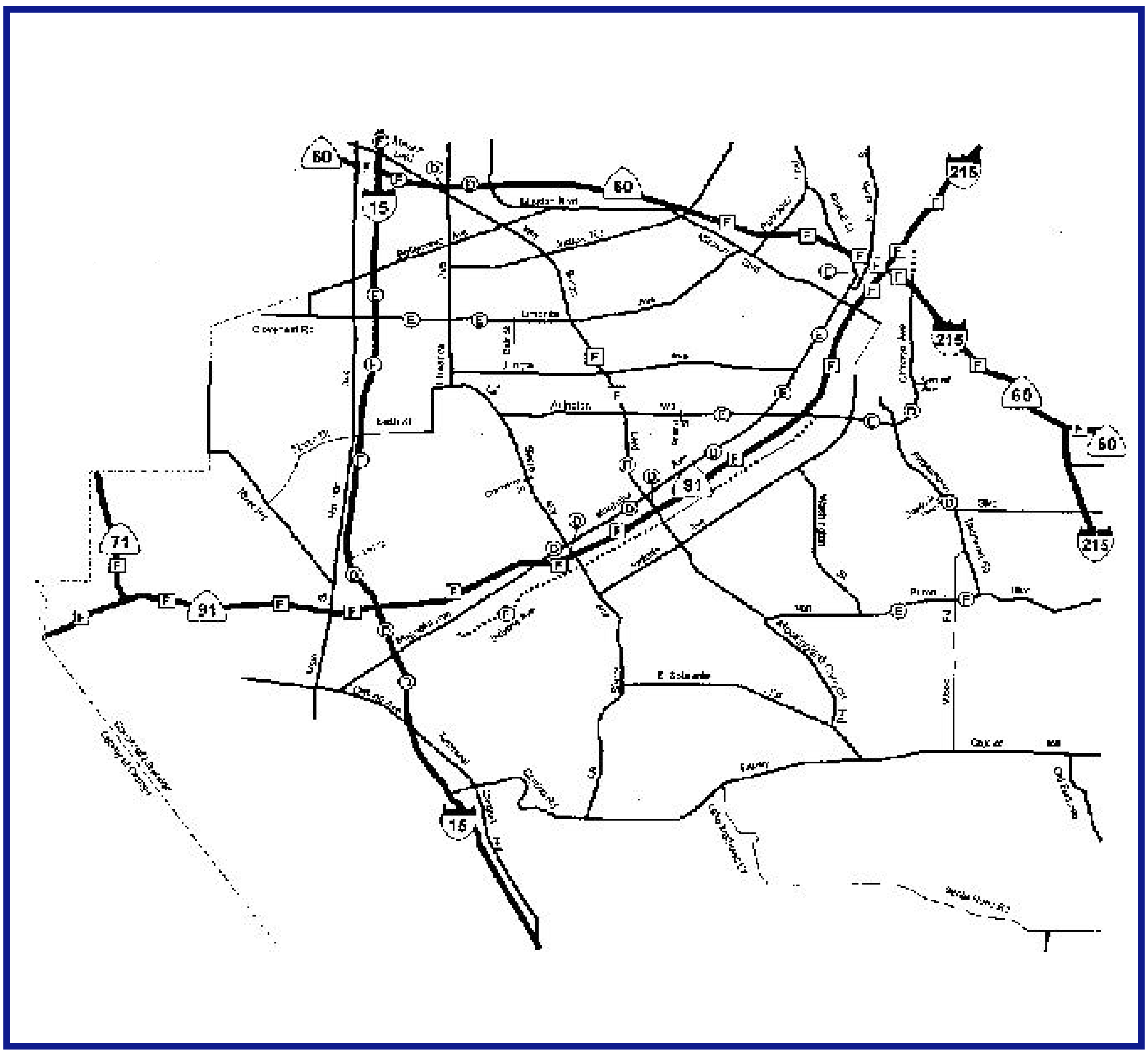
Results of the LOS segment analysis along street and highway segments are reflected in Figures 3.2a through 3.2j and are further described in Appendix A. A street and highway segment is defined as a stretch of roadway (generally 2 miles in length) and often located between signalized or controlled intersections. The HCM-based LOS analysis is based upon a calculation of the Average Daily Traffic (ADT) and other variables previously described, such as the number of lanes and signalized intersections along a segment considering roadway design standards adopted by Riverside County.

Referencing Figure 3.2, results of the segment analysis indicates that street and highway segments within Riverside County are currently operating at LOS A through F. Tables 3.G and 3.H provide a listing of those facilities that currently do not meet the County minimum LOS standard of C or better. Referencing that tables, twenty-seven (27) of the segments are operating at LOS D, seventeen (17) are operating at LOS E, and fifty-nine (59) facility segments are currently operating at LOS F. As a result, these street and highway segments fall short of Riverside County's, Caltrans', and affected local agencies' minimum LOS standards.

Referencing Tables 3.G and 3.H, most of the deficient Local, Interstate, and State Route facilities are located in the western portion of Riverside County. In addition, it appears based upon the analysis, that most deficiencies occur on the freeway system and other major arterials. There are some local facilities that are also deficient; however, they are not restricted just to Western Riverside County. Most deficient local facilities occur along arterials in the Cities of Riverside, Coachella Valley, Moreno Valley, Temecula, and Lake Elsinore.

Some of the deficient streets and highways currently operating at LOS D, E, or F are located on the County's CMP System. Many of the segments along the State highway system have been operating at LOS F prior to adoption of the Riverside County CMP or since 1991. Such facilities are considered to be exempt from CMP requirements; therefore, improvement of the segments to LOS E or better is not required to comply with CMP statutes. However, since the County has adopted a policy to maintain a minimum LOS of C, improvement of the deficient facilities identified in Figure 3.2 must be considered during preparation of this General Plan Circulation Element Update process, unless the policy is modified. It should be noted that segments along three (3) State facilities that are considered exempt or at LOS F for CMP purposes since 1991, are currently operating at a better LOS (LOS E or better). The reason for an improvement in LOS 1999 is due to one of the following:

- The County General Plan Circulation Element Update analyzed ADT along the significant highways and roads. The CMP considered peak hour traffic. During the peak travel times, LOS can be significantly lower than when compared to ADT



Legend

- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- D, E, or F Level of Service
- Non-Exempt Facility
- Exempt Facility
- # LOS 'F' in CMP, and exempt from CMP requirements since 1991.

Figure3.2a

Source: VRPA Technologies,1999.

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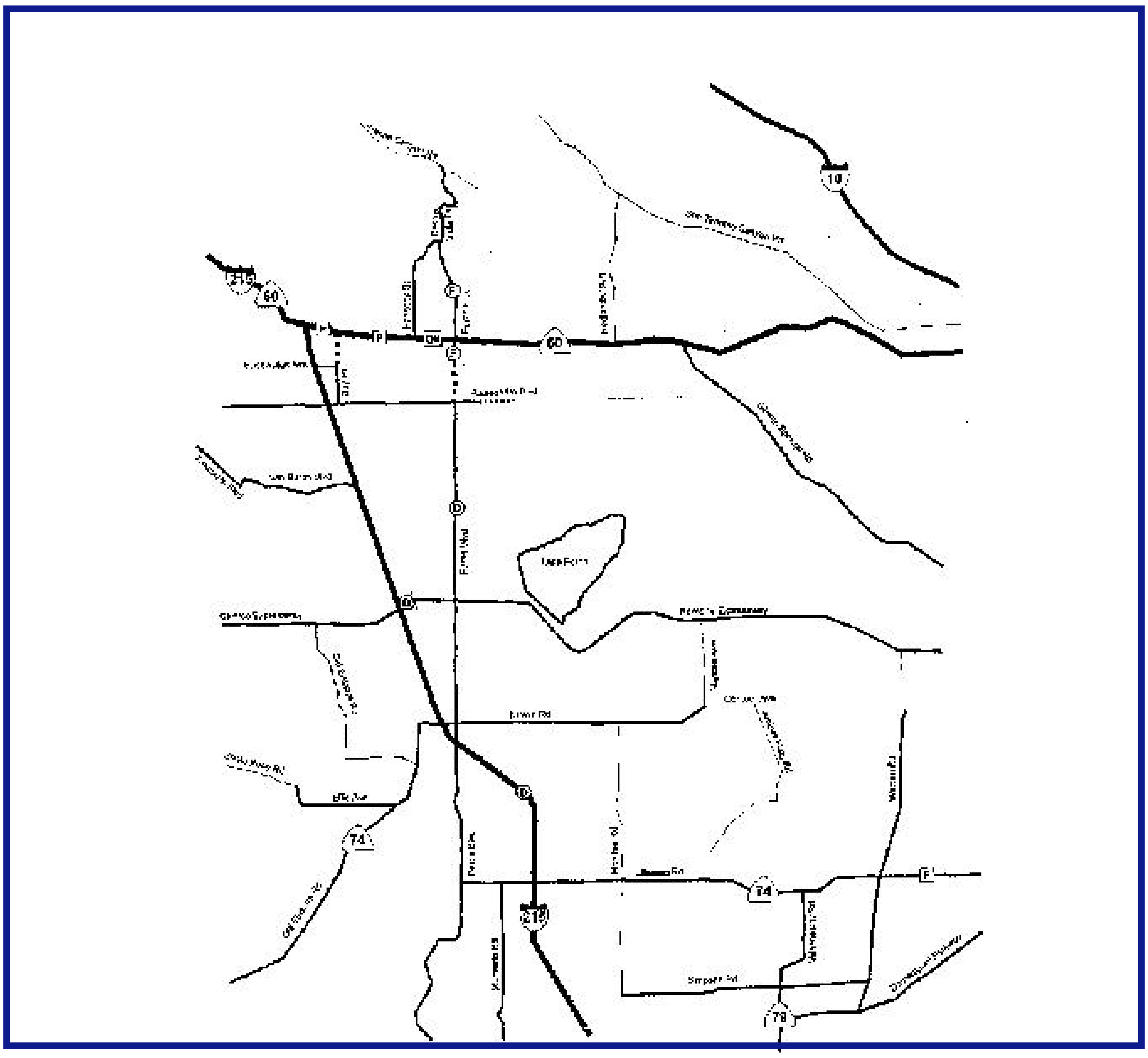
EXISTING CONDITIONS ROADWAY CLASSIFICATION AND LEVELS OF SERVICE



Legend

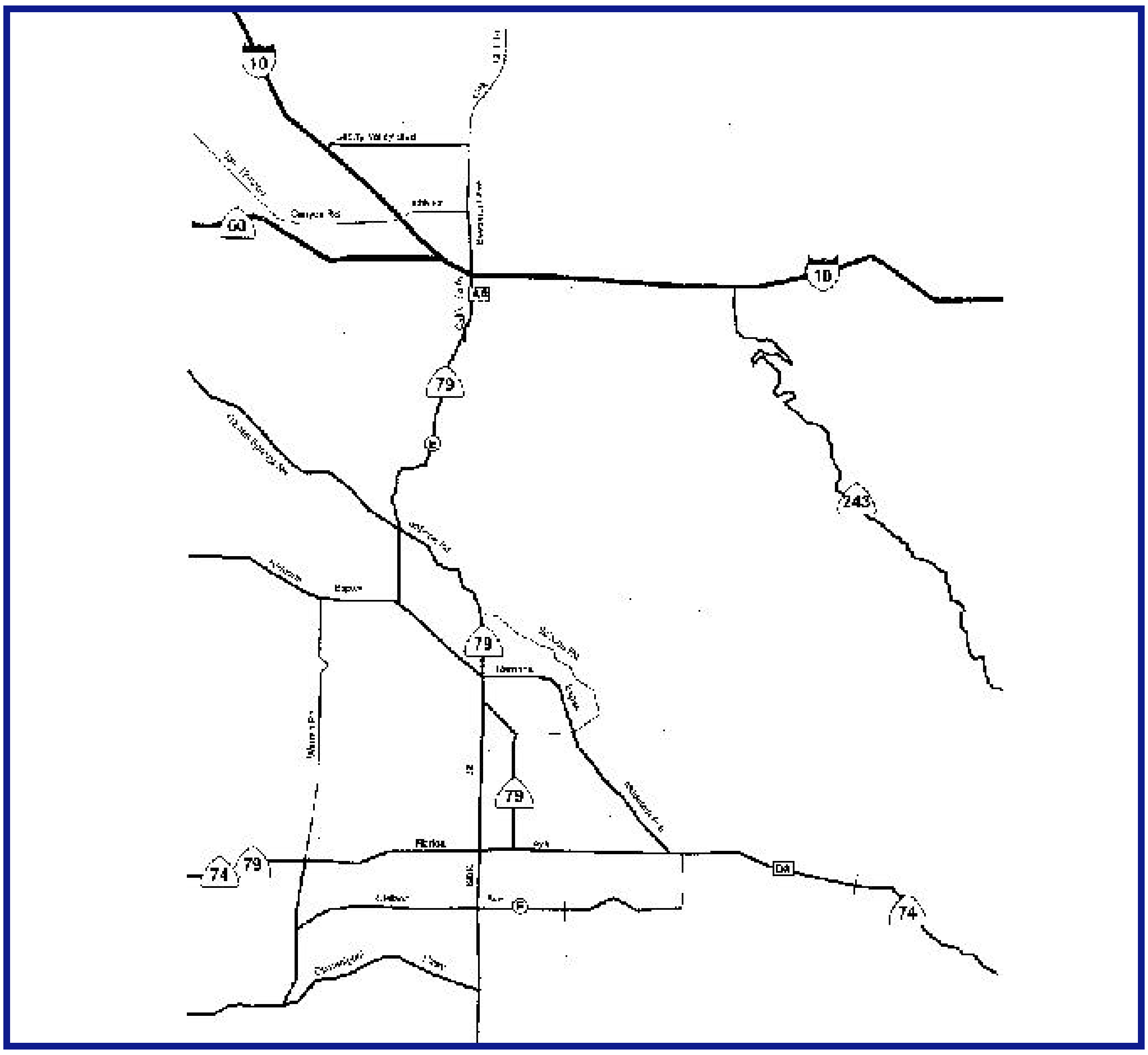
- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- D, E, or F Level of Service
- Non-Exempt Facility
- Exempt Facility
- * LOS 'F' in CMP, and exempt from CMP requirements since 1991.

Figure 3.2b

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS ROADWAY CLASSIFICATION AND LEVELS OF SERVICE



Legend

Collector
Secondary
Major
Arterial
Mountain Arterial
Urban Arterial
Expressway
Freeway
D, E, or F Level of Service
Non-Exempt Facility
Exempt Facility
* LOS 'F' in CMP, and exempt from CMP requirements since 1991.

Figure3.2c

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS
ROADWAY CLASSIFICATION
AND LEVELS OF SERVICE

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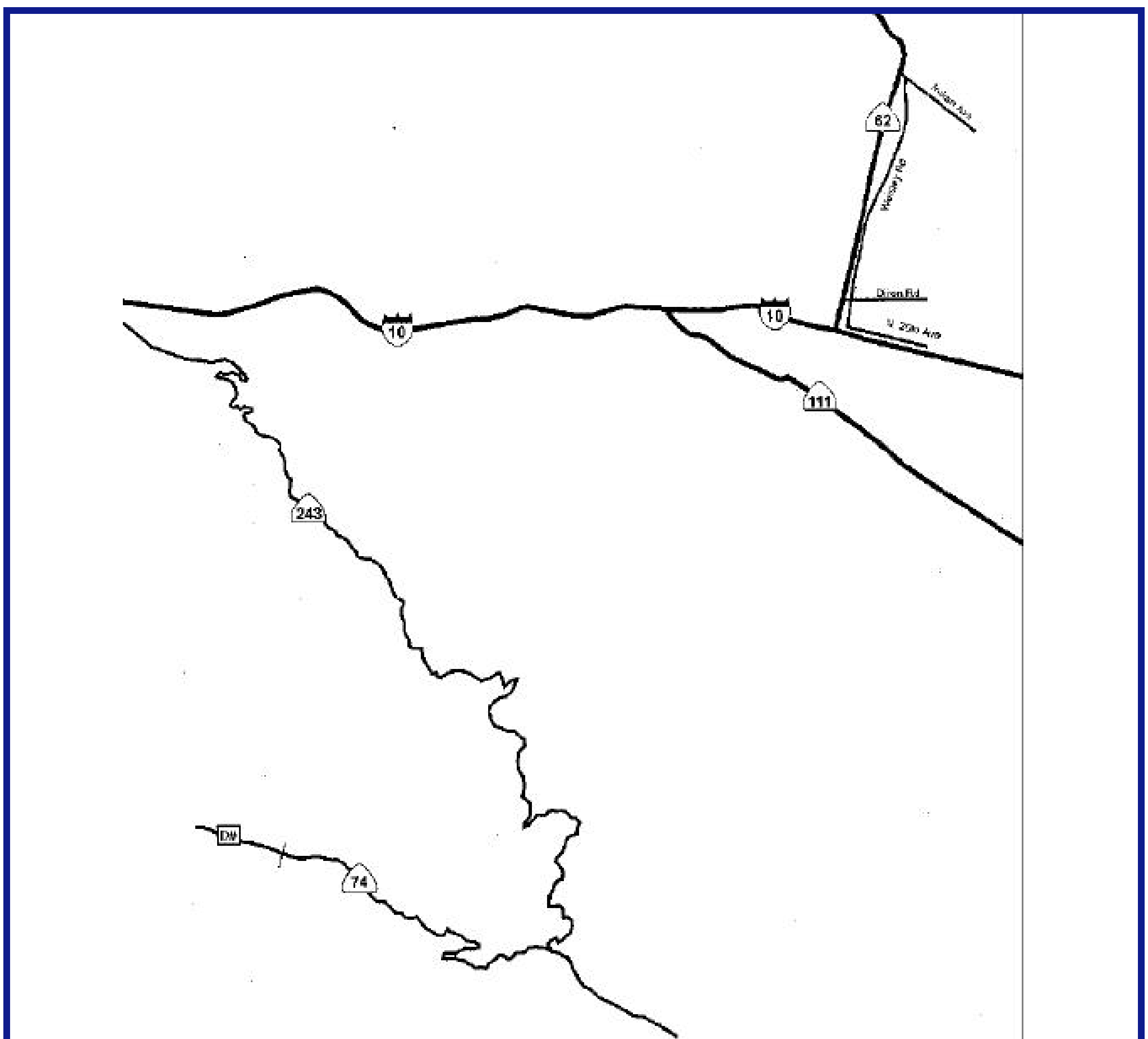


Legend

- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- D, E, or F Level of Service
- Non-Exempt Facility
- Exempt Facility
- \# LOS 'F' in CMP, and exempt from CMP requirements since 1991

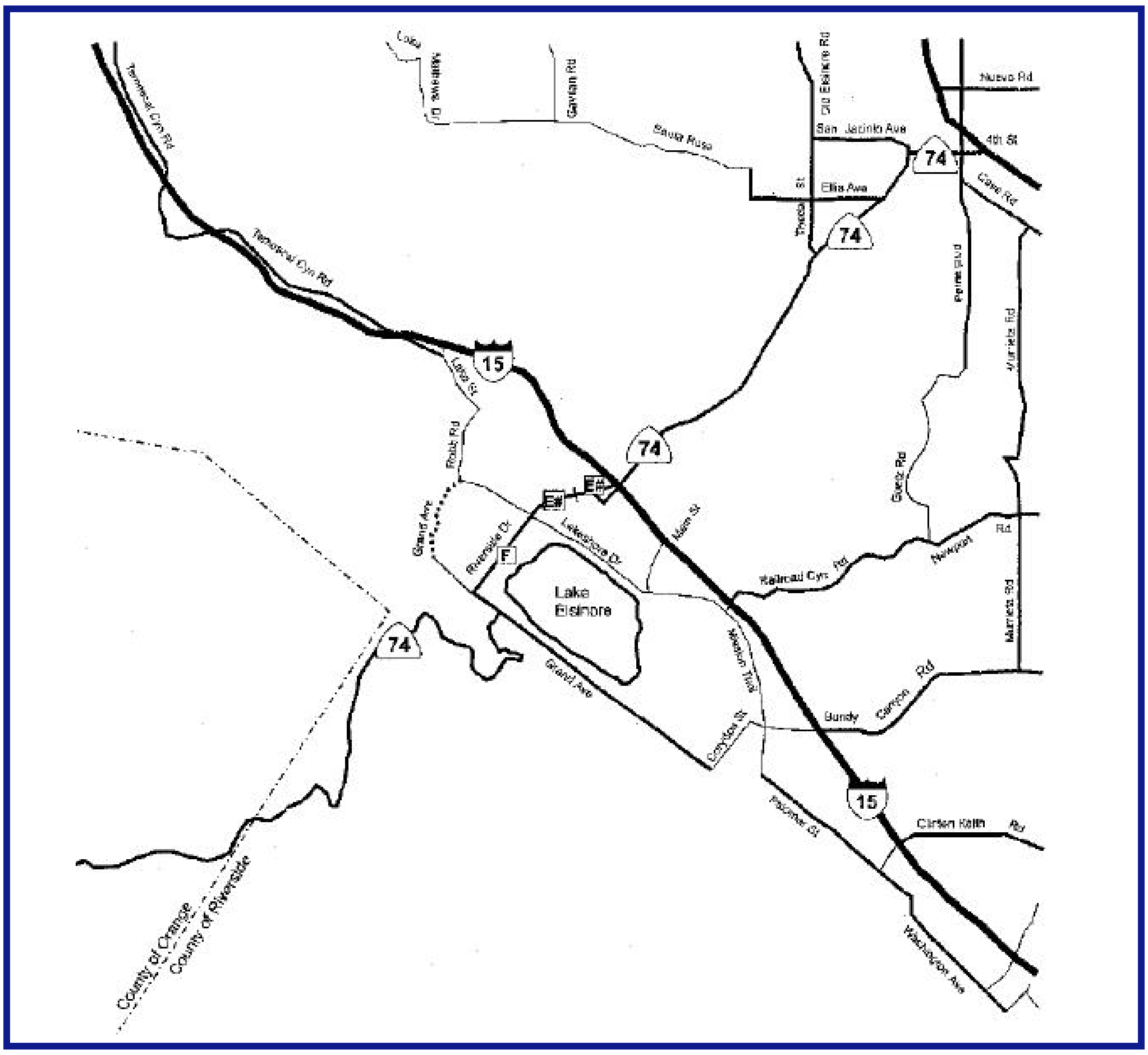
Figure 3.2d

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS
ROADWAY CLASSIFICATION
AND LEVELS OF SERVICE

R:\SVC931-Graphics\ExistingSetting\los-d.cdr(7/5/02)



Legend

- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- D, E or F Level of Service
- Non-Exempt Facility
- Exempt Facility
- # LOS 'F' in CMP and exempt from CMP requirements since 1991

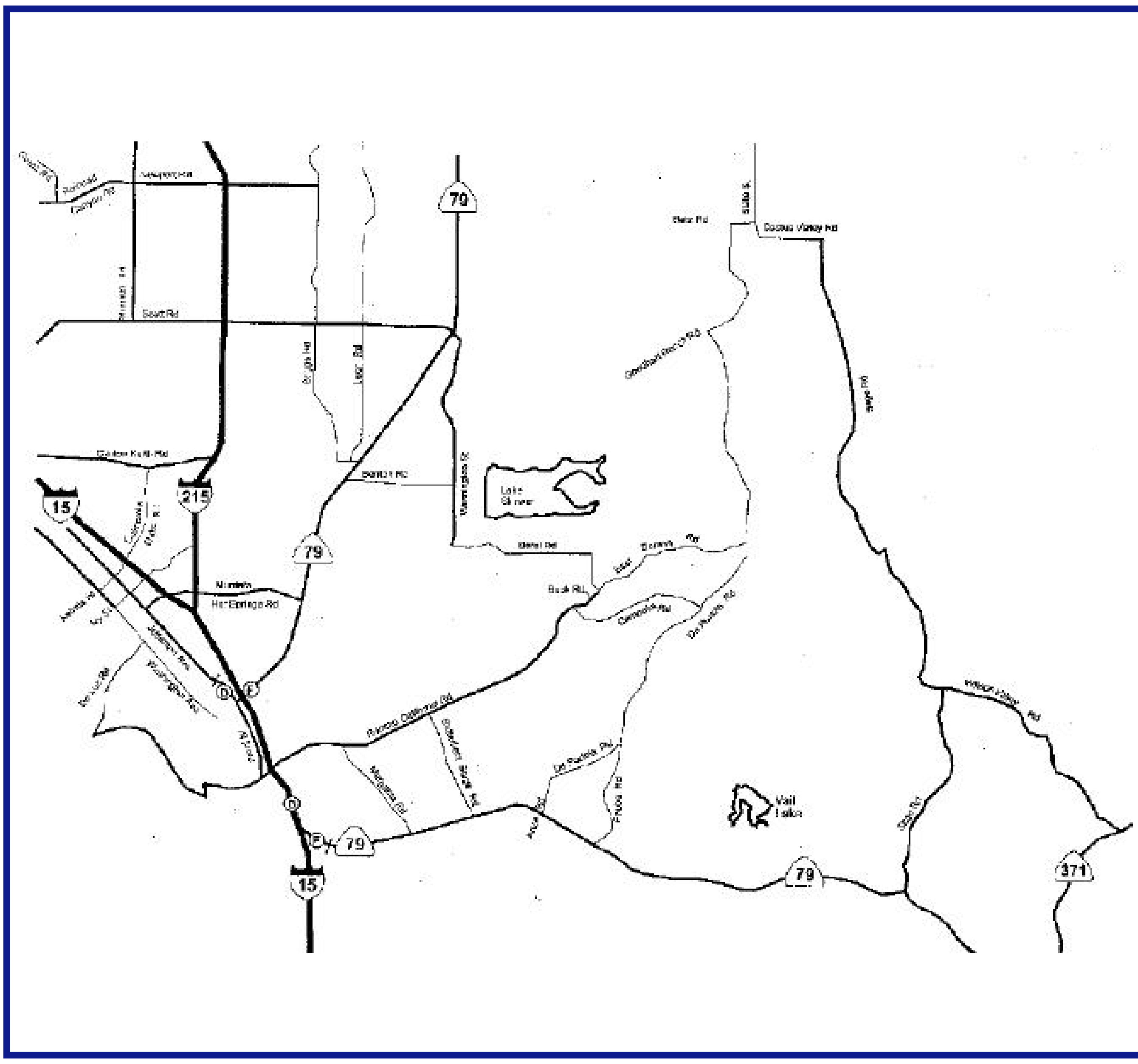
Figure3.2e

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS ROADWAY CLASSIFICATION AND LEVELS OF SERVICE

R:\SVC931-Graphics\ExistingSetting\los-e.cdr(7/5/02)



Legend

- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- D, E, or F Level of Service
- ○ Non-Exempt Facility
- □ Exempt Facility
- \# LOS 'F' in CMP, and exempt from CMP requirements since 1991.

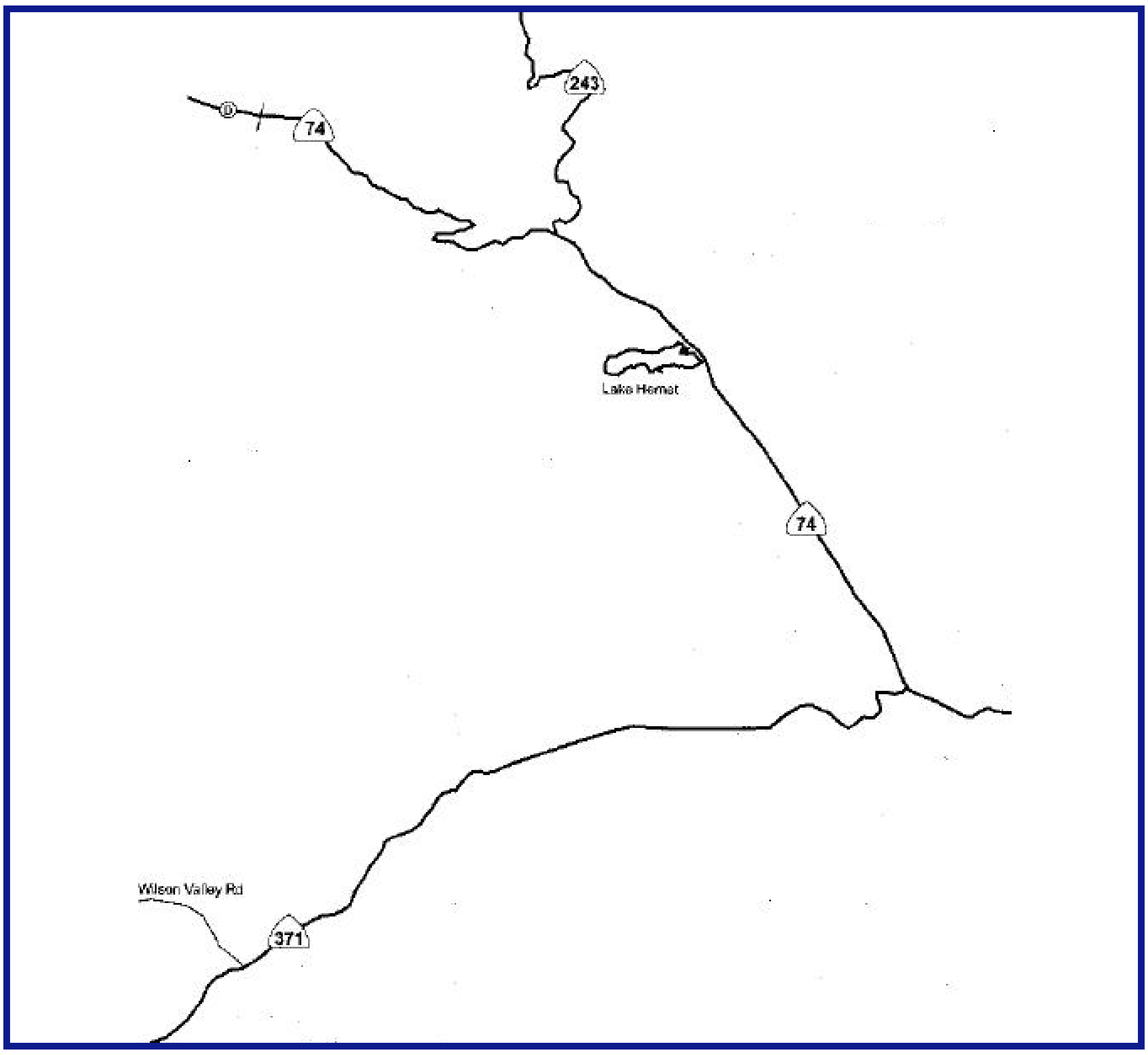
Figure 3.2f

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS ROADWAY CLASSIFICATION AND LEVELS OF SERVICE

R:\SVC931-Graphics\ExistingSetting\los-f.cdr(7/5/02)



Legend

- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- D, E, or F Level of Service
- Non-Exempt Facility
- Exempt Facility
- # LOS 'F' in CMP, and exempt from CMP requirements since 1991.

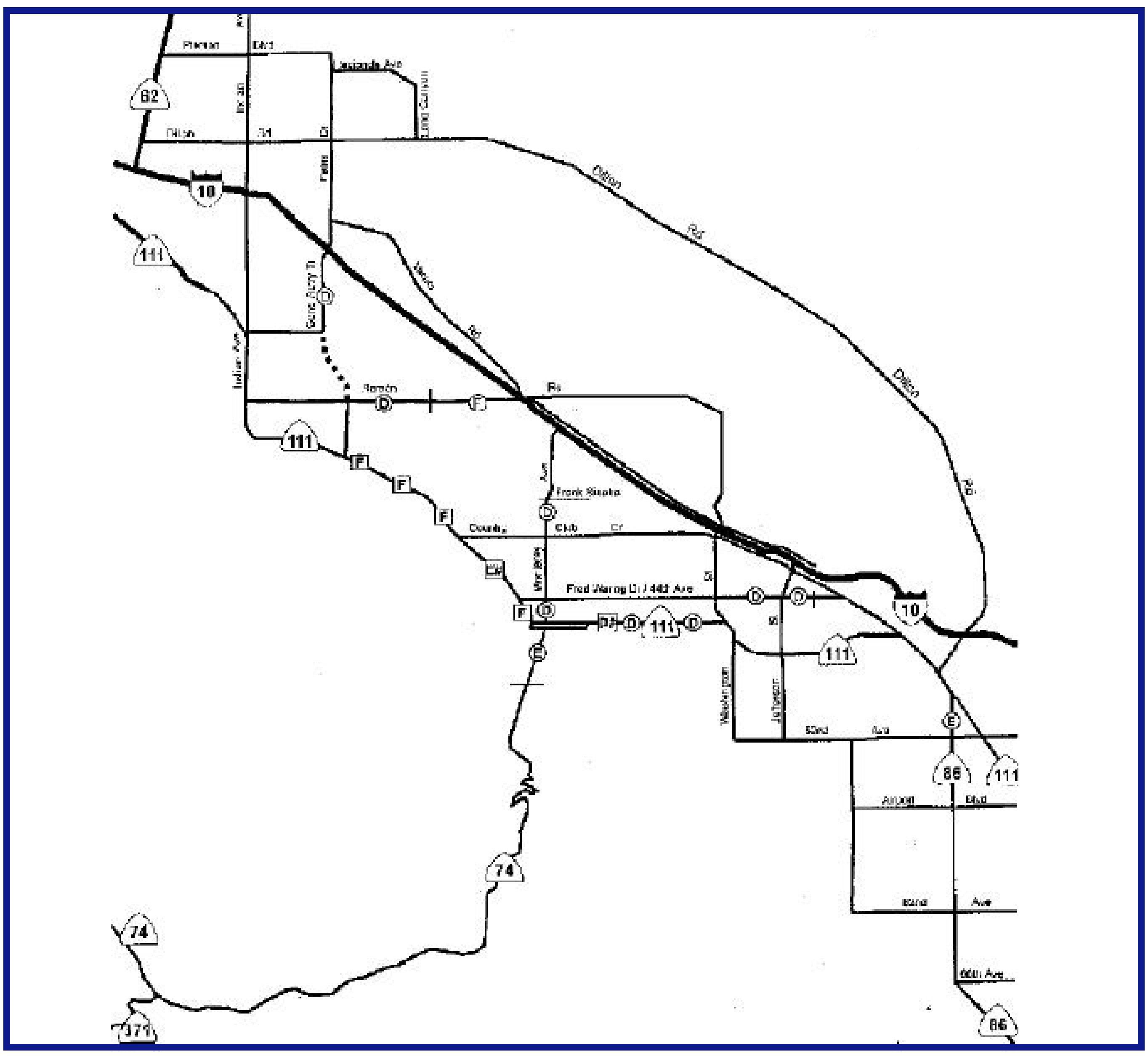
Figure3.2g

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS
ROADWAY CLASSIFICATION
AND LEVELS OF SERVICE

R:\SVC931-Graphics\ExistingSetting\los-g.cdr(7/5/02)



Legend

- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- D, E, or F Level of Service
- Non-Exempt Facility
- Exempt Facility
- # LOS 'F' in CMP, and exempt from CMP requirements since 1991.

Figure 3.2h

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS
ROADWAY CLASSIFICATION
AND LEVELS OF SERVICE

R:\SVC931-Graphics\ExistingSetting\los-h.cdr(7/5/02)

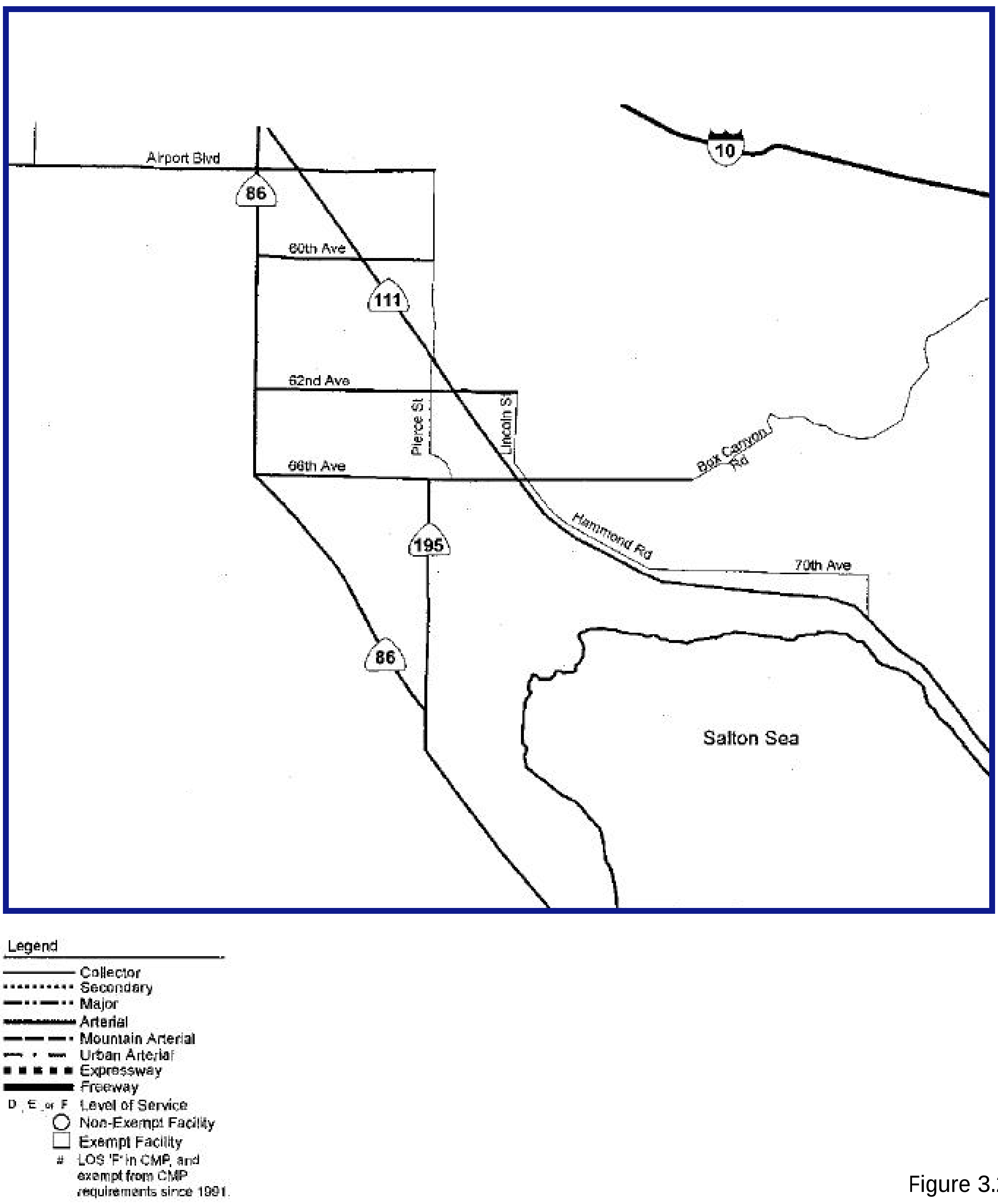


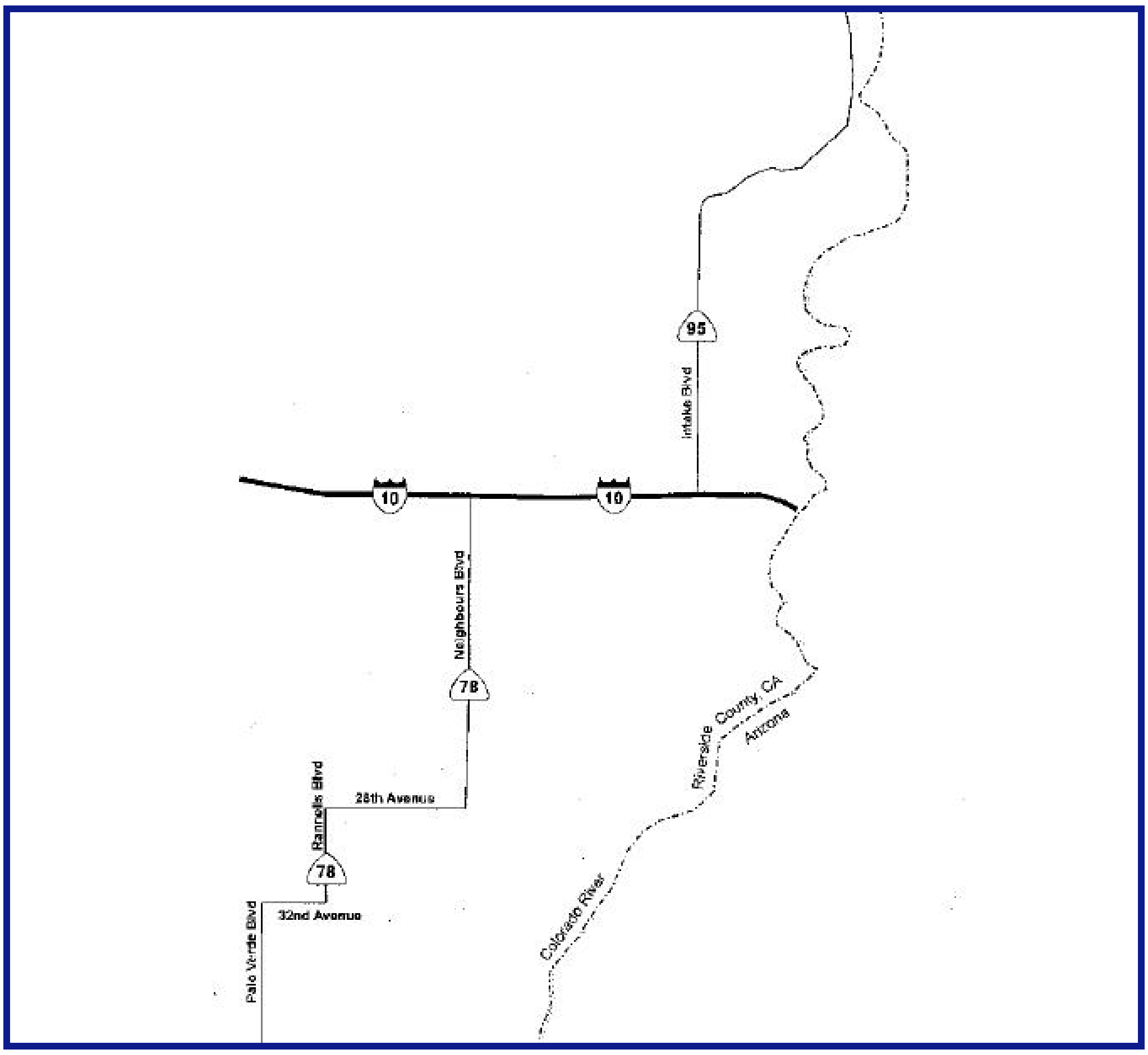
Figure 3.2i

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS
ROADWAY CLASSIFICATION
AND LEVELS OF SERVICE

R:\SVC931-Graphics\ExistingSetting\los-i.cdr(7/5/02)



Legend

- Collector
- Secondary
- Major
- Arterial
- Mountain Arterial
- Urban Arterial
- Expressway
- Freeway
- Ⓓ,Ⓔ, or Ⓕ Level of Service
- Exempt Facility

Figure 3.2j

Source: VRPA Technologies,1999.

NottoScale

EXISTING CONDITIONS
ROADWAY CLASSIFICATION
AND LEVELS OF SERVICE

R:\SVC931-Graphics\ExistingSetting\los-j.cdr(7/5/02) conditions. This condition explains the reason for LOS deficiencies along segments of SR 74 and SR 60; or

C A lane-widening project has been implemented. Since 1991, SR 79 has been widened from two (2) to four (4) lanes. As a result, the LOS has improved from LOS F to LOS A.

Table 3.G - Existing Roadway Capacity Analysis (Interstate and State Routes)

		Existing Conditions (1999)			
Roadway Segment	Limits	Facility Type[1]	No. of Lanes[2]	ADT[3]	LOS[4]
I-15	Temecula, Jct. Rte. 79 - Jct. Rte. 215 No.	Freeway	8	131600	D
	Corona, Magnolia Ave. - Corona, Jct. Rte. 91	Freeway	8	130600	D
	Corona, Jct. Rte. 91 - Norco, 2nd St.	Freeway	8	133700	D
	Norco, 2nd St. - Norco, 6th St	Freeway	6[*6]	125500	F
	Norco, 6th St. - Limonite Ave	Freeway	6[*6]	122400	F
	Limonite Ave. - Jct. Rte. 60	Freeway	6	111200	E
	Jct. Rte. 60 - San Bernardino Co. Line*	Freeway	9[*6]	175500	F
SR 60	San Bernardino Co. Line - Milliken Ave.	Freeway	6[*5]	197900	F
	Milliken Ave. - Jct. Rte. 15	Freeway	6[*5]	189800	F
	Jct. Rte. 15 - Van Buren Blvd.	Freeway	6[*6]	122400	F
	Van Buren Blvd. - Etiwanda Ave.	Freeway	6[*6]	91800	C
	Etiwanda Ave. - Mission Blvd.	Freeway	6	101000	D
	Valley Way - Rubidoux, Rubidoux Blvd.	Freeway	4[*5]	89800	F
	Rubidoux, Rubidoux Blvd. - Riverside, Crestmore Ave.	Freeway	4[*5]	96900	F
	Riverside, Crestmore Ave - Riverside, Main St.	Freeway	4[*5]	103100	F
	Riverside, Main St. - Riverside, Orange St.	Freeway	4[*5]	98000	F
	Riverside, Orange St. - Riverside, E. Jct. Rte. 215	Freeway	4[*5]	100000	F
	Riverside, E. Jct. Rte. 215 - Riverside, Day St.	Freeway	4[*5]	105100	F
	Riverside, Day St. - Moreno Valley, Pigeon Pass Rd.	Freeway	4[*5]	108200	F
	Moreno Valley, Pigeon Pass Rd. - Moreno Valley, Heacock St.	Freeway	4[*5]	83700	F
	Moreno Valley, Heacock St. - Moreno Valley, Perris Blvd.	Freeway	4#	68400	D
SR 71	Riverside Co. Line - Jct. Rte. 91	Arterial	2[*5]	33700	F
SR 74	Elsinore, Grand Ave. - Elsinore, Lake Shore Dr.	Arterial	2[*5]	20100	F
	Elsinore, Lake Shore Dr. - Gunnerson St./Strickland Ave.	Arterial	2#	17200	E

Roadway Segment	Limits	Existing Conditions (1999) Facility Type[1]	No. of Lanes[2]	ADT[3]	LOS[4]
	Gunnerson St./Strickland Ave. - Elsinore, Jct. Rte. 15	Arterial	2#	17600	E
	Elsinore, Jct. Rte. 15 - Perris Seventh St.	Arterial	2	16400	E
	Perris Seventh St. - Perris, D St.	Arterial	2	16900	E
	Hemet, Lyon Ave. - Hemet, State St.	Arterial	4#	29100	D
	Hemet, State St. - Hemet, Jct. 79 No, San Jacinto St.	Arterial	4#	30600	D
SR 79	Sage Rd. - Temecula, Pala Rd.	Arterial	2[%]	18200	F
	Temecula, Pala Rd. - South Jct. Rte. 15, Temecula So.	Arterial	2[%]	30100	F
	Temecula, No. Jct. Rte. 15 - Borel St.	Arterial	4	32700	E
	Central Ave./State St. - Ramona Expressway	Arterial	2	14900	D
	Soboba Rd - California Ave.	Arterial	2	14900	E
SR 86	Coachella, So. Jct. Rte. 111 - Coachella, Dillon Rd./Ave. 48	Arterial	4	35200	E
SR 91	Orange Co. Line - Green River Dr.	Freeway	8[*5]	228500	F
	Green River Dr. - Jct. Rte. 71 No.	Freeway	8[*5]	220400	F
	Jct. Rte. 71 No. - Serfas Club Dr.	Freeway	8[*5]	219300	F
	Serfas Club Dr. - Corona, Maple St.	Freeway	8[*5]	222400	F
	Corona, Maple St. - Corona, Lincoln Ave.	Freeway	8[*5]	215300	F
	Corona, Lincoln Ave. - Corona, West Grand Blvd.	Freeway	8[*5]	226500	F
	Corona, West Grand Blvd. - Corona, Main St.	Freeway	8[*5]	219300	F
	Corona, Main St. - Jct. Rte. 15	Freeway	8[*5]	235700	F
	Jct. Rte. 15 - McKinley St.	Freeway	8[*5]	211200	F
	McKinley St. - Pierce St.	Freeway	8[*5]	185700	F
	Pierce St. - Magnolia Ave.	Freeway	8[*5]	163200	F
	Magnolia Ave. - La Sierra Ave..	Freeway	8[*5]	168300	F
	La Sierra Ave.. - Tyler St.	Freeway	8[*5]	166300	F
	Tyler St. - Van Buren Blvd.	Freeway	8[*5]	170400	F
	Van Buren Blvd. - Adams St.	Freeway	8[*5]	162200	F
	Adams St. - Madison St.	Freeway	8[*5]	165300	F
	Madison St. - Arlington Ave.	Freeway	8[*5]	165300	F
	Arlington Ave. - Central Ave./State St.	Freeway	8[*5]	168300	F
	Central Ave./State St. - Fourteenth St.	Freeway	8[*5]	168300	F
	Fourteenth St. - Eighth St.	Freeway	8[*5]	167300	F
	Eighth St. - LaCadena Dr./Poplar and Spruce St.	Freeway	8[*5]	162200	F

Roadway Segment	Limits	Existing Conditions (1999) Facility Type1	No. of Lanes2	ADT3	LOS4
	LaCadena Dr./Poplar and Spruce St. - Jct. Rte. 60, Jct. Rte. 215 No.	Freeway	8*5	160200	F
SR 111	Washington St. - Racquet Club Dr.	Arterial	4	31100	D
	Racquet Club Dr. - Miles/Manitou Ave.	Arterial	4	31100	D
	Miles/Manitou Ave. - Cook St.	Arterial	4	30700	D
	Cook St. - Indian Wells City Limits	Arterial	4	31200	D
	Indian Wells City Limits - Portola Ave.	Arterial	4#	31200	D
	Portola Ave. - Jct. Rte. 74 So.	Arterial	4*5	39500	F
	Jct. Rte. 74 So. - Bob Hope Dr.	Arterial	4*5	33800	F
	Bob Hope Dr. - Country Club Dr.(40th Ave.)	Arterial	4#	36400	E
	Country Club Dr.(40th Ave.) - Frank Sinatra Dr.	Arterial	4*5	38500	F
	Frank Sinatra Dr. - Date Palm Ave./Broadway	Arterial	4*5	40100	F
	Date Palm Ave./Broadway - Golf Club Dr.	Arterial	4*5	41600	F
	Golf Club Dr. - Gene Autry Trail	Arterial	4*5	42700	F
I-215	So. Jct. Rte. 74, Case Rd. - No. Jct. Rte. 74; Fourth St.	Freeway	4	61200	D
	Jct. Rte. 60 East - Fair Isle Dr.	Freeway	6*5	174800	F
	Fair Isle Dr. - Central Ave.	Freeway	6*5	180000	F
	Central Ave. - Pennsylvania Ave.	Freeway	6*5	174800	F
	Pennsylvania Ave. - University Ave.	Freeway	6*5	173700	F
	University Ave. - 3rd/Blaine St.	Freeway	6*5	172000	F
	3rd/Blaine St. - Spruce St.	Freeway	8*5	177900	F
	Spruce St. - Jct. Rte. 60 & 91 West	Freeway	8*5	178900	F
	Jct. Rte. 60 & 91 West - Columbia Ave.	Freeway	8#	151900	E
	Columbia Ave. - Center St.	Freeway	6*5	147700	F
	Center St. - San Bernardino Co. Line	Freeway	6*5	143600	F

Notes: * I-15: Jct. Rte 60 - San Bernardino Co. Line - Analyzed as a 9-lane Freeway.

All counts increased 2 percent per year to reflect 1999 Conditions.

*1 Referenced from SCAG RIVSAN/CTP Base Year Model or CVAG CVATS Base Year Model.

*2 Referenced from SCAG RIVSAN/CTP Base Year Model or CVAG CVATS Base Year Model.

*3 Referenced from Riverside County GIS System - Traffic Count Database or from CVAG Manual or from Caltrans Count Manual.

*4 Derived by VRPA Technologies based upon methodology referenced in Appendix D and E.

*5 Exempt from CMP requirements because the facility segment has been LOS F since 1991.

*6 Not exempt from CMP Requirements.

The Riverside County Congestion Management Program has identified this segment as LOS "F" and exempt from CMP requirements since 1991.

The LOS shown in this table may differ from the LOS reported in the CMP. This can occur because the CMP is based on a different methodology than this table or because lanes have been added to the facility since the time it was declared to be exempt.

% Currently undergoing roadway improvements. Resultant roadway improvement should improve Level of Service.

Table 3.H - Existing Roadway Capacity Analysis (Classified Local Facilities*[1])

Roadway Segment	Limits	Existing Conditions (1999)			
		Facility Type[1]	No. of Lanes[2]	ADT[3]	LOS[4]
44th Ave	Washington St - Clinton St	Arterial	4	32000	D
Alessandro Blvd	Frederick St - Heacock St	Arterial	4	33100	E
Alessandro Blvd	Overlook Pkwy - Trautwein	Arterial	4	30700	D
Arlington Ave	Adams - Magnolia Ave	Arterial	4	34300	E
Arlington Ave	Victoria Ave Chicago Ave	Arterial	4	29500	D
Chicago Ave	Central Ave - Alessandro Blvd	Arterial	4	30000	D
Gene Autry	I-10 - Palm Springs Bypass	Arterial	2	14900	D
Gene Autry	Palm Springs Bypass - Vista Chino	Arterial	2	15200	D
Indiana Ave	Cajalco St - Fillmore St	Collec-tor	2[*8]	13700	F
Jefferson Ave	Winchester Ave - Date St	Arterial	2	14600	D
La Sierra Ave	Arlington Ave - Gramercy Ave	Arterial	2[*6]	27900	F
La Sierra Ave	Magnolia Ave - SR 91	Arterial	4	28800	D
Limonite Ave	I-15 - Etiwanda Ave	Arterial	2	17100	E
Limonite Ave	Etiwanda Ave - Bain St	Arterial	2	17500	E
Magnolia Ave	SR 91 - La Sierra Ave	Arterial	4	32200	D
Magnolia Ave	Harrison St Van Buren Blvd	Arterial	4	29000	D
Magnolia Ave	Van Buren Blvd Arlington Ave	Arterial	4	30300	D
Magnolia Ave	Arlington Ave - 7th St	Arterial	4	35100	E
Monterey Ave	Frank Sinatra Dr - SR 111	Arterial	4	28900	D
Palm Dr	Two Bunch Palms Tr - Dillon Rd	Arterial	2[*8]	22600	F
Palm Dr	Dillon Rd - Varner Rd	Arterial	2	17600	E
Palm Dr	Varner Rd - I-10	Arterial	2	17600	E
Perris Blvd	Reche Vista Dr - SR 60	Arterial	2[*8]	32900	F
Perris Blvd	SR 60 - Eucalyptus Ave	Arterial	4	33300	E
Perris Blvd	Alessandro Blvd - Cajalco Ex-pressway	Arterial	4	28900	D
Ramon Rd	Gene Autry Tr - Da Vall Dr	Arterial	4	31300	D
Ramon Rd	Da Vall Dr - Bob Hope Dr	Arterial	2[*6]	20100	F
Ramona Express-way	I-215 - Patterson Ave	Arterial	4	31000	D
San Jacinto	Main St - Commonwealth Ave	Arterial	2	17700	E
San Jacinto	Menlo Ave - Florida Ave	Arterial	2[*8]	36000	F
Stetson Ave	State Ave - Stanford St	Arterial	2	16400	E
Van Buren Blvd	Washington St - Wood Rd	Arterial	4	34600	E
Van Buren Blvd	Limonite Ave - Jurupa Ave	Arterial	4#	31200	D

Roadway Segment	Limits	Existing Conditions (1999) Facility Type1	No. of Lanes2	ADT3	LOS4
Van Buren Blvd	Jurupa Ave - Arlington Ave	Arterial	4#	31200	D
Van Buren Blvd	Arlington Ave - Magnolia Ave	Arterial	4	31800	D
Van Buren Blvd	Magnolia Ave - SR 91	Arterial	4	30800	D

Notes: *1 Identified by VRPA Technologies to reflect Existing Conditions on a "regional basis".
*2 Referenced from SCAG RIVSAN/CTP Base Year Model or CVAG CVATS Base Year Model.
*3 Referenced from SCAG RIVSAN/CTP Base Year Model or CVAG CVATS Base Year Model.
*4 Referenced from Riverside County GIS System - Traffic Count Database, CVAG Traffic Count Manual or Caltrans Traffic Count Manual. All counts increased 2% per year to reflect 1999 Conditions.
*5 Derived by VRPA Technologies based upon methodology referenced in Appendix D and E.
*6 Exempt from CMP requirements. The facility segment has been LOS F since 1991.
*7 Not exempt from CMP Requirements.
*8 Not on the CMP System.
The CMP has identified this segment as LOS "F" and exempt from CMP requirements since 1991.
The LOS shown in this table may differ from the LOS reported in the CMP. This can occur because the CMP is based on a different methodology than this table (peak hour analysis vs. AADT) or because lanes have been added to the facility since the time it was declared to be exempt (1991).

Referencing Tables 3.G and 3.H, a number of deficient facilities operating at LOS D, E, or F have been identified. The identification of these deficient facilities provides an opportunity for Riverside County, Caltrans, and other affected local agencies to focus on street and highway and other improvement projects that will improve the overall LOS in the County over time.

3.2.2 Existing Public Transportation Systems/Services

Fixed-route transit services and demand response (dial-a-ride) transit services are provided by the Riverside Transit Agency (RTA) for the western portion of Riverside County and by SunLine Transit in the Coachella Valley.

3.2.2.1 Riverside Transit Agency (RTA)

The Riverside Transit Agency (RTA) was formed in March of 1977 through a joint-powers agreement between the County of Riverside and the incorporated cities within its service area. Currently, RTA operates 29 fixed bus routes providing public transit service throughout a 2,500 square mile area of Western Riverside County. RTA's fixed routes have been designed to establish transportation connections between all the cities and unincorporated communities in Western Riverside County. A *Riverside Transit Agency System Map* brochure has been included in Appendix A, which shows all the fixed routes, route connection and transfer locations, and demand response system service areas. The brochure also includes helpful hints for using the system, an explanation of rider fares, and instructions on the use of bike racks. RTA also participates with OmniTrans in San Bernardino County to provide express bus service between downtown Riverside and downtown San Bernardino, connecting with express service to Ontario.

RTA is currently operating 76 full size buses, 67 mini-buses and vans, and two trolleys. The system carries approximately 6.4 million passengers annually, which is about 18,000 passengers per day. All of the RTA s vehicles are wheelchair accessible and all full size buses include bike racks. RTA was the nation's first transit agency to own and operate EPA-approved, methanol powered buses, and has recently added several buses that operate on Compressed Natural Gas (CNG). Overall, the rolling stock fleet now includes 20 buses operating on alternative fuels. To provide the necessary fuel services, RTA has recently purchased an on-site CNG fueling station.

RTA currently utilizes several types of media and methods to share or distribute information about the transit services. The agency prints a *Ride Guide*, that includes fare schedules, route maps, and other rider information, as well as a multi-color *RTA System Map*.

The map is stapled into the center of the *Ride Guide* and can be easily separated from the rest of the document. RTA has developed an Internet Web Site (www.rrta.com) that includes a variety of information about fares, routes, schedules, and other transit user information.

RTA is committed to increasing its use of advanced technologies for its monitoring and service delivery systems to improve operating efficiency and insure proper and effective use of taxpayer dollars. The agency is moving toward the implementation of a Geo-Synchronous Positioning Satellite System, for both fixed route and dial-a-ride services, which will provide real-time information related to bus location, farebox collection, and vehicle management systems. RTA has earned an impressive safety record. While accumulating over 4.9 million miles per year, over 85 percent of the system's operators have been accident free for more than five years.

3.2.2.2 SunLine Transit

SunLine Transit Agency (SunLine) was formed in 1977 through a Joint-Powers Authority (JPA) between the County of Riverside and a number of the Coachella Valley cities. The purpose of the JPA was to provide public transit services for the Coachella Valley area. The JPA currently includes the County of Riverside, and the cities of Desert Hot Springs, Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and Coachella. The service area covers 928 square miles with a permanent population of over 270,000 residents. Due to the desirable climate and an economy largely based on tourism, the population increases by another 200,000 seasonal residents, and additional national and international visitors.

SunLine operates 13 fixed routes, with more than 700 stop locations, serving over three million passengers annually. SunLine's *SunBus System Map* is presented below in Exhibit X (Page 4 of SRTP). The agency currently operates a fleet of 40 buses of which 100 percent operate on CNG. SunLine was the first transit agency in the nation to operate a 100 percent CNG fleet of vehicles. The agency also operates two CNG fueling facilities, one in Thousand Palms and one in Indio.

All of SunLine's buses are equipped with front mounted bicycle racks, and overall the system is carrying over 6,000 bicycles per month. While the SunLine system of fixed route transit stops are not currently 100 percent Americans with Disabilities Act (ADA) accessible, the agency has established an ACCESS Committee to review service plans and policies and to make recommendations to staff regarding ADA issues. The SunBus system provides transportation services to an average of 900 wheelchair passengers per month.

SunLine also operates the SunDial System, which provides curb to curb demand responsive (dial-a-ride) service for members of the community requiring such assistance. The SunDial fleet includes 19 vehicles and serves over 40,000 passenger trips annually.

3.2.2.3 Other Specialized Transit Services

In addition to fixed route and demand-responsive services provided by RTA and SunLine, specialized public transportation services are also available through services operated by four municipal operators - the City of Riverside, City of Corona, City of Banning, and City of Beaumont. Additionally, the Riverside County Transportation Commission supports a number of specialized transportation programs including shared ride car and vanpool services, social service dial-a-ride, and specialized services for seniors and persons with disabilities.

3.2.2.4 Common Carriers

Greyhound Bus Lines provides private transportation services that link the principal population centers of the County with other regions. This includes east-west service connecting Blythe, Indio, Palm Springs, Banning/Beaumont, and Riverside (via San Bernardino). The service continues westward to downtown Los Angeles and intermediate stops. North-south service connects Riverside with Temecula, continuing southward to San Diego. The number of bus trips in each direction ranges from five to eight per day.

3.2.2.5 Intermodal Coordination

RTA, SunLine, OmniTrans in San Bernardino County, the Orange County Transportation Authority (OCTA), and each of the city transit service providers coordinate their respective schedules and transfer stops to provide for an enhanced level of transit service. RTA's main terminal in Riverside is located between University Avenue and Mission Inn Avenue, one block west of Market Avenue. Transfer points in other areas are indicated on the RTA transit map. RTA also provides connections to selected Metrolink stations for both inbound and outbound trains.

3.2.3 Existing Rail Transportation System

3.2.3.1 Inter-City Passenger Rail

The only AMTRAK station located in Riverside County is in the City of Palm Springs. This station provides connecting AMTRAK service to points west including Los Angeles and to points east including Tucson, Arizona and El Paso, Texas. AMTRAK does provide bus connections to and from other Riverside County areas to the San Bernardino AMTRAK station on a daily basis. RTA Bus service is provided from downtown Riverside to downtown San Bernardino; however, a transfer will be needed to get to the AMTRAK station. There is also an Amtrak stop in Palm Springs at Indian Canyon Drive (extension of Indian Avenue South) at Amado Road. Amtrak motor coaches and SunLine transit use the Sun Bus stop on the east side of Indian Canyon Drive.

3.2.3.2 Commuter Rail

Commuter rail in the Southern California Region has significantly grown along the Metrolink system from 940,000 riders per year in Fiscal Year (FY) 92-93 (with four operating commuter rail lines), to 4.2 million passengers per year in FY 94-95. In FY 96-97 almost 6 million riders chose Metrolink with six major commuter rail corridors in service. During that same period, the Riverside Line increased from 133,000 passengers in FY 92-93 to 927,000 passengers in FY 96-97.

Over the next 20 years, MetroLink is expected to increase to 169 daily trains and 50,400 daily riders (almost $0.6 billion in capital investment) on all lines to maximize use of commuter rail in the Southern California Region. The increased service may be supported by the introduction of demand response feeder systems. System improvements are consistent with the Southern California Regional Rail Authority's long-term plan. The long- term plan calls for extension of the Riverside Transit Corridor, in accordance with performance standards, along the San Jacinto branch line to the City of Hemet.

3.2.3.3 High Speed Rail

A regional high speed rail system is proposed that will connect major regional activity centers and significant inter-/multi-modal transportation facilities in Los Angeles, Orange, Riverside and San Bernardino Counties by year 2020. This system would also provide connection to the San Diego Region, and connect with the proposed high-speed rail system in Northern California. On July 21, 1999, the California High Speed Rail Authority adopted a plan for an Inland route for the system. This would include stops at Ontario Airport, Riverside, and Temecula. However, the Authority indicated that it would continue to consider an alternative route through Orange County. Cost and ridership estimates will be prepared to further investigate the system's feasibility.

3.2.4 Existing Non-Motorized Systems

3.2.4.1 Bicycling

Bicycling occurs throughout the County, but is more concentrated in the cities, and is more recreational than commute-oriented. The current bicycle element provides for connections between major urban and recreational facilities within the County. However, implementation of the plan has occurred only to a limited extent. One of the major regional bikeway paths is located along the Santa Ana River, which has been completed from the Orange/Riverside County boundary to downtown Riverside. In addition to the bicycle element, local agencies have adopted bicycle facility plans focusing on safe bicycle routes to schools and other community facilities.

California Vehicle Code (Section 21200[a]) states that every person riding a bicycle upon a highway has all the rights and is subject to all the provisions applicable to the driver of a vehicle. While bicycles are permitted on most roads in Riverside County, many people will not consider a bicycle as a means of transportation unless some accommodation has been made for their safety and convenience. In order to entice these prospective bicycle riders, a variety of bicycle facility types are necessary. The term "Bikeway" means all facilities that provide for bicycle travel. There are three types of Bikeway classifications: Class 1, which are off-road, paved paths, Class 2, which are on-road, signed and striped bicycle lanes, and Class 3, which are on-road, signed bicycle routes with no separate lanes.

Investment in bikeways provides an inexpensive environment-friendly transportation opportunity. Bicycle usage will continue to offer important relief to congested roadways, provide air quality benefits, and reduce energy consumption. Bicycling is considered an effective alternative mode of transportation that can help to improve air quality and reduce the number of vehicles traveling along existing highways, especially within the cities and unincorporated communities. However, the numbers of cyclists is small in comparison to the amount of auto traffic.

A number of barriers currently impede the increased usage of bicycles as an alternative non-motorized mode of travel. These barriers include negative perceptions about non-motorized commuting; unsafe, insufficient, and inconvenient bikeways; and crime, including personal and bicycle safety and security. Given the favorable climate for cycling most of the year, overcoming these institutional barriers would help increase the ridership of bicyclists throughout the County.

3.2.4.2 Pedestrian Facilities

Pedestrian facilities within the immediate vicinity of schools and recreational facilities are also important components of the non-motorized transportation system. Pedestrian circulation facilities within and around school and recreational areas, in the form of sidewalks built to current County standards, are provided where they are appropriate and enhance the safety of those who choose to walk to and from their destination.

For the most part, sidewalks are installed in more urban environments, when the roadway frontage is developed. Because development occurs in stages, numerous missing links can occur in the sidewalk system. Eventually these are filled in, but this can sometimes takes many years.

3.2.4.3 Equestrian Trails

There are a number of equestrian trails located in the rural and semi-urban areas of the County. Large lot developments in the County allow for the care and use of horses. A consideration during preparation of this Circulation Element Update will be to identify appropriate locations and standards for equestrian trail development.

3.2.5 Existing Aviation Systems

3.2.5.1 Passenger Air Service Passenger Air Service

There are approximately 60 airports in the Southern California Region. The majority of passenger air traffic is handled by six commercial airports: Los Angeles International, Burbank, John Wayne/Orange County, Ontario International, and the Palm Springs and Long Beach Municipal Airports.

These airports served some 74.6 million passengers in 1997. The number of air passengers continues to grow and is expected to double by the year 2020. The airports listed below are the six major airports residents in Riverside County currently use for air passenger services:

- Palm Springs International
- Ontario International Airport;
- Orange County-John Wayne Airport
- Burbank Airport
- Los Angeles International Airport
- San Diego Lindbergh Field

3.2.5.2 General Aviation Airports

There are currently eight public use general aviation airports located in unincorporated Riverside County: Flabob, French Valley, Hemet-Ryan, Bermuda Dunes, Desert Resorts Regional, Chiriaco Summit, Desert Center, and Blythe.

- ***Flabob Airport*** is located in northwest Riverside County, west of the City of Riverside. The airport has one runway that is 4, 315 feet long, and has Medium Intensity Runway Edge Lights (MIRL) for nighttime takeoffs and landings. There were 32,000 general aviation operations at Flabob Airport in 1996.

- ***French Valley Airport*** is located northeast of the City of Temecula. There is one north-south runway that is 4,600 feet long and 75 feet wide. French Valley Airport does not currently have a control tower, and approaches to the runway utilize a Global Positioning System (GPS) approach and visual flight rule conditions (VFR). Both approaches to the runway are equipped with Precision Approach Path Indicator lights (PAPI). In 1998, 194 general aviation aircraft were based at French Valley Airport, which saw 70,000 operations[1]. The airport currently has a GPS approach.

- ***Hemet-Ryan Airport*** is located southwest of the City of Hemet. It has two runways, a 3,200-foot long and 45-foot wide runway which has MIRL for nighttime takeoffs and landings. The second runway is 2,045 feet long by 25 feet wide, and has no indicator lights for nighttime usage. This runways primary usage is during firefighting. For many years, the California Department of Forestry has stationed aerial firefighting aircraft at Hemet-Ryan Airport. There are 260 general aviation aircraft based at Hemet-Ryan Airport, which had 80,000 operations in 1996. The airport also has a second unlit runway 2,045 feet long by 25 feet wide.

- ***Bermuda Dunes Airport*** is located in eastern Riverside County. The airport is privately owned, but is available for public use. There is one runway that is 5,002 feet long and 70 feet wide. In 1996, there were 119 general aviation aircraft based at the airport, which had 35,000 total general aviation operations that year. There is no control tower or electronic takeoff and landing equipment. The airport currently has a VOR and a GPS approach.

- ***Desert Resorts Regional Airport*** is located in the southern portion of the Coachella Valley near the community of Thermal. The Airport has two runways. The primary runway travels north-south, and is 6,800 feet in length and 150 feet in width. The second runway runs northwest-southeast, and is 5,000 feet in length and 100 feet in width. Both runways have MIRL that provide an outline of the runway. The Airport has Very High Frequency (VHF) Omnidirectional Range/Tactical Air Navigation for navigational instruments. There were 73 general aviation aircraft based at The Deserts Resorts Regional Airport in 1996. During that year, there were 76,500 general aviation operations. A hangar has been remodeled to provide 4,500 square feet of building space where office spaces, waiting areas, public facilities, and flight planning areas are located.

- ***Chiriaco Summit Airport*** is located in the eastern portion of Riverside County, east of the Coachella Valley. Chiriaco Summit has one runway. The runway is 4,600 feet long and 50 feet wide and the airport does not have any aircraft permanently based there. There were 2,000 general aviation operations at the airport in 1996. There is no control tower and no electronic instrument approach equipment.

- ***Desert Center Airport*** is located in eastern Riverside County between the Coachella and Palo Verde Valleys. There is one runway; this runway is 4,600 feet

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[1] An operation is defined as either a takeoff or a landing. Thus, an airplane which lands at an airport and subsequently takes off accounts for two operations.

long and 50 feet wide. There are no general aviation aircraft based at this airport, which had 2,000 total operations in 1996. Currently, the airport does not have a control tower or electric takeoff and landing equipment.

C ***Blythe Airport*** is located near the city of Blythe at the eastern end of Riverside County. The airport has two runways which serve business users and occasional military aircraft. One runway runs east-west, and is 6,562 feet long by 150 feet wide. The second runway is 5,820 long and 100 feet wide. VORTEC and Category 1 (not FAA approved) navigational equipment are available for takeoffs and landings. In 1996, there were 20 general aviation aircraft based at Blythe Airport, which had 24,600 operations that year.

3.2.5.3 Military/Air Cargo Aviation Facilities

There is currently one military/air cargo airport located in Riverside County: March Air Reserve Base.

- ***March Air Reserve Base*** is located between the cities of Moreno Valley, Perris, and Riverside. The site of the former March Air Force Base, the Reserve Base is used for both military and civilian aircraft. Runway 14-32 is one of the longest civilian runways in Southern California at 13,300 feet. There is a fully staffed control tower with Category 2 navigation flight aids. In 1997, there were 51,546 military aircraft operations and 2,252 civilian aircraft operations.

3.2.6 Existing Transportation Management

3.2.6.1 Existing Transportation Systems Management (TSM)

Transportation Systems Management (TSM) provides for short-range transportation strategies designed to improve both the movement of people and goods and the operational efficiency of the existing transportation system at minimal cost. The types of transportation systems management strategies that are currently implemented within Riverside County on an on-going basis include traffic signal synchronization, lane additions at intersections, provision of left-turn pockets, two-way left turn lanes, parking and access management, and similar traffic engineering treatments that maximize the use of existing streets and roads without major construction. These improvements have increased the overall capacity of the highway system in Riverside County without the provision of major capital expenditures.

3.2.6.2 Existing Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is the term for a class of strategies designed to optimize the use of the existing transportation system. Specifically, demand management strategies attempt to increase transit ridership, vehicle occupancy, walking and bicycling, and reduce the lengths of some trips, move them to off-peak hours, or eliminate them altogether. Examples of this would include carpooling, modified work schedules (or flextime), telecommuting, or incentives to ride transit, such as transit passes. Implementation of demand management strategies can reduce dependence on the single-occupant vehicle, thereby reducing traffic congestion, vehicle emissions, and fuel consumption.

In the last decade, the region's number of trips and amount of travel has grown at a much faster rate than population. TDM strategies are designed to counter this trend. The region cannot build its way out of congestion; it has neither the financial resources nor the willingness to bear the environmental impacts of such a strategy. TDM is one of the many approaches that will be used to maintain mobility and access as the region continues to grow and prosper.

Agencies in Riverside County have participated extensively in TDM efforts over the years. The County is a participant in the regional rideshare program through SCAG (1-800-COMMUTE). To ensure efficient use of the transportation system, the Riverside County Transportation Commission (RCTC) also helps commuters find better ways to get to work. RCTC's free commuter assistance programs include *Advantage Ridershare, Club Ride, Commuter Exchange,* and the *Inland Empire Commuter Services*. In addition, RCTC administers the Measure A percent sales tax, which voters approved in 1988 to ease congestion on the County's freeways, highways, and major thoroughfares.

To support these programs, there are 19 designated park-and-ride lots in the County, as listed in Table 3.I. County agencies have experimented with tele-work centers in conjunction with San Bernardino County, which failed to generate the amount of usage that warranted continued operation.

Finally, High Occupancy Vehicle (HOV) lanes are a significant part of the region's strategy to provide incentives for carpooling. HOV lanes were installed along SR-91 as part of the Measure A program and are planned along I-215/SR 60 through Box Springs. An extensive HOV network has been built in the SCAG region, and is being expanded farther to include some 400 miles of freeway.

3.2.7 Existing Goods Movement

As the nation's most important port region and its second largest metropolitan manufacturing area, Southern California generates more than 600,000,000 tons of goods movement annually. Of this, 70 percent is handled by trucks, with rail, water and air providing the remainder.

Goods movement in the region is anticipated to grow more than 30 percent from 431 million tons to more than 564 million tons in the next 20 years as a result of both population growth and the growth in international trade, which will approximately double present volumes through the ports and airports.

Table 3.I - Officially Designated Park-and-Ride Lots in Riverside County

Corona

R1. Route 91 at Main Street. *Bus Service*: IE, RTA. Six bike lockers.

R2. Corona Community Church, 1717 Via del Rio. Near Route 91 and Maple Street. Bus Service: RTA

Lake Elsinore

R3. Highway 74 at I-15. *Bus Service:* RTA.

R4. Highway 74 at Grand Avenue. *Bus Service:* RTA.

Mira Loma

R5. Route 60 at Van Buren Boulevard. *Bus Service:* OMNITRANS

R6. Route 60 at Country Village Road. *Bus Service:* IE, RTA.

R7. 12105 Limonite Avenue. Adjacent I-15. *Bus Service:* RTA.

Moreno Valley

R8. Indian Plaza, 24550 Sunnymead Boulevard. *Bus Service:* RTA

R9. Towngate Center. Route 60 at Frederick Street. *Bus Service: RTA*

Norco

R10. Norco City Hall, 3945 Old Hammer Avenue. Adjacent I-15. *Bus Service:* RTA.

R11. Route 15 at 2nd Street. Six bike lockers. *Bus Service:* RTA.

Pedley

R12. Pedley Metrolink Station, 6001 Pedley Road. *Bus Service:* RTA.

Riverside

R13. California Baptist College, 8432 Magnolia Avenue. *Bus Service:* RTA.

R14. Riverside Plaza, Route 91 and Central Avenue. Riverside Avenue Parking Structure (top floor). *Bus Service:* RTA.

R15. La Sierra University, 4700 Pierce Street, Adjacent Route 91. *Bus Service:* RTA.

R16. Tyler Galleria, Route 91 at Tyler Street. Northeast corner. *Bus Service:* RTA.

R17. Route 60 at Orange Street. West of Route 91 Junction. *Bus Service:* RTA.

R18. Riverside Metrolink Station, 4066 Vine Street. Metrolink Service. *Bus Service:* RTA.

Temecula

R19. 41327 Winchester Road. Adjacent I-15. *Bus Service:* RTA.

The movement of goods in Riverside County involves the system of rail, air cargo, and trucking. The efficiency with which these elements are planned and provided has impacts on noise, air quality, land use, congestion, and safety.

The ability of the County to compete domestically and internationally on an economic basis requires an efficient and cost-effective method for distributing and receiving products. Specifically, trucks support the County's manufacturing industry and are essential to the intra-regional distribution of consumer goods.

The Region is faced with a serious dilemma. Present and proposed levels of investments suggest a future in which the majority of facilities will be severely congested for much of the day. Given the shortage of funds available for both operations and maintenance as well as for new capital projects, and the growing conflict between people and goods for the use of highways, airports and rail lines, the region will be hard pressed to maintain existing levels of mobility for goods movement.

3.2.7.1 Truck Travel

Primary generators of truck traffic in the County are agricultural and industrial uses. Since agriculture is a relatively mature industry in the County, overall truck traffic volume generated by agricultural uses should remain stable in the future. However, relocation and replacement of individual agricultural processing plants and other new industries can significantly alter both regional and localized patterns and concentrations of truck traffic in cities and established communities in the County. As healthy industrial growth is expected within the County, the scale of industrial-related truck traffic will continue to increase.

While port capacity is expected to remain adequate due to present expansion plans, airport and highway capacity will be under severe constraint in the region due to the lack of capacity-enhancing project capital investment. Currently, trucks comprise at least 15 percent of the daily traffic volume on some of the primary goods movement corridors in Riverside County: I-15 from Temecula to Ontario, SR 60 westward from I-215, and I-10 in the Coachella Valley and San Gorgonio Pass areas.

Because of the operational characteristics of trucks, their net effect on traffic flow is two to three times the number of passenger cars on level terrain, and could be considerably more on long upgrades, such as I-215/60 eastbound in the Box Springs area and I-10 westbound west of Palm Springs. Traffic engineers relate the effect of trucks to passenger car equivalents or PCEs. Thus, a roadway with 15 percent of the traffic as trucks could be regarded as having 30 to 40 percent of its capacity consumed by trucks in terms of PCEs. In most cases, the truck percentage in the peak commuting periods is lower (usually no more than 4 to 6 percent), as the passenger car volume is higher and some trucks tend to avoid those hours because of the slow speeds. Table 3.J lists the daily truck volumes for selected facilities and locations in Riverside County.

Table 3.J - Daily Truck Volumes on Freeways in Riverside County (Bi-Directional)

Location	Daily Truck Volumes
I-10, Junction Route 111	13,800
I-10, Banning	12,300
SR-60, East of Moreno Valley	5,800
SR-60, East of I-15	19,100
I-15, at SR-79	15,100
I-15 at SR-60	39,100
SR-91 at Main Street	23,200
SR-91 at 14th Street	8,600
I-215, Perris	7,500
I-215/SR-60, Spruce Street	13,000

Source: 1997 Caltrans Truck Count Book adjusted by 2 percent to reflect 1999 volumes.

For the State of California, approximately 76 percent of all in-and outbound freight is shipped by truck. In addition, trucks transport 98 percent of all finished goods to the final retail and wholesale destinations, according to the California Trucking Association (CTA). A steady increase in heavy-duty trucks is expected in the future. It is anticipated that the region's truck volumes will increase by 40 percent through Year 2020. Current economies dictate that trucking will be used for the majority of surface traffic less than 800 miles, which encompasses most or all of California, Arizona, and Nevada.

3.2.7.2 Freight Railroads

The Union Pacific (UP) and the Burlington Northern Santa Fe (BNSF) Railroads provide freight service in Riverside County, connecting the County with major markets within California and other destinations north and east. Freight terminals and service to specific industries are located throughout the County. The SCAG Regional Transportation Plan estimates train volume on the UP line between Colton and Indio to be 26 daily. An estimated 28 to 50 daily trains move on the Riverside to Atwood portion of the BNSF line.

Though the railroads are reluctant to provide information on the amount of freight originating in the County, it is likely that the predominant mode for freight movements in the County will continue to be by truck in the foreseeable future. This is certainly the trend expected for raw agricultural commodities moving to packing and processing facilities. For long distance trips (i.e., outside the 800-mile threshold), SCAG has estimated that trains will carry approximately 50 percent of the freight into the region, by tonnage.

An emerging trend in goods movement is containerized cargo, in which containers are transferred from ship to rail to truck. Containerized cargo movement has assisted rail lines to compete with trucks for medium to long haul goods movement. To assist in moving containerized cargo, railroad companies are proposing "multi-modal" facilities in various locations throughout the nation. At these facilities, which are typically located within or adjacent to major metropolitan areas, containerized cargo is shipped long haul to the metropolitan area by rail and is unloaded onto trucks at the "multi-modal"facility for local deliveries. BNSF has been investigating potential sites for a multi-modal facility along its line which parallels the I-10 freeway from Fontana to Beaumont.

3.2.7.3 Air Cargo

Air cargo is the fastest growing method of transporting goods in and out of the Southern California Region, and is expected to continue to increase at a faster rate than passenger air service. The Los Angeles (LAX) and Ontario International Airports are the major cargo handling airports in Southern California. Both of these airports handle about 96 percent of all the air cargo movement, with LAX alone accounting for 79 percent of the air cargo traffic. The trucking, rail, and air cargo operations in this area make it one of the larger multi-modal freight management and distribution complexes in the nation. Land development is occurring in support of these functions, extending into the Mira Loma and Norco areas of Riverside County. Also, the March Air Reserve Base is currently a joint use status land use. This area has potential to be used to accommodate the increased growth in goods movement, and it also has the potential of becoming a passenger airport.

3.3 Planned Circulation System

The planned street and highway network contained in the current Circulation Elements of Riverside County and each of the cities within the County is illustrated in Figure 3.3. Riverside County and cities within the County use similar, but not necessarily the same standards for roadway sections. Differences in Circulation Element roadway standards are identified in Table 3.K.

One of the goals of this Circulation Element is to enhance the process for achieving smooth coordination between City and County transportation agencies. It is vital that transportation planning continue to be coordinated and enhanced to achieve the following objectives:

- Roadways and other non-motorized facilities planned and constructed in one jurisdiction should connect with similar types of facilities in an adjacent jurisdiction.

Table 3.K - Riverside County Roadway Classifications

Jurisdiction	Freeway	Specific Plan Road	Expressway	Urban Arterial	Mountain Arterial	Arterial	Major	Secondary	Collectors	
Riverside County	Variable	Variable	Variable	134' row	110' row	110' row	100' row	88 ' row		
Riverside	Variable		144' row 8 lanes div.	120' row 6 lane div.		110' row 4 lane div.	100' row 4 lane div.	88' row 4 lane undiv.	80' row 2 lane undiv	66' row 2 lane undiv.
Corona	Variable						88'-130' row 4-6 lanes	88' row 4 lane		68' row 2 lane undiv.
Norco						110' row 86' c/c 6 lanes div. or painted	100' row 64' - 80' c/c 4 lanes div.	88' row 64' c/c 4 lane undiv.		
March JPA				120' row 102' c/c div.		110'row 86' c/c div.	.	88' row 64' c/c undiv	78' row 56' c/c painted	
Moreno Valley	Variable			134' row 110'' c/c 6 lanes div.		110'row 86' c/c 4 lanes div.	100' row 76' c/c 4 lanes	88' row 56' c/c 4 lanes	78' row 56' c/c	66' row 44' c/c
				120' row 102' c/c 6 lanes div.						
Perris	Variable					118' row 86' c/c 6 lanes div.		88' row 64' c/c 4 lanes undiv.		
Lake Elsinore	Variable			134' row 110' c/c div 6 lanes		120' row 96' c/c div. 6 lanes	100' row 80' c/c div. 4 lanes	90' row 70' c/c painted 4 lanes		68' row 48' c/c undiv.
Canyon Lake				134' row		110' row		88 ' row		

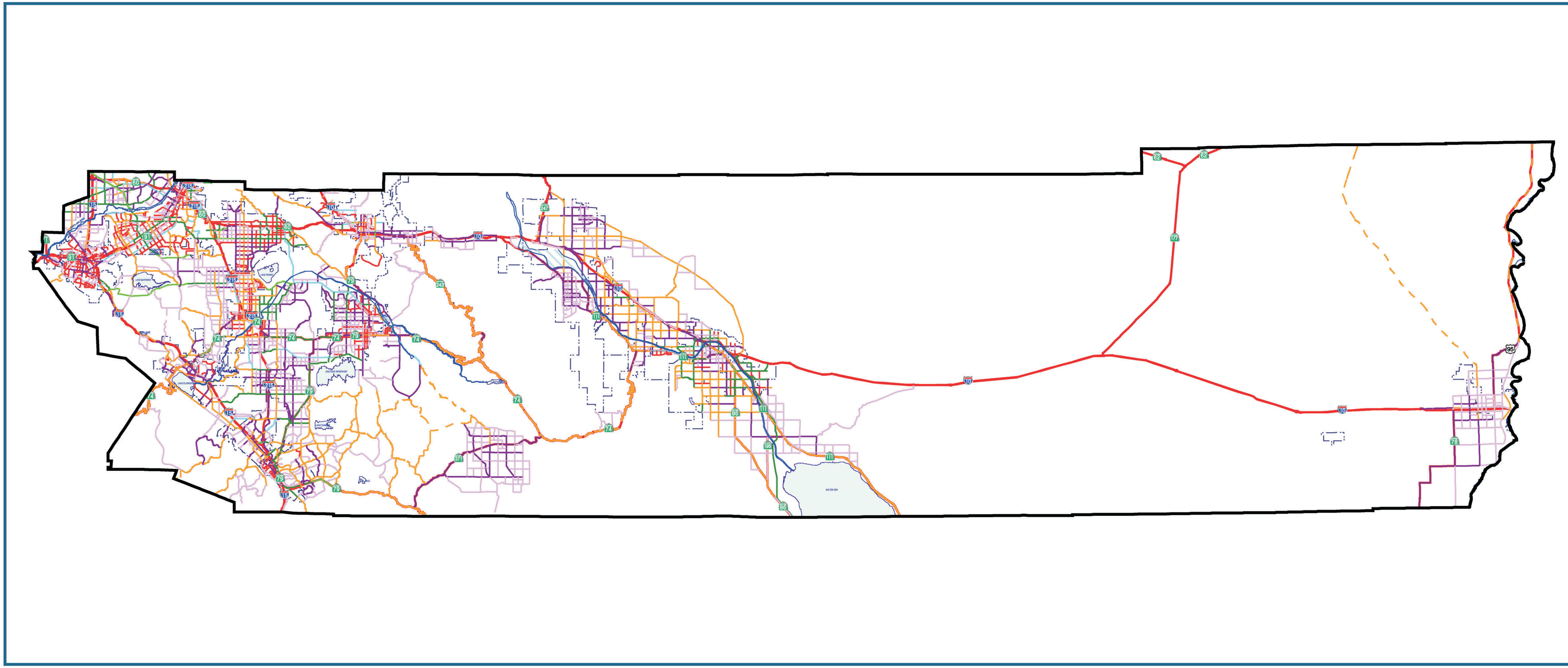
Jurisdiction	Freeway	Specific Plan Road	Expressway	Urban Arterial	Mountain Arterial	Arterial	Major	Secondary	Collectors
Murrieta			150' row 126' c/c 8 lanes div.			110' row 86' c/c 6 lanes div.	100' row 76' c/c 4 lanes div.	88' row 64' c/c 4 lanes painted	80'-90' 56'-66' 2 lanes painted
Temecula			138'-150' row 118'-130' c/c 8 lanes div.	134' row 110' c/c 6 lanes div.		110' row 86' c/c 4 lanes div.	100' row 76' c/c 4 lanes div.	88' row 64' c/c 4 lanes undiv.	78' row 56' c/c 2 lanes painted
Calimesa		Variable				110' row	100' row	88 ' row	
Hemet				134' row 110' c/c div.		110 'row 86' c/c div.	100' row 76' c/c div.	88' row 64' c/c undiv.	66' row 44' c/c undiv.
San Jacinto		142' row		134' row			100' row	88' row	66' row
Beaumont			150' row 132' c/c 8 lanes div.	134' row 110' c/c 6 lanes div.		110' row 86'-92' c/c 4-6 lanes	100' row 76' c/c 4 lanes painted	88' row 64' c/c 4 lanes undiv.	66' row 44' c/c 2 lanes undiv.
Banning	Variable						100' row 4 lanes	80' row 4 lanes	
Desert Hot Springs							100' row 76' c/c 4 lanes	80' row 64'-76' c/c 4 lanes	
Palm Springs				154' row 74' c/c div. w/ frontage road			100' row 76' c/c div.	80'-88' row 64' c/c	
Cathedral City	Variable					110' row	100'row	88' row	66' row
Palm Desert						110'-126' row 86'-90' c/c 4-6 lanes div.	100' row 76' c/c 4 lanes div.	88' row 64' c/c 4 lanes undiv.	

Jurisdiction	Freeway	Specific Plan Road	Expressway	Urban Arterial	Mountain Arterial	Arterial	Major	Secondary	Collectors	
Rancho Mirage				120' row 100' c/c 6 lanes div.		110' row 86'-96' c/c 4-6 lanes div.	100' row 76' c/c 4 lanes div.	88' row 64' c/c 4 lanes undiv.		
Indian Wells				126' row 106' c/c 6 lanes div.			102' row 78' c/c 4 lanes div.	88' row 64' c/c 4 lanes undiv.		64'-72' row 40'-48' c/c 2 lanes undiv.
La Quinta				96' c/c 6 lanes div.		76'-86' c/c 4 lanes div.		64' c/c 4 lanes undiv.		40'-50' c/c 2 lanes undiv.
Indio	Variable			120'-134' row 102'-116' c/c 6 lanes div.		110' row 86' c/c 4 lanes div.	100' row 76'-84' c/c 4 lanes painted	88' row 64' c/c 4 lanes undiv.		66' row 44' c/c 2 lanes undiv.
Coachella			144' row 124' c/c 8 lanes div.	120' row 100' c/c 6 lanes div.		110' row 86' c/c 4 lanes div.	100' row 76' c/c 4 lanes div.	88' row 64' c/c 4 lanes undiv.	72' row 48' c/c 2 lanes undiv.	64' row 40' c/c 2 lanes undiv.
Blythe							96' row 82'c/c 4 ln w/p	74' - 84' row 54' - 70' c/c 4 ln w/p		

Key:

row	right-of-way
c/c	curb-to-curb
div.	divided (median)
undiv.	undivided
painted	striped median or two way left turn lane
4 ln w/p	4 lanes with parking

Note: Classification of city roadway categories is based on the best fit available to the Riverside County roadway classification. City General Plan Circulation Elements may use different nomenclature from that presented in this table.



LEGEND

Cities
Highways

Road Type Classifications

- Secondary
- Major
- Arterial
- Urban Arterial
- Expressway
- Mountain Arterial
- Specific Plan Road
- Collector

Figure 3.3

5 0 5 10 Miles

PLANNED ROADWAYS

- Major thoroughfares in one jurisdiction that connect to residential streets in an adjacent jurisdiction should be thoroughly evaluated to reduce traffic impacts.

- A geographic area served by more than one jurisdiction should include major streets and highways that can accommodate through trips.

- Pathways for bicycle, equestrian, and pedestrian use should be continuous through jurisdictions.

To accomplish these objectives, the following actions will be taken during preparation of the Future Conditions and Implementation sections of this Circulation Element update:

- City and County roadway and trail classifications will be gathered from existing data sources and will be reviewed. Where information is still needed, a request for additional information will be forwarded to the affected jurisdiction.

- Any resulting differences in classification standards between the affected agencies will be documented.

- A comparison will be made to determine where inconsistencies are present on a facility by facility level.

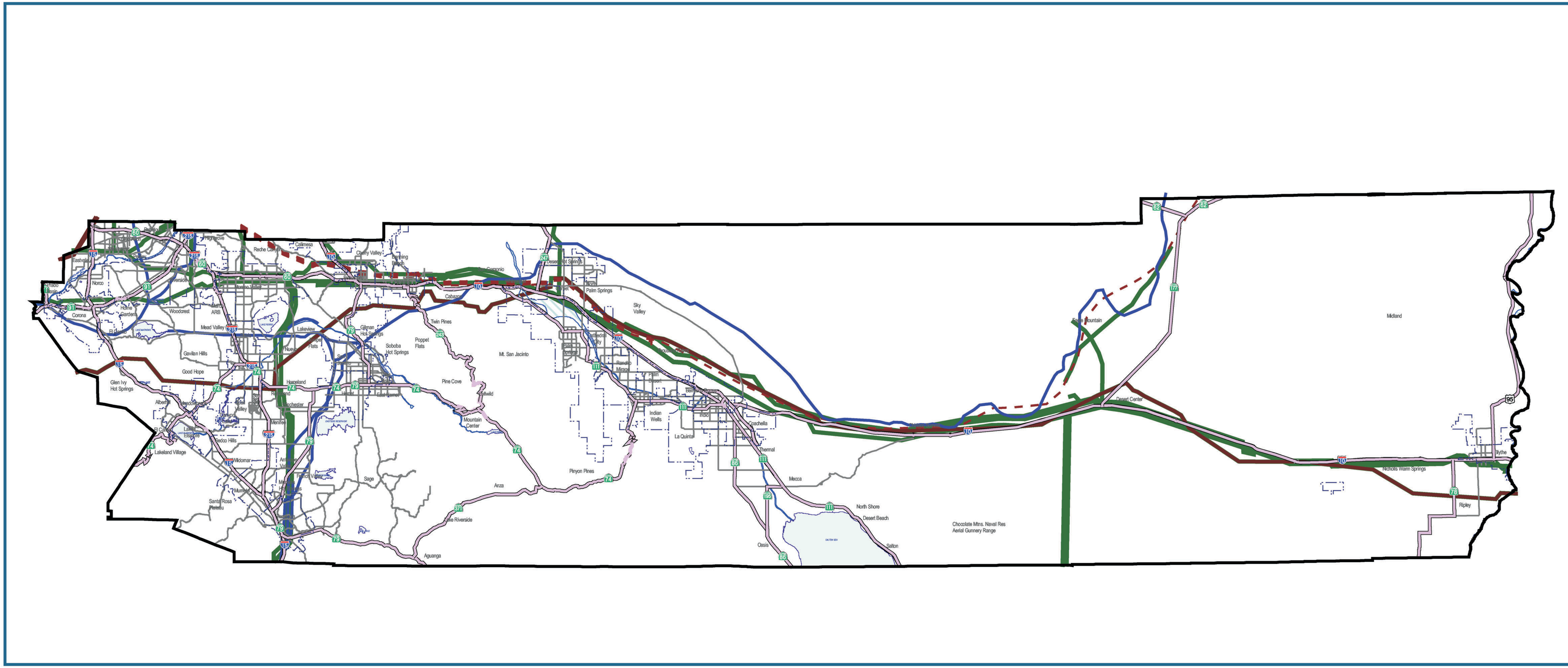
- The Future Conditions and Implementation sections of this Circulation Element Update will include results of the tasks and the County's current goals, objectives, and policies will be enhanced to address cross-jurisdictional transportation issues.

3.4 Major Utility Corridors

The major conveyance lines for water, natural gas, and electricity transmission systems form a substantial network of corridors crossing Riverside County. These major utility transmission lines are shown in Figure 3.4. The locations of these transmission lines were obtained from information and maps provided by the Metropolitan Water District of Southern California and the State of California Energy Commission. As shown in the figure, there is a concentration of major water, gas, and electrical utility corridors along I-10 through the desert and San Gorgonio Pass. Additional corridors are created along the routes of the other major utility transmission lines as shown in Figure 3.3.

3.4.1 Major Water Pipelines and Aqueducts

Major water conveyance systems consist of the Colorado River Aqueduct operated by the Metropolitan Water District (MWD) of Southern California, the California Aqueduct operated by the State Department of Water Resources (DWR), and water distribution lines operated by MWD.



LEGEND

- Cities
- Highways
- Major Roads

- Natural Gas Pipeline
- 345 - 500kv Power Line
- 220 - 287kv Power Line
- Water Pipelines and Aqueducts

5 0 5 10 Miles

Figure 3.4

RIVERSIDE COUNTY INTEGRATED PROJECT RCIP

MAJOR UTILITY TRANSMISSION LINES

The starting point of the Colorado River Aqueduct is in San Bernardino County. The aqueduct extends north-south as it enters Riverside County near the intersection of State Route 62 and State Route 177 and continues southerly towards Desert Center. The Colorado River Aqueduct generally follows I-10 east-west across the County from Desert Center to the San Gorgonio pass near Cabazon. At that point, the aqueduct veers to the south of I-10 and extends towards San Jacinto before terminating at Lake Mathews.

Part of California's State Water Project (SWP), the California Aqueduct terminates in Riverside County at Lake Perris and is the southernmost storage location within the SWP.

Figure 3.3 also shows the major water distribution system lines in Riverside County operated by MWD. These lines are the primary water transmission pipelines conveying water from storage locations to the eventual end user.

3.4.2 Major Natural Gas Pipelines

Most of the major natural gas transmission pipelines in Riverside County are operated by The Gas Company. As shown in Figure 3.3, The Gas Company operates three major pipelines extending east to west through Riverside County. These main pipelines follow I-10 through most of the county. Dual pipelines branch off these main lines near Desert Center and extend southward into Imperial County and another set of dual lines branch off the main pipelines near Gilman Springs Road at SR-60 and extend southward into San Diego County. Near the I-215 interchange, one pipelines veers to the south and extends west across the county following State Route 91. Another veers to the north and follows I-215 before extending west across the county through the City of Riverside and Pedley. Additional Gas Company pipelines extend north-south in the western portion of Riverside County, providing system connectivity to west San Bernardino valley and the upper desert region in San Bernardino County as shown in Figure 3.3.

Near Desert Center, an additional natural gas transmission line extends northward from the main pipelines following the I-10 corridor. This pipeline follows Kaiser Road before terminating near Eagle Mountain. A separate pipeline operated by Imperial Irrigation District extends north from MWD's Eagle Mountain water pumping plant and terminate near the intersection of SR-62 and SR-177.

3.4.3 Major Electrical Transmission Lines

Major electricity transmission pipelines in Riverside County are operated by Southern California Edison and Imperial Irrigation District. Major electricity transmission lines are those that carry a minimum of 220 kilovolts (kV) of power, and are shown in Figure 3.3.

SCE operates a 500 kV transmission line extending east-west through most of Riverside County. The 500 kV line follows the I-10 corridor from the Arizona border west to the San Gorgonio pass area, veers south of I-10 towards Perris, and then extends west from Perris into Orange County. From the San Gorgonio Pass area, multiple 220 kV lines veer north of I-10 and follow San Timoteo Canyon into Redlands in San Bernardino County. Portions of SCE's 220 kV transmission lines pass through the northwest corner of Riverside County.

MWD operates a 220 kV transmission line extending from its Hinds water pumping plant located along I-10 west of Desert Center to its Iron Mountain pumping plant located in San Bernardino County north of the intersection of SR-62 and SR-177.

Section 4.0 - Open Space and Conservation

Existing Setting Report

Revised March 2000

4.1 Introduction

Riverside County enjoys a magnificent and varied natural setting, consisting of mountains, steep hills, broad valleys, and narrow canyons; alpine forests and open deserts; and lakes and rivers. The vast amount of open space within Riverside County is a major component of its character and charm, and at the same time, a potential battleground for development and environmental interests. As noted in Section 1.0 of this report, Riverside County's population is projected to grow rapidly over the next 20 years. As Southern California and Riverside County continue to grow, the value of existing open spaces to provide visual relief from congested metropolitan areas to the west, protect important habitat areas, conserve resources, protect public health and safety, maintain a healthy agricultural economy, and conserve vital resources becomes increasingly important.

The purpose of this chapter is to provide the factual background and understanding necessary to meet the State's data and analysis requirements for Open Space and Conservation Elements. It also presents the background information necessary to comply with the provisions of the Southern California Air Quality Management District (SCAQMD) and SCAG requirements that local agencies address air quality issues.

4.2 Biological Resources

In Riverside County, variation in topography, elevation, soil, and climate create conditions for a wide variety of natural communities, each with its own assemblage of native plant and animal species. This section focuses on those communities and species that, because of their legal status, rarity, or vulnerability, are of greatest concern to state and federal agencies, and consequently to land use planners. The section is divided into two subsections, covering western and eastern Riverside County. Within these subsections, natural communities, species, and existing conservation areas are discussed.

4.2.1 Biological Resources in Western Riverside County

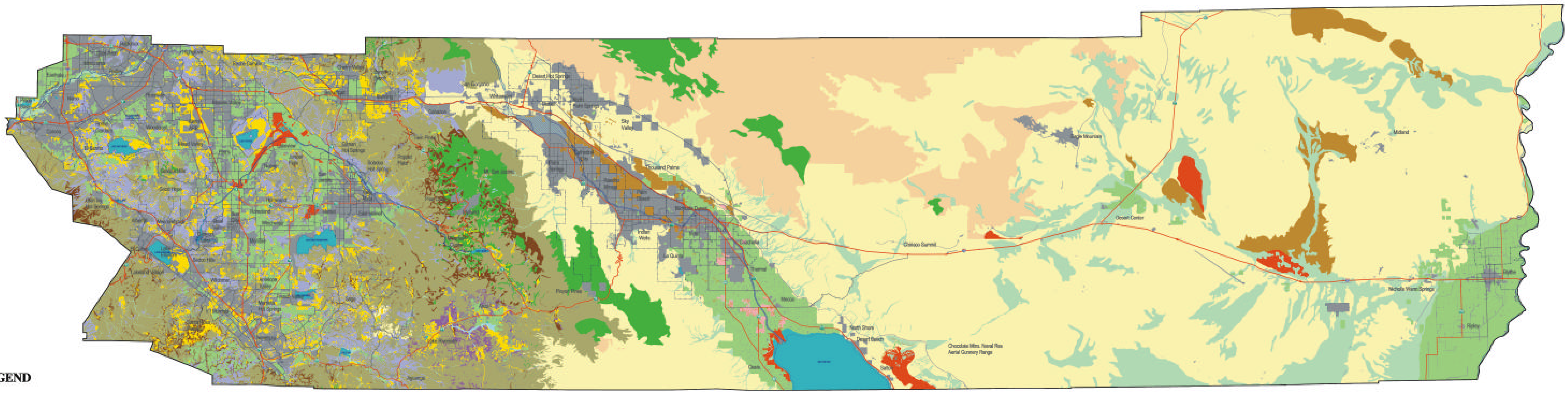
4.2.1.1 Regional Characteristics of Western Riverside County

"Western Riverside County" is defined as the area which will be covered by the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), which is approximately the portion of the County west of the crest of the San Jacinto Mountains (see Figure 4.2.1 for a graphic depiction of the boundary). Even though it constitutes less than one third of the County, Western Riverside County contains most of the County's non-desert areas, as well as most of its urbanized areas. Prior to development, most of Western Riverside County was covered by chaparral and coastal sage scrub, with coniferous and oak woodlands at higher elevations. Elevations within Western Riverside County range from about 755 feet in the northwestern corner of the County to about 10,800 feet at San Jacinto Peak. Variation in topography, soil, and climate across this elevational range creates habitats for a wide variety of animals and plants, including many that are rare or endemic to southern California.

4.2.1.2 Natural Communities of Western Riverside County

Generalized Natural Communities

Geographic Information System (GIS) databases recording land cover were obtained from the California Department of Fish and Game (CDFG), the Bureau of Land Management (BLM) and the County of Riverside. The natural communities covered by each database are shown in Table 4.2.A. For purposes of a natural community map for this study, natural communities were grouped into the sixteen generalized natural communities listed in the leftmost column of Table 4.2.A. This table lists generalized natural community categories used for the Natural Communities of Riverside County map (Figure 4.2.1) and component categories in GIS coverages available from Riverside County, the CDFG, and the CVAG. The number to the left of each community name is the code used for that community in the particular GIS database.



LEGEND

Natural Communities
- Agriculture
- Chaparral
- Chenopod Scrub
- Coastal Sage Scrub
- Coniferous Woodland/Forest
- Desert Dune
- Grassland
- Meadow and Marsh
- Mojavean Desert Scrub
- Oak Woodland/Forest
- Playa and Vernal Pool
- Riparian and Bottomland
- Sagebrush Scrub
- Sonoran Desert Scrub
- Urban and Disturbed
- Water

Jurisdictional and Infrastructure
- Rivers, Channels, and Ephemeral Waterways
- Water Bodies
- County Boundary
- City Boundaries
- Highways
- Major Roads

Figure 4.2.1

Scaleisapproximate

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NATURAL COMMUNITIES

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Table 4.2.A - Natural Community Categories

Natural Community Category	Multi-Species Habitat Conservation Plan (County)		Gap Analysis of Mainland California CD ROM (CDFG)		Coachella Valley MSHCP (CVAG)	
Urban and Disturbed*	130	Residential/ Urban/ Exotic	11100	Urban and Built-Up Land	11100	Urban
					11110	Rural
					11750	Quarries
Agriculture*	110	Agriculture	11200	Agricultural Land	11200	Agriculture
	111	Field Croplands	11210	Orchards and Vine-yards		
	112	Grove/Orchard				
	113	Dairy & Livestock Feedyards				
Water	120	Open Water/Reservoir/Pond	11520	Lakes and Reservoirs	11520	Lakes
					11530	Reservoirs
Desert Dune		(category not in database)	22000	Desert Dunes	22100	Active Desert Dunes
					22101	Active Shielded Desert Dunes
					22200	Stabilized and Partially Stabilized Desert Dunes
					22210	Mesquite Hummocks
					22300	Stabilized and Partially Stabilized Desert Sand Fields
					22301	Stabilized and Partially Stabilized Shielded Desert
					22302	Ephemeral Desert San Fields
					22400	Active Desert Sand Fields
Coastal Sage Scrub	320	Coastal Scrub	32300	Venturan Coastal Sage Scrub	32000	Coastal Scrub
	325	Diegan Coastal Sage Scrub	32500	Diegan Coastal Sage Scrub		
	327	Riversidean Sage Scrub	32700	Riversidian Sage Scrub		
	328	Riversidean Alluvial Fan Sage Scrub				
Sonoran Desert Scrub	330	Sonoran Desert Scrub	33100	Sonoran Creosote Bush Scrub	33100	Sonoran Creosite Bush Scrub
	333	Colorado Desert Wash Scrub	33200	Sonoran Desert Mixed Woody Scrub	33220	Sonoran Mixed Woody and Succulent Scrub
	336	Semi-desert Succulent Scrub				
Mojavean Desert Scrub		(category not in database)	34100	Mojave Creosote Bush Scrub	34210	Mojave Mixed Woody Scrub
			34210	Mojave Mixed Woody Scrub	34220	Mojave Mixed Steppe
			34220	Mojave Mixed Steppe	34300	Blackbrush Scrub

Natural Community Category	Multi-Species Habitat Conservation Plan (County)		Gap Analysis of Mainland California CD ROM (CDFG)		Coachella Valley MSHCP (CVAG)	
			34300	Blackbush Scrub		
Sagebrush Scrub	350	Big Sagebrush Scrub	35210	Big Sagebrush Scrub		
Chenopod Scrub		(category not in database)		(category not in database)	36110	Desert Saltbush Scrub
Chaparral	370	Chaparral	37110	Northern Mixed Chaparral	37110	Northern Mixed Chaparral
	371	Southern Mixed Chaparral	37120	Southern Mixed Chaparral	37200	Chamise Chaparral
	372	Chamise Chaparral	37200	Chamise Chaparral (Chamisal)	37300	Red Shank Chaparral
	373	Red Shank Chaparral	37300	Red Shank Chaparral	37400	Semi-Desert Chaparral
	374	Semi-Desert Chaparral	37400	Semi-Desert Chaparral	37510	Mixed Montane Chaparral
	375	Montane Chaparral	37510	Mixed Montane Chaparral	37900	Scrub Oak Chaparral
	379	Scrub Oak Chaparral	37530	Montane Ceanothus Chaparral	37001	Interior Live Oak Chaparral
			37810	Buck Brush Chaparral	37002	Upper Sonoran Manzanita Chaparral
			37830	Ceanothus crassifolius Chaparral	37100	Upper Sonoran Mixed Chaparral
			37840	Ceanothus megacarpus Chaparral		
			37900	Scrub Oak Chaparral		
			37A00	Interior Live Oak Chaparral		
			37B00	Upper Sonoran Manzanita Chaparral		
			37G00	Coastal Sage-Chaparral Scrub		
Grassland	420	Valley and Foothill Grassland	42110	Valley Needlegrass Grassland		(category not in database)
	421	Valley Needlegrass Grassland	42200	Non-Native Grassland		
	422	Non-native Grassland				
Playa and Vernal Pool	440	Vernal Pool	46000	Alkali Playa Community	36120	Desert Sink Scrub
	441	Southern Interior Basalt Vernal Pool				
	442	San Diego Mesa Claypan Vernal Pool				
	460	Alkali Playa				
Meadow and Marsh	450	Meadow (Montane)		(category not in database)	52310	Cismontane Alkali Marsh

Natural Community Category	Multi-Species Habitat Conservation Plan (County)		Gap Analysis of Mainland California CD ROM (CDFG)		Coachella Valley MSHCP (CVAG)	
	451	Wet Montane Meadow			52410	Coastal and Valley Freshwater Marsh
	520	Marsh				
	523	Cismontane Alkali Marsh				
	524	Coastal and Valley Freshwater Marsh				
Riparian and Bottomland	610	Riparian Forest	61310	Southern Coast Live Oak Riparian Forest	61320	Southern Arroyo Willow Riparian Forest
	613	Southern Cottonwood/Willow Riparian	61320	Southern Arroyo Willow Riparian Forest	61810	Sonoran Cottonwood Willow Riparian Forest
	615	Montane Riparian Forest	61330	Southern Cottonwood-willow Riparian Forest	61820	Mesquite Bosque
	620	Southern Sycamore/Alder Riparian Woodland	62200	Desert Dry Wash Woodland	62200	Desert Dry Wash Woodland
	630	Riparian Scrub	63310	Mule Fat Scrub	62300	Desert Fan Palm Oasis Woodland
	631	Mule Fat Scrub	11730	Sand/Gravel in River Flood Plains	62400	Southern Sycamore-Alder Riparian Woodland
	632	Southern Willow Scrub			63810	Tamarisk Scrub
	635	Montane Riparian Scrub			63820	Arrowweed Scrub
	638	Tamarisk Scrub				
	140	Disturbed Alluvial				
	150	Arundo/Riparian Forest				
Oak Woodland/ Forest	710	Oak Woodland	71182	Dense Englemann Oak Woodland	81320	Canyon Live Oak Forest
	716	Coast Live Oak Woodland	81320	Canyon Live Oak Forest	81340	Black Oak Forest
	718	Dense Engelmann Oak Woodland	81340	Black Oak Forest		
	810	Broadleaved Upland Forest				
	811	Black Oak Forest				
Coniferous Woodland/ Forest	720	Peninsular Juniper Woodland and Scrub	72200	Mojavean Pinon and Juniper Woodlands	72200	Mojavean Pinyon and Juniper Woodland
	830	Closed-cone Coniferous Forest	72300	Peninsular Pinon and Juniper Woodlands	72320	Peninsular Juniper Woodland and Scrub
	840	Lower Montane Coniferous Forest	84140	Coulter Pine Forest	84140	Coulter Pine Forest
	851	Jeffrey Pine	84150	Bigcone Spruce-Canyon Oak Forest	84150	Bigcone Spruce-Canyon Oak Forest

Natural Community Category	Multi-Species Habitat Conservation Plan (County)		Gap Analysis of Mainland California CD ROM (CDFG)		Coachella Valley MSHCP (CVAG)	
	853	Southern California White Fir	84210	Westside Ponderosa Pine Forest	84210	Westside Ponderosa Pine Forest
	861	Lodgepole Pine	84230	Sierran Mixed Coniferous Forest	84230	Sierran Mixed Coniferous Forest
	865	Subalpine Coniferous Forest	85100	Jeffrey Pine Forest	85100	Jeffrey Pine Forest
			85210	Jeffrey Pine - Fir Forest	85210	Jeffrey Pine-Fir Forest
	871	Mixed Evergreen Forest	86500	Southern California Subalpine Forest	86500	Southern California Subalpine Forest

Note: * GIS coverages for Urban and Agricultural areas were updated for this project.

The generalized natural communities that occur in Western Riverside County are described in Table 4.2.B, and are illustrated in Figure 4.2.1. The western (framed) portion of the map is from the GIS coverage used for the Western Riverside County MSHCP. Federal and State listed, proposed, and candidate species that may be expected to occur in these communities are listed in Table 4.2.B.

Table 4.2.B - Generalized Natural Communities of Western Riverside County and Associated Listed, Proposed, and Candidate Species

Name	Description	Federal and State Listed, Proposed, and Candidate Species
Urban and Disturbed	This category includes areas where natural vegetation has been largely destroyed by human activity, other than agriculture. It includes land covered by concrete, asphalt, buildings, lawns, golf courses, etc., as well as areas cleared of vegetation or otherwise significantly disturbed by machinery. Urban and disturbed areas occur throughout lower elevations in Western Riverside County, and to a much lesser degree in mountainous areas.	mountain plover (*Charadrius montanus*) – may utilize golf courses and sod farms
Agriculture	Agricultural land may be defined broadly as land used primarily for production of food and fiber. Agricultural land includes field croplands, orchards, groves, vineyards, and dairy and livestock feedyards. In Western Riverside County, agricultural land is predominantly in the Perris and Menifee Valleys.	mountain plover (*Charadrius montanus*) Swainson's hawk (*Buteo swainsonii*)
Water	This category consists of areas permanently or generally flooded, including lakes, reservoirs, ponds, rivers, and streams. This category occurs throughout Western Riverside County.	Santa Ana sucker (*Catastomus santaanae*) southwestern arroyo toad (*Bufo microscaphus californicus*) California red-legged frog

Name	Description	Federal and State Listed, Proposed, and Candidate Species
		(*Rana aurora draytonii*) American peregrine falcon (*Falco peregrinus anatum*) Bald eagle (*Haliaeetus leucocephalus*)
Coastal Sage Scrub	This plant community consists of low, soft-woody shrubs and subshrubs. Characteristic species include California Buckwheat (*Eriogonum fasciculatum*), white sage (*Salvia apiana*), and california broom (*Lotus scoparius*), with scalebroom (*Lepidospartum squamatum*) in occasionally flooded areas. Coastal sage scrub is widespread at lower elevations in Western Riverside County.	Munz' onion (*Allium munzii*) Nevin's barberry (*Berberis nevinii*) slender-horned spineflower (*Dodecahema leptoceras*) Santa Ana River woollystar (*Eriastrum densifolium ssp. sanctorum*) Quino checkerspot butterfly (*Euphydryas editha quino*) Delhi sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) California gnatcathcer (*Polioptila californica californica*) San Bernardino kangaroo rat (*Dipodomys merriami parvus*) Stephens' kangaroo rat (*Dipodomys stephensi*)
Sonoran Desert Scrub	This plant community is dominated by widely spaced shrubs and occurs on well-drained desert soils of low salinity in areas where temperatures rarely fall below freezing. Characteristic species include burro-weed (*Ambrosia dumosa*), creosote bush (*Larrea tridentata*), brittlebush (*Encelia farinosa*), ocotillo (*Fouquieria splendens*), catclaw (*Acacia greggii*), agave (*Agave desertii*), and various species of cactus. Sonoran desert scrub occurs in Western Riverside County at low elevations at the northern and southern ends of the San Jacinto Mountains.	Swainson's hawk (*Buteo swainsonii*)
Sagebrush Scrub	This plant community consists mostly of widely spaced soft-woody shrubs. Big sagebrush	Swainson's hawk (*Buteo swainsonii*)

Name	Description	Federal and State Listed, Proposed, and Candidate Species
	(*Artemisia tridentata*) is the dominant species. In Western Riverside County, sagebrush scrub occurs around Anza, around Temecula, and at sparsely scattered locations in the San Jacinto Mountains.	
Chaparral	This plant community is dominated by dense, evergreen shrubs up to 10 feet tall. Characteristic species include chamise (*Adenostoma fasciculatum*), red shank (*Adenostoma sparsifolium*), scrub and live oaks (*Quercus* spp.), manzanita (*Arctostaphylos* spp.), ceanothus (*Ceanothus* spp.), sugar bush *(Rhus ovata*), and mountain-mahogany (*Cercocarpus* spp.). Chaparral is widely distributed throughout Western Riverside County.	Nevin's barberry (*Berberis nevinii*) Vail Lake ceanothus (*Ceanothus ophiochilus*) slender-horned spineflower (*Dodecahema leptoceras*) Mojave tar plant (*Hemizonia mohavensis*) Quino checkerspot butterfly (*Euphydryas editha quino*) southern rubber boa (*Charina bottae umbratica*) California gnatcathcer (*Polioptila californica californica*)
Grassland	Grasslands are dominated by native and exotic grasses to a height of about two feet. In Western Riverside County, native grasslands occur at only a few scattered locations, including the Santa Rosa Plateau; while non-native grasslands are widely distributed.	Munz' onion (*Allium munzii*) San Jacinto Valley crownscale (*Atriplex coronata var. notatior*) thread-leaved brodiaea (*Brodiaea filifolia*) Quino checkerspot butterfly (*Euphydryas editha quino*) southern rubber boa (*Charina bottae umbratica*) Swainson's hawk (*Buteo swainsonii*) mountain plover (*Charadrius montanus*) California gnatcathcer (*Polioptila californica californica*) Stephens' kangaroo rat (*Dipodomys stephensi*)

Name	Description	Federal and State Listed, Proposed, and Candidate Species
Playa and Vernal Pool	The playa plant community is composed primarily of low, grayish, widely spaced shrubs on poorly drained soils of high salinity and/or alkalinity due to evaporation of water that accumulates in closed basins, often with high water table and with salt crust on the surface. Total cover is usually low due to wide spacing between shrubs and minimally developed understory. This community is similar to chenopod scrub, but with more succulent species. Dominant species include saltbush (*Atriplex* spp.), iodine bush (*Allenrolfea occidentalis*), and bush seepweed (*Sueda moquinii*). In Western Riverside County, this community occurs primarily in the San Jacinto and Perris Valleys. The vernal pool plant community consists primarily of amphibious annul herbs and grasses that begin their lives as aquatic juveniles in winter rain-filled pools, then flower and die as the pools dry in Spring and Summer. Soil salinity is generally much lower than in playas. Typical dominants include mesa mint (*Pogogyne* spp.), navarretia (*Navarretia* spp.), downingia (*Downingia* spp.), mouse-tail (*Myosurus* spp.), popcorn flower (*Plagiobothrys* spp.), woolly marbles (*Psilocarphus* spp.), and button-celery (*Eryngium* spp.). In Western Riverside County, vernal pools are located on the Santa Rosa Plateau, at Skunk Hollow, in the Hemet Plain, and in Moreno Valley at the edge of Sycamore Canyon Park. Small pools may also be present at other locations where suitable conditions exist.	Munz' onion (*Allium munzii*) San Jacinto Valley crownscale (*Atriplex coronata var. notatior*) thread-leaved brodiaea (*Brodiaea filifolia*) San Diego button-celery (*Eryngium aristulatum var. parishii*) Parish's meadowfoam (*Limnanthes gracilis var. parishii*) spreading navarretia (*Navarretia fossalis*) California Orcutt grass (*Orcuttia californica*) vernal pool fairy shrimp (*Branchinecta lynchii*) Riverside fairy shrimp (*Streptocephalus woottoni*)
Meadow and Marsh	These plant communities have soils that are saturated continually or at least during a significant portion of the year. They differ from vernal pools in retaining enough soil moisture to support perennial plant growth. Plant growth is often dense and consists primarily of perennial monocots, including sedges (*Carex*), nutsedges (*Cyperus*), rushes (*Juncus*), bulrushes (*Scirpus*), and cattails (*Typha*). In Western Riverside County, these communities occur in montane meadows and around the margins of lakes, rivers, and streams.	Parish's meadowfoam (*Limnanthes gracilis var. parishii*) California red-legged frog (*Rana aurora draytonii*) southern rubber boa (*Charina bottae umbratica*) American peregrine falcon (*Falco peregrinus anatum*)
Riparian and Bottomland	This category occurs in bottomlands, canyons, desert washes, floodplains, gravel bars, banks of perennially wet streams, and other places with high water tables. These areas are characteristically dominated by drought- or winter-deciduous trees, tall shrubs, or palms, such as cottonwoods (*Populus* spp.), willows (*Salix* spp.), mulefat	slender-horned spineflower (*Dodecahema leptoceras*) Santa Ana River woollystar (*Eriastrum densifolium ssp. sanctorum*)

Name	Description	Federal and State Listed, Proposed, and Candidate Species
	(*Baccharis salicifolia*), tamarisk, (*Tamarix* spp.), giant reed (*Arundo donax*), western sycamore (*Platanus racemosa*), California fan palm (*Washingtonia filifera*), arrow weed (*Pluchea sericea*), mesquite (*Prosopis* spp.), smoke tree (*Psorothamnus spinosus*), desert willow (*Chilpsis linearis*), catclaw (*Acacia greggii*), and palo verde (*Cercidium floridum*). In Western Riverside County, riparian and bottomlands are widespread and occur along major waterways and their tributaries, and in canyon bottoms.	Mojave tar plant (*Hemizonia mohavensis*) (southwestern) arroyo toad (*Bufo microscaphus californicus)* California red-legged frog (*Rana aurora draytonii*) southern rubber boa (*Charina bottae umbratica*) western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) southwestern willow flycatcher (*Empidonax traillii extimus*) American peregrine falcon (*Falco peregrinus anatum*) Bald eagle (*Haliaeetus leucocephalus*) least Bell's vireo (*Vireo bellii pusillus*) San Bernardino kangaroo rat (Dipodomys merriami parvus)
Oak Woodland/ Forest	This category consists of woodlands and forests dominated by oaks (*Quercus* spp.), and is found throughout Western Riverside County on mountain and foothill slopes and in canyons.	southern rubber boa (*Charina bottae umbratica*)
Coniferous Woodland/ Forest	This category consists of woodlands and forests dominated by conifers, including pines (*Pinus* spp.), junipers (*Juniperus* spp.), white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*) and bigcone douglas fir (*Pseudotsuga macrocarpa*). In Western Riverside County, coniferous woodlands and forests occur at upper elevations in the San Jacinto and San Bernardino Mountains, and to a lesser extent at other scattered locations.	southern rubber boa (*Charina bottae umbratica*) Bald eagle (*Haliaeetus leucocephalus*)

Sensitive Natural Communities

The CDFG, through its Natural Diversity Data Base, tracks the occurrence of natural communities which it considers to be the most sensitive in the state. According to the Natural Diversity Database (CDFG, NDDB 1999a), the natural communities described below occur in Western Riverside County. Community descriptions are from Holland

(1986), the Natural Diversity Database, and Sawyer and Keeler-Wolf (1995), unless otherwise noted.

Canyon Live Oak Ravine Forest

This community consists of forests with continuous canopies dominated by canyon live oak (*Quercus chrysolepis*), but also potentially including pines, bigcone Douglas fir (*Pseudotsuga macrocarpa*), incense-cedar (*Calocedrus decurrens*), bigleaf maple (*Acer macrophyllum*), California black oak (*Quercus kelloggii*), California bay (*Umbellularia californica*), madrone (*Arbutus menziesii*), or white fir. Shrubs and herbs are infrequent due to the continuous tree canopy. This community occurs in canyons and near mountain streams, in non-desert regions of California.

Desert Fan Palm Oasis Woodland

This community consists of woodlands dominated by California fan palm (*Washingtonia filifera*), but also potentially including willows (*Salix* spp.), Western sycamore (*Platanus racemosa*) canyon live oak (*Quercus chrysolepis*), Fremont cottonwood (*Populus fremontii*), or velvet ash (*Fraxinus velutina*). This community occurs on intermittently flooded or saturated soils in the Sonoran Desert.

Riversidean Alluvial Fan Sage Scrub

This community consists of shrublands with a continuous or intermittent canopies less than five feet high, and sometimes with grassy understories. Dominant shrubs include scalebroom (*Lepidospartum squamatum*), and potentially also California buckwheat (*Eriogonum californicum*), California sagebrush (*Artemesia californica*), California broom (*Lotus scoparius*), chaparral yucca (*Yucca whipplei*), mulefat (*Baccharis salicifolia*), western poison-oak (*Toxicodendron diversilobum*), skunkbrush (*Rhus trilobata*), brittlebush (*Encelia farinosa*) or other shrubs. Scattered trees may also be present, including western sycamore (*Platanus racemosa*), Southern California black walnut (*Juglans californica* var. *californica*), California juniper (*Juniperus californica*), or Fremont cottonwood (*Populus fremontii*). This community occurs on rarely flooded alluvial deposits along streams of southern California.

Sonoran Cottonwood Willow Riparian Forest

This community consists of winter-deciduous, broadleafed streamside forests to about 60 feet tall, dominated by Fremont cottonwood (*Populus fremontii*) with dense understories of several willow (*Salix*) species, in deep, well-watered, loamy alluvial soils along the near-channel floodplains of perennial desert rivers and streams.

Southern California Arroyo Chub/Santa Ana Sucker Stream

This community consists of warm or cool water streams of the Los Angeles Basin that support communities of arroyo chub, Santa Ana sucker, and speckled dace (Moyle and Ellison 1991), including the Santa Ana River and its tributaries in Riverside, San Bernardino, and Orange Counties.

Southern Coast Live Oak Riparian Forest

This community consists of open to locally dense evergreen riparian woodlands dominated by coast live oak (*Quercus agrifolia*). This community appears to be richer in herbs and poorer in understory shrubs than other riparian communities. It occurs in bottomlands and outer floodplains along larger streams, on fine-grained, rich alluvium, in canyons and valleys of coastal southern California, mostly south of Point Conception.

Southern Cottonwood Willow Riparian Forest

This community consists of tall, open, broadleafed winter-deciduous riparian forests dominated by Fremont cottonwood (*Populus fremontii*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), and several tree willows. Understories usually are shrubby willows. The dominant species require moist, bare mineral soil for germination and establishment. This is provided after flood waters recede, leading to uniform-aged stands. This community occurs along sub-irrigated and frequently overflowed lands along perennially wet rivers and streams of the Tranverse and Peninsular ranges, from Santa Barbara County south to Baja California Norte and east to the edge of the deserts.

Southern Interior Basalt Flow Vernal Pool

This community consists of seasonally flooded or saturated depressions on the Santa Rosa Plateau dominated by annual hairgrass (*Deschampsia danthonioides*), downingias (*Downingia* spp.), spreading navarretia (*Navarretia fossalis*), low navarretia (*Navarretia prostrata*), spikerush (*Eleocharis* spp.), California Orcutt grass (*Orcuttia californica*), quillwort (*Isoetes* spp.) or other amphibious herbs or grasses.

Southern Interior Cypress Forest

This community consists of fairly dense, fire-maintained, low forests dominated by either Piute cypress (*Cupressus arizonica* ssp. *nevadensis*), Tecate cypress (*C. forbesii*), or Cuyamaca cypress (*C. arizonica* ssp. *arizonica*). This forest often occurs as isolated groves within a matrix of chaparral or pinyon-juniper woodland. Many stands are even-aged due to fire density. This community is most often found on northern exposures in the Southern Sierra Nevada and Peninsular Ranges south into Baja California.

Southern Riparian Forest and Mixed Riparian Forest

Southern riparian forest and mixed riparian forest are generic categories used by the Natural Diversity Data Base for riparian forests of undocumented species composition, but most likely dominated by cottonwoods (*Populus* spp.), willows (*Salix* spp.), western sycamore (*Platanus racemosa*), or coast live oak (*Quercus agrifolia*). Southern riparian forests occur throughout nondesert southern California along streams and floodplains and in bottomlands.

Southern Riparian Scrub

This community consists of riparian scrub dominated by mulefat (*Baccharis salicifolia*) or shrub willows (*Salix* spp.) along rivers and streams in nondesert regions of southern California. Southern riparian scrub requires frequent flooding to prevent succession to cottonwood or sycamore dominated woodlands.

Southern Sycamore Alder Riparian Woodland

This community consists of tall, open, broadleafed, winter-deciduous streamside woodlands dominated by western sycamore (*Platanus racemosa*), and sometimes white alder (*Alnus rhombifolia*). These stands seldom form closed canopy forests, and even may appear as trees scattered in a thicket of evergreen and deciduous shrubs. This community occurs in very rocky streambeds subject to seasonally high-intensity flooding, in the Transverse and Peninsular ranges from Point Conception south into Baja California Norte.

Southern Willow Scrub

This community consists of dense, broadleafed, winter-deciduous riparian thickets dominated by several willow (*Salix*) species, with scattered emergent Fremont cottonwood (*Populus fremontii*) and western sycamore (*Platanus racemosa*). Most stands are too dense to allow much understory development. This community occurs on loose, sandy or fine gravelly alluvium deposited near stream channels during flood flows, and requires repeated flooding. Southern willow scrub was formerly extensive along the major rivers of coastal southern California, but now much reduced by urban expansion, flood control, and channelization projects.

Valley Needlegrass Grassland

This community consists of midheight (to 2 feet) grasslands dominated by perennial, tussock-forming purple needlegrass (*Nassella pulchra*). Native and introduced annuals occur between the perennials, often actually exceeding the bunchgrasses in cover. It usually occurs on fine-textured (often clay) soils, moist or even waterlogged during winter, but very dry in summer, and often interdigitates with oak woodlands on moister, better drained sites. This community was formerly extensive around the Sacramento, San Joaquin, and Salinas Valleys, as well as the Los Angeles Basin, but is now much reduced.

4.2.1.3 Federal and State Listed, Proposed, and Candidate Species of Western Riverside County

Thirty one species in Western Riverside County have special status under the Federal Endangered Species Act (ESA) and/or the California Endangered Species Act (CESA). These include species that are listed as "endangered" or "threatened" under the ESA or that have been "proposed" or are "candidates" for such listing. These also include species that are listed as "endangered," "threatened," or "rare" under the CESA or that have been petitioned (i.e., are "candidates") for listing. Each of these species warrants intensive analysis for purposes of project review under the CEQA. Any potential project impacts to these species may involve permitting or other compliance requirements under CEQA. These species are identified with natural communities within which they may be expected to occur in Table 4.2.B. They are also listed in Table 4.2.C along with state and federal status and brief descriptions of habitat and distribution.

Table 4.2.C - Federal and State Listed, Proposed, and Candidate Species of Western Riverside County

Species [a1]	Habitat and Distribution	Status [c1]
Vascular Plants		
Allium munzii Munz's onion	*Habitat*: Grassy openings in coastal sage scrub, chaparral, juniper woodland, valley and foothill grasslands in clay soils (Boyd 1986; Skinner and Pavlik 1994). Found on mesic exposures or seasonally moist microsites. Associated with a special "clay soil flora" found in southwestern Riverside County that includes herbs such as chocolate lily *(Fritillaria biflora*), Palmer's grappling hook (*Harpagonella palmeri*), knot-weed spine flower *(Chorizanthe polygonoides* ssp. *longispina*), snakeroot (*Sanicula bipinnatifida, S. arguta*), lomatium *(Lomatium utriculatum, L. dasycarpum*), shooting stars (Dodecatheon clevelandii), bloomeria *(Bloomeria crocea*), soaproot (*Chlorogalum parviflorum*), many-stemmed dudleya (*Dudleya multicaulis*) and red-skinned onion (*Allium haematochiton*) (Boyd 1986; Winter 1992; Roberts 1993; CDFG NDDB 2000b). At least one population (Bachelor Mountain) is reported to be associated with pyroxenite outcrops instead of clay (D. Bramlet, in litt., October 1992). *Distribution*: Munz's onion is endemic to southwestern Riverside County. This species is restricted to heavy clay soils which are scattered in a band several miles wide and extending some 40 miles southeast from Corona through Temescal Canyon and along the Elsinore Fault Zone to the southwestern foothills of the San Jacinto Mountains from 300 to 1,000 meters elevation (Boyd 1988, Munz 1974; McNeal 1993). *Known Populations in Western Riverside County:* Munz's onion is known from 13 extant populations distributed primarily in the western and southern areas of the planning area (Roberts 1993; U.S. Fish and Wildlife Service 1998; CDFG NDDB 2000b). Munz's onion is situated in widely scattered populations from Estelle Mountain and the Gavilan	Fed: E State: T CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	Plateau at Harford Springs Park southeast through the hills north of Lake Elsinore (North Peak), to the Paloma Valley (Briggs and Scott Roads), Skunk Hollow, and Lake Skinner area (Bachelor Mountain). There is also a significant population at Elsinore Peak and other populations in the North Domenigoni Hills, Alberhill, Skunk Hollow, and in Temescal Canyon (Boyd and Mistretta 1991; Winter 1991; CDFG NDDB 2000b). The largest populations are at Harford County Park (with 20,000 to 50,000 individuals), Elsinore Peak (about 5,000 individuals), Dawson Canyon (about 2,000 individuals), Estelle Mountain (at least 2,000 individuals), Bachelor Mountain (over 3,000 individuals), and North Peak (about 3,000 individuals). More than half of the populations are on, wholly or in part, on private lands. Populations that are currently on public lands or within preservation areas include about half the plants at Harford Springs Park, Estelle Mountain, the North Domenigoni Hills, Bachelor Mountain (two populations), about half of the Elsinore Mountain population, and the North Peak population. The Elsinore Mountain population is managed, in part, by the Cleveland National Forest.[b2]	
Atriplex coronata var. *notatior* San Jacinto Valley crownscale	*Habitat:* Restricted to highly alkaline, silty-clay soils in association with the Traver-Domino- Willows soil association. Most populations are associated with the Willows soil series. Occurs primarily in floodplains (seasonal wetlands) dominated by alkali scrub, alkali playas, vernal pools, and, to a lesser extent, alkali grasslands (Bramlet 1993, Roberts 1993). *Distribution:* Endemic to western Riverside County (Munz 1974, Taylor and Wilken 1993). *Known Populations in Western Riverside County: Atriplex coronata* var. *notatior* is restricted to the San Jacinto, Perris, Menifee and Elsinore Valleys of western Riverside County, California. This taxon consists of 11 loosely defined populations that are primarily associated with the San Jacinto River and Old Salt Creek tributary drainages (Roberts 1993, Roberts and McMillan 1997, CNDDB 1998). One additional isolated and small population has recently been discovered in Willows soils at Alberhill Creek near Lake Elsinore (Roberts and McMillan 1997). The majority of the populations of *Atriplex coronata* var. *notatior* are located on privately owned lands. Three populations are on State land (San Jacinto Wildlife Area), one population is partially on County lands (RCHCA along the San Jacinto River), and one population is on a private preserve managed by MWD. This plant is not known to occur on Federal lands.[b1]	Fed: E State: – CNPS: 1b
Berberis nevinii Nevin's barberry	*Habitat:* Found in two habitat types: coarse soils in chaparral and gravelly wash margins in alluvial scrub (Niehaus 1977, Boyd 1987). *Distribution*: Endemic to southwestern cismontane southern California. It occurs in restricted localized populations from the interior foothills of the San Gabriel Mountains of Los Angeles County and San Bernardino County southeast to near the foothills of the Agua Tibia Mountains of southwestern Riverside County, from 300 and 659 meters (980-2150 feet) in elevation (CNDDB 1998, Munz 1974, Williams 1993). Scattered naturalized populations have been established outside this range (CNDDB 1998, Reiser 1996). *Known Populations in Western Riverside County: Berberis nevinii* is known only three areas in Riverside County: Vail Lake, Riverside, and Aguanga. The largest population complex is known from the vicinity of Vail Lake - Oak Mountain area along the north slope of the Agua Tibia Mountains (Boyd, Arnseth, and Ross 1989, Boyd and Banks 1995). The Vail Lake complex includes about 16 populations, the majority with 5 or fewer individuals for a cumulative total of about 200 individuals (CNDDB 1998, U.S. Fish and Wildlife Service 1998). This population complex is the largest concentration of *B. nevinii* in the United States (U.S. Fish and Wildlife Service 1998). Most of these populations are on private lands, although a few individuals occur on	Fed: E State: T CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	Bureau of Land Management lands north of Vail Lake and in the Cleveland National Forest southeast of Vail Lake. A lone individual has been reported from a rocky outcrop in a residential area in the city of Riverside (U.S. Fish and Wildlife Service 1998).[b1]	
Brodiaea filifolia thread-leaved brodiaea	*Habitat:* This species typically occurs on gentle hillsides, valleys, and floodplains in mesic, southern needlegrass grassland and alkali grassland plant communities in association with clay, loamy sand, or alkaline silty-clay soils (Bramlet 1993). In coastal Orange County and San Diego County, the distribution of brodiaea is highly correlated with specific clay soil series. Localities occupied by this species are frequently intermixed with, or near, vernal pool complexes, such as at the Santa Rosa Plateau and in the Upper Old Salt Creek drainage southwest of Hemet in Riverside County (CNDDB 1998, U.S. Fish and Wildlife Service 1998). *Distribution:* endemic to southwestern cismontane California, ranging from the foothills of the San Gabriel Mountains at Glendora (Los Angeles County), east to Arrowhead Hot Springs in the western foothills of the San Bernardino Mountains (San Bernardino County), and south through eastern Orange and western Riverside Counties to Carlsbad and just south of Lake Hodges in northwestern San Diego County, California (S. Morey, in litt., 1995; Keator 1993, Munz 1974, CNDDB 1998). This species occurs from near sea level to 600 meters (2,000 feet). Forty-eight (48) populations of *B. filifolia* have been reported. At least nine of these populations have been extirpated, primarily in San Diego County. Thirty-nine (39) populations are presumed extant. Nearly half of these remaining populations are clustered in the expanding cities of Vista, San Marcos, and Carlsbad and the Santa Rosa Plateau (CNDDB 1998, Roberts and Vanderwier 1997). Fewer than 500 individuals have been observed within half of the populations. Populations exceeding 5,000 flowering stalks has been reported in only 6 populations (CNDDB 1998, Vanderwier and Roberts 1997). *Known Populations in Western Riverside County:* Twelve populations of Brodiaea filifolia are known from western Riverside County. These populations are clustered into two complexes, one along the San Jacinto River near Perris and Lakeview, and the other on the Santa Rosa Plateau (Roberts and Vanderwier 1997). A small population on private land with about 50 individuals has also been reported in the Old Salt Creek drainage west of Hemet. Five populations of B. filifolia have been reported along the San Jacinto River varying in size from 25 to 2,500 individuals (CNDDB 1998, Roberts and Vanderwier 1997). The San Jacinto River flood plain supports about half of the remaining populations and over 40 percent of the potential habitat for this species in Riverside County. Likely all five populations are relics of one large population complex that once extended from Mystic Lake south to Railroad Canyon. Only about 25 percent of the alkali-associated habitat along the San Jacinto River currently remains available for this species due to discing and dry-land farming activities (Bramlet 1995, Roberts and Vanderwier 1997). Seventy-five percent of the potential suitable habitat is undergoing regular discing and other activities that preclude re-establishment of this species. About 5,200 acres of alkali habitats along the San Jacinto River are on land managed by the California Department of Fish and Game (CDFG) within the San Jacinto Wildlife Area. However, only a small portion of the San Jacinto Wildlife Area is suitable for B. filifolia because there are extensive (as much as 2300 acres) lake beds, duck ponds, and areas dominated by non-native grasses and forbs that crowd out broadiaea. B. filifolia is known to occupy about 22 acres (Bramlet 1995) between two populations. South of the San Jacinto Wildlife Area there is about 3,800 acres of potentially suitable habitat for B. filifolia on private lands along the San Jacinto River flood plain and in the upper reaches	Fed: T State: E CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	of Railroad Canyon. However, this area has also been subject to more extensive agricultural activities and related disturbances over the last century. Regardless, this area has supported higher quality alkali grassland and more potentially suitable brodiaea habitat then the San Jacinto Wildlife area because of more appropriate hydrological factors (less intense and more periodic flooding). Three populations of brodiaea have been found in this area. Only one population, with 1,500 individuals on about 1 acre of land (Railroad Canyon) has been observed recently (Tierra Madre Consultants 1991; CNDDB 1998, Roberts and Vanderwier 1997). The other populations appear to have been extirpated primarily as a result of discing and plowing in association with dryland farming activities. Increased dry land farming activities in the 1990's have resulted in an appreciable decline in alkali annual grasslands and recovering areas along this segment of the San Jacinto River. There are six populations of Brodiaea filifolia in the vicinity of the Santa Rosa Plateau. Four (4)of these populations are located on the plateau, forming a complex of over 30,000 individuals (Metropolitan Water District 1991, Roberts and Vanderwier 1997). Two (2) other small populations occur at Squaw Mountain and Redondo Mesa on private lands.[b1]	
Ceanothus ophiochilus Vail Lake ceanothus	*Habitat:* This species is found in dry habitats along ridgetops and north to northeast-facing slopes in chamise chaparral (Boyd, et. al., 1991). *C. ophiochilus* is restricted to shallow soils originating from ultra-basic parent rock and deeply weathered gabbro. *Distribution:* Endemic to southwestern Riverside County (Boyd, et. al. 1991, Schmidt 1993). *Known Populations in Western Riverside County: C. ophiochilus* is restricted to 3 populations in the hills immediately west of Vail Lake and on the north slope in the Agua Tibia Wilderness on lower, north-facing slopes of Agua Tibia Mountains (Boyd, et al., 1991, CNDDB 1998, U.S. Fish and Wildlife Service 1998). About half the individuals are within one population on private land (Vail Lake) and the other half are dispersed over 2 populations within the Agua Tibia Wilderness Area. These later populations show evidence of hybridization (U.S. Fish and Wildlife Service 1998). [b1]	Fed: E State: T CNPS: 1b
Dodecahema leptoceras slender-horned spineflower	*Habitat:* At the majority of sites, *Dodecahema leptoceras* is found in sandy soil in association with mature alluvial scrub (Reveal and Hardham 1989a, Rey-Vizgirdes 1994). In the Vail Lake area this species is also associated within gravel soils of Temecula arkose deposits in association with open chamise chaparral (Boyd and Banks 1995). *Distribution: Dodecahema leptoceras* is endemic to southwestern cismontane California, ranging from central Los Angeles County east to San Bernardino County, and south to southwestern Riverside County in the foothills of the Transverse and Peninsular Ranges, at 200 to 700 meters (660-2300 feet) elevation (Hickman 1993). Only 8 areas are still known to support *Dodecahema leptoceras*, including two localities each in Los Angeles County (Bee Canyon and Big Tijunga Wash), and two in San Bernardino County (the Santa Ana River wash and Cajon Wash [Reveal and Hardham 1989, Rey-Vizgirdes 1994, CDFG NDDB 1999d]). *Known Populations in Western Riverside County:* There are 4 areas known to support *Dodecahema leptoceras* in western Riverside County. A small population is reported in Temescal Wash at Indian Creek along the eastern flank of the Santa Ana Mountains (CDFG NDDB 1998). Two populations other small populations are known from the upper San Jacinto River near Valle Vista and Hemet (CDFG NDDB 1999d). Only the Valle Vista population remains extant although suitable habitat remains near Hemet. Two small populations are found in central Bautista Creek (Rey-Vizgardes 1994, CDFG NDDB 1999d). A significant population complex of *Dodecahema leptoceras* consisting of 5 or 6 separate	Fed: E State: E CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	groups occurs in association with washes associated with Arroyo Seco and Kolb Creek along the north flank of the Agua Tibia Mountains and at Vail lake in southern Riverside County (Rey-Vizgardes 1994, CDFG NDDB 1999d). With estimates of over 10,000 individuals, this complex represents the most extensive population of this species known (Boyd and Banks 1995). The majority of these plants are north of Highway 79. The majority of populations are on private land. A portion of the Bautista Creek population is within the San Bernardino National Forest and about one quarter of the Vail Lake population is within the Cleveland National Forest. *D. leptoceras* has also been collected at Lake Elsinore historically although this site is presumed to have been extirpated. The species may once have occurred along the Santa Ana River near the San Bernardino County line.[b1]	
Eriastrum densifolium ssp. *sanctorum* Santa Ana River woollystar	*Habitat:* The Santa Ana River woolly-star is found only within open washes and early-successional alluvial fan scrub on open slopes above main watercourses on fluvial deposits where flooding and scouring occur at a frequency that allows the persistence of open shrublands. Suitable habitat is comprised of a patchy distribution of gravelly soils, sandy soils, rock mounds and boulder fields (Zembal and Kramer 1984; Zembal and Kramer 1985; U.S. Fish and Wildlife Service 1986). Suitable habitat typically contains low amounts of clay, silt and micro-organic materials (Burk, et al. 1989). These areas typically maintain a perennial plant cover of less than 50%. Associated perennial plants include California buckwheat (Eriogonum fasciculatum), California croton (Croton californicus), yerba santa (Eriodictyon trichocalyx) and scale-broom (Lepidospartum squamatum) (Burk, et al. 1989; Zembal and Kramer 1984; Zembal and Kramer 1985). The Santa Ana River woolly-star is an early-successional species and possibly requires flood-mediated habitat rejuvenation (Wheeler and Burk 1990). Sheet flood flows probably occur in this habitat every one hundred to two hundred years (U.S. Fish and Wildlife Service 1986). A 1989 study of woolly-star habitats and surrounding habitats revealed that the percent cover of European annuals is lowest in woolly-star habitats (Burk, et al. 1989). *Distribution:* The Santa Ana River woolly-star occurs along the Santa Ana River and Lytle and Cajon Creek flood plains from the base of the San Bernardino Mountains in San Bernardino County southwest along the Santa Ana River through Riverside County into the Santa Ana Canyon of northeastern Orange County from about 150 to 580 meters (Munz 1974; Patterson 1993; Roberts 1998; Zembal and Kramer 1985; Patterson and Tanowitz 1989). *Known Populations in Western Riverside County:* Currently within the planning area, Santa Ana River woolly-star is known only from two small populations (less then 10 individuals) near Market Street within the City of Riverside and west of Fairmont Park and Golf Course (CNDDB 1998). The status of these populations is uncertain.[b2]	Fed: E State: E CNPS: 1b
Eryngium aristulatum var. *parishii* San Diego button-celery	*Habitat:* Occurs in vernal pools (Skinner and Pavlik 1994, Reiser 1996). *Distribution:* Southwestern California and northwestern Baja California, Mexico. *E. aristulatum* var. *parishii* is known historically from about 75 locations from southern coastal Camp Pendleton, and southern Riverside County, south to the Mexican border (CNDDB 1998, Constance 1993, Munz 1974). The species is known from about 10 locations in Baja California extending south to vicinity of Cabo Colnett (Reiser 1996). *Known Populations in Western Riverside County:* *E. aristulatum* var. *parishii* is known only from 4 populations on the Santa Rosa Plateau (CNDDB 1998). Two populations are on Mesa de Colorado, and two are on Mesa de Burro. Both populations are within the Santa Rosa Plateau Preserve. The populations contain fewer then 1,000	Fed: E State: E CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	individuals [b1]	
Hemizonia mohavensis Mojave tarplant	*Habitat*: Mojave tarplant occurs on low sand bars in river beds, along stream channels or in ephemeral grassy areas in riparian scrub and chaparral, at elevations between 850 to 1575 m (Skinner and Pavlik 1994; CDFG NDDB 2000a). *Distribution:* Mojave tarplant is believed to be extirpated in San Bernardino County and still occurs in Riverside County and San Diego County (CDFG NDDB 2000a). Within Riverside County, this species is limited to the north-facing slopes of the San Jacinto Mountains in the Cleveland National Forest. *Known Populations in Western Riverside County:* The CNDDB (2000a) contains nine occurrences within the San Jacinto Mountains. Four occurrences are located along Highway 243 north of Pine Cove. The remaining populations are associated with Brown Creek, Azalea Creek, Twin Pines Creek and minor gullies between Pines Creek and Dutch Creek (CDFG NDDB 2000a).[b2]	Fed: – State: E CNPS: 1a [c2]
Limnanthes gracilis var. *parishii* Parish's meadowfoam	*Habitat*: Parish's meadow foam is limited to ephemeral wetlands in the mountains of southern California between 1100 and 1700 meters (Skinner and Pavlik 1994). It occurs on gentle slopes or in swales, in forest glades, among Mima mounds and in areas likely to be inundated (Bauder 1992). This species is thought to exist mostly in sandy loam soils with a pH of 6.4 to 7.2 (Gentry 1965). Sproul and Beauchamp (1979) considered California buttercup *(Ranunculus californicus)* to be a good indicator species for Parish's meadowfoam (Winter 1991). *Distribution:* This species is endemic to San Diego and Riverside Counties, southern California. Distribution of Parish's meadowfoam is limited to scattered locations in the Cuyamaca and Laguna mountains and on Palomar Mountain, all in San Diego County, and the Santa Rosa Plateau in southwestern Riverside County (Bauder 1992). Fewer than 20 populations of this taxon exist, with the largest population (70 percent of the known individuals) occurring in the Cuyamaca Valley, of the Cuyamaca Mountains on private land managed by the Helix Water District (Roberts 1994). *Known Populations in Western Riverside County:* Parish's meadowfoam has been documented at only one site within western Riverside County, on the Santa Rosa Plateau.[b2]	Fed: – State: E CNPS: 1b
Navarretia fossalis spreading navarretia	*Habitat*: The primary habitat this species is associated with are vernal pools and depressions and ditches in areas that once supported vernal pools (Day 1993, Reiser 1996). In western Riverside County, *Navarretia fossalis* has been found in relatively undisturbed and moderately disturbed vernal pools, within a larger vernal floodplains dominated by annual alkali grassland or alkali playa (Bramlet 1993). The alkali vernal playa/pool habitat found in the Hemet area is based primarily on silty clay soils in the Willows and Travers series. These soils are usually saline-alkaline in nature and reliably pond water for long durations. Nearly half of the known populations of *Navarretia fossalis* occur within the same habitat occupied by *Atriplex coronata* var. *notatior* (San Jacinto Valley crownscale). *Brodiaea filifolia* (thread-leaved brodiaea) is also a common associate species. The distribution of *Navarretia fossalis* is more restricted than those of *Atriplex coronata* var. *notatior* and *Brodiaea filifolia*, however, in that *Navarretia fossalis* can only persist in the wettest areas of the San Jacinto River flood plain and the vernal pools at Hemet. Other species with *Navarretia fossalis* include *Myosurus minimus* (little mouse tail), *Cressa truxillensis* (alkali weed), *Rumex maritima* (golden dock), *Plagiobothrys leptocladus* (alkali plagiobothrys), *Hordeum intercedens* (vernal barley), *Suaeda moquinii* (bush seepweed), and *Hemizonia pungens* ssp. *laevis* (smooth tarplant). On the Santa Rosa Plateau, *N. fossalis* is associated with southern basalitic claypan vernal pools.	Fed: T State: – CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	Distribution: Distributed from northwestern Los Angeles County and western Riverside County, south through coastal San Diego County, California to San Quintin in northwestern Baja California, Mexico, from near sea level to 1,300 meters (4,200 feet) (Day 1993, Munz 1974). The majority of *Navarretia fossalis* populations are on privately owned lands. Fifty-one (51) populations of *N. fossalis* have been reported in the United States. There are currently fewer than 38 extant populations in the United States. Nearly 60 percent of these populations are concentrated in three locations: Otay Mesa in southern San Diego County; along the San Jacinto River in western Riverside County; and near Hemet in Riverside County (Bauder 1986, Bramlet 1993, CDFG NDDB 1999d, U.S. Fish and Wildlife Service 1998). Smaller populations are scattered in southern Riverside County, Los Angeles County, and coastal San Diego County. In Mexico, *Navarretia fossalis* is known from fewer than 10 populations clustered in three areas: along the international border, on the plateaus south of the Rio Guadalupe, and on the San Quintin coastal plain (Moran 1977). *Known Populations in Western Riverside County:* Riverside County supports the largest remaining populations of *Navarretia fossalis*, and these populations are associated with the largest areas of available habitat in the United States. Twelve (12) populations have been identified. Several populations are reported to exceed 40,000 individuals (CDFG NDDB 1999d). Eleven (11) of the 12 populations are found in the alkali soils of two population complexes within the Upper Salt Creek drainage west of Hemet, and along the San Jacinto River extending from just west of Mystic Lake south to the Perris Valley Airport (Bramlet 1993, CDFG NDDB 1999d). The majority of the populations at Hemet and along the San Jacinto River occur on private lands. A significant number of these populations have been suppressed and reduced by discing and dry land farming activities in recent years. Five (5) closely clustered populations are on the San Jacinto Wildlife Area, managed by the California Department of Fish and Game. Several vernal pools occupied by *N. fossalis* south of the Ramona Expressway are on lands managed for conservation by the Riverside County Habitat Conservation Association. A small population of *Navarretia fossalis* has been reported to occur on the Santa Rosa Plateau within the Santa Rosa Plateau preserve (Metropolitan Water District 1991). However, the identification of this population is uncertain, other *Navarretia* localities on the plateau have been identified as *N. prostrata*. Populations of *N. fossalis* also occurred at three localities in the vicinity of Murrieta Hot Springs and the southern end of the French Valley as recently as the 1920's, however, these populations have been extirpated (Stan Spencer, *in litt.*, 1993). Other populations are anticipated in this area. The status of a small population on private land at the north end of the French Valley near Highway 79 is uncertain.[b1]	
Orcuttia californica California Orcutt grass	*Habitat:* All known *Orcuttia californica* localities are associated with deep vernal pools (Reeder 1982, Skinner and Pavlik 1994, U.S. Fish and Wildlife Service 1998). In Riverside County, this species is found in southern basaltic claypan vernal pools at the Santa Rosa Plateau, and alkaline vernal pools as at Skunk Hollow and at Hemet (Bramlet 1993, CDFG NDDB 1999a). *Distribution:* In the United States, *Orcuttia californica* is found in southwestern California from eastern Ventura County east through Los Angeles County to Riverside County, and south to San Diego County from near sea level to 625 meters (2,050 feet) (Munz 1974, Reeder 1993). *Orcuttia californica* is known from a single vernal pool complex (Carlsberg) in Ventura County, a single vernal pool complex (Cruzan Mesa) in Los Angeles County, and 7 vernal pool complexes in San Diego County (U.S. Fish and Wildlife Service 1998, CDFG	Fed: E State: E CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	NDDB 1999a). Four (4) of the 7 populations in San Diego County are on Otay Mesa. An additional two populations on Otay Mesa have been extirpated. At least 4 additional populations in the Los Angeles Basin have been extirpated (Reeder 1982, U.S. Fish and Wildlife Service 1998). *Orcuttia californica* has been recorded from several locations in northwestern Baja California, primarily in the vicinity of Cabo Colnett (Reeder 1982, Rieser 1996). *Known Populations in Western Riverside County: Orcuttia californica* is known to occur from three vernal pool sites in Riverside County: Upper Salt Creek west of Hemet, Skunk Hollow, and the Santa Rosa Plateau (Bramlet 1993, U.S. Fish and Wildlife Service 1998, CDFG NDDB 1999a). Historically, this species was also known from Murrieta Hot Springs and Menifee Valley (Reeder 1982).[b1]	
Invertebrates		
Branchinecta lynchii vernal pool fairy shrimp	*Habitat*: *B. lynchi* is restricted to seasonal vernal pools (Eng, Belk, and Eriksen 1990; U.S. Fish and Wildlife Service 1994). The vernal pool fairy shrimp prefers cool-water pools that have low to moderate dissolved solids, are less predictable, and often short lived (Eriksen and Belk 1999). *Distribution: B. lynchi* is found primarily in the Central Valley and the foothills of the Sierra Nevada in northern California from 10 to 290 meters in elevation (Eng, Belk, and Eriksen 1990, Eriksen and Belk 1999, U.S. Fish and Wildlife Service 1994). The northernmost population is found near Medford in southern Oregon (Eriksen and Belk 1999). In southern California, vernal pool fairy shrimp is known only from western Riverside County up to an elevation of 1159 meters. *Known Populations in Western Riverside County:* The vernal pool fairy shrimp is known from three locations in the planning area: Skunk Hollow, the Santa Rosa Plateau, and at Salt Creek. Vernal pool fairy shrimp is most abundant on the Santa Rosa Plateau. At this time, vernal pool fairy shrimp has only been found at a single alkali vernal pool at the Salt Creek vernal pool complex but few of the pools have been surveyed. The populations at Santa Rosa Plateau are within the Santa Rosa Plateau Preserve. The populations at Skunk Hollow and Salt Creek are on private lands.[b2]	Fed: T State: –
Euphydryas editha quino Quino checkerspot butterfly	*Habitat:* Adult Quino often occur, on open or sparsely vegetated rounded hilltops, ridgelines, and occasionally rocky outcrops. Adults have been observed sunning themselves at the bases of hills, and they been seen flying through disturbed areas, apparently dispersing to sites possessing larval food plants and/or nectar sources. Micro and macro topography appear to influence *Euphydras editha* development and distribution (e.g. Weiss et al. 1988); larvae and adults have been detected on warmer south-facing slopes early in the season, whereas later in the season they were detected on cooler north-facing slopes. Quino populations appear to be associated with loamy soils with moderate to high amounts of clay, located within sparsely vegetated areas that contain potential host plants and nectar sources, and generally a moderate to high percentage of native plants. However, Quino have also been found along desert transition on decomposed granite soils (Pratt, pers. comm.). Topographically diverse sites, including areas with ridges, rounded hilltops, are very likely important for the long-term persistence of populations (e.g. Weiss et al. 1988, Pratt, pers. comm.). The habitat components have been found in association with, but not restricted to vernal pools, sage scrub, chaparral, native and non-native grassland, and open oak and juniper woodland communities. *Distribution*: The historic range of the QCB extends from the Santa Monica Mountains and Santa Clarita Valley east and south along the foothills of the Transverse and Peninsular ranges in California, and	Fed: E State: –

Species [a1]	Habitat and Distribution	Status [c1]
	south into northwestern Baja California, Mexico. Adults have been recorded from Point Dume and Dana Point in Los Angeles and Orange Counties, respectively, to approximately 1,500 meters (5,000 feet) in the Anza region of southwestern Riverside County, California (Mattoni e al, 1997, Pratt unpubl. data). Extant populations of the butterfly are currently known from western Riverside County and in southern San Diego Counties, California, and northwestern Baja California, Mexico (Mattoni et al. 1997). *Known Populations in Western Riverside County:* Historically, butterfly colonies were found in the Lake Mathews region and in the southwestern region of Riverside County. Currently one known colony exists in the Harford Springs Regional Park, in the northwestern part of the County. The remainder of the distribution occurs in the southern and eastern portions of the County. Butterfly populations have been documented ranging from just east of the 15 freeway east towards the Hogbacks through the Warms Springs creek area, east to the Southwestern Riverside County Multiple Species Reserve, continuing east . The Crowne Hill Property in Temecula supports a population. Other populations are found east through to Vail Lake and through the Sage/ Aquanga region and finally ending in the Durasno Valley (US Fish and Wildlife Service unpublished data, 1998).[b1]	
Rhaphiomidas terminatus abdominalis Delhi sands flower-loving fly	*Habitat*: The Delhi Sands flower-loving fly is strongly associated with the Delhi series soils. This species requires areas of open sand deposits for ovipositing and areas with vegetation for perching and nectaring. Typically, the Delhi Sands flower-loving fly is found in association with plants such as telegraph weed (*Heterotheca grandiflora*), California croton (*Croton californicus*), ragweed (*Ambrosia psilostachya*), and sometimes California buckwheat (*Eriogonum fasciculatum*) and annual bur-sage (*Ambrosia acanthacarpa*). *Distribution*: The Delhi Sands flower-loving fly is restricted (endemic) to the Colton Dunes (Delhi soil series) that once covered over approximately 40 square miles in northwestern Riverside and southwestern San Bernardino counties in southern California. The historic range of the Delhi Sands flower-loving fly likely extended over much of this area. All known extant populations of the Delhi Sands flower-loving fly occur within an 8 to 11-mile radius of each other within the counties of Riverside and San Bernardino. Nearly all of the remaining habitat is privately owned and distributed largely within the vicinity of Colton, Rialto, Fontana, Ontario, and the Prado-Mira Loma area, with the most contiguous and highest quality habitat in Colton. *Known Populations in Western Riverside County:* The distribution of the Delhi Sands flower-loving fly within Riverside County is limited to the northern portion of the County in the vicinity of Mira Loma, Jurupa, and the Agua Mansa area. The Delhi series soils extend east-west along Interstate 60 within the County of Riverside. [b1]	Fed: E State: –

Species [a1]	Habitat and Distribution	Status [c1]
Streptocephalus woottoni Riverside fairy shrimp	*Habitat*: *S. wootoni* is restricted to deep seasonal vernal pools, vernal pool like ephemeral ponds, and stock ponds (Eng, Belk, and Eriksen 1990, U.S. Fish and Wildlife Service 1993). Riverside fairy shrimp prefer warm-water pools that have low to moderate dissolved solids, are less predictable, and remained filled for extended periods of time (Eriksen and Belk 1999). All known habitat lies within annual grasslands, which may be interspersed through chaparral or coastal sage scrub vegetation. *Distribution:* Riverside fairy shrimp is restricted to southwestern California and northwestern Baja California. It occurs from Los Angeles County (L.A. Airport) south through Orange and western Riverside Counties to coastal San Diego County (primarily Camp Pendleton and Otay Mesa) and the vicinity of Baja Mar north of Ensenada in Baja California. With the exception of the Riverside populations, all populations are within 15 kilometers of the coast over a north-south distance of about 140 kilometers (Eriksen and Belk 1999). All known populations lie between 30 and 415 meters in elevation. *Known Populations in Western Riverside County:* Within western Riverside County, the Riverside fairy shrimp is known from vernal pools at Skunk Hollow, just east of the I-15 on the Pechanga Indian Reservation, and two localities in Rancho California along Highway 79. Riverside fairy shrimp appears to remain only at two sites (Skunk Hollow and the Pechanga Indian Reservation). Both sites along Highway 79 appear to have been graded. The type locality was graded in 1995 and the other site is apparently now within the Murrieta Golf Course. Other undiscovered populations may occur in this area.[b2]	Fed: E State: –
Fish		
Catastomus santaanae Santa Ana sucker	*Habitat*: The Santa Ana sucker generally lives in small, shallow streams, less than 7 meters in width, with currents ranging from swift in the canyons to sluggish in the bottomlands. They are found in permanent streams in water ranging in depth from a few centimeters to a meter or more (Smith 1966). Preferred substrates are generally coarse and consist of gravel, rubble, and boulder, but occasionally they are found on sand/mud substrates (Moyle et al. 1995). The Santa Ana sucker, typical of the sucker family, has large, thick lips and a small mouth used to "vacuum" algae and invertebrates from stream beds. It appears to be most abundant where the water is cool, clean, and clear, although the species can tolerate seasonally turbid water. Streams in which the species is found are subject to periodic, severe flooding that results in drastic decreases in sucker population densities. The species is adapted for living in unpredictable environments by having history strategies that include a short generation time, high fecundity, and relatively prolonged spawning period. These characteristics enable Santa Ana suckers to rapidly recolonize rivers following a flood by producing more young over a longer time span. The small size of the fish also probably enables individuals to utilize a greater range of instream refuges that would be unavailable to larger fish during high flows (Moyle et al. 1995). The species also has a greater dependence on detritus, algae, and diatoms by juveniles (Greenfield et al. 1970) which may be another adaptation for survival in highly variable environments. *Distribution*: The native range of this species includes the Los Angeles, the East, North, and West forks of the San Gabriel River, and in the lower Santa Ana River within southern California (Page and Burr 1991). It is now restricted to the headwaters of the San Gabriel River System, Big Tujunga Creek in the Los Angeles River basin, and portions of the Santa Ana River. An introduced population also occurs in the Santa Clara River system.[b1]	Fed: PT, fss State: ssc
Amphibians		

Species [a1]	Habitat and Distribution	Status [c1]
Bufo microscaphus californicus (southwestern) arroyo toad	*Habitat*: Arroyo toads are found in foothill canyons and intermountain valleys where the river is bordered by low hills and the stream gradient is low (Miller and Miller 1936, Sweet 1992). The arroyo toad is an extreme habitat specialist, restricted to riparian environments in the middle reaches of third order streams (Sweet 1989). Arroyo toads are known to either breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. The species is currently thought to be restricted to the headwaters of large streams with persistent water from March to mid-June that have shallow, gravely pools less than 18 inches deep, and adjacent sandy terraces. Upland burrows have been noted for this species. Patterns of habitat use by sub-adults and non-breeding adults is not well understood (Sweet 1992). *Distribution*: Coastal plain and mountain streams of Southern California west of the desert from San Antonio River (Ft. Hunter-Liggett), in Monterey County (Fed. Reg. Vol.59, No. 241, December 16, 1994), and near Santa Margarita, San Luis Obispo County, to northwestern Baja California, Mexico. However, there are known populations along the desert slope including the Mojave River, San Bernardino County, and Little Rock Creek, Whitewater River, San Filepe Creek, Vallecito Creek, and Pinto Canyon Riverside County, California (Jennings and Hayes 1994, Patton and Myers 1992, Stebbins 1985). *Known Populations in Western Riverside County:* Scattered historic occurrences near the area southwest of Lake Elsinore, and south of Vail Lake, the Whitewater River north of I-10, and Santa Margarita River Basin below 609 meters elevation. Recent surveys have located very small populations of arroyo toads in Temecula, Arroyo Seco, San Mateo, and Teneja creeks (NBS 1996). One population occurs at Dripping Springs near Vail Lake. Other localities include San Jacinto River near the confluence of Bautista Creek, and Sitton Peak. [b1]	Fed: E State: ssc
Rana aurora draytonii California red-legged frog	*Habitat:* The California red-legged frog inhabits lowland streams, wetlands, riparian woodlands, and livestock ponds (Hayes and Jennings 1988; Jennings 1988a). The species may also occur in uplands near breeding areas and along intermittent drainages connecting wetlands. The adults often use dense, shrubby or emergent riparian vegetation closely associated with deep (0.7 meters, or 2.3 feet), still or slow moving water (Hayes and Jennings 1988). Red-legged frogs require cold water pond habitats (including stream pools) with emergent and submergent vegetation (Storer 1925). Habitats with the highest densities of frogs are deep-water ponds with dense stands of overhanging willows (*Salix* sp.) And a fringe of cattails (*Typha latifolia*) between the willow roots and overhanging willow limbs (Jennings 1988a, Rathburn et al 1993). Red-legged frogs are closely tied to plunge pool habitats next to willows (Hayes and Jennings 1988). California red-legged frogs have also been found in association with stock ponds throughout its range, wildlife “guzzlers”, marsh habitat , and can occur in ephemeral ponds or permanent streams and ponds, however populations probably can not persist in ephemeral streams. Good water quality is important (Jennings 1988a) and water salinity should be at or below 4.5% to ensure survival of embryonic stages (Jennings and Hayes 1989). California red-legged frogs also appear to be more closely tied to small drainage areas ($<300 km^2$, or 116 sq. miles) and their intermittent water flow as opposed to large drainage areas ($>300 km^2$, or 116 sq. miles) and their perennial water flow, due to restricted access by aquatic macrofaunal predators. *Distribution*: According to Jennings and Hayes (1995), the historic range of the California red-legged frog extends through Pacific slope drainages from the vicinity of Redding (Shasta County: Storer 1925) inland and to Point Reyes (Marin County), California (coastally)	Fed: T State: ssc

Species [a1]	Habitat and Distribution	Status [c1]
	southward to the Santo Domingo River drainage in Baja California, Mexico. It has also occupied habitat in a few desert slope drainages in southern California (Jennings and Hayes 1994). Introduced populations occur in central southern Nevada. An introduced population also occurred on Santa Cruz Island (Jennings 1988a). The species is known from sea level to approximately 1500 m. *Known Populations in Western Riverside County:* Very rare in Riverside County. One small population occurs at the Santa Rosa Plateau which consists of four males and one female. During the spring of 1998 the female was not observed (Scott Harris, CDFG, pers. comm.). The Santa Rosa Plateau (Cole Creek) population is the only known population within western Riverside County. This population is the only known extant population south of Ventura County. [b1]	
Reptiles		
Charina bottae umbratica southern rubber boa	*Habitat*: In general, the southern rubber boa inhabits moist coniferous forests and woodland habitats (Stewart 1988) which may be interspersed with large grassy fields or other open areas. Stebbins (1985) indicates that they frequent areas dominated by grassland, broken chaparral, woodland, and forest, in and beneath logs, rock, and bark. According to Stewart (1988) prime habitat is dominated by Jeffrey pine (*Pinus jeffreyi*), yellow pine *(Pinus ponderosa*), sugar pine (*Pinus lambertiana*), white fir (*Abies concolor*), incense cedar *(Callocedrus decurrens*), and black oak (*Quercus kelloggii*). During warmer weather, cooler and wetter riparian and forested areas become more important. In the spring, areas which contain rock outcrops with a southern exposure and with scattered surface rocks are a particularly significant habitat feature in forested and relatively open sites (Stewart 1991). Rock outcrops serve as hibernacula. Snags, logs, and other surface debris provide cover (Ziener et. Al. 1988). *Distribution*: The southern rubber boa is restricted to the San Gabriel, San Bernardino and San Jacinto Mountains (Stebbins 1985, Ziener et al. 1988) in southern California. Individuals identified within the La Panza Range, Tehachapi Mountains and Mount Pinos area may be integrades (Stewart 1988). According to Stebbins (1985) the subspecies is found from sea level to around 10,000 feet, however, Stewart (1988) determined that they range between 5,051 feet (1540m) and 8,069 feet (2460m) in elevation. *Known Populations in Western Riverside County:* The southern rubber boa has been found within the transition life zone in the San Jacinto Mountains; known from Fern Valley near Idyllwild (private)(Glaser 1970). Historic occurrences include the following: Suicide Peak Trail ca. 1.5 miles North of Idyllwild (State); Marion Mountain, near Idyllwild (State?); Humber Park near start of Devil's Slide Trail (private?); Devil's Slide Trail, ca. 1 mile above Humber Park (USFS); Devil's Slide Trail, ca. 2.5 miles above Humber Park toward Tahquitz Valley (USFS); between 5,000 and 8,000 feet (Stewart 1991). The bulk of the known San Jacinto population is in designated wilderness (Loe 1985), however several locations occur on private land. [b1]	Fed: fss State: T
Birds [a2]		
Buteo swainsoni Swainson's hawk	*Habitat*: Typical habitat is open desert, sparse shrub lands, grassland, or cropland containing scattered, large trees or small groves. Cannot forage in most perennial crops or in annual crops that grow much higher than native grasses, which makes prey more difficult to find (England *et al.* 1997). The species appears to increase in density as the percent of habitat in cultivation increases up to 30 percent in some areas or even up to 75 percent in North Dakota (Schmutz 1989). Roosts in large trees, but will roost on ground if none available. Nests in scattered trees within these grassland, shrubland, or agricultural landscapes especially along stream courses or in open woodlands. As an example, in California's Central Valley, the nests are	Fed: -- State: T

Species [a1]	Habitat and Distribution	Status [c1]
	typically at the edge of a narrow band of riparian vegetation, in isolated oak woodland, and in lone trees, roadside trees, or farmyard trees, as well as in adjacent urban residential areas (England *et al.* 1989). During their migration movements, they rest and feed in grasslands and harvested fields, especially where grasshoppers are numerous, often perching on fence posts, telephone poles, and power poles. Large flocks may roost at night in trees (England *et al.* 1997). The Swainson's hawk was more abundant on study plots dominated by lowland hayfields and tallgrass prairies as opposed to upland mixed and shortgrass prairies (Berry *et al.* 1998). They were not sensitive to the amounts of urbanization (up to 30 percent) that occurred in the sample landscapes. The results of this study suggest that urban open space grasslands can support sizable populations of most dirunal raptors as long as prey populations persist. A GIS analysis of habitat at nest sites resulted in cropland as the dominant land cover type at nest sites of the Swainson's hawk (Bosakowski *et al.* 1996). *Distribution:* The Swainson's hawk occurs within western North America, including east-central Alaska, predominantly in the plains region of the United States and southern Canada (Brown 1996). Specifically, its breeding range includes the area north to portions of Washington and Oregon east of the Cascades, southern Idaho, western Montana, southern half of east Alberta, westcentral and southeastern Sasketchewan and southwestern Manitoba. Small numbers also breed in the interior valleys of British Columbia, then west to central Washington and Oregon, extreme northeastern California, western and southern Nevada, north and southeastern Arizona and disjunctly in California in the Sacramento and San Joaquin Valleys, within the valleys of the Sierra Nevada and occassionally elsewhere. It breeds south in northern Mexico to northeastern Sonora and through Chihuahua to northeastern Durango, southern Coahuila, northern Nuevo Leon and extreme north Tamauipas. The species breeds east to western Minnesota and northern Iowa, central Oklahoma, and central Texas (England *et al.* 1997). It winters in South America in the grasslands of Argentina within the pampas areas of Cordoba, Santa Fe, Buenos Aires, La Pampa, and south to northeast corner of Chubut and extending east into adjacent Uruguay (Brown 1996). Some individuals migrate as far south as southern South America, passing in large flocks over Central America (Brown and Amadon 1968). It very rarely winters within the United States within the entire western portion from California to the Mississippi River and sometimes in the Sacramento-San Joaquin River delta (Brown 1996). They may migrate in flocks that can be as large as 5,000 to 10,000 individuals, always during the daytime, typically soaring in thermals and rarely over water and typically during late September to early October and return to the breeding grounds by passing over southern California in mid-March to May (England *et al.* 1997). Within California, it is an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen Co., and Mojave Desert within California. Very limited breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, Antelope Valley, and in eastern San Luis Obispo Co. (Bloom 1980, Garrett and Dunn 1981). Breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley. Forages in adjacent grasslands or suitable grain or alfalfa fields, or livestock pastures. Within southern and central interior California, migrating individuals move south in September and October, and north in March through May (Grinnell and Miller 1944). *Known Populations in Western Riverside County:* The Swainson's hawk has been recorded in very few locations within the central portion of the western Riverside County area and appears to be absent from the montane regions. It would be expected to occur within the agricultural areas with rural and low density residential and would occur for short periods of time during its migration from wintering to	

Species [a1]	Habitat and Distribution	Status [c1]
	breeding areas.[b2]	
Charadrius alexandrinus nivosus western snowy plover (coastal population)	*Habitat*: The western snowy plover, in general, nests, feeds, and takes cover on sandy or gravelly beaches along the coast, on estuarine salt ponds, alkali lakes, and at the Salton Sea (Zeiner, *et al.* 1990). On the Pacific coast, it nests on barren to sparsely vegetated sand beaches, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, levees and flats at salt-evaporation ponds, and river bars (Page, *et al.* 1995). In California, most of the breeding activity occurs on dune-backed beaches, barrier beaches, and salt evaporation ponds and it infrequently occurs on bluff-backed beaches (Page and Stenzel 1981). The inland population breeds up to 3,048 meters on barren to sparsely vegetated ground at alkaline or saline lakes, reservoirs, and pond; on riverine sand bars; and at sewage, salt-evaporation, and agricultural waste-water ponds (Page, *et al.* 1995). The habitat for the wintering range is primarily coastal: beaches, tidal flats, lagoon margins, and salt-evaporation ponds with the inland population regularly wintering at agricultural wastewater ponds in the San Joaquin Valley and at desert saline lakes in southern California (Page et al. 1986; Shuford, *et al.* 1995). Other habitat use areas for the wintering population of inland birds includes the Salton Sea and playa lakes in the deserts regions of Arizona and New Mexico (Shuford, *et al.* 1995). The snowy plover foraging habitat includes the shores of lakes, reservoirs, ponds, braided river channels, and playas. Most of the feeding habitat is in shallow water or on wet mud or sand. On playas, the snowy plover forages on dry flats (Page, *et al.* 1995). *Distribution:* The western snowy plover breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, and in interior areas of Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma and north-central Texas, as well as coastal areas of extreme southern Texas, and possibly extreme northeastern Mexico (USFWS. 1993). During the breeding season, from April through August, the species occurs locally on sandy marine and estuarine shores, at salt ponds, and rarely at the Salton Sea as well as on salt pond levees (Cogswell 1977). The species occurs in inland areas during the breeding season at the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and southeastern deserts (Jurek and Leach 1973, Page, *et al.* 1979, 1983, Garrett and Dunn 1981). Beginning in July and August, the species may move from northwest Oregon to as far as Baja California, remaining on the wintering grounds from September through March (Zeiner 1990). For the interior population, the period of winter residency for the snowy plover is primarily November through February (Shuford, *et al.* 1995). During the fall and winter, the western snowy plover is common on sandy marine and estuarine shores; it is relatively uncommon at salt ponds, and rare at the Salton Sea (Zeiner 1990). The Pacific coast population winters locally from southern Washington to Mexico along both coasts of Baja California, rarely from Guatemala to Panama and from southwestern Ecuador to Chile (Page, *et al.* 1995). The inland population appears to winter predominantly along the Pacific coast and in the Gulf of California (Page, *et al.* 1997). The inland population also winters regularly in small numbers at the Salton Sea, Tulare Lake Basin in Kings and Tulare Counties, and interior lakes in southern California (Shuford, *et al.* 1995). It also remains year-round in smaller numbers at the Salton Sea and at salt ponds on San Francisco Bay (Cogswell 1977). *Known Populations within Western Riverside County:* Lake Elsinore, along the Santa Ana River, and within the Morena Valley area. It is unknown if these locations include nest sites or more than a few individuals. The largest number recorded in the literature is for 10 individuals wintering in the Lake Elsinore area (Shuford, *et al.* 1995). In depth surveys of breeding populations have been conducted foboth the coastal and inland populations and no breeding locations have been documented for the planning area (Page, *et al.* 1991).[b2]	Fed: T , smc State: ssc

Species [a1]	Habitat and Distribution	Status [c1]
Charadrius montanus mountain plover	*Habitat:* Range-wide, mountain plovers breed in dry open short-grass prairies or grasslands and winter in short-grass plains and fields, plowed fields, and sandy deserts (AOU 1998). The species appears to require relatively open areas with little vegetative cover where it forages for insects. May occur in areas with sparse shrub cover but avoids high and dense cover (Zeiner et al. 1990). Within southern California, the largest numbers of birds occur in grasslands and agricultural areas in the interior. (Garrett and Dunn 1981). *Distribution:* Mountain plovers breed locally from extreme southern Alberta generally eastward to North Dakota southward to Wyoming and western Texas. The species winters generally from California south to Baja California and southeasterly to Texas and northern mainland Mexico (AOU 1998). *Known Populations in Western Riverside County:* The species apparently occurs (or has occurred) locally throughout much of western Riverside County in suitable habitat. *Known Populations in Western Riverside County:* Mountain plovers have occurred recently in western Riverside County in appropriate habitat bounded by Perris, the Mystic Lake area, and Nuevo; in the Domenigoni Valley; and in the vicinity of Winchester between Highways 79 and Interstate 215 (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). The Perris/Nuevo/Mystic Lake area is one of few locales in California where mountain plovers have been regularly recorded in recent years (see Garrett and Dunn 1981).[b1]	Fed: PT State: ssc
Coccyzus americanus occidentalis western yellow-billed cuckoo	*Habitat:* Yellow-billed cuckoos as a whole may nest in open woodland, parks, and riparian woodland (AOU 1998). By contrast, western yellow-billed cuckoos in California require dense, wide riparian woodlands with well-developed understories for breeding (Garrett and Dunn 1981). It occurs in densely foliaged, deciduous trees and shrubs, especially willows which are required for roost sites. It is restricted when breeding to river bottoms and other mesic habitats where humidity is high and where the dense understory abuts on slow-moving watercourses, backwaters or seeps (Zeiner et al. 1990). *Distribution*: Yellow-billed cuckoos as a whole summer and nest from interior California east to New Brunswick sporadically southward to southern Mexico. The species presumably migrates throughout much of North America and winters primarily from northern to central South America (AOU 1998). The yellow-billed cuckoo is an uncommon to rare summer resident of valley foothill and desert riparian habitats in scattered locations in California (Zeiner et al. 1990). *Known Populations in Western Riverside County:* Up to five cuckoo territories have been documented in the west Riverside County study area in recent years; all of these were located in the Prado Basin or adjacent, Riverside County reach of the Santa Ana River (Fish and Wildlife Service, Carlsbad, California, unpublished data). The Prado Basin birds may represent the only summering "population" in southern California away from the Colorado River. Breeding of yellow-billed cuckoos has been confirmed only once in the Prado Basin during 14 years of observations there (Fish and Wildlife Service, unpublished data). The Prado Basin/Santa Ana River population described immediately above are the only known populations within the study area.[b1]	Fed: smc State: E
Empidonax traillii extimus southwestern willow flycatcher	*Habitat:* The southwestern willow flycatcher is restricted to riparian woodlands along streams and rivers with mature, dense stands of willows (*Salix* spp.), cottonwoods (*Populus* spp.) or smaller spring fed or boggy areas with willows or alders (*Alnus* spp.). Riparian habitat provides both breeding and foraging habitat for the species. The southwestern willow flycatcher nests in thickets of trees and shrubs approximately 13 to 23 feet tall with a high percentage of canopy cover and dense foliage from 0 to 13 feet above ground. The nest site	Fed: E, fss State: E

Species [a1]	Habitat and Distribution	Status [c1]
	plant community is typically even-aged, structurally homogeneous and dense (Brown 1988, Whitfield 1990, Sedgewick and Knopf 1992). Historically, the willow flycatcher nested primarily in willows and mule fat with a scatter overstory of cottonwood (Grinnell and Miller 1944). Following more recent changes in riparian plant communities in the region, the species still nests in willows where available, but is also known to nest in thickets dominated by tamarisk and Russian olive (Hubbard 1987, Brown 1988). Typically, sites selected as song perches by male willow flycatchers show higher variability in shrub size than do nest sites and often include large central shrubs. Habitats not selected for either nesting or singing are narrower riparian zones, with greater distances between willow patches and individual willow plants (Sedgewick and Knopf 1992). Nesting willow flycatchers invariably prefer areas with surface water nearby (Phillips et al. 1966). *Distribution:* The breeding range of this species, in general, includes southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, far western Texas, southwestern Colorado, and extreme northwestern Mexico (Federal Register 50: 39495). The breeding range for *E. t. extimus* includes Owens Valley, south fork of the Kern River, the Los Angeles Basin (Unitt 1987, Zeiner et al. 1990), the Santa Ynez River near Buellton, the Prado Basin riparian forest in Riverside County, the Santa Margarita and San Luis Rey Rivers in San Diego County, Middle Peak in the Cuyamaca Mountains, and near Imperial Beach (Small 1994). Breeding populations also exist in southern Nevada, Arizona, and New Mexico (Garrett and Dunn 1981). This taxon overwinters in Mexico (USFWS 1995). *Known Populations in Western Riverside County:* The southwestern willow flycatcher is sparsely located from the Prado Basin southeast to the Vail Lake region. It may also be located within Temescal Creek, Bautista Creek, and Vail Lake.[b1]	
Falco peregrinus anatum American peregrine falcon	*Habitat:* Throughout the species' range, peregrines are found in a large variety of open habitats, including tundra, marshes, seacoasts, and high mountains (AOU 1998). Within southern California, peregrine falcons are primarily found at coastal estuaries and inland oases (Garrett and Dunn 1981). The species breeds mostly in woodland, forest, and coastal habitats. Riparian areas and coastal and inland wetlands are important habitats yearlong, especially in nonbreeding seasons. Breeding requires cliffs or suitable surrogates (e.g., buildings) that are close to preferred foraging areas. They have been known to nest in trees and on small outcrops in other portions of their range. Some peregrines have used tall buildings, bridges or other tall man-made structures for nesting. The nest site usually provides a panoramic view of open country, often overlooking water and are always associated with an abundance of passerine, waterfowl, or shorebird prey, even in an urban setting. In general, the peregrine falcon frequents bodies of water in open areas with cliffs and canyons nearby for cover and nesting and is located in areas with abundant avian prey (Zeiner et al. 1990). In some parts of California, the home range averages 125 square miles and territories are spaced approximately 3 - 7 miles apart (Zeiner et al. 1990). The peregrine typically hunts its prey in air and prey is either struck to the ground or killed outright by the blow from the talons. The species may fly 10 to 12 miles from their nest in search of prey which are usually hunted over open habitat types such as water ways, fields and wetland areas such as swamps and marshes (USFWS 2/91) *Distribution:* The species breeds in North America from Alaska east to Labrador southward to southern California through Alabama. The species winters from southern Alaska to Tierra del Fuego in southernmost South America (AOU 1998). In California, the species breeds and winters throughout the state, with the exception of desert areas (Zeiner et al, 1990). The peregrine is a very uncommon breeding resident and uncommon as a migrant. *Known Populations in Western Riverside County:* Could be expected	Fed: smc State: E

Species [a1]	Habitat and Distribution	Status [c1]
	(albeit rarely) virtually anywhere within the study area during all seasons. Although peregrines were observed on at least two occasions in the Prado Basin and environs in 1998 (James Pike, Fish and Wildlife Service Volunteer Field Biologist, pers. comm., 1998), the species remains quite scarce elsewhere within the study area (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). [b1]	
Haliaeetus leucocephalus bald eagle	*Habitat:* Range-wide, bald eagles occur primarily in or near seacoasts, rivers, swamps, and large lakes (AOU 1998). It is considered a bird of aquatic ecosystems but within such areas, it must have an adequate food base, perching areas, and nesting sites to support them. Within southern California, although birds are found in these same habitats, they are most often recorded at large inland bodies of water (Garrett and Dunn 1981). In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and that offer good perch trees and night roosts. Fish predominate the typical diet of eagles, however, many other types of prey are also taken, including waterfowl and small mammals, and carrion especially in the wintering areas. Swoops from hunting perches, or soaring flight to pluck fish from water. Will wade into shallow water to pursue fish. Pounces on, or chases, injured or ice-bound water birds. In flooded fields, occasionally pounces on displaced voles, or other small mammals. Open, easily approached hunting perches and feeding areas are used most frequently (Zeiner et al. 1990). *Distribution:* Bald Eagles breed locally from Alaska eastward to Newfoundland southward locally to Baja California, Sonora, Texas, and Florida. The species winters in the large majority of the breeding range but generally withdraws from central Alaska and the central and the northern portions of Canada (AOU 1998). Within mainland southern California, the species primarily winters at larger bodies of water in the lowlands and mountains (Garrett and Dunn 1991). Fairly common as a local winter migrant at a few favored inland waters in southern California. Largest numbers occur at Big Bear Lake, Cachuma Lake, Lake Mathews, Nacimiento Reservoir, San Antonio Reservoir, and along the Colorado River (Zeiner, et al. 1990). Recent breeding attempts on the mainland south of Santa Barbara County (e.g., Silverwood Lake, Lake Skinner, Lake Perris) have been unsuccessful (Fish and Wildlife Service, unpublished data). *Known Populations in Western Riverside County:* Notwithstanding failed nesting attempts (see "Current Range" above) by summering or resident birds, the bald eagle is primarily a migrant and wintering species within western Riverside County. Although the species remains nowhere common and is generally rare and local in southern California (Garrett and Dunn 1981), the species could turn up virtually anywhere within western Riverside County in suitable habitats and may, in fact, attempt to nest therein. Birds have been detected in recent years at the at the Prado Basin, Lake Skinner, Lake Mathews, and Lake Perris. There are also area records from Lake Elsinore (where the species may have bred in the past (Garrett and Dunn 1981), and the species does occur at Lake Hemet and Vail Lake.[b1]	Fed: T State: E
Polioptila californica californica coastal California gnatcatcher	*Habitat:* The coastal California gnatcatcher (gnatcatcher), a subspecies of the California gnatcatcher, is a small, long-tailed member of the thrush family (Muscicapidae). The gnatcatcher typically occurs in or near sage scrub habitat, which is a broad category of vegetation that includes the following plant communities as classified by Holland (1986): Venturan coastal sage scrub, Diegan coastal sage scrub, maritime succulent scrub, Riversidean sage scrub, Riversidean alluvial fan sage scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub. Coastal sage scrub is composed of relatively low-growing, dry-season deciduous, and succulent plants. Characteristic plants of this community include California sagebrush (*Artemisia californica*), various species of sage (*Salvia* sp.), California buckwheat (*Eriogonum*	Fed: T State: ssc

Species [a1]	Habitat and Distribution	Status [c1]
	fasciculatum), lemonadeberry (*Rhus integrifolia*), California encelia (*Encelia californica*), and *Opuntia* (cholla and prickly pear) species. Ninety-nine percent of all gnatcatcher locality records occur at or below an elevation of 984 feet (Atwood 1990). Coastal sage scrub is patchily distributed throughout the range of the gnatcatcher, and the gnatcatcher is not uniformly distributed within the structurally and floristically variable coastal sage scrub community. Rather, the subspecies tends to occur most frequently within the California sagebrush-dominated stands on mesas, gently sloping areas, and along the lower slopes of the coast ranges (Atwood 1990). Territory size increases as vegetation density decreases and with distance from the coast, probably due to food resource availability. Therefore, gnatcatchers will use sparsely vegetated coastal sage scrub for shelter and to forage for insects as long as perennial shrubs are available. Gnatcatchers also use chaparral, grassland, and riparian habitats where they occur adjacent to sage scrub. The use of these habitats appears to be most frequent during lat summer, autumn, and winter, with smaller numbers of birds using such areas during the breeding season. These non-sage scrub habitats are used for dispersal, but data on dispersal use are largely anecdotal (Bowler 1995; Campbell *et al.* 1995). Although existing quantitative data may reveal relatively little about gnatcatcher use of these other habitats, these areas may be critical during certain times of year for dispersal or as foraging areas during drought conditions. Breeding territories have also been documented in non-sage scrub habitat. Campbell et al. (1998) discuss likely scenarios explaining why non-CSS is used by gnatcatchers, food source availability, dispersal areas for juveniles, temperature extremes, fire avoidance, and lowered predation rate for fledglings. *Distribution:* Historically, gnatcatchers occurred from southern Ventura County southward through Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties, and into Baja California, Mexico, to approximately 30 degrees North latitude near El Rosario (Atwood 1990). The gnatcatcher was considered locally common in the mid-1940's, but by the 1960's this subspecies had declined substantially in the United States owing to widespread destruction of its habitat (Atwood 1990). Currently, the subspecies occurs on coastal slopes of southern California, ranging from southern Ventura southward through Palos Verdes Peninsula in Los Angeles County through Orange, Riverside, San Bernardino and San Diego Counties into Baja California to El Rosario, Mexico, at about 30 degrees north latitude (Atwood 1991). In 1993, the USFWS estimated that approximately 2,562 pairs of gnatcatchers remained in the United States. Of these, 30 pairs occurred in Los Angeles County, 757 pairs occurred in Orange County, 261 pairs occurred in Riverside County, and 1,514 pairs occurred in San Diego County. *Known Populations in Western Riverside County:* The gnatcatcher is found throughout western Riverside county in coastal sage scrub habitat. The high density areas are found in the western portion of the county along the I-15 Corridor. The distribution of gnatcatchers in the County does not appear to be uniform, instead high density patches exist in generally two locations within the planning area, one in the north-western portion of the planning area east of the 15 Freeway in the City of Lake Elsinore. The other area is in the Temecula area including the south side of the Lake Skinner reservoir and west to Winchester Rd.. From north to south these dense patches occur at the proposed El Sobrante Landfill area, Alberhill area, the proposed North Peak Conservation Bank, south to Kabian Park and the area surrounding Canyon Lake. In the southern area the highest densities of birds reside on the Southwestern Multiple Species Reserve and west through the proposed Johnson Ranch Specific Plan, proposed Rancho Bella Vista Specific plan and the proposed SilverHawk Specific Plan. Current estimates for gnatcatchers in western Riverside number around 300 pairs (USFWS 1996). [b1]	

Species [a1]	Habitat and Distribution	Status [c1]
Vireo bellii pusillus least Bell's vireo	*Habitat:* The least Bell's vireo is a small, grey, migratory songbird. It is drab-grey above and whitish below with no streaking on the breast, and has indistinct white spectacles, and two faint wing bars with the lower bar more prominent. The least Bell's vireo occupies a more restricted nesting habitat than the other subspecies. Least Bell's vireos primarily occupy riverine riparian habitats that typically feature dense cover within 1-2 meters of the ground and a dense, stratified canopy. It uses habitat which is limited to the immediate vicinity of water courses below 1,500 feet elevation in the interior (Small 1994). It primarily nests in small, remnant segments of vegetation typically dominated by willows and mule fat but may also use a variety of shrubs, trees, and vines. The birds forage in riparian and adjoining chaparral habitat (Salata 1983). Nests are typically built within one meter of the ground in the fork of willows, wild rosa (*Rosa californica*), and mule fat (*Baccharis salicifolia*), or other understory vegetation (Franzreb 1989). Cover surrounding nests is moderately open midstory with an overstory of willow, cottonwood, sycamore, or oak. Crown cover is usually more than 50% and contains occasional small openings. The most critical structural component to least Bell's vireo breeding habitat is a dense shrub layer at 2 to 10 feet above the ground (Goldwasser 1981; Franzreb 1989). The home range or territory sizes of the vireo range from 0.5 to 4.0 areas (RECON 1989). *Distribution:*The least Bell's vireo is one of four subspecies of Bell's vireo, two of which occur in California. The *pusillus* subspecies was once common, and was the major breeding subspecies in California. The least Bell's vireo formerly was found in valley bottom riparian habitats from Tehama County, California southward locally to northwestern Baja, California, Mexico in the south, and as far east as the Owens Valley, Death Valley, and along the Mojave River (Grinnell and Miller 1944). Except for a few outlying pairs, the species is currently restricted to southern California south of the Tehachapi Mountains and northwestern Baja California (Garrett and Dunn 1981). Breeding pairs have been observed in the counties of Monterey, San Benito, Inyo, San Bernardino, Ventura, Los Angeles, Orange, Riverside, and San Diego, with the highest concentration in San Diego County along the Santa Margarita River (Small 1994). *Known Populations in Western Riverside County:* Given the ongoing recovery of the species and the large concentration of birds in the western portion of the planning area, the least Bell's vireo may found in suitable habitats nearly throughout. The least Bell's vireo population in the Prado Basin and contiguous (upstream and downstream) reaches of the Santa Ana River is the second largest population (by far) of this endangered species. Approximately 350 least Bell's vireo territories were detected in this area in 1998 (James Pike, Fish and Wildlife Service Volunteer Field Biologist, pers. comm., 1998). Other observations of the species in the study area and environs have occurred along Chino Creek, Temescal Wash, San Timoteo Creek, Alberhill Creek, Tucalota Creek, Murrieta and Temecula Creeks, along Wilson Creek, March Air Force Base, and in the vicinity of De Luz (Fish and Wildlife Service 1998; Fish and Wildlife Service, unpublished data). Additional localities include Santa Margarita River and Potrero Creek.[b1]	Fed: E, smc State: E
Mammals		
Dipodomys merriami parvus San Bernardino kangaroo rat	*Habitat:* Riversidean alluvial fan sage scrub and sandy loam soils, alluvial fans and flood plains, along washes, with nearby sage scrub (McKernan 1997 as cited in USFWS 1998c). *Distribution:* The historic range of the San Bernardino kangaroo rat extends from the San Bernardino Valley in San Bernardino County to the Menifee Valley in Riverside County (Lidicker 1960, Hall 1981 as cited by USFWS 1998c). The subspecies currently occupies approximately 1,299 ha (3,247 acres) of suitable habitat in about seven different locations (USFWS 1998c).	Fed: E State: ssc

Species [a1]	Habitat and Distribution	Status [c1]
	Known Populations in Western Riverside County: The primary populations in the planning area are the San Jacinto River and Bautista Creek in the vicinity of San Jacinto, Hemet and Valle Vista. Smaller populations are known from Reche Canyon and the Bloomington area, but it is unclear whether extant populations in these areas are within the Riverside County planning area. There are historic records for the Homeland, Perris, March ARB, San Jacinto Wildlife/Lake Perris, and Moreno Valley areas, but it is unlikely that these populations still exist because of habitat conversion and fragmentation. There is also a record from the Banning Pass/Cabazon area, but the validity of this record as *D. m. parvus* seems doubtful because *D. m. simiolus* occurs just to the east.[b1]	
Dipodomys stephensi Stephens' kangaroo rat	*Habitat:* The Stephens' kangaroo rat is found almost exclusively in open grasslands or sparse shrublands with cover of less than 50 percent during the summer. Historically this habitat was dominated by native perennial grasses and forbs. Open grasslands likely occurred in patches distributed throughout the range of the Stephens' kangaroo rat. The distribution and quality of Stephens' kangaroo rat habitat is a function of soil types, periodic fires, range use by grazing animals, year-to-year weather variations, and longer cycles of dry and wet periods. Habitat used by the Stephens' kangaroo rat usually is dominated by non-native annual grasses and forbs, especially in areas where annuals desiccate and disarticulate in the late spring, leaving large patches of open ground much of the year. They may use shrub habitats where shrub cover is less than 1 percent (Price *et al.* 1991). Soil type also is an important factor for Stephens' kangaroo rat occupation (O'Farrell and Uptain 1989; Price and Endo 1989). As a fossorial (burrowing) animal, the Stephens' kangaroo rat typically is found in sandy and sandy loam soils with a low clay to gravel content, although there are exceptions. Extremely rocky soils may support the Stephens' kangaroo rat, but populations densities generally are lower in such soils. Slope is a factor in Stephens' kangaroo rat occupation; the Stephens' kangaroo rat tends to use flatter slopes (i.e., < 30%), but may be found on steeper slopes in trace densities (i.e., < 1 individual/ha). Furthermore, the Stephens' kangaroo rat may use steeper slopes for foraging, but not for burrows (Behrends, pers. obs.). In areas where soils are poor for burrowing or where they are colonizing fallow agricultural fields, the Stephens' kangaroo rat may use opportunistically burrows of the California ground squirrel (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*). *Distribution*: The Stephens' kangaroo rat has a relatively small geographic range for a mammal species and is restricted to Riverside County and adjacent northern-central San Diego County, California. Prior to 1990, the Stephens' kangaroo rat was considered to be restricted generally to the Perris, San Jacinto, and Temecula valleys and Lake Mathews area of western Riverside County and portions of the Santa Margarita River Valley on MCB Camp Pendleton and the Fallbrook Naval Weapons Annex, the San Luis Rey River, and Lake Henshaw areas of San Diego County. Since 1990, the Norco Hills, Anza Valley, Guejito Creek, and Santa Maria (Ramona) Valley populations were discovered, thus extending the species' range to the northwest, east and south. According to the Habitat Conservation Plan for the Stephens' Kangaroo Rat in Western Riverside County, the estimated acreage in 1996 for the species rangewide was approximately 45,550 acres (RCHCA 1995). The actual amount of occupied habitat will vary from year to year based on habitat conditions associated with rainfall and vegetative conditions.[b1] *Known Populations in Western Riverside County:* The Stephens' kangaroo rat occurs in a patchy distribution in western Riverside County, ranging from the Corona/Norco Hills just west of Highway 91 in the western portion of the planning area to the Anza Valley in the	Fed: E State: T

Species [a1]	Habitat and Distribution	Status [c1]
	eastern portion of the planning area. The Stephens' kangaroo rat occurs in the Temecula area in the south to Potrero Valley and the Badlands in the north. In 1996, the estimated acreage of occupied habitat in Riverside County was approximately 34,450 acres (RCHCA 1996). Main populations occur in the larger core reserves for the kangaroo rat: Lake Mathews core reserve (approximately 4,264 occupied acres), Lake Skinner core reserve (approximately 1,988 occupied acres), and San Jacinto-Lake Perris core reserve (approximately 3,640 occupied acres). Smaller populations occur in the other core reserves: Sycamore Canyon core reserve (approximately 1,300 occupied acres), Steele Peak core reserve (approximately 860 occupied acres), and Motte-Rimrock core reserve (approximately 335 occupied acres). Approximately 12,400 acres of occupied Stephens' kangaroo rat habitat are contained in these six core reserves. Other areas in the planning area supporting substantial occupied habitat include the Anza Valley (1,000+ acres) and Potrero (approximately 1,332 acres). It is estimated that another 3,400 acres of occupied habitat occur in the western County outside of the Stephens' kangaroo rat HCP area. [b1]	

Notes:

a1 This list consists of species of Western Riverside County (see Fig. 4.2-1 for boundary) that were considered for coverage by the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) (County of Riverside, 1999) and that are listed as threated or endangered by the state or federal governments or that are proposed or candidates for listing.

a2 For some bird species, the CDFG's Natural Diversity Database contains occurrence data only for certain life stages or conditions, such as nesting, rookery, burrow sites, or wintering (CDFG NDDB, 1999c). This does *not* mean that these are the only conditions under which the species is protected, or even that the species necessarily receives a greater degree of protection under such conditions.

b1 Habitat and distribution information is from the August 9, 1999 Draft Proposal for the Western Riverside County MSHCP (County of Riverside, 1999).

b2 Habitat and distribution information is from the April 2000 Revised Draft Species Accounts for the Western Riverside County MSHCP (County of Riverside, 2000).

b3 Habitat and distribution information is from the California Department of Fish and Game's *Natural Diversity Database* (CDFG NDDB, 1999a).

b4 Habitat and distribution information is from *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik, 1994).

b5 Habitat and distribution information is from *Technical Appendix: Coachella Valley Multiple Species Habitat Communities Conservation Plan*. (CVAG, 1998).

b6 Habitat and distribution information is from *Revised Species Accounts* (Lower Colorado River Multi-Species Conservation Steering Committee, 1999) for the Lower Colorado River MSCP.

b7 Habitat and distribution information is from *California's Wildlife on CD-ROM* (CDFG, 1999).

b8 Habitat and distribution information is from *Freshwater Fishes of California* (McGinnis, 1984).

b9 Habitat and distribution information is from species descriptions written by Cameron Barrows (Kadie Barrows, pers. comm. to Stanley C. Spencer Sept. 22, 1999).

c Federal and state status, and California Native Plant Society (CNPS) designations were generally taken from *Special Plants List* (CDFG NDDB, 1999b) and *Special Animals* (CDFG NDDB, 1999c). However, the federal status has been updated for the peregrine falcon, and corrected for the mountain plover. Contrary to implications by the California Department of Fish and Game (CDFG NDDB, 1999c), there is no federal listing status called 'species of concern', and this term is *not* synonymous with 'former Category

2 candidates'. Therefore, this table does not follow *Special Plants List* or *Special Animals* in including 'species of concern' as a federal listing status designation. For more information on former Category 2 candidates, see the U.S. Fish and Wildlife Service website at http://endangered.fws.gov/norqa.html.

c2 The Mojave tarplant was rediscovered in 1994, and will be moved by CNPS to list 1b in the next edition of their *Inventory* (Skinner and Pavlik, 1994).

Federal Status

E = Endangered: Species listed as endangered by the U.S. Fish and Wildlife Service.
T = Threatened: Species listed as threatened by the U.S. Fish and Wildlife Service.
PT = Proposed Threatened: Species proposed for listing as threatened by the U.S. Fish and Wildlife Service .
fss = Forest Service Sensitive: Species considered sensitive by the UDSA Forest Service because of declining populations.
smc = Species of Management Concern: Migratory nongame birds identified by the U.S. Fish and Wildlife Service to be of concern due to (1) documented or apparent decline; (2) small or restriced populations; or (3) dependence on restricted or vulnerable habitats.

State Status

E = Endangered: Species classified as endangered by the California Fish and Game Commission.
T = Threatened: Species classified as threatened by the California Fish and Game Commission.
R = Rare: Species classified as rare by the California Fish and Game Commission.
ssc = Species of Special Concern: Species considered by the California Department of Fish and Game as possibly facing extirpation in California due to declining populations or loss of habitat.

California Native Plant Society (CNPS) Classifications

1a = CNPS list of plants presumed extinct in California.
1b = CNPS list of plants considered rare, threatened or endangered in California and elsewhere.
2 = CNPS list of plants considered rare, threatened, or endangered in California, but more common elsewhere.
3 = CNPS review list of plants for consideration as endangered but about which more information is needed.
4 = CNPS watch list of plants of limited distribution, whose status should be monitored.

4.2.1.4 Other Special Interest Species of Western Riverside County

In addition to species that have special status under ESA and CESA, many other species are considered rare or sensitive by various state, federal, or private organizations. These include U.S. Forest Service "sensitive species," USFWS "migratory non-game bird species of management concern," and species considered by the CDFG as "species of special concern" due to declining populations or loss of habitat. The CDFG also tracks other potentially sensitive species through its Natural Diversity Data Base (CDFG NDDB 1999a), and the California Native Plant Society (CNPS) tracks and categorizes plant species which it considers to be of concern (Skinner and Pavlik 1994). See the notes at bottom of Table 4.2.D for more information on these designations. All of these species should be considered during preparation of environmental documentation relating to the CEQA. The level of analysis for each species should be commensurate with its sensitivity and with the potential for the project to impact the species. Table 4.2.D lists special interest species known to occur in Western Riverside County as well as species which, given their known ranges and habitat requirements, may also be expected to occur within Western Riverside County. Species in Table 4.2.D without state or federal status designations are included because they are considered sensitive by resource agencies or because they were recommended by the USFWS for potential coverage under the Western Riverside County MSHCP (County of Riverside, 1999).

Table 4.2.D - Other Special Interest Species of Western Riverside County

Species a1	Habitat and Distribution	Status c
Vascular Plants		
Ambrosia pumila San Diego ambrosia	*Habitat:* San Diego ambrosia occurs in open habitats in coarse substrates near drainages, and in upland areas on clay slopes or on the dry margins of vernal pools. This species occurs in a variety of associations that are dominated by sparse grasslands or marginal wetland habitats such as river terraces, pools, and alkali playas (Munz 1974; Rieser 1996). In Riverside County, San Diego ambrosia is associated with open, gently-sloped grasslands and is generally associated with alkaline soils. Both extant Riverside County localities are found in close proximity to silty, alkaline soils of the Willows series (Knecht 1971). Preliminary testing of agricultural suitability of soils within a San Diego ambrosia population in San Diego County revealed mostly sandy loam textured soils, that were moderately acidic (pH ranging from 4.48 to 5.77) and low in salinity (DUDEK 1999). Control soil samples adjacent to this population where no San Diego ambrosia were present were more acidic ranging in pH from 3.97 to 4.63. Boling (1988) reported San Diego ambrosia from slopes from 0-9% slope on sandy or clay loams. At Mission Trails regional park in San Diego, *Ambrosia pumila* patches occurred upon slope angles ranging from 0 to 18% with the vast majority of plants occurring at slope angles of less than 5% (DUDEK 1999). San Diego ambrosia generally occurs at low elevations generally less than 1600 feet in the Riverside populations and less than 600 feet in San Diego County (CDFG NDDB 1998, 1999e, 2000b; UCR database; Munz 1974; Hickman 1993). Commonly associated species include *Nasella* spp., *Avena* spp., *Bromus* spp., *Centaurea melitensis, Ambrosia psilostachya, Hemizonia fascisulata, Holocarpha virgata, Distichlis spicata*, *Eremocarpus setigerus,* and several vernal pool species (Burrascano 1997; DUDEK 1999). *Distribution:* San Diego ambrosia is distributed from western Riverside County and western San Diego County, California south in widely scattered populations along the west coast of Baja California, Mexico, to the vicinity of Cabo Colonet (Munz 1974; Reiser 1996). Additional populations occur in the central highlands of Baja California in the vicinity of Laguna Chapala near Catavinia (Reiser 1996; Burrascano 1997). The majority of the California populations occur in San Diego County, where approximately 11 distinct populations have been reported along with two transplanted populations (Southwest Center 1996; Burrascano 1997; CDFG NDDB 2000b). The complex of populations near Laguna Chapala include the largest number of individuals. The status of populations between Cabo Colonet and the U.S. border are less certain and are rapidly disappearing from recreation development and agricultural conversion. *Known Populations in Western Riverside County:* Three populations of San Diego ambrosia have been mapped in Riverside County. One population is known from Skunk Hollow, a second from Nichols Road north of Lake Elsinore (Burrascano 1997; CDFG NDDB 2000b). The Skunk Hollow population is relatively small but the Nichols Road population is one of the largest in the United States. A third population has been reported for the City of Riverside based on a 1941 collection. The current status of this latter population is unknown but it is likely extirpated.[b2]	Fed: – State: – CNPS: 1b
Arabis johnstonii Johnston's rock cress	*Habitat: A. johnstonii* occurs in chaparral and pine forest (Skinner and Pavlik 1994, U.S. Fish and Wildlife Service 1998). *Distribution:* Endemic to the San Jacinto Mountains of western Riverside	Fed: – State: – CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c]
	County (Munz 1974). *Known Populations in Western Riverside County:* About 20 populations clustered into 3 groups: Garner Valley, Morris Ranch, and Desert Divide.[b1]	
Arctostaphylos rainbowensis Rainbow manzanita	*Habitat:* Ultramafic southern mixed chaparral, principally on gabbro soils or related soils rich in ferro-magnesian minerals. *Distribution:* Southwestern Riverside County and northwestern San Diego County. *Known Populations in Western Riverside County:* San Mateo Canyon Wilderness, Gavilan Mountain, Santa Margarita Ecological Reserve, and the Temecula, Wildomar, Margarita Peak and Pechanga areas.[b1]	Fed: – State: – CNPS: 1b
Astragalus bicristatus crested milk-vetch	*Habitat*: Perennial herb found in lower and upper montane conifer forests. *Distribution*: Riverside and San Bernardino Counties [b4] *Known Populations in Western Riverside County*: Reservoir area at top of Deep Canyon Stream, south of Pinyon Flat.[b12]	Fed: – State: – CNPS: 4
Astragalus pachypus var. *jaegeri* Jaeger's milk-vetch	*Habitat:* Jaeger's milk-vetch occurs on dry ridges and valleys and open sandy or rocky slopes in coastal scrub, chaparral, valley and foothill grassland and cismontane woodland habitats at elevations of 365 to 915 m (1,198 - 3,002 ft.; CDFG NDDB 2000a; Skinner and Pavlik 1994). *Distribution:* Jaeger's milk-vetch is endemic to Riverside County (CDFG NDDB 2000a; Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* This species is known to occur at Vail Lake near Kolb Creek, on the south side of Aguanga Valley, in the vicinity of Sage, Temecula Canyon, in the vicinity of Castile Canyon, in a canyon west of Portrero Creek, and at the base of Agua Tibia Mountain (CDFG NDDB 2000a). A historic location dating from 1897 in Beaumont should be verified (UCR database).[b2]	Fed: – State: – CNPS: 1b
Atriplex coulteri Coulter's saltbush	*Habitat*: Coulter's saltbush occurs along ocean bluffs in coastal bluff scrub; on coastal dunes; and on ridge tops, clay soils and alkaline low places in coastal scrub and valley and foothill grassland at elevations between 10 and 440 m (33- 1,444 ft.) (CDFG NDDB 2000a; Taylor and Wilken 1993). *Distribution:* This species is known from Santa Barbara County, Los Angeles County, Orange County, San Bernardo County, San Diego County, Santa Catalina Island, San Miguel Island, Santa Rosa Island, Santa Cruz Island, Anacapa Island, San Nicolas Island, and Baja California and San Benito Island Mexico (Reiser 1996; Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* Although potential habitat, resembling habitat in southern Orange and San Diego Counties occurs in western Riverside County, Coulter's saltbush has not been verified anywhere within the County. One unverified locality has been reported in the vicinity of Murrieta (A. Sanders, pers. comm., 2000). Reports from Salt Creek and Mystic Lake in the University of California, Riverside, GIS data base probably represent misidentifications or errors in data recording. [b2]	Fed: – State: – CNPS: 1b
Atriplex parishii Parish's brittlescale	*Habitat:* Parish's brittlescale is found in alkaline habitats. In western Riverside County it is found primarily along the San Jacinto River and at Salt Creek within the Domino-Willows-Tracer Soils series in association with the alkali vernal pools, alkali annual grassland, alkali playa, and alkali scrub components of alkali vernal plains (Munz 1974; Bramlet 1993; Skinner and Pavlik 1994; Ogden 1996; Ferren and Fielder 1993). At Salt Creek Parish's brittlescale is associated with sea blite (*Suaeda moquinii*), woolly marbles (*Psilocarphus brevisimmus*), alkali weed (*Cressa truxillensis*), wire-stem popcorn flower (*Plagiobothrys leptocladus*), California goldfields (*Lasthenia californica*), hairgrass (*Deschampsia danthoides*), Mojave silver scale (*Atriplex argentea*), bracted saltbush (*A. serenana*), sharp-tooth peppergrass (*Lepidium dictyotum*), dwarf peppergrass (*Lepidium latipes*), alkali plantain (Plantago elongata), and toad rush (*Juncus bufonius*) (Bramlet 1993). Parish's brittlescale is associated with other rare species, including San Jacinto Valley crownscale (*A. coronata* var. *notatior*), Davidson's	Fed: – State: – CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c]
	saltbush (*A. serenana* var. *davidsonii*), spreading navarretia (*Navarretia fossalis*), vernal barley *(Hordeum intercedens*), smooth tarplant (*Hemizonia pungens* ssp. *laevis*), and thread-leaved brodiaea (*Brodiaea filifolia*) (Bramlet 1993; Ogden 1996). *Distribution:* Parish's brittlescale is currently known only from the western Riverside County (CDFG NDDB 2000a; Ogden 1996). Historically, Parish's brittlescale was distributed sporadically in cismontane southern California from the Los Angeles Basin (Los Angeles and Orange Counties), and Riverside County (Munz 1974; Taylor and Wilken 1993). Parish's brittlescale also was known to occur at Cushenbury Springs in the Mojave Desert of San Bernardino County. Another locality has been reported at Vanderwieder Flat immediately east of the Planning Area but the current status of this historic population is unknown (CDFG NDDB 2000a). Parish's brittlescale has reported from northwestern Baja California, Mexico by Wiggins (1980) as occurring from Tijuana south to the eastern Sierra Juarez but these reports are unconfirmed. *Known Populations in Western Riverside County:* Parish's brittlescale is known definitively from only three populations within the Salt Creek drainage west of Hemet (Ogden 1996; CDFG NDDB 2000a; Reiser 1996; F. Roberts, botanist, pers. comm., 1999). Appropriate habitat still remains at several historical sites such as on the flood plain along the San Jacinto River (last observed in 1974) (Bramlet 1993; CDFG NDDB 2000a). Other areas this species may be found or relocated include the San Jacinto River between Mystic Lake and Railroad Canyon, additional localities at Salt Creek, isolated patches of alkaline habitat southeast of Mystic Lake (the northwest sector of the City of San Jacinto), Nichols Road, and possibly the lake bed of Lake Elsinore. [b2]	
Atriplex serenana var. *davidsonii* Davidson's saltscale	*Habitat:* In Riverside County, *Atriplex davidsonii* found in the Dominio-Willows-Traver Soils series and is associated with alkali flats and flood plains in alkali playa, alkali annual grassland, alkali scrub, and alkali vernal pool plant communities (Bramlet 1993, Ogden 1996). *Distribution:* Only definitely known to occur in cismontane southwestern California from Ventura County (Ojai), western Orange County (Seal Beach, San Joaquin Freshwater Marsh, Newport Backbay) in western Riverside County (Bramlet 1993, Roberts 1997, CDFG NDDB 1999a). Historically, this species has also been reported in coastal Santa Barbara County, three locations in Los Angeles County, Laguna Beach in Orange County, and possibly three locations in San Diego County (Taylor and Wilken 1993, Reiser 1996, Roberts 1997, CDFG NDDB 1999a). There is also a 1930 record for Santa Cruz Island (CDFG NDDB 1999a) and an old record for the Coronados Islands in extreme northwestern Baja California, Mexico. The distribution of this species outside the U.S is poorly known. This species is extremely rare outside of Riverside County. *Known Populations in Western Riverside County:* Within the planning area, *A. serenana* var. *davidsonii* is known to occur in the Upper Salt Creek drainage area west of Hemet and along the San Jacinto River floodplain from Mystic Lake south to the Ramona Expressway where it occurs in small, patchy populations (Bramlet 1993, CNDDB 1998, Ogden 1996). Suitable habitat along the San Jacinto River extends south at least the I-215 and possibly Perris Airport, however, these areas have not been surveyed. The Salt Creek populations appear to represent the largest remaining concentrations of this species known to exist. This species may also occur in the vicinity of Alberhill and Murrieta Hot Springs.[b1]	Fed: – State: – CNPS: 1b
Boykinia rotundifolia round-leaved boykinia	*Habitat*: Mesic chaparral, riparian woodland *Distribution*: Known from Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties.[b4] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: – CNPS: 4

Species [a1]	Habitat and Distribution	Status [c]
Brodiaea orcuttii Orcutt's brodiaea	*Habitat:* Occurs in clay soils in mesic native grasslands often associating with vernal pools. This plant is also known to occur in moist meadows and along stream courses at higher elevations (Keator 1993, Reiser 1996). *Distribution:* Distributed from southwestern Riverside County south through coastal and interior San Diego County into northwestern Baja California from sea level to 1,600 meters (5,200 feet) elevation (Keator 1993, Munz 1974, Reiser 1996). *Known Populations in Western Riverside County*: This species is known from two general locations in western Riverside County. One population barely enters Riverside County at Miller Mountain within the San Mateo Wilderness Area (Boyd, et. al., 1992). This population forms a hybrid swarm with B. filifolia. A complex of about 5 populations, representing the largest area of occupied habitat and the largest number of individuals in Riverside County is found on the Mesa de Burro, Mesa de Colorado, and Mesa de la Punta on the Santa Rosa Plateau (CNDDB 1998). These populations are on the Santa Rosa Plateau Preserve.**[b1]**	Fed: – State: – CNPS: 1b
Calochortus palmeri var. *munzii* Munz's mariposa lily	*Habitat:* On exposed knolls in shade of yellow pine woodland, on seasonally moist, fine granitic loam and chaparral on moist, sandy clay, and native grassland. *Distribution:* Endemic to the San Jacinto Mountains of western Riverside County. *Known Populations in Western Riverside County:* Historic populations include the following: 2 miles northwest of Pipe Creek (1950), and a vacant lot at Idyllwild near Alderwood and Pine Crest Roads (1967). Populations known from 1995 include the following: at Garner Valley north of Morris Creek, and along both sides of Highway 74 at mile-post 70.0 in adjacent ditch and meadows (~1000 individuals), and off Fobes Ranch Road (T6S, R3E, S23 on SE1/4 of SE1/4; ~250 individuals); and Mountain Center along both sides of Highway 74 at mi. 60.0 (~500 individuals).**[b1]**	Fed: – State: – CNPS: 1b
Calochortus plummerae Plummer's mariposa lily	*Habitat:* This species occurs on rocky and sandy sites, typically of alluvial or granitic material, in coastal scrub, chaparral, cismontane woodland, lower montane coniferous forest and valley and foothill grasslands at elevations from 90 to 1610 m (295-1,761 ft.; CDFG NDDB 2000a; Skinner and Pavlik 1994). *Distribution:* Plummer's mariposa lily is known from Ventura County, Los Angeles County, San Bernardino County and Riverside County (Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* Recent (1991) records for Plummer's mariposa lily in the planning area are limited to canyons in the San Jacinto Mountains above the San Jacinto River. Historic occurrences are recorded along May Valley Road, north of Highway 74 in the San Jacinto Mountains (1958); near Banning (1926); two miles south of Calimesa (1978); in the Badlands southwest of Beaumont (1932); at the head of Banning Canyon along the San Gorgonio River (1915). These five historic occurrences should be verified (CDFG NDDB 2000a). One population is reported from the Santa Ana Mountains along the border between Riverside and Orange counties (Roberts 1997; Roberts 1998).**[b2]**	Fed: – State: – CNPS: 1b
Calochortus weedii var. *intermedius* intermediate mariposa lily	*Habitat*: This species occurs on dry, rocky open slopes and rock outcrops in coastal scrub and chaparral at elevations from 120 to 850 m (394-2,789 ft.; CDFG NDDB 2000a; Skinner and Pavlik 1994). Intermediate mariposa lily occurs in valley and foothill grasslands only after burns (F. Roberts, pers. comm. 2000). *Distribution:* Intermediate mariposa lily is known from the San Jose Hills, Puente Hills and Santa Ana Mountains in Los Angeles County, Orange County and Riverside County (Skinner and Pavlik 1994). The majority of the known populations are in the foothill regions of Orange County (F. Roberts, pers. comm. 2000). *Known Populations in Western Riverside County:* This species is recorded from the foothills of the Santa Ana Mountains, northwest of	Fed: – State: – CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c]
	the Santa Rosa Plateau (UCR database), the hills west of Crown Valley and south of the Eastside Reservoir, Sierra Peak in the Santa Ana Mountains and west of Vail Lake between Temecula Creek and Kolb Creek. The Sierra Peak population is located along the border between Orange County and Riverside County and may not lie within the boundaries of the planning area (CDFG NDDB 2000a).[b2]	
Castilleja lasiorhyncha San Bernardino Mountains owl's-clover	*Habitat*: Meadows, pebble plain, upper montane coniferous forest, chaparral; mesic to drying soils in open areas of stream and meadow margins or of vernally wet areas. 3,700-7800 feet elevation. *Distribution*: San Diego, San Bernardino, and San Mateo Counties. *Known Populations in Western Riverside County*: San Jacinto Mountains, between Tahquitz and Little Tahquiz valleys. [b3]	Fed: – State: – CNPS: 1B
Caulanthus simulans Payson's jewel-flower	*Habitat*: Chaparral, coastal sage scrub, sandy-granitic soils; occurs after fire in open dry areas. *Distribution:* Eastern San Diego County and central Riverside County, primarily along the desert edge, 400-2200 meters (1300-7200 feet). *Known Populations in Western Riverside County:* Anza Valley, Sage, Aguanga, Billy Goat Mountain, Anza/Coyote Canyon, Pinyon Flats, El Toro Mtn., Santa Rosa Indian Reservation, San Jacinto Mountains.[b1]	Fed: – State: – CNPS: 4
Chaenactis parishii Parish's chaenactis	*Habitat:* Chaparral *Distribution:* Riverside, San Diego, and Baja California [b4] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: 4
Chorizanthe leptotheca peninsular spineflower	*Habitat:* Peninsular spineflower is found in open habitats, typically on granitic-derived or alluvial surfaces. At higher elevations, this species appears to be associated with chaparral, sage scrub and coniferous forest openings and at lower elevations it is typically associated with old formation alluvial benches (Reveal and Hardham 1995). *Distribution:* Riverside, San Bernardino, San Diego counties, and northern Baja California. This species occurs in sandy and gravelly places in the mountains at elevations of 300 to 1,900 m above msl (Reveal and Hardham 1989a; Hickman 1993). The range of peninsular spineflower extends from the foothills at the southern base of the San Bernardino Mountains in San Bernardino County, southward along the eastern edge of the Santa Ana Mountains, continuing through the San Jacinto Mountains of Riverside County and the mountains of central San Diego County to the Tecate Mountains of northern Baja California (Reveal and Hardham 1989a). *Known Populations in Western Riverside County:* Peninsular spineflower occurs in Temescal Canyon, Aguanga Valley (Temecula River Valley), Garner Valley, Gavilan Plateau, Hemet, Hemet Lake (UCR database), Agua Tibia Wilderness Area, Kolb Creek at Highway 79 (Boyd and Banks 1995), Vail Lake, Good Hope, Valle Vista and Cahuilla (U.S. Fish and Wildlife Service, Unpublished Data).[b2]	Fed: – State: – CNPS:4
Chorizanthe parryi var. *parryi* Parry's spineflower	*Habitat*: Parry's spineflower occurs within the alluvial chaparral and scrub of the San Gabriel, San Bernardino and San Jacinto Mountains, at elevations of 100 to 1,300 m (328 -4,265 ft.) above msl (Reveal and Hardham 1989b). *Distribution:* This species is known from the flats and foothills of the San Gabriel, San Bernardino and San Jacinto Mountains within Los Angeles, San Bernardino and Riverside Counties of southern California (Reveal and Hardham,1989b). Parry's spineflower is possibly extirpated from Los Angeles County (Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* This species is known from about 20 occurrences in Riverside County; Aguanga, Anza Valley, Hartford Springs Park, Cactus Valley, Gavilan Peak, Rawson Canyon, Lakeview Mountains, Box Springs Mountain, Reche Canyon Summit, Gilman Hot Springs Road, Banning, Crown Valley, Estelle Mountain, Murrieta Hot Springs, Portrero Valley, Vail Lake, Valle Vista, Double Butte Park, Eastside Reservoir, Wilson Valley, Hogback Hills and Lake Mathews Reserve (CDFG NDDB 2000a).[b2]	Fed: – State: – CNPS: 3
Chorizanthe	*Habitat:* Long-spined spineflower is associated primarily with heavy,	Fed: –

Species [a1]	Habitat and Distribution	Status [c]
polygonoides var. *longispina* long-spined spineflower	often rocky, clay soils in southern needlegrass grassland, and openings in coastal sage scrub, and chaparral (Skinner and Pavlik 1994; Reiser 1996; CDFG NDDB 2000a). Reveal and Hardham (1989b) describe this species as occurring on sandy and gravelly soil but this appears to be infrequently the case. Occasionally this species is associated with mountain meadows in sandy loam soil as at Cuyamaca State Park or in sandy or gravelly soils as on Kearney Mesa or Cutca Valley in San Diego County (Reiser 1996; Boyd and Banks 1995; CDFG NDDB 2000a). The majority of populations are clearly associated with clay soils (F. Roberts, pers. com, March 2000). Long-spined spineflower is often associated with needlegrass (*Nassella* sp.), wild oat (*Avena* sp.), Douglas microseris (*Microseris douglasii* ssp. *platycephala*), California sagebrush (*Artemisia californica*), Munz's onion (*Allium munzii*), red-skinned onion (*A. haematochiton*) Palmer's grappling hook (*Harpagonella palmeri*), prostrate spineflower (*Chorizanthe procumbens*), and small-flowered morning-glory (*Convolvulus simulans*) (CDFG NDDB 2000a). *Distribution:* Long-spined spineflower occurs in southwestern California and northwestern Baja California, Mexico, from western Riverside County south, through San Diego County, to the vicinity of Oso Negros, east of Ensenada, Mexico (Munz 1974; Reveal and Hardham 1989b; Hickman 1993; Reiser 1996). This species occurs from about 100 to 1,400 meters in elevation. About 25 to 35 populations have been reported in the United States (Reveal and Hardham 1989b; CDFG NDDB 2000a). At least 6 populations have been reported from Mexico (Reiser 1996). *Known Populations in Western Riverside County:* This species is found primarily within the western and southwestern areas of the planning area, often in association with clay soils. In the vicinity of the Gavilan Hills, long-spined spineflower is found in the Temescal Canyon area, Lake Mathews-Estelle Mountain Reserve, Hartford Springs Park, and the Motte Reserve (Reveal and Hardham 1989b; CDFG NDDB 2000a). In the Santa Ana Mountains it occurs within the San Mateo Wilderness, Elsinore Peak, and on the Redondo and Mesa de Burro area of the Santa Rosa Plateau (Lathrop and Thorne 1985; CDFG NDDB 2000a). Populations are also found in clay soils at Skunk Hollow and the Paloma Valley (Briggs and Scott Road), Bachelor Mountain (Lake Skinner Preserve) and along the north slopes of the Palomar Mountains (Dripping Springs Campground, Dorland Mountain, Woodchuck Road, Oak Mountain, and Arroyo Seco) (Boyd and Banks 1995; CDFG NDDB 2000a). Ten occurrences are reported by the from the El Sobrante Road, Cajalco Road, and eastern and southern shores of Lake Mathews (CDFG NDDB 2000a). These occurrences appear to represent a single extended population complex. The largest reported population is in the vicinity of Doland Mountain (Boyd and Banks 1995). Other scattered populations have been reported in other areas, including a collection made in the Garner Valley and southern Alberhill (Reiser 1996; CDFG NDDB 2000a). Data supplied by the U.S. Fish and Wildlife Service and the University of California Riverside also report populations within the Sedco Hills and Riverside. [b2]	State: – CNPS: 1b
Chorizanthe procumbens prostrate spineflower	*Habitat:* Prostrate spineflower is found in sandy soil, often in association with sandy barrens and sandy openings in chamise chaparral, coastal sage scrub, and occasionally grasslands (Munz 1973, Reiser 1994; Boyd and Banks 1995). This species is also known to tolerate minimal soil disturbance and frequently is found along the margins of dirt roads or brushed chaparral (Reiser 1996). *Distribution:* Prostrate spineflower occurs in coastal southern California and northwestern Baja California, Mexico, in valleys and hillsides below 800 meters (2,640 feet) (Munz 1974, Hickman 1993). In California, it occurs on the mesas and foothills of the Santa Monica, San Gabriel and San Bernardino mountains within Los Angeles County, San Bernardino County, Riverside County, Orange County and San Diego County (Reveal and Hardham 1989b). In Mexico, this species ranges as far south as Camalu along the coast of Baja California (Reiser 1996) and has	Fed: – State: – CNPS: 4

Species a1	Habitat and Distribution	Status c
	been recorded from at least 18 locations (Reveal and Hardham 1989b). The species is most common in coastal Orange and San Diego Counties where it has been reported from about 25 localities (Reiser 1996; Roberts 1997). It's status in Baja California is uncertain. *Known Populations in Western Riverside County:* The distribution of prostrate spineflower in western Riverside County is spotty and poorly understood. It is known from five to ten locations within the planning area. Most populations are concentrated in the Santa Ana Mountains or along the north slope of the Palomar Mountains (Reveal and Hardham 1989b; Boyd, *et. al.* 1992; Boyd and Banks 1995). One location has been reported from the vicinity of Winchester (Reiser 1996). According to information supplied by UC Riverside, the plant has also been reported in Moreno Valley, the Sedco Hills and the vicinity of Anza. These last records appear to be outside the known range of this species and require verification. Large populations of prostrate spineflower occur in the Dorland Mountain area at the northwest corner of the Agua Tibia Wilderness Area. Here it is associated with heavy soils derived from weathered gabbro. Population sizes varied from several hundred individuals to tens of thousands (Boyd and Banks 1995). The Agua Tibia populations are not included in the UCR database.[b2]	
Convolvulus simulans small-flowered morning glory	*Habitat*: Restricted to clay soils in southern valley needlegrass grassland, mixed native and non-native grasslands, and open Riversidian sage. *Distribution:* Vail Lake, Temescal Canyon, Lake Skinner, Paloma Valley, Murrieta (hill west of Skunk Hollow).[b1] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: 4
Dudleya multicaulis many-stemmed dudleya	*Habitat:* Clay soils in chaparral, coastal sage scrub, valley and foothill grasslands. *Distribution:* Camp Pendleton Marine Corps Base, San Diego County, Orange County, and Riverside County, extirpated in Los Angeles County. At elevations less than 600 meters (1950 feet). *Known Populations in Western Riverside County:* Alberhill, Estelle Mountain, Temescal Valley, Temescal Wash, Sitton Peak (Santa Ana Mountains), Prado Dam/Chino Hills near San Bernardino County line, San Mateo Canyon Wilderness Area (Oak Flats), Lake Mathews, Santa Ana Canyon, Sierra Peak (south of Corona), and Vail Lake.[b1]	Fed: – State: – CNPS: 1b
Dudleya viscida sticky-leaved dudleya	*Habitat: D. viscida* is found on mesic, mostly north-facing rocky canyon slopes. Most common on metasedimentary and intrusive volcanic substrates. *Distribution:* Endemic to southwestern California. Known from fewer than twenty occurrences in southeastern Orange, northern San Diego, and southwestern Riverside counties. The majority of the populations are concentrated within the southern Santa Ana Mountains but scattered populations are found as far south as Oceanside and Lake Hodges in San Diego County. *Known Populations in Western Riverside County:* Lower half of San Mateo and Devil Canyons, also in Lucas Canyon, and Cold Springs Canyon. To be expected in tributaries of Devil and Nichols Canyons.[b1]	Fed: – State: – CNPS: 1b
Erigeron breweri var. *jacinteus* San Jacinto Mountain daisy	*Habitat*: Rocky areas in subalpine conifer forests and lower montane conifer forests. *Distribution*: Riverside, Los Angeles, San Bernardino Counties.[b4] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State:-- CNPS: 4
Erodium macrophyllum large-leaf filaree	*Habitat*: Open places, grasslands, and shrublands; below 3,500 feet. *Distribution*: Los Angeles County; Santa Cruz Island; near San Diego.[b10, b11] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: –
Fritillaria biflora chocolate lily	*Habitat*: Heavy soil in grassy places below 3000 feet; valley grasslands. *Distribution*: San Diego and Riverside counties.[b10]	Fed: – State: –

Species a1	Habitat and Distribution	Status c
	Known Populations in Western Riverside County: Vail Lake Area, summit of big Oak Mt. North of Lake; Santa Rosa Plateau, Mesa de Burro; Murrieta, junction of Teneja Rd and Washing ton Avenue, Santa Ana Mts.; Elsinore Peak, Santa Ana Mts; Skinner Lake, near park entrance; Harford Springs County Park south entrance, northwest corner of Gavilan plateau. [b12]	CNPS: –
Galium angustifolium ssp. *gracillimum* slender bedstraw	*Habitat*: Rocky areas in Joshua tree woodland and Sonoran Desert scrub. *Distribution*: Riverside and San Bernardino Counties.[b4] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: 4
Galium angustifolium ssp. *jacinticum* San Jacinto Mountains bedstraw	*Habitat:* Lower montane coniferous forest. *Distribution:* Riverside County. *Known Populations in Western Riverside County:* Known from southeast of Hemet; Camilla; Cherry Valley; Lake Fulmor, Dark Canyon and Black Mountain area of the San Jacinto Mountains.[b1]	Fed: – State: – CNPS: 1b
Galium californicum ssp. *primum* California bedstraw	*Habitat*: Granitic or sandy soils in shaded areas at the ecotone of chaparral and lower montane coniferous forest and in the lower edge of the pine belt (Skinner and Pavlik 1994; CDFG NDDB 2000b). *Distribution:* California bedstraw is a narrow endemic species; the distribution of this subspecies is limited to elevations of 1,350 to 1,700 m (4,429-5,577 ft.) on the western side of the San Jacinto Mountains in western Riverside County and San Bernardino County (Skinner and Pavlik 1994; CDFG NDDB 2000b; Dempster 1993). *Known Populations in Western Riverside County:* California bedstraw is known from the Alvin Meadows area of the San Jacinto Mountains in the San Bernardino National Forest (Dempster 1993; Skinner and Pavlik 1994). The UCR database includes a mapped locality in San Timoteo Canyon west of Beaumont. The CDFG NDDB (2000b) also includes a description of a site in Reche Canyon very close to the border between Riverside County and San Bernardino County; this occurrence was not included in the mapping data. These two localities should be verified as most sources describe the range of *G. californicum* ssp. *primum* as limited to the San Jacinto Mountains (Skinner and Pavlik 1994; Dempster 1993; Munz 1974). [b2]	Fed: – State: – CNPS: 1b
Githopsis diffusa ssp. *filicaulis* Mission Canyon bluecup	*Habitat*: Mesic and disturbed areas of chaparral; grassy areas *Distribution*: Riverside and San Diego counties; Baja California. *Known Populations in Western Riverside County*: 16 km (9.9 miles) south of Hemet, below Sage. [b3, b4]	Fed: – State: -- CNPS: 1b
Harpagonella palmeri var. *palmeri* Palmer's grapplinghook	*Habitat:* Palmer's grapplinghook is associated with clay and cobbly clay soils in open coastal sage scrub, chaparral, valley and foothill grasslands (Reiser 1996), scrub oak woodland (CDFG NDDB 2000b). At one location (near Dorland Mountain) this species occurs on highly weathered gabbro soils (Boyd and Banks 1995). *Distribution:* Palmer's grapplinghook occurs in the cismontane region of Los Angeles County, Orange County, Riverside County, San Diego County, Santa Catalina Island, Arizona and Baja California, Mexico, at elevations between 15 and 830 m (49-2,723 ft.; CDFG NDDB 2000b; Reiser 1996; Boyd and Banks 1995). *Known Populations in Western Riverside County:* In western Riverside County, this species is known to occur at Elsinore Peak, Gavilan Plateau, northwest base of Gavilan Peak, Lake Skinner, Vail Lake, on the mesa west of Skunk Hollow, south side of Bachelor Mountain near Lake Skinner, Harford Springs Park, in Temescal Canyon on the south side of Alberhill Mountain, west northwest of Alberhill, Paloma Valley, Hemet Valley, North Peak, Winchester and Borel Roads, Indian Truck Trail, south-facing slope of Oak Mountain near Vail Lake, Temecula Canyon Wash, and at the Kolb Creek/Pechanga Creek Divide near Dorland Mountain (UCR database; CDFG NDDB 2000b; Reiser 1996).[b2]	Fed: – State: – CNPS: 2
Hemizonia pungens ssp. *laevis* smooth tarplant	*Habitat:* Coastal sage scrub, alkali meadows, alkali playas, riparian woodland, grasslands. *Distribution:* Riverside County, San Diego County, Orange County, Los Angeles County, San Bernardino County, Santa Cruz Island, Baja	Fed: – State: – CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c]
	California, Mexico. *Known Populations in Western Riverside County:* Temecula Creek, Sycamore Canyon Park, Moreno Valley, Lakeview, San Jacinto River, 1160 meters (3810 feet) east of Lake Skinner, Clinton Keith Road east of Deer Creek Development, Potrero Creek near Beaumont, Dominigoni Valley, San Jacinto Wildlife Area.**[b1]**	
Huechera hirsutissima shaggy-haired alumroot	*Habitat:* Shaggy-haired alumroot occurs in upper-montane coniferous forest and subalpine coniferous forest, often near large rocks, at elevations of 1,815 to 3,500 m (5,955-11,483 ft.; Skinner and Pavlik 1994; CDFG NDDB 2000b). At the location mapped behind Tahquitz Rock, shaggy-haired alumroot was recorded as occurring at the base of a boulder in a shady, mesic gully in subalpine coniferous forest (CDFG NDDB 2000b). *Distribution:* Shaggy-haired alumroot is restricted to the San Jacinto Mountains and Santa Rosa Mountains in Riverside County (Munz 1974; Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* Only two occurrences of shaggy-haired alumroot are known within the planning area, both within the San Jacinto Mountains. One locality lies on the western slopes of the San Jacinto Mountain, above the San Jacinto River (UCR database). The other locality is in a gully behind Tahquitz Rock (CDFG NDDB 2000b).**[b2]**	Fed: – State: – CNPS: 1b
Holocarpha virgata ssp. *elongata* graceful tarplant	*Habitat:* Graceful tarplant occurs in chaparral, cismontane woodland, coastal sage scrub, and valley and foothill grasslands below 600 m (1969 ft.; Keil 1993; Skinner and Pavlik 1994). Generally, shrub cover is not well-developed at graceful tarplant localities, with a heavy incidence of non-native grasses and invasive herbs. The habitat for this species usually occurs on level, mildly disturbed terrain (Reiser 1996). *Distribution:* Graceful tarplant is endemic to Orange County, Riverside County and San Diego County (Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* Graceful tarplant occurs on the Santa Rosa Plateau, north of Tenaja Road and east of Squaw Mountain; southwest of Cherry Street in Temecula; south of Poly Butte near Hemet; and San Mateo Canyon Wilderness Area (UCR database; Reiser 1996).**[b2]**	Fed: – State: – CNPS: 4
Hordeum intercedens vernal barley	*Habitat:* Vernal barley is associated with mesic grasslands, vernal pools, and large saline flats or depressions (Braum and Bailey 1987; Skinner and Pavlik 1994). In Riverside County, vernal barley is found in the Dominio-Willows-Traver Soils series and is associated with alkali flats and flood plains within the alkali vernal plains community (Ferren and Fiedler 1993). Within this community vernal barley is primarily associated with alkali annual grasslands and vernal pools and to a lesser extent alkali scrub and alkali playa (F. Roberts, botanist, *in litt.*, September 1999). Associated species include: seablite (*Suaeda moquinii*), alkali weed (*Cressa truxillensis*), wire-stem popcorn flower (*Plagiobothrys leptocladus*), sand spurry (*Spergularia marina*), California goldfields (*Lasthenia californica*), Mojave silver scale (*Atriplex argentea*), San Jacinto Valley crownscale (*A. coronata* var. *notatior*), bracted saltbush (*A. serenana*), five-hook bassia (*Bassia hyssopifolia*), sharp-tooth peppergrass (*Lepidium dictyotum*), dwarf peppergrass (*Lepidium latipes*), little mousetail *(Myosurus minimus* var. *apus*), alkali heath (*Frankenia grandifolia*), smooth tarplant (*Hemizonia pungens* ssp. *laevis*), and toad rush (*Juncus bufonius*) (Bramlet 1993; F. Roberts, *in litt.*, 1999). The distribution of vernal barley in San Diego and Orange County suggests that this species may occur in mesic grasslands, hard and basaltic vernal pool habitats within Riverside County. *Distribution:* Vernal barley occurs in scattered locations bordering the Central Valley of central California, southwestern California, and northwestern Baja California, Mexico, below 1,000 meters elevation (Barkworth 1993). In southern California it has been reported from Orange, Riverside, and San Diego Counties. In Mexico, it has been reported as far south as Punta Blanca about 130 km (80 miles) south of	Fed: – State: – CNPS: 3

Species [a1]	Habitat and Distribution	Status [c]
	El Rosario (Reiser 1996). *Known Populations in Western Riverside County:* The distribution of *Hordeum intercedens* is not well understood in western Riverside County. However, known populations appear to be closely associated with the distribution of alkali soils and the alkali vernal plains community. The majority of recent collections are from the Upper Old Salt Creek drainage area west of Hemet and along the San Jacinto River floodplain from Mystic Lake south to at least the I-215 where it occurs in extensive stands forming the dominant element of the alkali annual grassland community (Ogden 1996; F. Roberts, *in litt.*, 1999). The species likely occurs in other areas such as the Santa Rosa Plateau.[b2]	
Hulsea vestita ssp. *callicarpha* beautiful hulsea	*Habitat:* Beautiful hulsea occurs on rocky or gravelly soils in chaparral and lower montane coniferous forests on dry slopes at elevations of 1,200 to 2,750 m (3,937- 9,022 ft.; Munz 1974; Wilken 1993; Skinner and Pavlik 1994). This species may be a fire-follower (Reiser 1996). *Distribution:* Beautiful hulsea is restricted to the San Jacinto, Palomar and Santa Rosa Mountains in San Diego County and Riverside County (Munz 1974; Skinner and Pavlik 1994). Beautiful hulsea occurs in the vicinity of Lake Fulmor, Pine Cove, Idyllwild, Mountain Center, Pine Meadow and Hemet Lake in the San Jacinto Mountains; and on Cahuilla Mountain (UCR database). Reiser (1996) reports this species from North Mountain, east of Hemet, along the summit fire road.[b2] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: 4
Juglans californica var. *californica* Southern California black walnut	*Habitat:* California black walnut utilizes a variety of habitats in southern California, typically on deep, friable tertiary marine shales that have a high water-holding capacity (Keeley 1990; Holstein 1981). Scattered individuals commonly co-occur with laurel sumac *(Malosma laurina)* on alluvium located at the base of hills and in canyons. Individuals also occur infrequently on south-facing slopes, and more commonly, on west-facing slopes (Mullally 1992). On mesic north-facing slopes this walnut is primarily a member of open woodlands of various types and sometimes produces pure stands (Mullally 1992). It is sometimes present within coastal sage scrub and rarely occurs in chaparral. Along intermittent streams California black walnut tolerates high salinity and alkalinity (Mullally 1992). In these riparian corridors, this species prefers the dryer slopes that are almost never prone to flooding and erosional activity yet are in close proximity to groundwater, and seasonal surface water. Black walnut riparian woodlands in southern California may be dominated by California black walnut alone or walnuts associated with sclerophyllous evergreen trees that include California live oak (*Quercus agrifolia*) and toyon (*Heteromeles arbutifolia)* (Keeley 1990). In oak-walnut forests, especially those with a preponderance of coast live oak, this species often is located on the periphery of the woodland where is can obtain sufficient sunlight (Mullally 1992). Engelmann oaks occasionally co-occur with this species in various settings. *Distribution:* California black walnut is a low growing hardwood tree endemic to southern California (Keeley, 1990). Swanson (1976) determined the range of this species to be north of Santa Barbara County with specimens located in San Luis Obispo County, inland of Cambria, to the southeast along the Santa Ana River (Orange County), eastward to Riverside County, and as far east as Yucaipa in San Bernardino County. Extant walnut-dominated woodlands and forests are limited to the Santa Clarita River drainage in the vicinity of Sulphur Mountain, small stands in the Simi Hills and Santa Susana Mountains, the north slope of the Santa Monica Mountains, the San Jose Hills, Puente Hills, and Chino Hills (Griffin and Critchfield 1972; Quinn 1989). Outside of this range in Santa Barbara County, western San Bernardino County, and south to San Diego County, California black walnut occur mixed with other of trees, especially oaks (Quinn 1989). This species grows on marine shales typically between 150 and 900 meters in elevation (Sawyer and Keeler-	Fed: – State: – CNPS: 4

Species [a1]	Habitat and Distribution	Status [c]
	Wolf 1995). *Known Populations in Western Riverside County:* California black walnut has been documented in seven locations within western Riverside County. The majority of stands in the planning area occur on the eastern and western subregions of the Santa Rosa Plateau of the Santa Ana Mountains according to the UC Riverside database. Scattered individual trees exist east of Pedley along Cimonite Avenue and west of Rubidoux, immediately north of the Highway 60. [b2]	
Juncus duranii Duran's rush	*Habitat*: Mesic areas in lower coniferous forests, meadows, and upper coniferous forests. *Distribution*: Los Angeles, Riverside, and San Bernardino counties [b4] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: 4
Lasthenia glabrata ssp. *coulteri* Coulter's goldfields	*Habitat:* In Riverside County, *Lasthenia* glabrata ssp. *coulteri* is restricted to highly alkaline, silty-clay soils in association with the Traver-Domino-Willows soil association. Most populations are associated with the Willows soil series. *L. glabrata* ssp. *coulteri* occurs primarily in floodplains (seasonal wetlands) dominated by alkali scrub, alkali playas, vernal pools, and, to a lesser extent, alkali grasslands (Bramlet 1993, CNDDB 1998). *Distribution:* Distributed from coastal San Luis Obispo County south through coastal Santa Barbara County, Ventura County, Los Angeles to San Diego County and northwestern Baja California from sea level to about 1,000 meters (Munz 1974, Ornduff 1993, Reiser 1996). Interior valley populations have been recorded from the western Mojave desert in Kern and San Bernardino Counties, cismontane western Riverside County, and the Ojos Negros Valley east of Ensenada, Mexico (Munz 1974, Ornduff 1993, Reiser 1996). *L. glabrata* ssp. *coulteri* has also been reported from Santa Rosa Island. This form is presumed extirpated from Kern, Los Angeles, and San Bernardino Counties. It is severely declining in Orange and San Diego Counties. *Known Populations in Western Riverside County: L. glabrata* ssp. *coulteri* is known primarily from three areas in western Riverside County: From Mystic Lake through Lake View, Nuevo, and Perris to Railroad Canyon along the San Jacinto River, Salt Creek, and the alkali wetlands near Nichols Road in the City of Lake Elsinore (Bramlet 1993, CNDDB 1998). The San Jacinto River population complex is the largest remaining population representing 70 to 90 percent of all *L. glabrata* ssp. *coulteri* known (CNDDB 1998, F. Roberts, botanist, *pers. comm*., 1999). Minor populations are known from alkali soils at Upper Salt Creek, Nichols Road, Mockingbird Canyon, Murreita, southeast of Mystic Lake, and two populations in the vicinity of the Anza Valley. At least one historical record indicates this species may have been found at the Lake bed at Lake Elsinore. However, the eastern portion of Lake Elsinore has been diked off which may preclude flooding and ultimately lead to habitat conversion within the eastern lake bed. About 60 percent of currently known populations are on the San Jacinto Wildlife Area. Smaller populations are on RCHCA lands south of the Ramona Expressway (CNDDB 1998). About half to three-fourths of the suitable habitat for this species, primarily along the San Jacinto River, is on private lands.[b1]	Fed: – State: – CNPS: 1b
Lepechinia cardiophylla heart-leaved pitcher sage	*Habitat:* Heart-leaved pitcher sage occurs in closed-clone coniferous forest, chaparral and cismontane woodland at elevations of 550 to 1,370 m (1,800-4,490 ft.; Epling 1948; Skinner and Pavlik 1994; Reiser 1996). Along Indian Truck Trail, heart-leaved pitcher sage is also associated with southern oak woodland forest with scattered Coulter pine and big cone spruce. Along Horsethief Trail this species is associated with chaparral-oak woodland and decomposed granite soils. On Pleasants Peak, this species is associated with a stand of knobcone pine (CDFG NDDB 2000b). *Distribution:* Heart-leaved pitcher sage is restricted to the Santa Ana Mountains in Orange and Riverside counties, Iron Mountain in San	Fed: – State: – CNPS: 1b

Species a1	Habitat and Distribution	Status c
	Diego County and the coastal mountains of northern Baja California (Epling 1948; Munz 1974; Skinner and Pavlik 1994; Reiser 1996). *Known Populations in Western Riverside County:* Heart-leaved pitcher sage is known to occur at a number of locations within the Santa Ana Mountains: Sierra Peak, Indian truck trail, Bald Peak, Trabuco Peak, Horsethief Trail, Pleasants Peak and the ridge between Ladd Canyon and East Fork Canyon (CDFG NDDB 2000b). Occurrences have also been recorded for this species in the foothills of the Santa Ana Mountains northwest of Lake Elsinore and in the hills southeast of Alberhill (UCR database). These latter two localities should be verified. [b2]	
Lepidium virgicum var. *robinsonii* Robinson's pepper-grass	*Habitat*: Chaparral and coastal sage scrub in dry soils and scrubland up to 3,100 feet. *Distribution*: Santa Barbra County; San Diego County; Los Angeles County; Orange County, Riverside County *Known Populations in Western Riverside County*: Sycamore Canyon, Box Springs in Riverside.[b3]	Fed: -- State: -- CNPS: 1b
Lilium humboldtii ssp. *ocellatum* ocellated Humboldt lily	*Habitat:* Ocellated Humboldt lily is associated with riparian corridors in lower montane coniferous forest and coastal chaparral below 5,500 feet. This species typically occurs on lower stream benches but can also occur on shaded, dry slopes, beneath a dense coniferous canopy and cismontane oak woodland (Boyd and Banks 1995; Skinner and Pavlik 1994). *Distribution:* Ocellated Humboldt lily occurs in the Counties of San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, and San Diego; and on Santa Rosa Island and Santa Cruz Island (Skinner and Pavlik 1994; Reiser 1996). *Known Populations in Western Riverside County:* Within western Riverside County, ocellated Humboldt lily is restricted to canyons along the east slope of the Santa Ana Mountains and the north slope of the Palomar Mountains. This species is known to occur in Arroyo Seco and Agua Tibia canyons of the Agua Tibia wilderness area (Boyd and Banks 1995) and Fisherman's Camp in Tenaja Canyon (UCR database). Historic occurrences are known from Castro Canyon (Boyd and Banks 1995); Horsethief Canyon, Elsinore Mountains; and Corona between Tin Mine Canyon and Santiago Peak, Skyline Drive (UCR database). [b2]	Fed: – State: – CNPS: 4
Lilium parryi lemon lily	*Habitat:* Lemon lily requires moisture year-round and the distribution of this species is limited to the banks of seeps, springs and permanent streams higher than 1300 m (4,270 ft.) above msl. Typical habitat consists of forested, shady stream banks within narrow canyon bottoms (Linhart and Premoli 1994; Skinner 1993). *Distribution:* In California, lemon lily is known from at least 30 localities in several mountain ranges (*e.g.*, San Gabriel Mountains, San Jacinto Mountains and San Bernardino Mountains) within San Diego, Riverside, Los Angeles, and San Bernardino Counties. In Arizona, lemon lily is known to occur at 10 locations within the Santa Rita Mountains, Huachuca Mountains and Chiricahua Mountains (Linhart and Premoli 1994). *Known Populations in Western Riverside County:* In western Riverside County, lemon lily is considered to be limited to the San Jacinto Mountains (Reiser 1994; Skinner 1988). Six population localities are known within the San Jacinto Mountains. One unconfirmed 1993 locality for the Tenaja Canyon area in the southern Santa Ana Mountains is reported (UCR database). [b2]	Fed: – State: – CNPS: 1b
Linanthus floribundus ssp. *hallii* Santa Rosa Mountains linanthus	*Habitat*: Desert canyons in Sonoran Desert scrub from 3000-4200 feet elevation. *Distribution*: Known only from Riverside and San Diego Counties. *Known Populations in Western Riverside County*: Rockhouse Canyon, Santa Rosa Mountains; Alder Canyon West of Coyote Canyon (Northeast of San Diego County), Pinyon Flat, Santa Rosa Mountains [b3]	Fed: -- State: -- CNPS: 1b
Malaxis monophyllos ssp. *brachypoda* adder's mouth	*Habitat*: Meadows and seeps, bogs and fens, upper montane coniferous forest. Elevation ranges from 7200-8900 feet. *Distribution*: Known only from Riverside and San Bernardino Counties. *Known Populations in Western Riverside County*: Tahquitz Valley, San	Fed: -- State: -- CNPS: 2

Species [a1]	Habitat and Distribution	Status [c]
	Jacinto Mountains; South Fork of Santa Ana River.[b3]	
Microseris douglasii var. *platycharpha* small-flowered microseris	*Habitat:* Small-flowered microseris is found in clay soils and occurs on plains, hillsides, and foothill slopes in association with native grasslands or vernal pools (Munz 1974; Chambers 1955; Chambers 1993; Reiser 1996). *Distributi*on: *Microseris douglasii* ssp. *platycarpha* is known from cismontane southern California and northwestern Baja California, Mexico below 1,000 meters (Munz 1974; Chambers 1993). In the United States it occurs from Los Angeles County east to Riverside County, and south through Orange and San Diego Counties to the Mexican border. In Baja California it is known from at least 6 localities as far south as Las Escobas near Colonia Guerrero (Reiser 1996). This species has been recorded from five localities in Orange County (Roberts 1997) and about 15 localities in San Diego County (Reiser 1996). Small-flowered microseris is also reported from San Clemente and Santa Catalina Islands (Munz 1974). *Known Populations in Western Riverside County:* This species is known to occur primarily in the southwestern and southeastern planning areas: Santa Rosa Plateau, Tenaja, Elsinore Peak, Miller Mountain, Lake Skinner, and Bachelor Mountain (Service unpublished data; Lathrop and Thorne 1985). Boyd and Banks (1995) report this species from the Oak Mountain north of Vail Lake, in the hills west of Vail Lake above Pauba Valley and west of Woodchuck Park in the Dorland Mountain area. Occurrences are also known from San Mateo Wilderness, Alberhill, Lake Matthews Reserve and Paloma Valley (UCR database). An isolated occurrence has been reported in lower Temescal Canyon (U.S. Fish and Wildlife Service, unpublished data):[b2]	Fed: – State: – CNPS: 4
Mimulus clevelandii Cleveland's bush monkeyflower	*Habitat:* Cleveland's bush monkey flower is known to occur mostly above 3000 feet in chaparral and lower montane coniferous forests, especially on peaks and ridgelines (Boyd and Banks 1995). The microhabitat generally consists of open locales in xeric chaparral dominated by chamise, with exposed rocks nearby and shallow soils available (Reiser 1994). Chaparral pea (*Pickeringia montana*), southern mountain misery (*Chamaebatia australis*) and (*Calamagrostis koelerioides*) commonly co-occur with this species (Reiser 1994). The species appears to strictly follow metavolcanic and gabbroic soils (Reiser 1994), although Hirshberg (2000) has noticed this species growing in seeps in granitic outcrops and in the understory of oak woodlands. *Distribution:* This species is restricted to the Peninsular Ranges, occurring in the Santa Ana and Palomar mountains southward into northern Baja California (Thompson 1993). *Known Populations in Western Riverside County*: Cleveland's bush monkeyflower has been documented on Santiago Peak at several locations according to the Calflora Database, although there was only a single observation (1994) after 1962. [b2]	Fed: – State: – CNPS: 4
Mimulus diffusus Palomar monkeyflower	*Habitat:* Palomar monkeyflower is a foothill and mountain species. It grows in sandy soil in chaparral and yellow pine forest (Munz 1974; Thompson 1993), and may be found in sandy washes and disturbed areas near roads and trails (Thompson 1993). *Distribution:* Mountains of southern California and extreme northern Baja California, Mexico generally from 1,500 to 2,000 m (4,900-6,600 ft.; Grant 1924; Munz 1974), although it occurs as low as 400 m (1,300 ft.) on the north slope of the Agua Tibia Mountains in southern Riverside County. In the United States it is found from the Santa Ana and San Jacinto Mountains of Orange and Riverside County south through the Peninsular Ranges of San Diego County to the Mexican border. In Baja California, this species is restricted to the Sierra Juarez Mountains (Reiser 1996). *Known Populations in Western Riverside County***:** Palomar monkeyflower is highly restricted in Riverside County and known only from higher elevations of the Santa Ana Mountains (Boyd, *et al.* 1992), the Agua Tibia Mountains (Boyd and Banks 1995) and the San Jacinto Mountains. The UCR Database has 19 mapped locations with 21	Fed: – State: – CNPS: 4

Species [a1]	Habitat and Distribution	Status [c]
	occurrences: eight in the San Jacinto Mountains along Highways 74 and 243; three in the vicinity of Sage; three west of the Santa Rosa Plateau in the Santa Ana Mountains and one in each of the following locations: French Valley north of Lake Skinner, Good Hope, Reche Canyon, in the hills south of Alberhill, and southwest of El Cerrito.[b2]	
Mobergia calculiformis light-gray lichen	*Habitat*: Standard sources provide no information on habitat for this species. *Distribution*: Standard sources provide no information on distribution for this species. *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: –
Monardella macrantha ssp. *hallii* Hall's monardella	*Habitat*: Hall's monardella occurs on dry slopes and ridges in openings within broad-leaved upland forest, chaparral, lower montane coniferous forest, cismontane woodland and valley and foothill grassland (Munz 1974; Jokerst 1993; Skinner and Pavlik 1994). *Distribution*: Hall's monardella is known from the San Gabriel, San Bernardino, Cuyamaca, Santa Ana, San Jacinto, Palomar and Santa Rosa Mountains in Orange County, San Bernardino County, Riverside County and San Diego County the in San Diego County and Riverside County (Abrams 1912; Abrams 1951; Munz 1974; Skinner and Pavlik 1994; Reiser 1996). *Known Populations in Western Riverside County*: Hall's monardella is known to occur on the northeast slope of Santiago Peak, the north slope of Cahuilla Mountain and along a drainage on the north slope of Agua Tibia Mountain (CDFG NDDB 2000a). Reiser (1996) reports this species from Sugarloaf in the Santa Ana Mountains and on the trail to San Jacinto Peak.:[b2]	Fed: – State: – CNPS: 1b
Monardella pringlei Pringle's monardella	*Habitat*: Coastal scrub *Distribution*: Extirpated from Riverside and San Bernardino counties *Known Populations in Western Riverside County*: Historically known only from the vicinity of Colton.[b4]	Fed: -- State: -- CNPS: 1a
Mucronea californica California spineflower	*Habitat:* California spineflower is associated with very sandy soils in coastal dunes, coastal sage scrub, chaparral, cismontane woodland, and valley and foothill grasslands (Reiser 1996; Skinner and Pavlik 1994). *Distribution:* California spineflower occurs in Monterey County, Kern County, San Luis Obispo County, Ventura County, Santa Barbara County, Los Angeles County, San Bernardino County, Orange County, Riverside County and San Diego County at elevations below 1,400 m (4,590 ft.; Reiser 1996; Skinner and Pavlik 1994; Hickman 1993). *Known Populations in Western Riverside County:* One population was recorded in 1904 in Wilder's Canyon in the Jurupa Hills (Reveal 1989b). This location is currently mismapped in the City of Pedley. Given the age of the record, this occurrence should be verified. [b2]	Fed: – State: – CNPS: 4
Muhlenbergia californica California muhly	*Habitat:* California muhly occurs in chaparral, coastal sage scrub, lower coniferous forest and meadows, usually near mesic seeps or along streambanks (Skinner and Pavlik 1994). *Distribution:* California muhly is known from Los Angeles County, Riverside County and San Bernardino County at elevations between 100 to 2,000 m (330-6,560 ft.; CDFG NDDB 2000b; Skinner and Pavlik 1994; Peterson 1993). *Known Populations in Western Riverside County:* This species occurs at Sage, Aguanga, Estelle Mountain, Gavilan Hills, Gavilan Plateau, near Prado Dam, La Paz Canyon, Temescal Canyon, and Sitton Peak in the Santa Ana Mountains (U.S. Fish and Wildlife Service, Unpublished Data).[b2]	Fed: – State: – CNPS: 1b
Myosurus minimus ssp. *apus* little mousetail	*Habitat:* occurs in vernal pools, alkali vernal pools and alkali annual grasslands within flood plains (Bramlet 1993, Munz 1974, Skinner and Pavlik 1994). *Distribution:* Distributed from scattered areas in the Central Valley of northern California from Colusa and Butte County south to Kern County, and from Orange and San Bernardino County south to coastal San Diego County. It is distributed from sea level to 1,500 meters	Fed: – State: – CNPS: 3

Species a1	Habitat and Distribution	Status c
	(4,900 feet) elevation (Munz 1974, Reiser 1996, Skinner and Pavlik 1994). It is also known from several sites in Baja California primarily from the Las Palmas-Tecate area, but as far south as Erendira near San Vicinte. Most populations are relatively small. The two largest concentrations of this species are on the Otay Mesa of San Diego County and at Salt Creek in Riverside County. *Known Populations in Western Riverside County: M. minimus* ssp. *apus* is known from about 9 locations in western Riverside County. The largest single complex of this plant known are found within a complex of 200 or more alkali vernal pools at Salt Creek west of Hemet (Bramlet 1993). The majority of this complex is on private lands. Two other populations consisting of 6 occupied vernal pools are on the Santa Rosa Plateau within the Santa Rosa Plateau Preserve. Two populations are reported from the Gavilan Plateau. One is within Hartford Springs Park (Reiser 1996). Populations at March Air force Base and within the Edgemont area are likely extirpated. *M. minimus* ssp. *apus* has been reported form the vicinity of Lake Elsinore, Wildomar, and Menifee, however the status of these populations is unknown.[b1]	
Oxytheca caryophylloides chickweed oxytheca	*Habitat:* Chickweed oxytheca occurs in sandy soils in association with yellow pine forest (Munz 1974; Hickman 1993). *Distribution:* Chickweed oxytheca is a California endemic species. It is restricted to mountains from the southern Sierra Nevada in Tulare County, east through Ventura County and the San Gabriel Mountains (Los Angeles County), to the San Jacinto Mountains (Riverside County) at elevations of 1,200 to 2,600 meters (Munz 1974; Ertter 1980; Reveal 1989; Hickman 1993). *Known Populations in Western Riverside County:* Within the planning area, chickweed oxytheca is known only from the San Jacinto Mountains. The six mapped locations of this species occur along S.R. 243 and in the vicinity of Idyllwild (UCR GIS database). [b2]	Fed: – State: – CNPS: 4
Penstemon californicus California beardtongue	*Habitat:* California beardtongue occurs on granitic and sandy soils and stony slopes in chaparral, coniferous forest, and pinyon-juniper woodland habitats (Skinner and Pavlik 1994; Holmgren 1993; Munz 1974; CDFG NDDB 2000a). California beardtongue co-occurs with Johnston's rock cress (*Arabis johnstonii*), Munz's mariposa lily (*Calochortus palmeri* var. *munzii*) and Ziegler's aster (*Layia ziegleri*) (CDFG NDDB 2000a). *Distribution:* California beardtongue is restricted to Riverside County and northern Baja California at elevations of 1000 to 2100 m (3,280-6,890 ft.; Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* The majority of known occurrences for California beardtongue are in the San Jacinto Mountains, particularly Garner Valley, Pyramid Peak and Kenworthy Ranger Station. Other localities include Hemet Valley, the vicinity of the Eastside Reservoir, Tenaja Road in the Santa Rosa Plateau Reserve, Blackburn Canyon, Aguanga and Sage (Reiser 1996; UCR database; CDFG NDDB 2000a; Munz 1974). [b2]	Fed: – State: – CNPS: 1b
Penstemon clevelandii var. *connatus* San Jacinto beardtongue	*Habitat*: Chaparral *Distribution*: Imperial, Riverside, and San Diego counties; Baja California.[b4] *Known Populations in Western Riverside County*: Mt. San Jacinto, Northface, Snow Creek, 5000'; San Jacinto Mts at intersection of "Pines to Palms Hwy" and Palm Canyon west branch; San Jacinto Mountains, Pinyon Flats; Santa Rosa Mountains on Hwy 74 3.5 miles NW of Santa Rosa Mtn.[b12]	Fed: – State: – CNPS: 4
Polygala cornuta var. *fishiae* Fish's milkwort	*Habitat*: Fish's milkwort is most frequently associated with shaded areas within cismontane oak woodlands and riparian woodlands, although it also occurs in xeric and mesic chaparral habitat (Reiser 1996; Skinner and Pavlik 1994; Munz 1974; Boyd and Banks 1995). *Distribution*: Fish's milkwort occurs in cismontane southern California and northwestern Baja California, Mexico, from 100-1,100 meters (Munz 1974; Wendt 1993; Reiser 1996). In the United States it has been reported from Santa Barbara and Ventura County east through the	Fed: – State: – CNPS: 4

Species [a1]	Habitat and Distribution	Status [c]
	Santa Monica Mountains, Mount Wilson, and the Santa Ana Mountains, south through the Peninsular Ranges of San Diego County to the Mexican border. It has been reported from at least six locations in Baja California as far south as Maneadero (Reiser 1996). It is not well known within its range and populations typically consists of a few individuals. It has been reported from about 16 locations in San Diego County (Reiser 1996) and 17 localities in Orange County (Roberts 1997). *Known Populations in Western Riverside County:* Fish's milkwort occurs in the western portion of the planning area. Collections are reported from the Santa Rosa Plateau; Temecula Canyon and Cole Canyon west of Murrieta (Lathrop and Thorne 1985; UCR database), at least two localities from the vicinity of San Mateo Canyon in the San Mateo Wilderness Area (Boyd, *et al.* 1992); and Main Street Canyon just south of Corona in the northern Santa Ana Mountains (UCR database). Fish's milkwort has been recorded just outside the southern boundary of Riverside County along the southern flank of the Agua Tibia Mountains (Boyd and Banks 1995) indicating that this species may also be found along the northern slopes of the Agua Tibia Mountains.[b2]	
Potentilla rimicola cliff clinquefoil	*Habitat:* Cliff cinquefoil occurs in granite crevices and rocky sites within upper-montane coniferous forest and subalpine coniferous forest, at elevations of 2,390 to 3,030 m (7,840-9,940 ft.; Skinner and Pavlik 1994; CDFG NDDB 2000a). At the location mapped near Deer Springs, cliff cinquefoil was recorded as occurring in crevices in a rock pinnacle (CDFG NDDB 2000b). *Distribution:* Cliff cinquefoil is restricted to the San Jacinto Mountains in Riverside County and the San Pedro Martir Mountains in northern Baja California (Munz 1974; Ertter 1993; Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* Only two occurrences of this species are known within the planning area, both within the San Jacinto Mountains. One locality is in Dark Canyon and the other locality is near Deer Spring in the San Jacinto Mountains (CDFG NDDB 2000b).[b2]	Fed: – State: – CNPS: 1b
Quercus engelmannii Engelmann oak	*Habitat:* Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland, gentle slopes, valley bottoms, raised stream terraces, and stream corridors in canyons in deep soils, as well as open stands. Important associations with coast live oak in closed stands. Black oak or California walnut may also be present. *Distribution:* Endemic to southern California and extreme northwestern Baja California, Mexico. Distributed from the southern face of the San Gabriel Mountains of Los Angeles County, south through eastern Orange and western Riverside County to San Diego County, California. Several small populations are known from the vicinity of Tecate and Santo Thomas, Baja California, Mexico. Also reported from Santa Catalina Island (one tree). Elevation 50-1220 meters (164-4000 feet). This species has declined, primarily in the northwestern portion of its range where isolated fragmentary populations persist in the vicinity of Glendora, San Dimas, and Claremont (Los Angeles County). Also known from several small populations in the San Joaquin Hills and foothills of the Santa Ana Mountains (Orange County). The core of the species range, as has been historically, from the Santa Rosa Plateau (Riverside County) and the valleys of interior San Diego County[1] *Known Populations in Western Riverside County:* Santa Rosa Plateau and Temecula. Small populations have been observed in Sage and Elsinore Mountains.[b1]	Fed: – State: – CNPS: 4
Romneya coulteri Coulter's matilija poppy	*Habitat:* Coulter's matilija poppy occurs in dry washes and canyons below 1,200 m (3,940 ft.) in open, mildly disturbed sage scrub, chaparral and along rocky drainages (Munz 1974; Clark 1993). Mature chaparral and sage scrub may limit expansion of this species (Reiser 1996). *Distribution:* Coulter's matilija poppy is restricted to the eastern slope and foothills of the Santa Ana Mountains in Los Angeles, Orange, Riverside and San Diego counties (Reiser 1996). *Known Populations in Western Riverside County:* In western Riverside County, Coulter's matilija poppy is known from the confluence of	Fed: – State: – CNPS: 4

Species [a1]	Habitat and Distribution	Status [c]
	Leach and Dickey Canyons; Alberhill (Mountain Avenue and canyons near Alberhill); Fresno Canyon and Wardlow Canyon west of Corona; south of Lake Skinner; Railroad Canyon along the San Jacinto River; Murrieta Hot Springs; and the Gavilan Plateau; Temescal Canyon near Glen Eden and Hagador Canyon; and Horsethief Canyon (UCR database; Reiser 1996). This species is known historically from the Elsinore Mountains (UCR database). [b2]	
Rupertia rigida Parish's rupertia	*Habitat*: Chaparral, cismontane woodland, lower coniferous forests *Distribution*: Riverside, San Bernardino, and San Diego counties; Baja California. [b4] *Known Populations in Western Riverside County*: San Jacinto Mountains at the junction of highways 371 and 74. [b12]	Fed: -- State: – CNPS: 4
Satureja chandleri San Miguel savory	*Habitat*: San Miguel savory is associated with rocky, gabbroic and metavolcanic substrates in coastal sage scrub, chaparral, cismontane woodland, riparian woodland, and valley and foothill grasslands (CDFG NDDB 2000a). *Distribution:* San Miguel savory occurs in Orange County, Riverside County, San Diego County, and Baja California, Mexico, at elevations between 120 and 1,005 m (390-3,300 ft.; CDFG NDDB 2000a; Reiser 1996; Skinner and Pavlik 1994). *Known Populations in Western Riverside County:* Occurrences of San Miguel savory are known from Steele Mountain; in the vicinity of the Hogbacks; in the hills west of the Santa Rosa Plateau; on the Santa Rosa Plateau; in the Santa Ana Mountains: one mile west of Murrieta on Tenaja Road, ten miles west of Murrieta (vicinity of Tenaja guard station), three miles south of Murrieta near De Luz Road, and three miles southwest of Murrieta near Warner's Ranch. A historic (1959) occurrence is known from St. Johns Canyon south of Hemet. The latter should be verified.[b2]	Fed: – State: – CNPS: 4
Scutellaria bolanderi ssp. *austromontana* southern skullcap	*Habitat*: Chaparral, cismontane forests, lower coniferous forest; in gravelly soils on streambeds or in mesic sites in oak or pine woodland. *Distribution*: Riverside, and San Diego Counties. Extirpated from Los Angeles and San Bernardino counties. *Known Populations in Western Riverside County:* Head of Cole Canyon, south of Murrieta and northwest of Mesa de Burro; San Jacinto Mtns; junction of Palms to Pines Highways and Idyllwild Road, Strawberry Ck in Idyllwild.[b3, b4]	Fed: – State: – CNPS: 1b
Selaginella asprella bluish spike moss	*Habitat*: Granitic areas of lower coniferous forest, upper coniferous forest, subalpine coniferous forests. *Distribution*: Kern, Los Angeles, Orange?, Riverside, San Bernardino, San Diego, Tulare counties and Baja California.[b4] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: – CNPS: 4
Sphenopholis obtusata prairie wedge grass	*Habitat*: Mesic areas in cismontane woodland and meadows. *Distribution*: Amador, Inyo, Mono, Fresno, Riverside, San Bernardino, and Tulare counties. [b4] *Known Populations in Western Riverside County:* Santa Ana River, old field in the vicinity of Mt. Rubidoux.[b12]	Fed: – State: – CNPS: 2
Streptanthus campestris southern jewel-flower	*Habitat*: Rocky areas in chaparral, lower coniferous forest, and pinyon and juniper woodland. *Distribution*: Riverside, San Bernardino, and San Diego counties; Baja California. *Known Populations in Western Riverside County:* Presumed extant at the following: Coyote Canyon, Santa Rosa Spring Rd, El Toro Mtn; Onstatt's Valley, San Jacinto Mtns.; Tamarack Valley, below Long Valley, San Jacinto Mtn. [b4]	Fed: – State: -- CNPS: 1b
Syntrichopappus lemmonii Lemmon's syntrichopappus	*Habitat*: Sandy or gravelly areas in chaparral or Joshua tree woodland. *Distribution*: Kern, Los Angeles, Monterey, Riverside, and San Bernardino counties. [b4] *Known Populations in Western Riverside County:* San Jacinto Mountains, Garner Valley area 2.2 miles north of Kenworthy Ranger Station.[b12]	Fed: – State: – CNPS: 4

Species [a1]	Habitat and Distribution	Status [c]
Thelypteris puberula var. *sonorensis* Sonoran maiden form	*Habitat*: Seeps and streams in meadows. *Distribution*: Los Angeles, Riverside, and Santa Barbra counties; Arizona, Baja California, and Sonora Mexico. *Known Populations in Western Riverside County:* Presumed extant from Taquitz Ck in San Jacinto Mtns [b3, b4]	Fed: – State:-- CNPS: 2
Trichocoronis wrightii var. *wrightii* Wright's trichocoronis	*Habitat:* In Riverside County, *T. wrightii* var. *wrightii* is found in alkali playa, alkali annual grassland, and alkali vernal pool habitats (Bramlet 1993). This species tends to be in the more mesic portions of these habitats. *Distribution:* The historic range includes the Great Valley of central California, western Riverside County, and the Edwards Plateau of central Texas and adjacent Mexico (Munz 1974, Powell 1993). *T. wrightii* appears to be extirpated from central California. Plants from Texas and north-central Mexico may represent a distinct species. If such is the case, the plants of Riverside County may represent a distinct species (A. Sanders, U.C. Riverside Herbarium, *pers. comm.* 1999). *Known Populations in Western Riverside County:* This species is known only from 4 locations along the San Jacinto River from the vicinity of the Ramona Expressway and San Jacinto Wildlife Area (Bramlet 1993, CNDDB 1998) and along the northern shore of Mystic Lake. Only two locations on either side of the Ramona Expressway have been seen in recent years. This species may occur at Salt Creek and possibly in the alkali wetlands near Nichols Road near Lake Elsinore.[b1]	Fed: – State: – CNPS: 2
Invertebrates		
Cicindela senilis frosti Frost's tiger beetle	*Habitat*: Inhabits the marine shoreline, from the central California coast south to the salt marshes of San Diego; inhabits dark-colored mud in the lower zone and dried salt pans in the upper zone. *Distribution*: Ventura, San Diego, Los Angeles, Orange counties.[b3] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: –
Cicindela tranquebarica viridissima greenest tiger beetle	*Habitat*: Standard sources provide no information on habitat for this species. *Distribution*: Entries in the Federal Register state that the greenest tiger beetle, apparently thought extinct, was recently discovered "near the Santa Ana River, California" (60 FR 34226, June 30, 1995), and further, that recent studies indicate that this taxon is not a distinct subspecies, but in fact synonymous with *Cicindela tranquebanca vibex* Register (60 FR 7459, February 28, 1996). *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: –
Euphilotes enoptes cryptorufes San Jacinto blue butterfly	*Habitat*: Standard sources provide no information on habitat for this species. *Distribution*: Standard sources provide no information on distribution for this species. *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: –
Hemileuca electra electra electra silkmoth	*Habitat*: Chapparal; flat-top buckwheat (*Eriogonum fasciculatum*) is only known larval host plant in U.S.. *Distribution*: San Diego, Orange, Los Angeles, Western Riverside, and southwest San Bernardino counties; elevation ranges from 0-3,280 feet above sea level; bounded to the north by Transverse Mountain range and to the east by Peninsular ranges. *Known Populations in Western Riverside County:* Four miles east of Aguange, Riverside County; Lake Skinner (McElfresh and Millar, 1999; Tuskes and McElfresh, 1995).	Fed: – State: –
Holcopasites ruthae Ruth's cuckoo bee	*Habitat*: Coastal sage scrub *Distribution*: Only record of this subspecies is in California (W. Riverside County); one other CA subspecies near Blythe and one unknown location; other subspecies in Arizona. *Known Populations in Western Riverside County:* University of	Fed: – State: –

Species a1	Habitat and Distribution	Status c
	California, Riverside property, mesa of coastal sage scrub, near agricultural land, groves, and parking structure (Cooper, 1993).	
Hydroporus simplex simple hydroporus diving beetle	*Habitat*: Aquatic sites *Distribution*: Pinecrest, Tuolomne County; San Bernardino County.[b3] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: –
Linderiella santarosae Santa Rosa Plateau fairy shrimp	*Habitat*: *L. santarosae* is restricted to seasonal southern basalt flow vernal pools with cool clear to milky waters that are moderately predictable and remain filled for extended periods of time (Thiery and Fugate 1994, Eriksen and Belk 1999). *Distribution*: *L. santarosae* is endemic to Riverside County (Thiery and Fugate 1994, Eriksen and Belk 1999) at an elevation of 625 meters. *Known Populations in Western Riverside County:* The Santa Rosa Plateau fairy shrimp is known only from vernal pools on the Santa Rosa Plateau (Thiery and Fugate 1994, Eriksen and Belk 1999). [b2]	Fed: – State: –
Fish		
Gila orcuttii arroyo chub	*Habitat*: The arroyo chub is adapted to surviving in the warm fluctuating streams of the Los Angeles Plain. Prefer slow moving or backwater sections of warm to cool streams where the bottoms are of sand or mud (Moyle 1976). They are omnivorous grazers, feeding on algae and other plants as well as on small crustaceans and aquatic insect larvae (Moyle 1976). The depth of the stream is typically greater than 40 centimeters (1.3 feet). *Distribution:* Common at three localities within its native range, namely the upper Santa Margarita River and its tributary, De Luz Creek, Trabuco Creek below O'Neill Park and San Juan Creek drainage, and Malibu Creek. It is present, but scarce in Big Tujunga Canyon, Pacoima Creek above Pacoima Reservoir, and in the Sepulveda Flood Control Basin, Los Angeles River drainage; upper San Gabriel River drainage; and middle Santa Ana River tributaries between Riverside and the Orange County line (Swift 1993). *Known Populations in Western Riverside County:* Santa Ana River from Jurupa, downstream to Prado Basin, and Santa Margarita River near Temecula within Riverside County (NDDB,Swift 1993). The arroyo chub is also present in Temescal Wash (Robert Fisher, pers. comm. June 9, 1999).[b1]	: fss State: ssc
Rhinichthys osculus Santa Ana speckled dace	*Habitat*: Permanent streams and rivers with cool, flowing rocky-bottomed washes are the primary habitats of the speckled dace. Summer water temperatures in their primary habitat usually range from 17-20 degrees Celsius and are typically maintained by outflows of cool springs. Shallow cobble, runs and gravel riffles are preferred (Wells and Diana 1975). They also thrive in warm permanent streams such as the Owens River; large lakes such as Lake Tahoe, and Eagle Lake; small mountain lakes; the outflows of desert springs; and warm intermittent streams (Moyle 1976). Rocks and riffles are preferred within stream habitats; and rocky or sandy bottoms, usually less than 1 meter deep, are preferred within lakes. Carter and Hubert (1995) found that species richness increased as study reaches declined in elevation and as width, water velocity, and discharge increased. In addition, as habitat diversity increases along the length of a stream, fish communities become more complex (Carter and Hubert 1995). Beauchamp *et al.* (1994) found that habitat complexity declined with depth. *Distribution*: Historically, the species was distributed throughout the upland portions of the Santa Ana, San Gabriel, and Los Angeles river systems of southern California (Los Angeles and Orange counties), but was rare in the lowlands. Currently, the dace has a limited distribution in the headwaters of the Santa Ana and San Gabriel rivers. The contiguous north, east and west forks of the San Gabriel are the highest quality habitat remaining for the dace. It occupies only remnants of its historical range. In 1976, Moyle reported that the speckled dace was the most widely distributed freshwater fish, and occupied the widest variety of habitats in the western United States. Although absent from	Fed: fss State: ssc

Species a1	Habitat and Distribution	Status c
	most coastal streams, they are found throughout California and are the only fish native to all of the major Western drainage systems from the Colorado River south to Sonora, Mexico (Moyle 1976). *Known Populations in Western Riverside County:* Within Riverside county, speckled dace were introduced into the Santa Clara and Cuyama rivers, and have been reported from the south fork of the San Jacinto river (Miller 1968; Swift *et al.* 1993). Deinstadt *et al.* (1990) estimate that 2,000 or less dace comprise the population in the west fork, which is constantly threatened with disturbance related to the Cogswell reservoir upstream. Accidental high releases of water and sediment from this reservoir devastated this area in 1981 and 1991. Additional areas include Strawberry Creek which supports a small population; Cajon Creek has a large population; the west fork of City Creek has a small population and is apparently stable; and the San Jacinto River probably supports a good population, probably the second largest after the San Gabriel river, although a thorough survey is currently underway (Moyle *et al.*, 1995). It is important to note that the majority of these populations are separated by vast stretches of dry washes most of the year. They are isolated headwater stocks without the opportunity for gene flow. Historical populations of dace at Mill Creek, Silverado Canyon at Shrewsberry Springs, and the north fork of Lytle Creek are probably extinct (Moyle *et al.* 1995). [b2]	
Amphibians		
Ensatina escholtzii klauberi large-blotched salamander	*Habitat*: Canyon Live oak-coulter pine woodlands, yellow pine-incense cedar dominated coniferous forests, California scrub oak-toyon-buckwheat dominated shrubby assemblages. Oak logs and woody debris may be key habitat components. *Distribution*: The known range of this California endemic is discontinuous from the San Jacinto Mountains in Riverside County to Cottonwood Creek, San Diego County, California. Its known elevation range extends from 518 meters (1700 feet) (Alpine, San Diego County) to 1646 meters (5410 feet) (Idyllwild, Riverside County)· *Known Populations in Western Riverside County:* This taxon is assumed to occur in the mountain foothills in western Riverside County.[b1]	Fed: fss State: ssc
Rana muscosa mountain yellow-legged frog	*Habitat:* Ponds, lakes, tarns, and streams at moderate to high elevations. This species does not occur in small creeks with insufficient depth for adequate refuge and overwintering. Prefers shorelines that gently slope up to a depth of 5-8 cm (2-3 inches). *R. muscosa* are most successful where predatory fish are absent.[b1] *Distribution:* Historically, *R. muscosa* is a California near endemic distributed continuously in the Sierra Nevada from Plumas County in the north to Tulare County in the south. Additional disjunct populations of *R. muscosa* occur in isolated clusters in the San Bernardino and San Jacinto Mountains (Zweifel 1955). In southern California, the historic elevation range extended from 370 meters (1210 feet) to greater than 2290 meters (7510 feet). *R. muscosa* has probably been extirpated from more than 99 percent of its historic range in southern California. The taxon has not been seen in the San Bernardino Mountains since 1970. The only *R. muscosa* known to still occur in southern California can be found in four small tributaries of the upper reaches of the San Jacinto River system in the San Jacinto Mountains, and four small streams in the San Gabriel Mountains. *Known Populations in Western Riverside County:* There are likely far less than 100 adult frogs left in Riverside County, a precariously small remnant population. These are found in four small tributaries of the upper reaches of the San Jacinto River system in the San Jacinto Mountains. [b1]	Fed: fss State: ssc
Scaphiopus hammondii western spadefoot toad	*Habitat*: *S. hammondii* requires rain pools with water temperatures between 9ºC - 30ºC in which to reproduce (Brown 1966, 1967), and that persist with more than three weeks of standing water (Feaver 1971) in which to metamorphose successfully. Rain pools must lack fish, bullfrogs, and crayfish in order for *S. hammondii* to successfully reproduce and metamorphose (Jennings and Hayes 1994). Though not	Fed: -- State: ssc

Species a1	Habitat and Distribution	Status c
	observed specifically for this taxon, soil characteristics of burrow refuge sites likely become fairly hard and compact during the period of summer aestivation (Jennings and Hayes 1994, Ruibal et al 1969). *Distribution: S. hammondii* is a California near endemic ranging from Shasta County southward into Baja California (Stebbins 1995). Its known elevation range extends from near sea level to 1363 meters (4460 feet) (Zeiner et al. 1988). The known range of *S. hammondii* is restricted to west of the Sierran-desert range axis (Myers 1944). About 80% of the habitat once known to be occupied by *S. hammondii* in southern California has been developed or converted to uses incompatible with successful reproduction or recruitment. *Known Populations in Western Riverside County: S. hammondii* is found in scattered locations throughout western Riverside County, east of the San Jacinto Mountains and desert regions. Historic occurrences are as follows: South of Temecula near Highway 15; South and east of Lk. Mathews reserve area; City of Lake Elsinore, north of the lake; Unincorporated lands surrounding Eastside Reservoir, Canyon Lake, and Murrieta, east of Highway 15; Lee Lake near Highway 15; City of Corona; South of Highway 10 at Banning and Beaumont; Areas between Riverside and Moreno Valley, north of Highway 60; Western most portion (in Riverside County) of Santa Anna River.[b1]	
Taricha tarosa tarosa coast range newt	*Habitat: T. t. torosa* frequents terrestrial habitats, but breed in ponds, reservoirs, and slow moving streams (Stebbins 1985). *Distribution*: Populations in southern California appear to exhibit a high level of historic fragmentation. The known elevation range of this taxon extends from near sea level to 1830 meters (6000 feet). *T. t. torosa* has been depleted in southern California, including extirpation of southern most populations in San Diego County. *Known Populations in Western Riverside County: T. t. torosa* occurs in coastal drainages of the western most portions of Riverside County. Lands adjacent to Forest Service southeast of Lake Elsinore, and along highway 74, and southwest of Corona. Southeast of Lake Norconian and west of Highway 15. Several known citations on Forest Service lands, and at the Santa Rosa Plateau. [b1]	Fed: -- State: ssc
Reptiles		
Anniella pulchra pulchra California (or silvery) legless lizard	*Habitat: Anniella pulchra pulchra* has been described as a sand-swimmer (Gans *et al.* 1992) that is common in several habitats but especially in coastal dune, valley-foothill, chaparral, and coastal sage scrub (Zeiner *et al.* 1988). Holland and Goodman (1998) state that it may be found in a variety of habitats including coastal sage scrub, chaparral, oak woodland, and pine forests. Stebbins (1985) and Miller (1944) go on to say that it frequents the sparse vegetation of beaches, pine-oak woodland, streamside growth of sycamores, cottonwoods, and oaks alluvial fans, oak-grass covered sandy hills, and grape vineyards. It may occasionally enter desert scrub habitats (Stebbins 1985). As a fossorial animal (Holland and Goodman 1998), it is found primarily in areas with sandy or loose organic soil or where there is plenty of leaf litter (Zeiner *et al.* 1988). Gans *et al.* (1992) claims that it is a burrower in shallow sand, and its habitats are characterized by loose soils (sand, loam, humus) suitable for burrowing (Holland and Goodman 1998). *Anniella pulchra* may sometimes seek cover under flat boards or rocks where they lie barely covered in loose soil (Zeiner *et al.* 1988), but more typically they occur in the leaf litter under the overhang of trees and bushes on sunny slopes (Stebbins 1985). They usually burrow in washes, dune sand of beaches, and loose soil near the bases of slopes and near permanent or temporary streams (Stebbins 1985), but Klauber (1932) found them occasionally in dense soil or amongst rocks. Burt (1931) states that a key habitat feature is moist sandy soils. Miller goes on to say that soil moisture is an essential habitat requirement, and Stebbins (1985) agrees that it needs moisture, warmth, and plant cover. However, Klauber (1932) disagreed with the notion that they require moist soil based on their presence in very dry desert situations. Regardless, it is evident that they are usually associated with friable soils with some moisture content and	Fed: fss State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	some vegetative cover. It has also been noted that they may sometimes occur in the twig base of woodrat nests (Stebbins 1985). Germano and Mrafka (1996) found them at the surface in hillside alkali scrub habitat with no sandy soils present. While Cunningham (1953) collected specimens from the foothill region of Los Angeles with scattered live oaks, elderberries, and buckwheat in loose and sandy soil under a log and boulder; in Santa Barbara with juniper, willow, and mule fat habitat under a boulder in damp sandy soil near a stream; beneath a boulder on an alluvial fan with fine and hard packed soil; and under logs or tin in sandy soil. *Anniella pulchra* has been documented to be active at temperatures between 7 and 30 C, however the preferred temperature range ranges from between 15 and 25 C (Brattstrom 1965) and between 21 and 28 C (Bury and Balgooyen 1976). They have a broad thermal tolerance. Bury and Balgooyen (1976) concluded that they prefer hot and moist or warm and moist conditions to cold and moist conditions (Bury and Balgooyen (1976). Additionally, Miller (1944) found that they cannot swim well and may drown. *Distribution:* The near California endemic occurs from Antioch, California, south through the Coast, Transverse, and Peninsular Ranges into northwestern Baja California, Mexico. Inhabiting elevations from sea level along the coast to 1830 m (6,000 ft.) in the Sierra Nevada Mountains, it generally occurs west of the desert, but is conspicuous ly absent from the agricultural centers of California (Klauber 1932; Miller 1944;Cunningham 1957; Bezy *et a*l. 1977; Fusari 1983; Hunt 1983; Stebbins 1985; Zeiner *et a*l. 1988). *Known Populations in Western Riverside County:* There are scattered documented occurrences for *Anniella pulchra pulchra* throughout western Riverside County. The species appears to only occur within the western portion of Riverside County with the exception of Whitewater River (Stebbins 1985). Specific locations are known from Temecula, Riverside, Santa Ana Mountain foothills, Santa Rosa Mountain foothills, Banning, Beaumont, Moreno Valley, Santa Ana River area, and Gilman Hot Springs (Cunningham 1959; Hunt 1983). It is likely that the legless lizard is distributed throughout the study area where suitable habitats exist. [b13]	
Arizona elegans occidentalis Coastal glossy snake	*Habitat:* Open habitats with barren desert, chaparral, sagebrush, grassland or woodland with sandy or loamy soils (Stebbins 1985). *Distribution:* Central to southern California interior valleys and plains. Historically below 1,500 meters (4,900 feet) in all counties. *Known Populations in Western Riverside County:* Interior valleys and plains eastward from the base of the Santa Ana and Elsinore mountains to the San Jacinto Valley and the Pacific foothills of the San Jacinto Mountains, probably extending through the San Gorgonio Pass (Glaser 1970). An uncommon species in planning area, although historically this subspecies was widespread. Historic occurrences have been recorded in the following areas: Mira Loma; Rubidoux; Riverside; near Cajalco Reservoir; ½ mile southeast of Calimesa (on San Bernardino County line); Perris; Lakeview; San Jacinto; Anderson; Elsinore to 7 and 9 miles northeast; Sedco; Wildomar; Murrieta; Temecula (Glaser 1970).[b1]	Fed: – State: –
Clemmys marmorata pallida southwestern pond turtle	*Habitat*: Aquatic sites-ponds, marshes, rivers, streambeds and irrigation ditches with aquatic vegetation; requires basking sites and suitable (sandy banks or grassopen fields) upland habitat for egg laying. *Distribution*: Known from Placer, Sacramento, Tulare, Fresno, Tuolumne, Mariposa, Kings, San Benito, Merced, Alameda, Contra Costa counties. [b3] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: --
Cnemidophorus tigris multiscutatus coastal western whiptail	*Habitat:* Open often rocky areas with little vegetation or sunny microhabitats within shrub or grassland associations, (Benes 1969, Fitch 1970, Pianka 1966, 1970, 1986). *Distribution:* Semiarid and arid regions of southern California and western Baja California, Mexico (Fitch 1970, Glazer 1970, Pianka 1966,	Fed: -- State: --

Species [a1]	Habitat and Distribution	Status [c]
	1970). *Known Populations in Western Riverside County:* Occurrences have been documented throughout western Riverside County in suitable habitat. Population clusters south and east of Lake Skinner and extending north toward the Eastside Reservoir, also east of Lake Mathews from I-15 to Riverside, and west of Temecula and Murrieta. Additional localities include Potrero Creek, Cactus Valley, Crown Valley, and Motte Reserve.[b1]	
Cnemidophorus hyperythrus beldingi (Belding's) orange-throated whiptail	*Habitat:* Chaparral, non-native grassland, (Riversidian) coastal sage scrub, juniper woodland, oak woodland. Associations include alluvial fan scrub, and riparian areas. This species is presumably tied to perennial vegetation because its major food source, termites (Bostic 1966b), require perennial plants as a food base. California buckwheat or flattop buckwheat (*Eriogonum fasciculatum*), a colonizing species of disturbed, sandy soils, is an important indicator of favorable habitat for *C. h. beldingi* (McGurty 1981). The presence of *E. fasciculatum* generally indicates a particular amount of intershrub spacing (10 to 40 percent bare ground cover) apparently required for foraging and thermoregulatory behavior of this species (McGurty 1981). *E. fasciculatum* is known to commonly occur in both coastal sage scrub and chaparral. California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*) are some of the other plant species that may fill the perennial plant requirement for *C. h. beldingi*. Friable soil appears to be a necessary requirement for excavating burrows and hiding eggs (Bostic 1965a). Indeed, soil grain size preference data clearly suggest that *C. h. beldingi* choose only the two finest grain sizes in which to bury (Brattstrom 1989). The usefulness of this data is somewhat limited, as the lizard may choose to bury in loose soil aprons brought up from the sub-surface by rodents, in an otherwise large grain exposure (Brattstrom 1989). *Distribution:* The current range includes southwestern California and Baja California. In California, *C. h. beldingi* ranges from the southern edges of Orange (Corona del Mar) and San Bernardino (near Colton) Counties southward to the Mexican border, located on the coastal slope of the Peninsular Ranges, and extending from near sea level to 1040 meters (3410 feet) (northeast of Aguanga, Riverside County) (Jennings and Hayes 1994). *Known Populations in Western Riverside County:* Brattstrom (1989), in a status survey conducted for the California Department of Fish and Game, determined that *C. h. beldingi* is found in parts of the Cahuilla Indian Reservation and Terwilliger Valley, and northwest along the western foothills of the San Jacinto Mountains of Riverside County. More than 50 % of historic occurrences of *C. h. beldingi* in west Riverside County are presumed extirpated due to loss of habitat. The remaining range seems to be tied to coastal sage scrub adjacent to floodplains or terraces along streams occurring in western Riverside County. Historic distribution information suggests that orange-throated whiptails were found throughout western Riverside County.[b1]	Fed: -- State: --
Coleonyx variegatus abbottii San Diego banded gecko	*Habitat:* Rocky chaparral and sage scrub with nearby riparian or wetland components required for successful egg laying and clutch hatching. *Distribution:* The western slopes of southern California coastal ranges into the northern half of Baja California (Stebbens 1985). *Known Populations in Western Riverside County:* Found uncommonly in northwest Riverside County. Scattered occurrences have been documented from east of Lake Mathews, north of Moreno Valley, south and east of Banning along I-10, and south of Temecula. [b1]	Fed: -- State: --
Crotalus ruber ruber northern red diamond rattlesnake	*Habitat:* Though *C. r. ruber* is recorded from a number of vegetation types, it is most commonly associated with heavy brush with large rocks or boulders (Klauber 1972). Dense chaparral in the foothills, cactus or boulder associated coastal sage scrub (Stebbins 1954, 1985; Fitch 1970), and desert slope scrub associations are known to carry populations of *C. r. ruber*, however, chamise and red shank associations may offer better	Fed: -- State: --

Species [a1]	Habitat and Distribution	Status [c]
	structural habitat for refuges and food resources for this species than other habitats (Jennings and Hayes 1994). Prey density likely affects the population dynamics of *C. r. ruber*, however, availability of suitable dens for both hibernation and gravid females may be a more limiting factor (Keenlyne 1972). *Distribution:* The known range of *C. r. ruber* extends from Pioneertown and Morongo Valley in San Bernardino County southward on both, coastal and desert, sides of the Peninsular Ranges and the Santa Anna Mountains, to Loreto, Baja California (Peguegnat 1951, Stebbins 1985). Elevation range of the species from near sea level to 1520 meters (4990 feet) (Palomar Mountain), though most frequently encountered below 1200 meters (3940 feet) (Klauber 1972). *Known Populations in Western Riverside County: C. r. ruber* is known to occur throughout western Riverside County. This species has been observed throughout western Riverside County with the exception of the higher elevations of San Jacinto Mountains. Other localities include Domenogoni Valley, Potrero Valley, and Motte Reserve.[b1]	
Diadophis punctatus ringneck snake	*Habitat:* According to Stebbins (1985), *Diadophis punctatus* is a snake of moist habitats including woodlands, forest, grassland, chaparral, farms, and gardens. At Camp Pendleton, San Diego County, California, *D. punctatus* is found in most habitats, including coastal sage scrub, chaparral, oak woodland, riparian areas, and grassland (Holland and Goodman 1998). During a 26 year study in Kansas, Fitch (1975) found that while *Diadophis punctatus* used a wide variety of habitats, terrain and vegetation, some chief requirements became apparent. These include soil that is slightly damp but not wet or soggy, abundant shelter in the form of a surface mat of dead vegetation and/or loose objects such as flat rocks, boards, or trash and screening shrubs or trees with open canopies sparse enough to permit abundant sunshine to reach the ground. Regardless, ringneck snakes appear to be most common in open, relatively rocky areas within valley-foothill, mixed chaparral, and annual grass habitats (Zeiner *et al.* 1988). Holland and Goodman (1998) thought that it may be more common in grasslands and scarce in riparian areas where sandy soils are extensive or not bordered by areas with heavier soils. Though *D. punctatus* utilize a wide variety of habitats, they are usually found on the ground under bark, beneath and inside rotting logs, and under stones and boards (Stebbins 1985) within those habitats. Ringneck snake utilize surface litter and cover extensively, and rely on rotting logs, woodpiles, stable talus, and small holes in the ground (Ziener *et al.* 1988), and usually encountered during the day under boards or flat rocks. The species is usually tied to riparian habitats and canyon bottoms; however, they are not aquatic (Rosen *et al.* 1996; Hammerson 1982). Henderson (1970) appears to support this position by maintaining that captive snakes maintained on moist substrates develop blisters, thus supporting the notion that while ringneck snakes occur near wet habitats, they do not depend on the wet areas of that habitat. There is not enough information available to determine if *D. p. modestus* and *D. p. similis* prefer different habitats. *Distribution:* Thirteen subspecies (Pinou *et al.* 1995) of *Diadophis punctatus* range from southern Washington and Idaho to northern Baja California, Mexico from Atlantic Coast to Pacific Coast (Stebbins 1985; Stoltz 1993; USDA Forest Service 1995; Hinojosa 1996). *Diadophis punctatus* is widespread in California, absent only from large portions of the Central Valley, high mountains, desert and areas east of the Sierra-Cascade crest (Zeiner *et al.* 1988). The six Californian subspecies occur at elevations ranging from sea level to 2150 m (Zeiner *et al.* 1988; Stebbins 1985). Based on Stebbins (1985), it appears that *D. p. similis* is nearly restricted to San Diego County and northern Baja California, Mexico, while *D. p. modestus* occurs in northern San Diego County north through Ventura County. Undoubtedly a zone of overlap occurs. *Known Populations in Western Riverside County:* The presence of San Diego ringneck snake within the study area has been disputed by local herpetologists. Since the distinction between the two subspecies relies	Fed: fss State: –

Species [a1]	Habitat and Distribution	Status [c]
	on scale counts and other esoteric morphological characters, and the study area is within the known range of San Bernardino ringneck snake it is likely that the subspecies was misidentified. Regardless, the data point for this subspecies was located in the Lake Skinner/Crown Valley area. San Bernardino ringneck snake have been located along the Santa Ana River, the City of Riverside, within the Badlands, south of Hemet near Cactus Valley, within the Hogbacks, at Glen Ivey, in Temecula along Murrieta Creek, near Vail Lake at Lake Matthews, along Temescal Wash, north of Cherry Valley, in Banning, and on San Jacinto Mountain near Idyllwild.[b13]	
Gambelia wislizenii long-nosed leopard lizard	*Habitat: Gambalia wislizenii* inhabits a variety of desert woodland and scrub habitats such as semiarid plains grown to bunch grass, alkali bush, sagebrush, creosote bush, or other scattered low plants. It prefers sandy or gravelly flats and plains, or hardpan. The greatest densities of this species have been observed in creosote flats (Zeiner *et al.* 1988). It is less common in rocky areas and it avoids dense grass or brush (Stebbins 1985; Zeiner *et al.* 1988). *Distribution:* The range of *Gambalia wislizenii* extends from the Great Basin south to Magdalena Plain, Baja California, Sonora, and north Zacatecas, Mexico; and from the desert base of the mountains in southern California east to southeast New Mexico and west Texas (Stebbins 1985). It occurs from near sea level to around 6,000 feet. *Known Populations in Western Riverside County:* Stebbins (1985) reports old records from the Gavilan Peak area, Riverside County, California. The MSHCP data base holds locations in the Glen Ivy area, Lake Skinner area, Quail Valley area, Gavilan Hills, Woodcrest area, City of Riverside, San Jacinth/Hemet/Valle Vista area, Hemet Lake, Banning, and Cabezon. The reliability of these records is unknown. [b13]	Fed: – State: –
Lampropeltia zonata parvirubra San Bernardino Mt. kingsnake	*Habitat: L. z. parvirubra* occurs in sunny canyons with rocky outcrops or talus (a sloping mass of rocks at the bottom of a steep slope) in association with bigcone spruce (*Psuedotsuga macrocarpa)* and other canyon chaparral species at low elevations, and with black oak, Jeffrey pine, ponderosa pine, and incense cedar at higher elevations (Zweifel 1952b, Cunningham 1955, Newton and Smith 1975). *Distribution: L. z. parvirubra* is generally associated with the Transverse Ranges, where it is restricted to the San Gabriel (Los Angeles County), San Bernardino Mountains (Los Angeles and San Bernardino Counties), and San Jacinto Mountains (Riverside County). *L. z. parvirubra* is documented from elevations ranging from 370 to 2470 m (1,210-8,100 ft.; Jennings and Hayes 1984). *Known populations in Western Riverside County:* Idyllwild and south of Banning on the San Jacinto Mountains. The MSHCP data base also has locations within the Santa Rosa Mountains; these are likely to have been misidentified and are actually San Diego mountain kingsnake.[b13]	Fed: fss State: ssc
Lampropeltis zonata pulchra San Diego Mountain kingsnake	*Habitat: L. zonata* is found most commonly in the vicinity of rocks or boulders near streams or lake shores, where it may utilize rotting logs and seek cover under dense shrubs throughout its California range, according to Zeiner *et a*l. (1988). Occurring in a variety of habitats including valley-foothill hardwood, and hardwood-conifer, mixed and montane chaparral, valley-foothill riparian, coniferous forests, and wet meadows (Zeiner *et a*l. 1988). Holland and Goodman (1998) further refine its habitat associations for southern California by characterizing it as a species which is typically found in montane coniferous forests or mixed coniferous forests, occasionally in riparian woodlands at lower elevations. In other areas of California, it may occasionally occur into chaparral communities. Regardless, *L. zonata* is primarily associated with montane coniferous forests and mixed coniferous forests and secondarily associated with riparian woodland, oak woodland, chaparral, and coastal sage scrub (McGurty 1988). Chaparral and scrub habitats are only occupied when woodland habitats are present nearby (Zweifel 1952; McGurty 1988). *L. zonata pulchra* and *parvirubra* are often, but not exclusively, associated with rock outcrops and talus, where they use	Fed: fss State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	crevices and cap rocks, or rocks on soil as refugia, basking sites, hibernation sites, foraging grounds, and suitable oviposition sites (Jennings and Hayes 1994; Holland and Goodman 1998). A key habitat feature in many areas appears to be the presence of downed logs, usually of large conifers (Holland and Goodman 1998). McGurty (1988) found that *L. zonata* were most commonly found in the following order, 1) under rocks, 2) in rock cracks, under logs or bark of logs and stumps, 4) in the open, and 5) dead on the road. In the interior mountain ranges, *L. z. pulchra* occurs primarily in associations of ponderosa, Jeffrey, and Coulter pine, and black oak, and is infrequently found below the coniferous forest associations (Zweifel 1952; McGurty 1988; Jennings and Hayes 1994). When occurring at lower elevations, and in the coastal ranges, it occurs below the edge of mixed oak-coniferous forest in riparian woodlands, usually in canyon bottoms, that have western sycamore, Fremont's cottonwood, coast live oak, willows, wild rose, poison oak, and blackberries. It may be found in narrow riparian woodlands in association with chaparral and coastal sage scrub vegetation types (Zweifel 1952; Jennings and Hayes 1994; McGurty 1988). *L. z. pulchra* is known to occur in the narrow riparian woodlands in association with chaparral and coastal sage vegetation types (Jennings and Hayes 1994). Most of the *L. z. pulchra* found by McGurty (1988) in rock outcrops, were associated with open stands of conifers and black oak. Within the rock outcrops, snakes preferred to be under layered rock structures and in rock fractures nearly twice as often as under a rock on the ground. Adults and subadults are more selective than juveniles, choosing rock structures with direct subterranean access while juveniles were mainly found under rocks on ground soils. Rock outcrops within broken shade are preferred, however shady north-facing rocks and rock fissures which are wider than the snake body within the rock outcrop, are usually avoided (McGurty 1988). *Distribution: Lampropeltis zonata* occurs throughout the montane portions of south-central Washington, Oregon, California, and into northern Baja California, Mexico (McGurty 1988) along the Cascade and Sierra Mountains and patchily through the Coast Ranges, Transverse Ranges and patchily down the Peninsular Ranges, effectively circling California's Central Valley. Throughout its range, it may be found from sea level to 2450+ m (8,040+ feet; Zeiner *et al.*1988), however Klauber (1943) states that *L. zonata* is seldom found below an altitude of 4,000 feet. Generally speaking, *L. z. pulchra* is apparently restricted to Coast Range south of Ventura County and across to the Peninsular Ranges. Specifically, it ranges from the Santa Monica Mountains (Los Angeles County), Santa Ana Mountains (Orange and Riverside Counties), Santa Rosa Mountains (Riverside County), and Corte Madera, Cuyamaca, Hot Springs, Laguna, and Palomar Mountains (San Diego County) (Jennings and Hayes 1984; McGurty 1988). The subspecies has been documented from sea level to approximately 1800 m (5,900 feet) however, the lower elevational ranges are for coastal situations which enjoy lower temperatures and fog or abundant cloud cover. The inland locations *(e.g.*, Santa Ana Mountains, Santa Rosa Mountains) are more typical and primarily support the subspecies between 1219 and 1829 m (6000 feet; McGurty 1988). *Known populations in Western Riverside County:*Santa Ana Mountains. [b13]	
Lichanura trivirgata roseofusca coastal rosy boa	*Habitat:* According to Zeiner *et a*l. (1988), in coastal areas, the rosy boa occurs in rocky chaparral-covered hillsides and canyons, while in the desert it occurs on scrub flats with good cover. Holland and Goodman (1998) add that it is known from a variety of desert and semi-desert habitats, however it is absent from grasslands but may occur in oak woodlands if it interdigitates with scrub or chaparral habitats. A majority of the specimens found on Camp Pendleton (San Diego County, California), were in coastal sage scrub, chaparral, or mixed habitats, however it was also found in riparian areas (Holland and Goodman 1998). Yingling (1982) states that the coastal rosy boa occurs in	Fed: – State: –

Species [a1]	Habitat and Distribution	Status [c]
	chaparral and desert-edge foothills. Within these habitats, it appears to prefer moderate to dense vegetative cover with rocks (Stebbins 1985; Zeiner *et a*l. 1988; Holland and Goodman 1998). Holland and Goodman (1998) state that rock outcrops are commonly found in habitats used by the rosy boa and according to Zeiner *et a*l. (1988), they have been found under rocks, in boulder piles, and along rock outcrops and vertical canyon walls (Zeiner *et al.* 1988). Additionally, woodrat nests are often used as refugia (Holland and Goodman 1998). *Distribution:* The species' range extends from southern California and southwestern Arizona, south throughout Baja California, Mexico and northwestern mainland Mexico, avoiding the lowest deserts which are mainly in agricultural production or open dunes (Yingling 1982; Stebbins 1985, Zeiner *et al.* 1988). *Charina (Lichanura) trivirgata roseofusca* only occurs west of the desert below approximately 1200 m (3,400 feet) in elevation. It's range extends from Los Angeles and southwestern San Bernardino Counties, south through western Riverside County (easternmost range is around the San Jacinto Mountains), through San Diego County (up to the western 1370 m (4,490 ft) elevation on the Peninsular Ranges) and south approximately 150 miles into northern Baja California, Mexico (Cope 1889; Stejneger 1889; Yingling 1982; Stebbins 1985, Spiteri 1986; Zeiner *et al.* 1988). *Known Populations in Western Riverside County:* There are scattered documented occurrences for *Charina [Lichanura] trivirgata roseofusca* throughout western Riverside County with aggregations present east of Riverside and east of Lake Mathews. Additional localities include Chino area, Allessandro Heights, Santa Ana Mountains, San Jacinto Mountains, Sage area, Corn Springs, Hemet, and Lakeview Mountains. It is likely that the boa is distributed throughout the study area where suitable habitats exist [b13]	
Phrynosoma coronatum blainvillei San Diego horned lizard	*Habitat: P. c. blainvillii* is found in a wide variety of vegetation types including coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland and coniferous forest (Klauber 1939; Stebbins 1954). In inland areas, this species is restricted to areas with pockets of open microhabitat, created by disturbance (e.g., floods, fire, roads, grazed areas, fire breaks) (Jennings and Hayes 1994). *Distribution:* Historically, *Phrynosoma c. blainvillii* was distributed from the Transverse Ranges in Kern, Los Angeles, Santa Barbara, and Ventura counties southward through the Peninsular Ranges of southern California to Baja California (Jennings 1988b). *P. c. blainvillii* seems to have disappeared from about 45 % of its former range in southern California, in particular on the coastal plain where it was once common (Hayes and Guyer 1981) in riparian and coastal sage scrub habitats on the old alluvial fans of the southern California coastal plain (Bryant 1911, Van Denburgh 1922). In California, *Phrynosoma c. blainvillii* ranges from the Transverse Ranges south to the Mexican border west of the deserts, although the taxon occurs on scattered sites along the extreme western desert slope of the Peninsular Ranges (Jennings 1988b). The known elevation range of this species is from 10 meters (33 feet) at the El Segundo dunes (Los Angeles County) to approximately 2130 meters (6990 feet) at Tahquitz Meadow, on San Jacinto mountain, in Riverside County. *Phrynosoma c. blainvillii* is thought to intergrade with *P. c. frontale* in extreme southern Kern county and northern Santa Barbara, Ventura, and Los Angeles counties (Reeve 1952, Montanucci 1968, Jennings 1988b). *Known Populations in Western Riverside County:* This species is distributed throughout western Riverside County. No specific population aggregations are apparent within the planning area.[b1]	Fed: fss State: ssc
Salvadora hexalepis virgultea coast patch-nosed snake	*Habitat: S. hexalepis* is a broad generalist in its habitat requirements. It seems to make use of whatever cover is available and thrives in most environments (Stebbins 1954). It occupies desert scrub, coastal chaparral, washes, sandy flats, and rocky areas. Additionally, Bogert (1939) noted a predilection in *S. hexalepis virgultea* (coastal patch-	Fed: – State: ssc

Species a1	Habitat and Distribution	Status c
	nosed snake) for brush or chaparral. He deduced that each form in the genus *Salvadora* occupies different habitats that are segregated based on natural physiographic and climatic factors, or combinations of the two. *Distribution:* The western patch-nosed snake ranges from west-central Nevada south to the tip of Baja California and northwestern Sonora, and from coastal southern California to southwestern Utah and central Arizona, occurring from below sea level to around 2,130 meters (Goldberg 1995). *Known populaitons in Western Riverside County:* Two species of patch-nosed snake occur in Riverside County, the desert *(S. hexalepis hexalepi*s) and coastal *(S. hexalepis virgultea)* forms. Bogert (1939) reports a population of *hexalepis* occurring at Riverside Mountain, two miles east on Pinon Flat, Riverside County; and populations of *virgultea* occurring at Banning, Riverside, San Jacinto, Perris, Sage, and Vandeventer Flat, Riverside County.[b13]	
Sceloporus graciosus vandenburgianus southern sagebrush lizard	*Habitat:* Sagebrush, manzanita-ceanothus brushland, pinon-juniper woodland, pine and fir forests (Stebbins 1985). Prefer good light, open ground, and scattered low bushes. Usually found near bushes, brush heaps, logs, or rocks (Stebbins 1985). *Distribution:* Mountains of southern coastal California and Baja California, Mexico. Above 1,500 meters (4900 feet) in all counties except Orange. *Known Populations in Western Riverside County:* In Santa Ana Mountains above 3,000 feet and in the San Jacinto and Santa Rosa mountians at 5,000 feet and above (Glaser 1970). Historic occurrences have been recorded in the following areas: Santa Ana Mountains above 3,000 feet; Fuller's Mill at 5,850 to 7,000 feet; road between Fuller's Mill and Schain's Ranch at 5,500; Hall's Mill site near Schain's Ranch at 5,500 feet; Hall Creekat about 5,000 feet; Idyllwild at 6,000 feet; Strawberry Valley at 6,000 feet; Fern Valley; Keen Camp; Tahquitz Peak at 8,000 feet; canyon east of Round Valley at 8,500 feet; Thomas Mountain; Snow Creek at 5,500 feet; Santa Rosa Peak at 7,500 feet (Glaser 1970).[b1]	Fed: – State: –
Sceloporus orcuttii orcuttii granite spiny lizard	*Habitat:* Granite outcrops in areas of oak and chaparral, ranging into the yellow pine belt below 1676 meters elevation. *Distribution:* Lower slopes of the Peninsular Ranges in southern California from the north side of San Gregorio Pass south to the tip of Baja California, Mexico. Typically found from elevations of sea level to around 2134 meters (7000 feet). *Known Populations in Western Riverside County:* Known to occur throughout western Riverside County on granite outcrops. Research collections were made of this species by Mayhew (1963) on typical habitat at the University of California at Riverside Campus (UCR), the Box Springs Mountains just east of UCR, granite outcrops between 2-9 miles south of UCR, Mount Rubidoux in the City of Riverside, and in the San Jacinto Mountains. Santa Ana Mountains, Arlington, Mockingbird Canyon, Reche Canyon, Moreno, Val Verde, Woodcrest, Gavilan, Temescal, Perris, Elsinore, and Lake Perris State Park. Additional localities include Domenogoni Valley, Vail Lake area Potrero Valley, Cactus Valley, Crown Valley, Harford Springs area, Motte Reserve, and the Santa Rosa Plateau. [b1]	Fed: – State: –
Thamnophis hammondii two-striped garter snake	*Habitat*: Oak woodlands, mixed oak and chaparral on coastal slopes of mountains and foothills to sea level. Closely associated with streams with rocky beds and bordered by willows (Stebbins 1985), also ponds, lakes, wetlands and vernal pools. *T. hammondii* is one of the most aquatic of the garter snakes (Rossman et al. 1996). *Distribution*: From Monterey County southward along the coast and drainages within the coast and peninsular ranges to Mission San Fernando Velicata in northwestern Baja California, Mexico (Stebbins 1985; McGuire 1989). McGuire and Grismer (1993) concluded that *T. digueti* is an invalid taxon and should be regarded as synonymous with *T. hammondii*, extending the range to the tip of Baja California. It also occurs on Catalina Island. Elevational distribution extends from sea level to 2130 m (7000 feet) (Stebbins 1985).	Fed: fss State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	Known Populations in Western Riverside County: Riparian, wetland, and vernal pool areas of the San Jacinto Mountains, near Lake Elsinore and Skinner Reservoir. Moist areas from the Santa Ana and Elsinore Mountains, through interior valleys, over the San Jacinto Mountains to elevations of at least 8,000 feet (Glaser 1970). Known historic occurrences include the following: Santa Ana Mountains to 4,300 feet; Riverside; Mockingbird Canyon; Elsinore; Temecula to 1 mile north; San Jacinto River, 8.6 miles southeast of Hemet; Tahquitz Valley at 8,000 feet; Kenworthy; Hemet Lake to 1 mile west; Hall Creek at 5,000 feet; base of San Jacinto Mountains near Cabazon; Palm Canyon at 800 feet (Glaser 1970). *Known Populations in Western Riverside County:* Riparian, wetland, and vernal pool areas of the San Jacinto Mountains, near Lake Elsinore and Skinner Reservoir. Moist areas from the Santa Ana and Elsinore Mountains, through interior valleys, over the San Jacinto Mountains to elevations of at least 8,000 feet (Glaser 1970). Known historic occurrences include the following: Santa Ana Mountains to 4,300 feet; Riverside; Mockingbird Canyon; Elsinore; Temecula to 1 mile north; San Jacinto River, 8.6 miles southeast of Hemet; Tahquitz Valley at 8,000 feet; Kenworthy; Hemet Lake to 1 mile west; Hall Creek at 5,000 feet; base of San Jacinto Mountains near Cabazon; Palm Canyon at 800 feet (Glaser 1970).[b1]	
Thamnophis sirtalis infernalis California red-sided garter snake	*Habitat*: Depends upon marsh and upland habitats for foraging and refugia near permanent water that have good strips of riparian vegetation (Jennings and Hayes 1994), and meadows adjacent to marshlands (Von Bloeker 1942). *Distribution*: Coastal ranges and valleys of most of coastal California, from Humboldt County to Santa Barbara County. Extremely rare south of Santa Barbara County. Formerly to Riverside County (Temecula River) (Stebbins 1985). Sea level to 832 meters (2730 feet). *Known Populations in Western Riverside County:* Known only from moist areas along the western edge of the interior valleys and plains, but likely occurring in Santa Ana and Elsinore mountains (Glaser 1970). Historic occurrences have been recorded for the following areas: Riverside; Santa Ana River near Rubidoux; Temecula (Glaser 1970). Temecula River (Stebbins 1985). [b1]	Fed: -- State: --
Xantusia henshawi henshawi granite night lizard	*Habitat*: *Xantusia henshawi henshawi* is restricted to narrow microenvironment conditions (Bezy 1972) where it is rarely found far from rock outcrop crevices (Lee 1975). The locally common, but patchily distributed lizard (Lee 1976; Holland and Goodman 1998) is found exclusively in areas of massive rocks, rock outcrops, and flaking granite, in a variety of desert, chaparral, and woodland habitats (Zeiner *et al.* 1988). It takes cover in cracks and crevices and can be found under flakes and slabs of exfoliating granite (Lee 1974; Zeiner *et al.* 1988). It is almost completely confined to granodiorite or metavolcanic rocky areas within suitable habitats (Lee 1973; Grismer and Galvan 1986; Bezy 1988). Lee (1973b; 1975) found that most of the suitable rock outcrop habitat type used by the lizard is primarily within chaparral habitats, with chaparral-coastal sage scrub and chaparral-creosote bush ecotonal areas also occupied (Lee 1973b; 1975). However, it may utilize grasslands and other habitats between suitable outcrops for movement (Holland and Goodman 1998). *Distribution: Xantusia henshawi henshawi* ranges from southern California (South Cabazon, Riverside County [Glaser 1970]) south into northern Baja California, Mexico (Arroyo Encanto, Baja California Mexico [Lee 1976]). The lizard can be found in arid and semi-arid habitats on the coastal and desert slopes of the Peninsular Ranges, occupying the San Jacinto Mountains and Santa Rosa Mountains (Riverside County), Laguna Mountains (San Diego County), and the San Pedro Martir Mountains (Baja California Del Norte, Mexico). Its elevational range is from 130 to 1200 m (430-3,900 feet) in California (Zeiner *et a*l. 1988) though Lee (1976) indicates that it reaches 2250 m, (7,400 feet) presumably in Mexico.	**Fed: --** **State: --**

Species [a1]	Habitat and Distribution	Status [c]
	Known Populations in Western Riverside County: Historic populations of *Xantusia henshawi henshawi* are known to occur in southern Banning (Bezy 1972) and within a band that appears to wrap around the Banning area south along the base of San Jacinto Mountain, through the Pine Meadow area, to the west around the Wilson Creek/Vail Lake/Aguanga area, and also south into the Cleveland National Forest (Lee 1975; 1976). The MSHCP data base also show populations occurring in San Jacinto, southwest of the San Jacinto River and north of Hemet, around the Cactus Valley area, in the vicinity of Sage, and in Winchester. A number of these points appear to be outside the known range of the species in areas which probably do not support their narrow ecological requirements, therefore the more centrally-located points should be scrutinized carefully for appropriate habitat features. [b13]	
Birds [a2]		
Accipiter cooperii Cooper's hawk	*Habitat:* Cooper's hawks breed primarily in riparian areas and oak woodlands and apparently are most common in montane canyons (Garrett and Dunn 1981; Hamilton and Willick 1996). Migrant and wintering birds are generally more catholic in their choice of habitats and may be found with regularity in developed (e.g., suburban) areas. Hunts in broken woodland and habitat edges, catching predominantly avian prey in air, on ground, and in vegetation. This species is seldom found in areas without dense tree stands or patchy woodland habitat (Zeiner, et al. 1990). *Distribution:* Cooper's hawks breed from British Columbia eastward to Nova Scotia and southward to northern Mexico and Florida. The species winters from British Columbia eastward to New England southward primarily to Honduras (AOU 1998). This species was once considered a common nester throughout California (Grinnell and Miller 1944). In southern California, the species is present year-round nearly throughout, except for the Colorado River and desert areas, where the species no longer breeds (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Cooper's hawks apparently may be found nearly throughout the study area in appropriate woodland habitats (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Data records are located throughout much of the study area except in the easternmost desert areas. Locations appear to be concentrated along the Santa Ana River, within the Lake Elsinore/Canyon Lake area, and in the southwestern portion along Temecula and Murrieta creeks and along the Santa Margarita River. Important breeding populations include a large concentration in the Prado Basin and contiguous reaches of the Santa Ana River. Cooper's hawks also occur in select woodland habitats (at least in winter) throughout the study area.[b1]	Fed: – State: ssc
Accipiter gentilis northern goshawk	*Habitat:* Northern goshawks typically nest in moderately dense montane forests that are broken by lakes, streams, meadows, or openings. "Nests are usually concealed in dense, but sometimes small groves of large pines, firs, or aspens" (Gaines 1988). The goshawk prefers middle and higher elevations and mature, dense conifer forests. The species may casually occur in winter along the coast, throughout the foothills, and in the northern deserts where it may be found in pinyon-juniper and low-elevation riparian habitats (Zeiner et al. 1990). Distances between pairs have been reported to be 1.8 to 3.5 miles (Zeiner et al. 1990). *Distribution:* Northern goshawks breed in North America locally from Alaska eastward to Newfoundland southward to southern California, New Mexico, mainland Mexico, and Maryland. Baja California, central Mexico, and the Gulf Coast. The species winters primarily within the breeding range (AOU 1998). The northern goshawk is an uncommon permanent resident in the mountains of California in the Sierra south at least as far as Tulare County and in the Coast Range south as far as Mendocino County (Grinnell and Miller 1944). Within southern California, the species breeds only in Ventura County (e.g., Mount Pinos, Mount Abel), the San Bernardino Mountains, and the San Jacinto	Fed: fss,smc State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	Mountains (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Currently a very rare resident in southern California (including the planning area) (Garrett and Dunn 1981). The species apparently breeds in western Riverside County only within the San Jacinto Mountains. There currently is a known maximum of two breeding pairs in the Lake Fulmor/Lawlor Lodge area in the San Jacinto Mountains (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). **[b1]**	
Accipiter striatus sharp-shinned hawk	*Habitat*: The species breeds in young coniferous forests with high canopy associations. Breeding home ranges may be as large as approximately 800 hectares (Johnsgard 1990). Sharp-shinned hawks may occur in a large variety of woodland habitats during winter and migration periods and are most common in southern California in the coastal lowlands and desert areas (e.g., Garrett and Dunn 1981). Habitats that they are documented to use include ponderosa pine, black oak, riparian deciduous, mixed conifer, and Jeffrey pine. All habitats except alpine, open prairie and bare desert are used in the winter (Zeiner et al. 1990). *Distribution*: Breeds from Alaska southward throughout much of Canada, the northern lower 48 states, the Rocky Mountain west, mountains of the far west, parts of the Gulf States, and the highlands of Mexico. A highly migratory species, the sharp-shinned hawk winters from the lower 48 states to Panama and various Caribbean islands (AOU 1998). *Known Populations in Western Riverside County:* Although sharp-shinned hawks have been repeatedly recorded in the San Jacinto Mountains during summer months, there are no confirmed records of breeding there or in the study area as a whole (Grinnell and Miller 1944; Garrett and Dunn 1981).**[b1]**	Fed: – State: ssc
Agelaius tricolor tricolored blackbird	*Habitat*: The tricolored blackbird forms the largest colonies of any North American passerine bird. This behavior results in specific habitat requirements. Breeding colonies may attract thousands of birds to a single site. These colonies require nearby water, a suitable nesting substrate, and open-range foraging habitat of natural grassland, woodland, or agricultural cropland. In winter, they often form single-species, and sometimes single-sex, flocks, but they also flock with other blackbird species. They often change their nesting locations from year to year. These changes may be an adaptation to exploit rapidly changing environments in ephemeral habitats, providing secure nesting sites and plentiful insect food supplies (Beedy and Hamilton 1999). The tricolored blackbird breeds near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs and forages in grassland and cropland habitats (Ziener *et al.* 1990). The species seeks cover in emergent wetland vegetation, especially cattails and tules; also in trees and shrubs (Ziener *et al.* 1990). It roosts in large flocks in emergent wetland or in trees (Terres 1980). Although true marsh habitat with its growth of cattails and tules is favored, marshes are not necessary for the nesting of the species (Neff 1937). Within the Central Valley of California, the tricolored colonies are generally found in the rice lands of the Sacramento Valley and pasture lands of the lower Sacramento Valley and San Joaquin Valley. The colonies outside the Central Valley are in several different habitat types including being surrounded by chaparral covered hills which may extend for miles, surrounded by orchard, adjacent to salt marsh, or surrounded by sagebrush-grasslands (Dehaven et al 1975). *Distribution*: The tricolored blackbird has a relatively restricted range, breeding from southern Oregon and the Modoc Plateau of northeastern California, south through the lowlands of California west of the Sierra Nevada to northwestern Baja California (Grinnell and Miller 1944). The species is not migratory but is nomadic and highly colonial, although the pattern of nomadism is poorly known (Orians 1961). Large flocks appear suddenly in areas from which they have been absent for months,	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	they breed, and then quickly withdraw, known as itinerant breeding (Orians 1961). The tricolored blackbird is mostly a resident in California (Ziener *et al.* 1990). It is common locally throughout the Central Valley and in coastal districts from Sonoma County south (Ziener *et al.* 1990). Since 1980, active breeding colonies have been observed in 46 California counties and most of the largest colonies are in the Central Valley (Beedy and Hamilton 1999). It breeds locally west of the Cascade Range, Sierrra Nevada, and southeastern deserts from Humboldt and Shasta counties south to extreme southwest San Bernardino County, western Riverside County and western and southern San Diego County. In Central California, its breeding extends east into the foothills of the Sierra Nevada (Beedy and Hamilton 1999). It is a summer resident in northeastern California, occurring regularly only at Tule Lake, but has bred some years as far south as Honey Lake and in the marshes of the Klamath Basin in Siskiyou and Modoc counties (Ziener *et al.* 1990). In the southern deserts, it is found regularly only at Antelope Valley, Los Angeles County. In winter, it becomes more widespread along central coast and San Francisco Bay area (Grinnell and Miller 1944, McCaskie et al. 1979, Garrett and Dunn 1981). Not migratory over most of its range, but leaves Oregon, northeastern California, Santa Barbara County and eastern San Diego County in fall and winter, presumably migrating south (Ziener *et al.* 1990; Beedy and Hamilton 1999). Flocks become nomadic in fall seeking food (Ziener *et al.* 1990). In winter, flocks become more widespread from Marin to Santa Cruz counties and in Sacramento River Delta (Ziener *et al.* 1990). *Known Populations in Western Riverside County:* May be found throughout western Riverside County wherever there is suitable habitat (Zeiner *et al.* 1990). The early studies (1931 through 1936) of zoologists concluded that no nesting colonies were located within Riverside County (Neff 1939). Later studies within the planning area documented one to three breeding colonies comprising 2,000 to 15,750 birds (Dehaven *et al.* 1975). The historical colonies appear to be located generally in the western portion of the planning area, along the Interstate 15 corridor, including Alberhill area and near Temecula (Dehaven *et al.* 1975). Tricolored blackbird colonies were first discovered in Riverside County in 1950 and intermittent breeding was reported through the 1980s (Beedy *et al.* 1991). The largest colony during this time period, at the San Jacinto Wildlife Area, contained 3,000 pairs (4,500 adults) and was extant in 1989. Establishment of this colony contributed an almost 300 percent increase in the regional tricolored breeding population since the 1970s. However, this regional area only comprised about 4 percent of the total tricolored breeding population reported during the 1980s (Beedy *et al.* 1991). The population within the planning area does not appear to be migratory (Garrett and Dunn 1981). **[b2]**	
Aimophila ruficeps canescens rufous-crowned sparrow	*Habitat:* Rufous-crowned sparrows are found on grass-covered hillsides, coastal sage scrub, and chaparral and often occur near the edges of the denser scrub and chaparral associations. Preference is shown for tracts of California sage *(Artemisia californica)*. It also colonizes grass that grows as a successional stage following brush fires (Unitt 1984). Optimal habitat consists of sparse, low brush or grass, hilly slopes preferably interspersed with boulders and outcrops (Willet, 1912, 1933; Grinnell 1915, 1926, Grinnell and Miller 1944; Bent 1968; Pulliam and Mills 1977; Phillips et. Al 1983; Unitt 1984; Ehrlich et al. 1988; Root 1988). May occur on steep grassy slopes without shrubs if rock outcrops are present (Zeiner et al. 1990). Some observers have noted a preference for south-facing slopes and an affinity for California sagebrush over other vegetative types (Barlow 1902, Grinnell, 1914, Grinnell and Miller 1944, Bent 1968; Root 1988). *Distribution:* The current range and distribution of this subspecies is extremely restricted to a narrow belt of semiarid coastal sage scrub and sparse chaparral from Santa Barbara south to the northwestern corner of Baja California. (Todd, 1922, Grinnell, 1926, Grinnell and Miller 1944,	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	Bent 1968, Zeiner et al. 1990; Unitt 1984) *Known Populations in Western Riverside County:* Species maps provided by the Fish and Wildlife Service indicate the majority of reported occurrences are located in the southwestern corner of the county, forming a belt along the foothills of the San Jacinto Mountains, southeasterly to Temecula.[b1]	
Ammodramus savannarum perpallidus grasshopper sparrow	*Habitat:* Grasshopper sparrows in California breed (and primarily apparently winter) on slopes and mesas containing grasslands of varying compositions (Grinnell and Miller 1944; Garrett and Dunn 1981). They especially occur in grasslands composed of a variety of grasses and tall forbs with scattered shrubs for singing perches (Zeiner et al. 1990). *Distribution:* The species as a whole breeds from eastern Washington eastward to southern Maine southward to southern California, northernmost Mexico and Virginia. Grasshopper sparrows winter from California to North Carolina south through Middle America to Costa Rica (AOU 1998). In southern California, the species occurs locally in appropriate habitats west of the deserts (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* The species apparently occurs locally throughout much of western Riverside County in suitable habitat. Grasshopper sparrows apparently are most heavily concentrated in the Prado Basin, Santa Rosa Plateau, Lake Skinner, Black Mountain, and Kabian Park areas and, possibly, in the Lake Mathews area (Loren R. Hays, Fish and Wildlife Service, pers. obs.; Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Additional areas of concentration based on the U.C. Riverside database include the Lake Elsinore/Canyon Lake area, Murrieta Hot Springs and Temecula area, as well as the Eastside Reservoir and Santa Rosa Plateau Reserve.[b1]	Fed: smc State: –
Amphispiza bellii bellii Bell's sage sparrow	*Habitat:* The Bell's sage sparrow is a 5-6 inch long bird with a grey-brown head which sets off its white eye ring, a white lore spot, and broad white moustachial stripe, bordered by a dark whisker stripe. Sage sparrows are fairly common on alkaline flats in sagebrush and saltbrush, and in open arid desert in winter. This subspecies inhabits fairly dense, semi-open, or continuous areas of low, desert scrub and dry chaparral along coastal lowlands, inland valleys, and in the lower foothills of local mountains. Other coastal scrub habitats associated with Bell's sage sparrow include *Artemisia, Purshia,* and *Atriplex* as well as mixed brush and cactus patches in arid washes (Grinnell and Miller, 1944). Bell's sage sparrow usually nests in sagebrush or chaparral, and may have 2 broods per nest season (Ehrlich et al. 1988). The prefer to nest in an intermediate shrub size of 50 to 70 cm (1.6-2.3 feet) tall, which may represent a compromise between shrubs that provide favorable foraging sites, avenues of movement, and sufficient cover. Sage sparrows predominantly forage on the ground, feeding mostly on seeds in the winter and arthropods in the early breeding season, and switching to grasshoppers in the late breeding season (Rotenberry 1980). *Distribution:* A nonmigratory resident on the coastal ranges of California, on the western slope of the central Sierra Nevada mountains, and into northwestern Baja California (Bent, 1968). Generally found throughout the year in southern California and Baja areas where winter range overlaps with breeding range (Birds of North America, No. 326, 1998) *Known Populations in Western Riverside County:* Assumed to be wide but patchy distribution in western Riverside County, Bell's sage sparrow may occur in extant stands of dry chaparral coastal sage scrub habitat. In addition to existing core areas in the Lake Elsinore, Canyon Lake, Wildomar, Murrieta and Eastside Reservoir areas, other areas include Steele Peak, and along the foothills of the San Jacinto and Box mountains. (B. Carlson, pers. comm., 1998). Database records indicate the species is widely scattered throughout the study area except in the montane and desert regions from which data may be lacking due to survey effort.[b1]	Fed: smc State: ssc

Species [a1]	Habitat and Distribution	Status [c]
Aquila chryseatos golden eagle	*Habitat:* Range-wide, golden eagles occur locally in open country (e.g., tundra, open coniferous forest, desert, barren areas), especially in hills and mountainous regions (AOU 1998). Within southern California, the species "...favor grasslands, brushlands, deserts, oak savannas, open coniferous forests, and montane valleys. Nesting is primarily restricted to rugged, mountainous country." (Garrett and Dunn 1981). The essential habitat components of the golden eagle include a favorable nest site such as a large tree or cliff, a dependable food supply including medium to large mammals and birds, and a broad expanse of open country for foraging (Johnsgard 1990). Foraging takes place over large areas of grassland and open chaparral or coastal sage scrub. Nesting areas are very sensitive to human encroachment and disturbance (Dave Bittner, pers. comm.). *Distribution:* Golden eagles in North America breed locally from northern Alaska eastward to Labrador southward to northern Baja California, northern Mexico, and Maine. The species winters from southern Alaska and southern Canada southward through the breeding. Golden eagles are sparsely distributed throughout most of California, occupying primarily mountain and desert habitats. Approximately 500 breeding pairs are estimated to nest in California. *Known Populations in Western Riverside County:* The species apparently occurs (or has occurred) locally throughout much of western Riverside County in suitable habitats. The U.C. Riverside database indicates the species has been reported generally throughout the study area except within the forested portions of the eastern and western sections. Golden eagles have been detected in recent years in the Badlands, at Lake Perris and environs, at Lake Mathews and environs, Steele Peak, Menifee area, Temecula area, and at the western escarpment of the San Jacinto Mountains (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998) and in the Prado Basin (L.R. Hays, Fish and Wildlife Service, pers. obs.). The species nested in 1998 in the Chino Hills just outside of the study area and may nest in or near the other aforementioned locales. Additional localities include Potrero Valley, Hemet area, Banning area, and Santa Rosa Plateau.[b1]	Fed: – State: ssc
Asio flammeus short-eared owl	*Habitat*: The short-eared owl is usually found in open areas with few trees, such as annual and perennial grasslands, prairies, tundra, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands (Zeiner *et al.* 1990;Terres 1980). Commonly found in treeless areas using fence posts and small mounds as perches (Zeiner *et al.* 1990). Requires dense vegetation; tall grasses, brush, ditches, and wetlands are used for resting and roosting cover and may roost on the ground (Grinnell and Miller 1944). It is found in open, treeless areas with elevated sites for perches, and dense vegetation for roosting and nesting (Zeiner *et al.* 1990). Typically winters in agricultural fields and grasslands (Garrett and Dunn 1981). May roost in evergreen trees or groves near agriculture fields in the winter (Terres 1980). Within southern California, where it is considered a non-breeding bird, it is seen in saltwater marshes, freshwater marshes, tall grass meadows, and agricultural lands at almost any time of year, but most commonly late August through mid-April (Terres 1980). *Distribution*: The short-eared owl is a ground-dwelling owl that lives on every continent except Australia (Terres 1980). As a resident of mixed and tall grass habitats, it is a nomadic species that tends to congregate in areas where vole populations are high. They are generally reported in small numbers across central and western North America and may occur in winter throughout all of the United States and southern Canada (Clark 1975). The range is considered to include from northern Alaska, to Newfoundland, south to southern California. Breeding also occurs in Nevada, Utah, northeastern Colorado, Kansas, Illinois, Indiana, southern Ohio, New York, New Jersey, and Virginia (Terres 1980). The species was formerly a resident, locally, the length of the state, excluding higher mountains (Zeiner *et al.* 1990). A widespread winter migrant, found primarily in the Central Valley, in the western Sierra Nevada	Fed: smc State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	foothills, and locally in the southern desert region (Dixon and Bond 1937). An uncommon winter migrant in southern California, including the Channel Islands, with only one recent breeding record within the desert regions of the southern California area (Garrett and Dunn 1981). It is considered primarily a non-breeder in southern California (Terres 1980). The species winters occasionally almost throughout the breeding range but there is some migration to Texas, the Gulf coast, and Florida from parts of the nesting range when snow covers the fields and rodent population (Terres 1980). Migrants usually arrive in California in September or October, and leave in April (Zeiner *et al.* 1990). Concentrates in winter in areas where prey is abundant, and snow cover is scant or absent (Bent 1938). *Known Populations in Western Riverside County:* The short-eared owl has not been documented to occur in western Riverside County as a breeding bird (Zeiner *et al.* 1990; Garrett and Dunn 1981). It is considered an uncommon and local winter visitant in the planning area and documented to likely overwinter with some regularity (Garrett and Dunn 1981). The UCR database has few records within the central portion of the planning area, however none of the locations are documented as breeding locations. [b2]	
Asio otus long-eared owl	*Habitat*: Zeiner *et al.* (1990) summarize habitat and habitat associations as: riparian habitat is required by the species but it also uses live oak thickets and other dense stands of trees. Usually hunts in open areas, occasionally in woodland and forested habitats. Riparian or other thickets with small, densely canopied trees required for roosting and nesting (Terres 1980). Frequents dense, riparian and live oak thickets near meadow edges, and nearby woodland and forest habitats (Marks *et al.* 1994). Also found in dense conifer stands at higher elevations, however this is for roosting and nesting only and the forested areas within which it occurs are usually adjacent to more open habitat including grasslands and shrublands (Marks *et al.* 1994). The long-eared owl appears to be more associated with forest edge habitat than open or forest habitat (Holt 1997). During the breeding season, the species uses the hardwood deciduous forests and during the winter season, it was observed using coniferous woods (Wilson 1938). It occurs at elevations from near sea level to over 2,000 meters. *Distribution*: The breeding range of the long-eared owl includes the area from southeastern Yukon, northeastern British Columbia, and northern Alberta across central Canada to the Maritime Provinces and south to northern Baja California, southern Arizona, southern New Mexico, east to Pennsylvania, New York and northern New England (Marks *et al.* 1994). It also occurs in Europe and Asia (Terres 1980). The species may winter throughout the breeding range but the northernmost areas of the breeding range usually are evacuated in the winter. It winters largely from southern Canada and northern New England south, occasionally to the Gulf states and Jalisco, Michoacan, Guerrero, and Oaxaca in the interior of Mexico (Marks *et al.* 1994). Although the spring and fall movements suggest a regular migration of the species, the extent of migration versus nomadic movements in response to varying prey population movements is unclear. In California, the long-eared owl is an uncommon resident or winter visitant throughout most of the northern part of the state, excluding the humid North Coast Range, Cascade Range, and higher elevations of the Sierra Nevada. It is a winter visitant of tamarisk and other tree stands in the Mojave Desert, and a very rare winter migrant along the southern coastline. Uncommon local resident of Owens Valley, Fish Lake Valley, and numerous wooded washes and oases throughout southeastern California (Garrett and Dunn 1981). Apparently makes only local movements in California, although some migration may occur (Zeiner et al. 1990). May be seasonal movement westward from Sierra Nevada foothills in fall (Zeiner et al. 1990). Small (1974) reported irregular wandering of groups in winter. It is apparent from capture records that within southern California the species is a year-round resident. Often	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	congregates in winter flocks, perhaps including family groups (Zeiner, *et al.* 1990). *Known Populations in Western Riverside County:* Has not been documented recently to occur in western Riverside County either as a breeding bird or for wintering by the general literature (Zeiner et al. 1990). Its occurrence within the planning area is considered to be as a rare transient and winter visitant with few breeding locations (Garrett and Dunn 1981). It is documented by the UCR database to be sparsely located within the planning area but appears to be absent from the forested mountainous areas and the desert areas and breeding locations are not documented within the literature. The only known breeding location is for Potrero Creek (Garrett and Dunn 1981; Hayworth pers. Obs.). The long-eared owl has been recorded for the riparian habitat of the Santa Margarita River and Prado Basin along the Santa Ana River, however the exact location is unknown and breeding is not documented. The reach of the Santa Margarita River that was studied included the portion from the Pacific ocean to the Temecula Gorge; the studies of the Santa Ana River were concentrated at Prado Basin (Zembel 1987). Based on the past breeding records, it is considered a year-round resident, a transient, and a winter visitant (Zeiner *et al.* 1990; Garrett and Dunn 1981). [b2]	
Athene cunicularia burrowing owl	*Habitat:* The burrowing owl occurs in short-grass prairies, grasslands, lowland scrub, agricultural lands (particularly rangelands), prairies, coastal dunes, desert floors, and some artificial, open areas as a yearlong resident. They may also occur in forb and open shrub stages of pinyon-juniper and ponderosa pine habitats (Zeiner et al. 1990). They require large open expanses of sparsely vegetated areas on gently rolling or level terrain with an abundance of active small mammal burrows. They may also dig their own burrow in soft, friable soil and may also use pipes, culverts, and nest boxes where burrows are scarce (Robertson 1929). The mammal burrows are modified and enlarged. One burrow is typically selected for use as the nest, however, satellite burrows are usually found within the immediate vicinity of the nest burrow within the defended territory of the owl. The burrowing owl is primarily a diurnal and crepuscular hunter with a prey base including invertebrates and small vertebrates (Thomsen 1971). They may hunt by using short flights, running along the ground, hovering or by using an elevated perch from where prey is spotted. The home range may vary from 0.1 to 4 acres with an average distance between burrow of 436 feet (Thomsen 1971, Martin 1973). *Distribution:* Breeds from southern interior British Columbia (nearly extirpated), southern Alberta, southern Saskatchewan (extirpated from portion of province), and southern Manitoba (extirpated from portion of province), south through eastern Washington, central Oregon, and California to Baja California, east to Western Minnesota, northwestern Iowa, eastern Nebraska, central Kansas, Oklahoma, eastern Texas, and Louisiana, and south to central Mexico. Winters south regularly to El Salvador (e.g., AOU 1998). In California, burrowing owls are restricted to the central valley extending from Redding south to the Grapevine, east through the Mojave Desert and west to San Jose, the San Francisco Bay area, the outer coastal foothills area which extend from Monterey south to San Diego and the Sonoran desert (Grinnell and Miller 1944). *Known Populations in Western Riverside County:* The species has recently been detected east of I-215 on March Air Force Base, the Perris Reservoir area, east of Skinner Reservoir, the upper Menifee Valley, west of San Jacinto reservoir, along Santa Gertrudis Creek, and within the cities of Corona, Riverside, and Banning (Fish and Wildlife Service, unpublished data; California Science and Engineering Associates 1996). It has also been reported to occur in the Lake Skinner-Domenigoni Valley reserve, Lake Mathews Reserve and the Sycamore Canyon-March ARB Reserve. A focused survey of all suitable areas in the western portion of the county has not been conducted. Observed locations from the U.C. Riverside database tend to be scattered within the central	Fed: – State: ssc

Species a1	Habitat and Distribution	Status c
	portion of the study area within the more level areas. Populations have been recently confirmed at March Air Force Base, Perris Reservoir, Skinner Reservoir, upper Menifee Valley and at San Jacinto. Other critical colonies are possible between and outside these areas.[b1]	
Botaurus lentiginosus American bittern	*Habitat:* Golden eagles in North America breed locally from northern Alaska eastward to Labrador southward to northern Baja California, northern Mexico, and Maine. The species winters from southern Alaska and southern Canada southward through the breeding. Golden eagles are sparsely distributed throughout most of California, occupying primarily mountain and desert habitats. Approximately 500 breeding pairs are estimated to nest in California. *Distribution:* American bitterns breed locally from southeastern Alaska eastward to Newfoundland southward to southern California and Virginia; also bred (at least formerly) on the Mexican plateau. The species winters from British Columbia eastward to northern Florida south through (at least) Mexico and Cuba (AOU 1998). Within coastal southern California, the species is primarily a winter visitant, with nesting occurring only rarely in the coastal plain (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Although American bitterns have been repeatedly recorded in the San Jacinto Wildlife Area/Mystic Lake area (Garrett and Dunn 1981) and the Prado Basin and could breed at both locales, there currently are no confirmed breeding colonies in west Riverside County (see below). Birds could be found, albeit rarely, in appropriate habitat nearly throughout the study area, particularly in winter. The only locales where American bitterns have been consistently reported recently in western Riverside County are the San Jacinto Wildlife Area/Mystic Lake and Prado Basin. The species could breed at both locales.[b1]	Fed: smc State: –
Buteo regalis ferruginous hawk	*Habitat:* Range-wide, ferruginous hawks winter in open terrain and grasslands of plains and foothills (Grinnell and Miller 1944). Within southern California, ferruginous hawks typically winter in open fields, grasslands, and agricultural areas; "…arid desert scrub is generally avoided" (Garrett and Dunn 1981). Searches for prey from low flights over open, treeless areas, and glides to intercept prey on the ground. The species also hovers and hunts from high mound perches. It also roosts in open areas usually in a lone tree or utility pole (Zeiner et al, 1990). *Distribution*: Breeds from British Columbia locally eastward to southwestern Manitoba generally southward to Nevada and Texas. The species winters from central and southern parts of breeding range southward to Baja California and northern mainland Mexico (AOU 1998). Does not breed in southern California but winters there in interior and coastal areas (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Ferruginous hawks may be found locally in appropriate habitats nearly throughout western Riverside County, which is an important wintering area for this species, especially within the central portion of the study area. Important wintering areas in southern California as a whole include the Lakeview-Perris area (Garrett and Dunn 1981). Elsewhere, important ferruginous hawk habitats occur in the Prado Basin, the Murrieta area, Domenigoni Valley, and Rawson Canyon and environs (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998).[b1]	Fed: smc State: ssc
Campylorhynchus brunneicapillus couesi cactus wren	*Habitat:* The coastal cactus wren is an obligate, nonmigratory resident of the coastal sage scrub plant community (as defined by Westman 1981, and O'Leary 1990). It is closely associated with three species of cacti and occurs almost exclusively in thickets of cholla (*Opuntia prolifera)* and prickly pear (*Opuntia littoralis* and *Opuntia oricola)* dominated stands of coastal sage scrub below 457 meters in elevation on mesas and lower slopes of the coast ranges. Characteristic shrubs associated with coastal sage scrub include California buckwheat *(Eriogonum fasiculatum)*, coastal sagebrush *(Artemisia californica)*,	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	several sages *(Salvia* spp.) and scattered shrubs approaching tree-size, such as laurel sumac *(Malosma laurina)*, and lemonadeberry (*Rhus integrifolia)* (Garrett and Dunn 1981, Unitt 1984, Rea and Weaver 1990). Forages on the ground and in low vegetation for insects and other small invertebrates, cactus fruits and other fruits, seeds and nectar (Anderson and Anderson 1973). Thickets of vegetation provide cover and shelter and the nest, which is usually located in cactus, is used as a roost site. *Distribution*: Historically, coastal cactus wrens were found on the coastal slopes and lowlands of southern California in arid and semiarid regions with abundant cacti (Grinnell 1898, Grinnell and Miller 1944 Unitt 1984). As early as 1944, authorities noted that loss of habitat had greatly reduced the historical range of this species (Grinnell and Miller 1944). The current range of the coastal cactus wren occurs in cismontane southern California from southern Ventura County, east through coastal Los Angeles County to southwestern San Bernardino County, and south through Orange County, western Riverside County to coastal San Diego County, California and extreme northwestern Baja California, Mexico. Maps depicting the distribution of the coastal population of the cactus wren are presented in Garrett and Dunn (1981) and Rea and Weaver (1990). The range of *C. b. cousei* is now geographically disjunct with interior desert populations as a result of urbanization of the corridor along the San Gorgonio Pass in Riverside County (Rea and Weaver 1990) . *Known Populations in Western Riverside County:* The coastal cactus wren is found along the eastern flank of the Santa Ana Mountains from the vicinity of Corona to Alberhill and Lake Mathews. It also occurs from the city of Riverside east to the Box Springs Mountains and the Badlands, and south along the western flank of the San Jacinto Mountains to the city of San Jacinto. Small populations also occur in the Moreno Valley and Bernasconi Hills near Lake Perris and in the Lakeview Mountains north of Homeland. About 100 to 110 pairs of the coastal cactus wren are estimated to occur in Riverside County (Robert McKernan, San Bernardino Natural History Museum, San Bernardino CA, pers. comm. 1998). [b1]	
Cathartes aura turkey vulture	*Habitat*: The preferred habitat in eastern North America includes mixed farmland and forest, which provides the best opportunity for foraging on both wild and domestic carrion. For nesting in this region, it prefers forested or partly forested areas with nest sites such as rock outcrops, fallen trees, abandoned buildings, that are isolated from human and perhaps other mammalian disturbance (Kirk and Mossman 1998). Also preferred, are hilly areas that provide deflective updrafts for flight, especially in the north, where thermals may be weak and unpredictable. It avoids extensive areas of row-crop farmland. These preferred area are best found in swampy areas or hilly, often unglaciated uplands with low-input agriculture (Coleman and Fraser 1989a). In the west, it tends to occur most regularly in areas of pastured rangeland, non-intensive agriculture, or wild areas, with rock outcrops suitable for nesting but generally not in the high mountains. Suitable habitat for the species consists of extensive open areas with protected nest and roost sites provided by large trees, snags, thickets, shrubs, and rock outcrops (Zeiner, *et al.* 1990). The species occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting (Garrett and Dunn 1981). The turkey vulture uses large trees, rock outcrops, and riparian thickets for roosting, perching, and sunning (Hatch 1970). The species nesting habitat may occur in forest, rocky cliff or slope, deciduous forest, brushy habitat or grassy habitat. Turkey vultures roost communally during the winter and roost sites contain large conifers that are near habitat features that contribute to air currents (Thompson, *et al.* 1990). *Distribution*: The turkey vulture breeds north to southern British Columbia, northern Idaho, northwestern Montana, east-central Alberta, west-central Saskatchewan, southern Manitoba, western Ontario,	Fed: – State: –

Species [a1]	Habitat and Distribution	Status [c]
	southern Quebec, western Vermont, southern new Hampshire, and southern half of Maine, south through the continental United Stated, Middle America, and South America to Tierra del Fuego and the Falkland Islands. Within the Western United States and western Canada, the breeding range is discontinuous. Breeding is very local or absent in the portions of the Great Plains, including most of Nebraska, eastern Colorado, and much of western Kansas (Kirk and Mossman 1998). It winters primarily from northern California and north Central Valley south to the Mexican border, lower Colorado River Valley north to Parker, Arizona, New Mexico, eastern half of Texas, southeastern Oklahoma, through the southern portions of the mid-western states, north West Virginia, southeastern Pennsylvania, southern New York and southern Connecticut (Kirk and Mossman 1998). The turkey vulture is a partial migrant and individuals that breed north of the wintering range are generally migratory. They may be nomadic along the northern border of the winter range (Kirk and Mossman 1998). The turkey vulture is common in the breeding season throughout most of California (Grinnell and Miller 1944). It is absent to uncommon in most of state in winter, with greatest concentrations in coastal regions and is not found at highest elevations in Sierra Nevada. It migrates south or downslope for winter. Some individuals, occurring in coastal regions, winter in California. The remainder of population migrates, mostly to Central America, for the winter (Grinnell and Miller 1944). Large flocks concentrate along well defined, traditional migration routes in autumn (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* The turkey vulture is considered a year round resident throughout western Riverside county (Zeiner *et al.* 1990). The turkey vulture is widely distributed throughout the planning area especially within the central portion but also has scattered observation locations within the montane areas. It is considered a relatively common spring and fall transient or migrant and an uncommon year round resident (Garrett and Dunn 1981). There are no breeding records for the planning area. [b2]	
Catharus ustulatus Swainson's thrush	*Habitat*: In eastern portions of its range, the Swainson's thrush lives in spruce, fir, and balsam forests and sometimes in deciduous growth whereas west of the Sierra, it occurs in willow thickets of the lowlands along shaded streams; in the Rocky Mountains it occurs from 6,000 to 9,000 feet (Terres 1980). Wooded riparian habitats with a dense understory provide cover in summer (Stewart 1973). Nests and forages near water in wooded riparian habitats (Johnston 1949). Frequents riparian woodlands, especially with dense understory; often forages in nearby forest or woodland. Studies in the Oregon Cascades show Swainson's thrush is associated only with wet portions of stands of Douglas-fir (Gilbert and Allwine 1991). In comparing different microhabitats within a forested area in Idaho, Swainson's thrush was more abundant within an area correlated with greater amount of dense upper story foliage (Johnston 1949). In migration, cover is provided by a variety of woodland and forest habitats with a dense understory, as well as by riparian areas, including desert riparian habitat. *Distribution*: Nests from central Alaska, northern Yukon, to northern Manitoba, east across Canada to southern Labrador and Newfoundland, south to the Alaska Peninsula, southern California, Colorada, northern Great Lakes region, east to southeastern New York, Vermont and Maine, south in the Appalachians to West Virginia (Terres 1980). It winters from southern Mexico to Argentina (Terres 1980). Common as a migrant and summer resident with wide variation in abundance within California; absent in winter (Garrett and Dunn 1981). Found the length of the state in riparian habitats and in dense shrubs. Widespread in spring as a migrant; common in desert riparian habitat and in dense brush throughout interior and on coast. Sometimes found in late spring in riparian habitats in southern mountains. In summer, common in valley foothill riparian habitat along the coast from Santa Barbara Co. north to the Oregon border. Rare in the south and on western slope of Sierra	Fed: – State: --

Species [a1]	Habitat and Distribution	Status [c]
	Nevada in summer; common east of Sierra Nevada crest from Modoc and Lassen cos. through Mono Co. (Grinnell and Miller 1944). In fall, common in the north in Great Basin, interior, and coast (McCaskie *et al.* 1979). In the south in fall, found mainly along immediate coast including Channel Islands; rarely found in southern interior in fall. Arrives in California in April from wintering grounds in Mexico and Central America (Bent 1949). Numbers peak in May, then decline slightly as many migrants continue to breeding grounds farther north. Numbers increase again in September with fall migration, then decline by the end of September as individuals return to wintering grounds (Gaines 1977). *Known Populations in Western Riverside County:* The Swainson's thrush is documented as occurring within most of western Riverside County, within suitable habitat, as a summer resident breeding bird (Zeiner, *et al.* 1990). Although the general literature indicates it could occur anywhere within the planning area, there are few records that are widely scattered within the central and eastern portions of the planning area. The Swainson's thrush has been recorded for the riparian habitat of the Santa Margarita River and Prado Basin along the Santa Ana River, likely a breeding record, however the exact location is unknown. The reach of the Santa Margarita River that was studied included the portion from the Pacific Ocean to the Temecula Gorge; the studies of the Santa Ana River were concentrated at Prado Basin (Zembel 1987). The species also occurs within the planning area as a relatively common spring and fall transient or migrant (Garrett and Dunn 1981). [b2]	
Chaetura vauxi Vaux's swift	*Habitat*: Studies in the Oregon Cascades show Vaux's swift is associated only with old growth stands of Douglas-fir (Gilbert and Allwine 1991). Population numbers of Vaux's swift correlated most strongly with live trees greater than 100 centimeters in diameter at breast height and also with density of snags greater than 50 centimeters in diameter at breast height (Lundquist and Mariani 1991). Roosts in hollow trees and snags, and occasionally in chimneys and buildings; often in large flocks (Bent 1940). Prefers redwood and Douglas-fir habitats with nest-sites in large hollow trees and snags, especially tall, burned-out stubs. The most important habitat requirement appears to be an appropriate nest-site in a large, hollow tree (Zeiner, *et al.* 1990). Forages over most terrains and habitats, often high in the air (Zeiner, *et al.* 1990). Shows an apparent preference for foraging over rivers and lakes and shows the highest abundance in a continuous mesic shrub association compared to herbaceous xeric shrub and discontinuous mesic shrub (Sanders and Edge 1998; Zeiner, *et al.* 1990). *Distribution*: The range of the Vaux's swift is from southeastern Alaska, northeastern British Columbia and western Montana south to Central California, also to Central America. It winters from central California, southern Louisiana; mostly migrates to wintering grounds in Mexico and Central America (Terres 1980). A summer resident of northern California (Zeiner, *et al.* 1990). Breeds fairly commonly in the Coast Ranges from Sonoma Co. north, and very locally south to Santa Cruz Co.; in the Sierra Nevada; and possibly in the Cascade Range (Zeiner, *et al.* 1990). Fairly common migrant throughout most of the state in April and May, and August and September. A few winter irregularly in southern coastal lowlands (Grinnell and Miller 1944, McCaskie, *et al.* 1979, Garrett and Dunn 1981). Fairly common in spring and fall migration throughout the state, though unpredictable in occurrence. *Known Populations in Western Riverside County:* The Vaux's swift has not been recorded within the general literature for occurring in the western Riverside County area as a breeding or wintering resident but may occur in the region as a migrating species (Zeiner, *et al.* 1990). Most of the records are within the central portion of the planning area and are likely to be migrating transient individuals. They have been recorded in the San Bernardino National Forest and the San Bernardino Mountains and may breed there. [b2]	Fed: smc State: ssc
Circus cyaneus	*Habitat*: Frequents open wetlands, wet and lightly grazed pastures, old	Fed: –

Species [a1]	Habitat and Distribution	Status [c]
northern harrier	fields, dry uplands, upland prairies, mesic grasslands, drained marshlands, croplands, shrub-steppe, meadows, grasslands, open rangelands, desert sinks, fresh and saltwater emergent wetlands; seldom found in wooded areas (Bent 1937; MacWhirter and Bildstein 1996). Uses tall grasses and forbs in wetland, or at wetland/field border, for cover; roosts on ground (Bent 1937). No data found on water requirements, but frequents aquatic habitats. Home range usually includes fresh water. Mostly found in flat, or hummocky, open areas of tall, dense grasses, moist or dry shrubs, and edges for nesting, cover, and feeding (Bent 1937). While it seems to prefer to nest in the vicinity of marshes, rivers, or ponds, it may be found nesting in grassy valleys or on grass and sagebrush flats many miles from the nearest water (Call 1978). In a shrub-steppe habitat, the northern harrier was determined to use riparian and cultivated habitats disproportionately (Martin 1987). And in general, it prefers saltwater marshes, wet meadows, sloughs, and bogs for its nesting and foraging habitat and if these are absent, it hunts open fields and is frequently observed hunting over agricultural areas (Call 1978). California population has decreased in recent decades (Grinnell and Miller 1944, Remsen 1978), but can be locally abundant where suitable habitat remains free of disturbance, especially from intensive agriculture. In both wetland and upland areas, the densest populations typically are associated with large tracts of undisturbed habitats dominated by thick vegetation growth (MacWhirter and Bildstein 1996). *Distribution*: The northern harrier occurs as a breeding bird across the northern United States and Canada, throughout most of California and the central portion of the United States south to Texas. It is absent from desert regions and the southeastern parts of the United States (Bildstein 1988). Specifically, it occurs as a breeding bird from northern Alaska and Canada south to northern Baja Peninsula east to southern Nevada, southern Utah, northern New Mexico, northern Texas, southern Kansas, central Iowa, central Wisconsin, southern Michigan, northern Ohio, southern Pennsylvania, southeastern Virginia and probably in northeastern North Carolina (MacWhirter and Bildstein 1996). It appears to be most numerous in the northern great plains from the Dakotas and Montana into southern Canada (Bildstein 1988). During the winter, the northern harrier occurs throughout southern Canada and all of the United States (Bildstein 1988). The usual southern limit for wintering is Panama (MacWhirter and Bildstein 1996). In California, the northern harrier occurs from annual grassland up to lodgepole pine and alpine meadow habitats, as high as 3,000 m (10,000 ft) (Garrett and Dunn 1981). Breeds from sea level to 1,700 m (0-5700 ft) in the Central Valley and Sierra Nevada, and up to 800 m (3600 ft) in northeastern California. Permanent resident of the northeastern plateau and coastal areas; less common resident of the Central Valley. Widespread winter resident and migrant in suitable habitat. Some individuals migrate into California; others migrate through to Central America or northern South America. *Known Populations in Western Riverside County:* The northern harrier is widespread throughout the planning area but is absent from the forested areas of Cleveland National Forest and the San Bernardino National Forest. It is concentrated along the Interstate 15 corridor, within the central portion of the planning area and through the Badlands area to Beaumont. It is considered a common winter resident throughout the planning area but breeding locations are not documented and it likely occurs within the planning area as a rare breeding bird. [b2]	State: ssc
Cypseloides niger black swift	*Habitat*: It is observed flying high over western mountains and canyons and thus is not documented as being present very often. If there are suitable nest sites for breeding, the black swift will forage over almost any terrain and habitat (Lack 1956). Nests in moist crevice or cave on sea cliffs above the surf, or on cliffs behind, or adjacent to, waterfalls in deep canyons (Lack 1956). Forages widely over many habitats. It lives where there are rocky cliffs available for its somewhat specialized nest site but has great powers of slight and often ranes far away from the	Fed: smc State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	nesting area (Terres 1980). *Distribution*: It breeds from southeastern Alaska, British Columbia, western Washington, Montana, south to the Rocky Mountain States, New Mexico, Nevada and to southern California, south to Costa Rica and the West Indies. Its winter range is not precisely known but it includes tropical America (Terres 1980). Breeds very locally in the Sierra Nevada and Cascade Range, the San Gabriel, San Bernardino, and San Jacinto Mts., and in coastal bluffs and mountains from San Mateo Co. south probably to San Luis Obispo Co. Seems to avoid arid regions, however, such as the Great Basin, southern deserts, and Central Valley. In migration, rare and irregular outside the breeding range; does not winter in the state (Grinnell and Miller 1944, Remsen 1978, McCaskie et al. 1979, McCaskie *et al.* 1988, Garrett and Dunn 1981). Migrates south for the winter; mostly absent from October through April. Noted rarely and irregularly outside the breeding range, mostly west of the Great Basin and southern deserts (Knorr 1961). *Known Populations in Western Riverside County:* The black swift is present within western Riverside County as a breeding bird in the San Bernardino and San Jacinto Mountains (Zeiner, *et al.* 1990). It is documented as breeding at Tahquitz Creek and probably the north fork of the San Jacinto River in the San Jacinto Mountains (Garrett and Dunn 1981). It may occur in other parts of the planning area as an irregular transient (Garrett and Dunn 1981). [b2]	
Dendroica petechia brewsteri yellow warbler	*Habitat:* Yellow warblers in southern California breed in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows (Garrett and Dunn 1981). During migration, they occur in lowland and foothill woodland habitats such as desert oases, riparian woodlands, oak woodlands, mixed deciduous-coniferous woodlands, suburban and urban gardens and parks, groves of exotic trees, farmyard windbreaks, and orchards (Small 1994). Also breeds in montane chaparral, open ponderosa pine and mixed conifer habitats with substantial amounts of brush (Zeiner et al. 1990). The preferred nest trees are willows, alders, and cottonwoods. The yellow warbler forages for insect and spiders in the upper canopy of deciduous trees and shrubs. *Distribution*: Yellow warblers as a whole nest from northern Alaska eastward to Newfoundland and southward to northern Baja California and Georgia. Migrates throughout much of North America and winters from southern California, Arizona and the Gulf Coast southward to central South America. (AOU 1998). The yellow warbler breeds in California in suitable habitat southward from the northern border of the state generally west of the Sierra Nevada to the coastal slopes of southern California (Grinnell and Miller 1944). This taxon occurs as a migrant throughout the state and there is at least one apparent winter record (Grinnell and Miller 1944). *Known Populations in Western Riverside County:* Although the species has certainly declined within the study area in the recent past (Garrett and Dunn 1981), *Dendroica petechia brewsteri* apparently continues to breed in scattered areas throughout much of western Riverside County in appropriate woodland habitats. Locations in the northern portion of the planning area are widely scattered from the eastern to western boundaries. The species is also widely scattered along the Interstate 15 corridor from the north to south and then along the southern portion from the Santa Rosa Plateau to Aguanga. Significant breeding populations remain in the Prado Basin (Loren R. Hays, Fish and Wildlife Service, pers. obs.); along San Timoteo, Temecula, Wilson, and Alberhill Creeks and tributaries; the San Jacinto River; and along the western escarpment of the San Jacinto mountains (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Additional localities include Potrero Creek, Santa Margarita River, Tucalota Creek, and Lake Perris, Lake Mathews Reserve and Motte Rimrock Reserve.[b1]	Fed: – State: ssc
Elanus leucurus white-tailed kite	*Habitat*: The white-tailed kite inhabits low elevation, open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak woodlands.	Fed: smc State: –

Species a1	Habitat and Distribution	Status c
	Riparian areas adjacent to open areas are also used (Dunk 1995). The white-tailed kite uses trees with dense canopies for cover and the specific plant associations seem to be unimportant with the vegetation structure and prey abundance apparently more important (Dunk 1995). In California's Sacramento Valley, the kite increased predominantly in irrigated agricultural areas where the California meadow mouse occurred (Warner and Rudd 1975). In southern California, it also roosts in saltgrass and Bermuda grass. Uses herbaceous lowlands with variable tree growth and dense population of voles (Waian and Stendell 1970). Substantial groves of dense, broad-leafed deciduous trees used for nesting and roosting (Brown and Amadon 1968). *Distribution*: Although threatened with extinction in North America during the early twentieth centruy, the white-tailed kite has recovered since then, expanding its range in the United States from small portions of California, Texas, and Florida to Oregon and Washington, as well as into Middle America (Eisenmann 1971). Prior to the 1960s, this species occurred in low numbers across much of its range. Population decreases appeared to be common during this time, especially in Mexico and Central America, however, since 1960, the population status and range of this raptor in North America have improved markedly. And it has also rapidly colonized habitats throughout much of Central America in regions uninhabitable previously (Eisenmann 1971). The breeding range stronghold in North America is California, with nearly all areas up to the western Sierra Nevada foothills and southeast deserts occupied (Small 1994; Dunk 1995). It is common in the central valley of California and along the entire length of the coast, breeding has been documented regularly in the far west counties of Oregon, and breeding has also been documented recently in southwest Washington. It is a common breeder in southern Texas. A small breeding population has been established in southern Florida since at least 1986 with scattered reports elsewhere in the peninsula and in the eastern panhandle (Dunk 1995). Its breeding range continues south along the coast in Mexico, into Central America and in South America in Colombia south to Buenos Aires (Dunk 1995). In California, the white-tailed kite is a common to uncommon, year-long resident in coastal and valley lowlands; rarely found away from agricultural areas (Grinnell and Miller 1944). It inhabits herbaceous and open stages of most habitats mostly in cismontane California. It has extended its range and increased numbers in California in recent decades (Eisenmann 1971). Although apparently a resident bird throughout most of its breeding range, dispersal occurs during the nonbreeding season resulting in some range expansion during the winter. It is believed to become nomadic during low abundance of California voles and the population changes in a regular and predictable fashion directly tied to changing vole numbers. However, it is unknown whether in northern California, this constitutes a migration movement or nomadic responses to changes in the prey population (Dunk and Cooper 1994). Apparently not migratory, but Binford (1979) found some movements in coastal California and it may be observed sporadically throughout most of the state (Small 1994). It is a very uncommon to fairly common winter visitor to western Oregon particularly along the coast and interior valleys and a rare winter visitor to western edge of the Great Basin (Dunk 1995). *Known Populations in Western Riverside County:* The white-tailed kite is recorded as scattered throughout western Riverside County as a year-round resident, east of the San Bernardino National Forest and the eastern foothills area. Records are very sparsely distributed in the western portion of the planning area within the Cleveland National Forest. The species is generally located within the central portion of the planning area and could likely be observed within any suitable habitat from the Interstate 15 corridor east to the foothills of the San Jacinto Mountains. [b2]	
Eremophila alpestris actia	*Habitat:* The horned lark is a common to abundant resident in a variety of open habitats, usually where trees and large shrubs are absent (Zeiner	Fed: – State: ssc

Species a1	Habitat and Distribution	Status c
California horned lark	et al. 1990). Range-wide, California horned larks breed in level or gently sloping short-grass prairie, montane meadows, "bald" hills, opens coastal plains, fallow grain fields, and alkali flats (Grinnell and Miller 1944). Within southern California, California horned larks breed primarily in open fields and (short) grasslands, and rangelands (Garrett and Dunn 1981; Hamilton and Willick 1996). Horned larks feed primarily on grains and other seeds and shift to mostly insects in the summer months. The species builds a grass-lined nest in a depression on the ground in the open. *Distribution:* Breeds (and resident) in the coastal region of the State of California from Sonoma County southeast to United States/Mexican border, including most of the San Joaquin Valley, eastward to the foothills of the Sierra Nevada (see Grinnell and Miller 1944; AOU 1998). *Known Populations in Western Riverside County:* The species apparently occurs throughout much of western Riverside County in suitable habitat. It is broadly scattered throughout the central portion of the planning area. California horned larks are apparently most heavily concentrated in the Prado Basin, Murrieta, Domenigoni Valley, Rawson Canyon, and Lakeview areas (Loren R. Hays, Fish and Wildlife Service, pers. obs.; Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Numbers of horned larks in southern California are "...greatly augmented in winter by birds from outside the region" (Garrett and Dunn 1981). Additional localities include the Aguanga/Sage area, Temecula, Murrieta, and March Air Force Base.[b1]	
Falco columbarius merlin	*Habitat:* Range-wide, merlin breed in open country (e.g., open coniferous woodland, prairie) and winter in open woodland, grasslands, cultivated fields, marshes, estuaries and sea coasts (AOU 1998). Within southern California, birds are often found in these same habitats and are "…rarely found in heavily wooded areas or over open deserts." (Garrett and Dunn 1981). It frequents coastlines, open grasslands, savannahs, woodlands, lakes, wetlands, edges, and early successional stages. Favors coastlines, lakeshores, and wetlands where it forages while flying at low levels for primarily avian species (Zeiner et al. 1990). *Distribution*: Merlin breed locally in North America from Alaska eastward to Newfoundland southward to Washington and Maine. The species winters from the large majority of the breeding range southward to northern South America (AOU 1998). *Known Populations in Western Riverside County:* The species apparently may occur locally as a winter visitor throughout much of western Riverside County in suitable habitat. Although the merlin is considered a rare wintering species (Garrett and Dunn 1981) and nowhere common, the species may turn up virtually anywhere within the study area. However, habitat that is apparently important to the species is present in and around the Mystic Lake/San Jacinto Wildlife Area. A total of 4 birds have been recently observed wintering in this area (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998), which represents an unusual, if not extraordinary, concentration anywhere in the migratory/winter range of the species. Additional observations have been made in the Jurupa Hills. The species appears to be sparsely and erratically located within the central portion of the planning area.[b1]	Fed: – State: ssc
Falco mexicanus prairie falcon	*Habitat*: Habitat use of the prairie falcon includes annual grasslands to alpine meadows, but they are also associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas, typically dry environments of western North American where there are cliffs or bluffs for nest sites (Brown and Amadon 1968). The species requires sheltered cliff ledges for cover and nesting which may range in height from low rock outcrops of thirty feet to vertical, 400 feet high (or more) cliffs and should overlook some treeless country for hunting (Call 1978). Denton (1975) reported 76% of eyries had	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	water within 0.4 km (0.25 mi). Uses open terrain for foraging; nests in open terrain with canyons, cliffs, escarpments, and rock outcrops. They capture prey most often in areas of low (less than 30 centimeters), sparse vegetation (Steenhof 1998). The elevation of their habitat use, includes open habitat up to 3,350 meters (Steenhof 1998). They winter mostly in the great plains and great basin and most winter recovery locations of individuals banded in Canada were in grassland habitats, mainly in the Great Plains, but also in areas west of the Rockies; only 2 of 48 recoveries were in forested habitat (Schmutz et al. 1991). *Distribution*: The breeding range of the prairie falcon includes southern central British Columbia, southern Alberta, and southernmost Saskatchewan, east to the badlands and plains of western North Dakota and extreme western Nebraska south to Chihuahua, Coahuila, central Durango, and San Luis Potosi, Mexico (Steenhof 1998). The species winters east to Minnesota, northwestern Iowa, east-central Missouri, central Oklahoma, and most of Texas, to Vancouver, Brithish Columbia, the coasts of Washington, Oregon, and California, all of Baja California and as far south as central Mexico (Steenhof 1998). In California, the prairie falcon is an uncommon permanent resident and migrant that ranges from southeastern deserts northwest along the inner Coast Ranges and Sierra Nevada (Garrett and Dunn 1981). Distributed from annual grasslands to alpine meadows within this region. Not found in northern coastal fog belt, or along the coastline. Migrants from northern areas winter in California. Some residents wander upslope in summer and downslope for winter (Zeiner *et al.* 1990). *Known Populations in Western Riverside County:* The prairie falcon has been documented as occurring within the Santa Ana Mountains during the wintering season and as a year-round resident throughout the rest of the western Riverside County area from the central portion to the eastern boundary (Zeiner, *et al.* 1990). Location records from UCR show the general distribution as dominating the central part of the planning area with few records in the western or eastern mountainous areas and no records in the southeastern portion. The lack of record locations in the southeastern area may reflect low survey effort rather than lack of use of the area. [b2]	
Glaucidium gnoma northern pygmy owl	*Habitat*: The species is primarily found in montane, coniferous woodlands although all types of forest habitats may be inhabited including, deciduous hardwood, conifer, wooded canyons, and riparian (Terres 1980; Ziener, *et al.* 1990). Individuals seem to prefer the edges of streams, meadows, lakes in sparse to intermediate canopy cover (Ziener, *et al.* 1990). Nesting occurs in tree cavities and snags within deciduous or coniferous woodlands (Ziener, *et al.* 1990). In southern California typical habitat for residents include oak, oak-riparian and riparian-conifer woodlands (Garrett and Dunn 1981). *Distribution*: Resident in areas from southeast Alaska, through British Columbia, south through Washington and Oregon, through California, in the mountains of southern California and south through to Baja California. Also present in Great Basin and Rocky Mountains from northern Idaho and western Montana through Wyoming, Utah, and western and central Colorado to Arizona, New Mexico and the highlands of Mexico and Guatemala (Terres 1980). Within California the species is found in the Cascade, Sierra, Santa Monica San Bernardino Mountains, San Jacinto Mountains, and Peninsular ranges of Riverside and San Diego counties (Ziener *et al.* 1990). The northern pygmy-owl is largely a resident species in the region with little, if any, seasonal movement (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Within the Western Riverside County area the species is documented within the ornithological literature as being found in the San Bernardino National Forest and the Cleveland National Forest (Ziener, *et al.* 1990). This has not been confirmed by the U.S. Forest Service or the UCR database. [b2]	Fed: – State: –
Icteria virens auricollis	*Habitat*: Yellow-breasted chats as a whole may nest in second-growth, riparian thickets and brush (AOU 1998). By contrast, yellow-breasted	Fed: – State: ssc

Species a1	Habitat and Distribution	Status c
yellow-breasted chat	chats in southern California and the study area are primarily found in require dense, relatively wide riparian woodlands and thickets of willows, vine tangles, and dense brush with well-developed understories. Nesting areas are associated with streams, swampy ground, and the borders of small ponds. Grinnell and Miller (1944) suggested that the plant cover in breeding habitat "...must be dense to provide shade and concealment." *Distribution:* Yellow-breasted chats as a whole summer and nest from British Columbia eastward to New Hampshire southward to Baja California and northern, mainland Mexico. The species presumably migrates throughout much of North America and winters primarily from northern Mexico to Panama (AOU 1998). In southern California, the yellow-breasted chat primarily summers and breeds in scattered areas at lower elevations nearly throughout the region. Migrants are encountered only rarely to uncommonly away from breeding centers, and there are no confirmed mid-winter records in the region (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* The yellow-breasted chat apparently is found nearly throughout the study area in appropriate riparian habitats in the lowlands and lower foothill regions (see Garrett and Dunn 1981). The chat likely is found at all of the areas occupied by yellow warblers in the lowlands (please see yellow warbler species evaluation) and, probably, in additional areas where the warbler is not currently present (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Important populations include the large concentration in the Prado Basin and contiguous reaches of the Santa Ana River. See also description of range within study area, above. Other known localities include San Timoteo, San Jacinto, Temecula, Tucalota, and Santa Margarita rivers and creeks including many of their tributaries. Additional localities include Motte-Rimrock Reserve, Bautista Creek, Wilson Creek and Potrero Creek. The species is generally located within the western portion of the planning area from the northwest corner, south along the Interstate 15 corridor to Temecula.**[b1]**	
Ixobrychus exilis hesperis western least bittern	*Habitat*: The western least bittern rests, roosts, nests, and hides in dense, emergent vegetation and, at the Salton Sea and Colorado River, in adjacent thickets of saltcedar in desert riparian habitat. The emergent vegetation may be interspersed with clumps of woody vegetation and open water and they occasionally occur in salt marshes and mangrove swamps (Gibbs et al. 1992). Uses dense, emergent vegetation for cover and nesting, and feeds in such vegetation, as well as in small openings. Their nesting habitat is usually near open water, or a small opening in vegetation (Weller 1961). Often feeds along the edge of emergent vegetation, on the open-water side. During migration, their habitat use is similar to the breeding habitat. Overwintering birds occur mainly in brackish and saline swamps and marshes but little is known otherwise (Gibbs *et al.* 1992). *Distribution*: Breeds over most of eastern United States and from south and eastern Oregon south to Nicaragua. The population is discontinuous between the Mississippi River valley and Pacific states, and throughout eastern and southern Mexico to Costa Rica (Gibbs *et al.* 1992). It is rare to uncommon in the larger cattail and tule marshes of the Central Valley of California and locally in southwestern, southeastern and northeastern California (Cogswell 1977). In southern California, it is a common summer resident (especially April to September), at Salton Sea and Colorado River, in dense emergent wetlands near sources of freshwater, and in desert riparian (saltcedar scrub) (Garrett and Dunn 1981). Uncommon through winter in some locations; quite rare in deserts and coastal lowlands, but may breed locally (Garrett and Dunn 1981). Rare to uncommon from April to September in large, fresh emergent wetlands of cattails and tules in the Central Valley, where it nests; and on northeast plateau, where it probably nests (Cogswell 1977, McCaskie, *et*	Fed: smc State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	al. 1979). Distributional data are scant because of extremely secretive behavior. Most of California population migrates south to Mexico for winter (mainly October to March). In general, is winters from northeastern California, northwestern Mexico, southern Texas and southern Florida to Brazil (Cogswell 1977; Terres 1980). Part of population in southern California apparently is nonmigratory. Breeding and wintering ranges overlap widely in Florida, southern California, and Baja (Gibbs *et al.* 1992). *Known Populations in Western Riverside County:* The least bittern is reported to occur as a year-round resident in the Mystic Lake and San Jacinto Wildlife area within Western Riverside County (Zeiner *et al.* 1990). Other locations shown within the UCR database include the Santa Ana River. It probably is present year-round but is not commonly observed. [b2]	
Lanius ludovicianus loggerhead shrike	*Habitat*: The loggerhead shrike is known to forage over open ground within areas of short vegetation, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, riparian areas, open woodland, agricultural fields, desert washes, desert scrub, grassland, broken chaparral and beach with scattered shrubs (Unitt 1984; Yosef 1996). Individuals like to perch on posts, utility lines and often use the edges of denser habitats (Zeiner, *et al.* 1990). In some parts of its range, pasture lands have been shown to be a major habitat type for this species, especially during the winter season (Yosef 1996) and breeding pairs appear to settle near isolated trees or large shrubs (Yosef 1994). The highest density occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats; occurs only rarely in heavily urbanized areas, but often found in open cropland (Zeiner *et al.* 1990). In many regions, indices of the loggerhead shrike abundance correlate with the percentage of pastureland available (Gawlik and Bildstein 1993). In the Mojave Desert, the loggerhead shrike was observed more often in urban settings than other raptor species occurring there (Knight *et al.* 1999). In the midwest the habitat use of the shrike is defined as savannah habitat at the landscape scale but at the fine-scale, sites used by shrikes were characterized by tall, sparse, structurally heterogeneous herbaceous vegetation with high standing dead plant cover and low litter cover (Michaels and Cully 1998). The tree and shrub density did not differ between sites used and not used by shrikes (Michaels and Cully 1998). *Distribution*: Throughout most of the southern portion of its range, the shrike is resident except as described by Terres (1980;Yosef 1996). The northern populations are migratory (Yosef 1996). The species nests from southern Canada through the Great Basin and California, to Baja California, Mexico and the Gulf coast (Terres 1980). Specifically, in western north America, the species breeds from southeast Alberta, western Montana, northwest Wyoming, southern Idaho, south-central Washington, eastern Oregon, and California south to southern Baja California. In Central North America, it breeds from southern Saskatchewan and southwest Manitoba, north Dakota, and portions of southern Minnesota, eastern Iowa, northwest and southeast Missouri and northern Arkansas, south through Louisiana, Texas, New Mexico, and Arizona and through Mexico to north Sinaloa and Oaxaca. In eastern North America, it breeds in southern Wisconsin, and from southeast Illinois and southwest Ohio south to the Gulf Coast and from eastern West Virginia and all but the eastern portions of both Virginia and North Carolina south to Gulf Coast and all but extreme southern Florida (Yosef 1996). Winter grounds are found in the southern portion of the breeding range and further south into Mexico (Terres 1980). The northern populations are migratory and most winter from northern California, northern Nevada, northern Utah, central Colorado, southern and eastern Kansas, western Missouri, northern Kentucky, and northern	Fed: smc State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	Virginia south through the southern United States and in Mexico south throughout the breeding range (Yosef 1996). In California, the species is found throughout the foothills and lowlands of California as a resident (Zeiner *et al.* 1990). Winter migrants are found coastally, north of Mendocino county (Zeiner *et al.* 1990). The loggerhead shrike seems to have always been most abundant in the southern and western portions of its range (Cade and Woods 1997). *Known Populations in Western Riverside County:* Occurs throughout areas of suitable habitat as a yearlong resident, breeding and wintering, in western Riverside County (Zeiner *et al.* 1990). The loggerhead shrike occurs relatively frequently within the central portion of the planning area with few records in the montane areas. [b2]	
Melospiza lincolnii Lincoln's sparrow	*Habitat*: Lincoln's sparrow is known to prefer dense, low underbrush often in disturbed edges with grasses and weeds mixed with shrubs (Bent 1968). The species occurs in a variety of habitats including willow-sedge swamp, scrub-meadow and flat land aspen (Salt 1957). Breeding in southern California occurs in wet montane meadows of corn lily, sedges and low willows (Garrett and Dunn 1984). Lincoln's sparrows are most common in wet meadows with little damage by grazing; singing males are concentrated in flooded or boggy areas near meadow edges where pines provide elevated perches for singing and patches of willows are often present nearby (Cicero 1997). During the winter, the species requires thickets of shrubs or tall forbs interspersed with grassy areas, usually on damp ground or near water (Zeiner, *et al.* 1990). *Distribution*: The Lincoln's sparrow has a boreal distribution from west-central Alaska, central Yukon, central northwest territories, northern Saskatchewan and northern Manitoba to north central Quebec, Labrador, and Newfoundland, south through the Cascade Mountains of Washington, Oregon, and California to southern Tulare County; also south through Wyoming, central and western Colorado to south central New Mexico and west to northeast Utah and north central Idaho (Ammon 1995). In Oregon, also breeds in the Blue Mountains and Wallowa Mountains; in California, also breeds in the Warner Mountains, the northern inner coastal range south to Tehama County, in the San Bernardino Mountains, and irregularly in other mountain ranges of the southwest (Ammon 1995). The species is found during the summer in Alaska, all of Canada, northern U.S. and mountains of the West (Terres 1980). Wintering for the species occurs in along the Pacific coast of Bristish Columbia, Washington, Oregon and California, in the central part of the United States, in Baja California, Mexico, along the Gulf Coast and is a causal wintering bird in Central America (Ammon 1995; Terres 1980). The species is a common migrant and winter visitor throughout the state with some breeding populations in the northern mountains (Zeiner, *et al.* 1990). Individuals arrive in southern California in late September and depart in late April (Unitt 1984). *Known Populations in Western Riverside County:* Occurs within the western Riverside County area as a migrant and winter visitor throughout the lowland areas and is fairly common to locally common in overgrown fields and brush thickets and channels (Garrett and Dunn 1981). It is a summer breeding bird within the San Bernardino Mountains and San Jacinto Mountains in Tahquitz and Round valleys (Zeiner, *et al.* 1990; Garrett and Dunn 1981). [b2]	Fed: – State: –
Nycticorax nycticorax nycticorax black crowned night heron	*Habitat:* Black-crowned night-herons locally require marshes, ponds, reservoirs, and estuaries for foraging; nests are placed in trees or dense marshes (Garrett and Dunn 1981; Gallagher 1997). The black-crowned night heron is a yearlong resident in lowlands and foothills throughout most of California. It occurs in large nesting colonies. The species feeds along the margins of lacustrine, large riverine, and fresh and saline emergent habitats and rarely on kelp beds in marine subtidal habitats. The nests and roosts are placed in dense-foliaged trees and dense emergent wetlands (Zeiner et al. 1990).	Fed: – State: –

Species a1	Habitat and Distribution	Status c
	Distribution: Black-crowned night-herons breed in the Western Hemisphere from British Columbia eastward to Nova Scotia southward locally through the Americas to southern South America. The species winters locally from Washington to New England southward throughout the remainder of the breeding range (AOU 1998). In southern California, the species generally occurs locally throughout except for mountainous and desert areas (Garrett and Dunn 1981). Rookeries are scarce within southern California. *Known Populations in Western Riverside County:* Although the species may breed at Lake Elsinore and Mystic Lake (the species formerly bred at the latter locale [Garrett and Dunn 1981]); the only known active rookery in west Riverside County is in the Prado Basin (L.R. Hays, Fish and Wildlife Service, pers. obs.; Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Up to 10 pairs have bred at that locale in recent years (James Pike, Fish and Wildlife Service Volunteer Field Biologist, pers. comm., 1998). Additional localities include Lake Mathews, Vail Lake, Lake Perris, and Lake Skinner.[b1]	
Oporomis tolmiei Macgillvrays warbler	*Habitat*: Throughout California the species inhabits Valley foothill riparian, coastal Douglas-fir, redwood, montane riparian and desert riparian habitats (Zeiner *et al.* 1990). Breeding pairs typically are found in moist brushy areas within coniferous forests between 2,000-2,800m but may also be found in clear-cuts or mixed deciduous forests up to 3,000 meters (Pitocchelli 1995; Garrett and Dunn 1984). The species prefers secondary-growth woodlands, brushy areas near water and dense willow canyon drainages (Terres 1980). It requires dense undergrowth and moderate cover with the amount of cover being important for assessing breeding habitat in coniferous and deciduous forest. It breeds in deciduous forests with 60 percent total cover, composed of 44 percent shrubs 8 percent coniferous species, 7 percent deciduous species (Morrison 1981). In migration the birds are elusive, mostly seen passing through thick shrubbery, but avoiding trees (Pitocchelli 1995, Miller and Stebbins 1964). Within San Diego county the species is known from weedy brush, streamside thickets and desert wash scrub (Unitt 1984). *Distribution*: The birds nest from southern Alaska, south to central California to central New Mexico (Terres 1980). Specifically, within suitable habitat the species occurs along the Rocky Mountains, west to the Pacific Ocean, from southeast Alaska, to British Columbia, the Yukon, south to northern New Mexico, central Arizona, and southern California (Pitocchelli 1995).Within California, breeding populations occur in coastal areas, north of Monterey county (Zeiner, *et al.* 1990). Breeding also occurs, less commonly, in the Sierras (Zeiner, *et al.* 1990). The populations tend to be more disjunct at the periphery of the breeding range, especially within the prairies and in southwestern United States (Pitocchelli 1995). The species winters in southern Baja California, Mexico to Panama but this is poorly defined (Terres 1980). It is a highly migratory species however little is known about the nature of migration because of the species preference for dense undergrowth and its elusive and shy behavior. The earliest spring migrants appear in March in California and pass through the lowland areas into late May (Pitocchelli 1995). *Known Populations in Western Riverside County:*In southern California the species in more common in the interior than coastal regions with known populations in the San Bernardino and San Gabriel mountains (Zeiner, *et al.* 1990). During migration, the species may occur throughout the region as a spring and fall transient through the central portion of the planning area (Garrett and Dunn 1981).[b2]	Fed: – State: –
Oreortyx picta mountain quail	*Habitat:* The mountain quail is found in dense montane chaparral and brushy areas within coniferous forests, locally on lower slopes, in pinon-juniper-yucca associations, also sometimes locally in dense arborescent coastal chaparral dominated by ceanothus, manzanita, and scrub oak. It	Fed: – State: –

Species [a1]	Habitat and Distribution	Status [c]
	is found seasonally in open, brush stands of conifer and decidous forest and woodland, and in chaparral (Zeiner et al. 1990). The species nests on the ground in herbage at the base of a tree in rocks or near shrub, logs or stumps. *Distribution:* The species range is from southern Washington and southwestern Idaho south to northern Baja California. The mountain quail occurs in all of the California mountain ranges west of the deserts and the mountains of the northern interior. It is a common to uncommon resident, found typically in most major montane habitats of the state. *Known Populations in Western Riverside County:* The mountain quail is known to occur in the San Jacinto Mountains. The species may move downslope during the winter months. [b1]	
Otus flammeolus flammulated owl	*Habitat*: The flammulated owl is likely a common summer resident locally in a variety of coniferous habitats from ponderosa pine to red fir forests (Winter 1974; Garrett and Dunn 1981). This species of owl uses dense coniferous woodland (Unitt 1984). Winter (1974) observed nesting preference in *Pinus ponderosa* and *Pinus jeffreyi* within yellow pine belt habitats. This inconspicuous bird is thought to rest near the tops of trees, close to the trunk (Terres 1980; Marshall 1939). The flammulated owl appears to prefer old forests of ponderosa pine mixed with Douglas-fir with canopy cover from 52 to 64 percent, shrub cover from 16 to 21 percent and ground cover from 39 to 49% [Linkhart *et al.* 1998; Groves et al. 1997]). The species is thought to prefer low to intermediate canopy cover and is found between 1,800 and 3,000 meters (Zeiner, *et al.* 1990). Common features of reported flammulated owl habitat include cool, semi-arid climate, high abundance or diversity of nocturnal arthropod prey, open physiognomy, some dense foliage that is used for roosting (McCallum 1994). The wintering migration habits are poorly understood, although the species was originally assumed to be nonmigratory, however, the northern populations are likely to be migratory (McCallum 1994; Phillips 1942). *Distribution*: The breeding territory for the species spreads from British Columbia, Canada, east slope of Cascades and interior ranges of Washington, northeast California, western Nevada, in California occurs in the Cascades, Sierra Nevada, interior coast ranges, Transverse and Peninsular ranges, in Idaho, Montana, Colorado, New Mexico, Arizona to Vera Cruz, Mexico (Winter 1974; McCallum 1994). Wintering habitat extends from Jalisco, Mexico to Guatemala (Winter 1974). In North America, wintering occurs in lowlands peripheral to breeding habitat in September through October and occasionally through December (McCallum 1994). Summer residents are found throughout California at elevation above 1,800 meters (Zeiner, *et al.* 1990). Within southern California the species is known from the San Bernardino, San Gabriel and Palomar mountains, whereas only two records exist for the San Jacinto Mountains and no records in the Santa Rosa mountains (Winter 1978). *Known Populations in Western Riverside County:* Observations from J. Fairchild in 1969 and 1972 indicate the species occurs in the Tahquitz Valley of the San Jacinto Mountains and Little Round Valley, one mile south of Mt. San Jacinto State Park (Winter 1978). One other record is within the UCR database for the Santa Rosa Plateau. The species is a localized summer resident, and is likely overlooked to an extent but may be uncommon to fairly common within suitable montane habitat. Although the migratory status is uncertain, it probably does not winter within the region because its earliest documented observation is for the end of April (Garrett and Dunn 1981). [b2]	Fed: – State: –
Pandion haliaetus osprey	*Habitat*: This species is strictly restricted to large waters supporting fish with surrounding or nearby forest habitats, often ponderosa pine or mixed conifer (Zeiner *et al.* 1990). Osprey often use rivers, lakes, and reservoirs for foraging and rocky pinnacles, large trees and snags in open	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	forest for cover and nesting (Zeiner *et al*. 1990; Call 1978). If nesting sites are in short supply, they may nest a mile or more from water if the food supply proves adequate (Call 1978). Although widely seen on the coast, these birds are rare transients in the interior portions of southern California (Garrett and Dunn (1984). *Distribution*: The species is found on every continent except Antarctica (Terres 1980). Within North America it extends from northwestern Alaska to Baja California, Mexico and Florida (Terres 1980). Wintering habitat begins in southern United States south to Peru and Brazil (Terres 1980). Within California, breeding populations reside in the Cascade and Sierra mountain ranges (Zeiner *et al*. 1990). Wintering habitat is found along the California coast south of San Francisco (Zeiner *et al*. 1990). Ospreys are found in San Diego County between mid September and November (Unitt 1984). Migration rates and locations were studied and the results indicate that western populations winter north and west of other population in Mexico and Central America. They were observed to migrate 2 to 3 times faster in spring than in fall (Poole and Agler 1987). *Known Populations in Western Riverside County:* Within Riverside county, the bird occurs west of the San Jacinto Mountains and in other parts of Riverside County, it occurs at the Salton Sea but is also known to migrate through San Gorgonio Pass and Coachella Valley (Zeiner *et al*. 1990; Miller and Stebbins 1964). It is an uncommon winter visitor along the coast of California including the Western Riverside County area; it is most often encountered in fall and winter, although a few birds regularly remain through the summer but is not documented as a breeding bird, thus it is considered a rare transient of water bodies within the lowland and montane regions (Garrett and Dunn 1981). **[b2]**	
Phalacrocorax auritus double-crested cormorant	*Habitat:* Double-crested cormorants are strictly piscivorous and thus require lakes, rivers, reservoirs, estuaries, or ocean for foraging. Double-crested cormorants nest on the mainland in tall trees near (or in) aquatic environments. The species is a yearlong resident along the entire coasts of California and on inland lakes, in fresh, salt and estuarine waters. *Distribution***:** Double-crested cormorants breed from Alaska eastward to Newfoundland southward, in isolated colonies, to California, Florida, Mexico and Belize. The species winters from Alaska eastward to New England southward to California, Florida, Mexico, and Belize (AOU 1998). In southern California, therefore, the species is resident. Although double-crested cormorants are present in suitable habitats throughout southern California, rookeries are extremely scarce away from the Salton Sea, the Colorado River, and the Channel Islands (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Although double-crested cormorants may be found year-round nearly throughout the study area in appropriate habitats, the only known rookery in west Riverside County is in the Prado Basin (L.R. Hays, Fish and Wildlife Service, pers. obs.; Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Approximately 40 pairs bred in the Prado Basin during the 1998 breeding season (James Pike, Fish and Wildlife Service Volunteer Field Biologist, pers. comm., 1998). Other localities include Lake Mathews, Lake Perris, Lake Skinner, and Lake Elsinore.**[b1]**	Fed: – State: ssc
Picoides pubescens downy woodpecker	*Habitat*: Downy woodpeckers as a whole may nest in deciduous and mixed deciduous coniferous woodland, riparian woodland, second growth, parks, and orchards (AOU 1998). Within southern California, the species generally nests in deciduous (often willow) woodlands, deciduous growth/oak woodlands, orchards, suburban plantings, and occasionally in conifers (Garrett and Dunn 1981). Grinnell and Miller (1944) previously reported that "...lowland stream-bottoms constitute the main theaters of activity for this woodpecker. Possibly, available water is a	Fed: – State: –

Species [a1]	Habitat and Distribution	Status [c]
	factor for presence." It is a yearlong resident of riparian deciduous and associated hardwood and conifer habitats. It requires abundant snages, and tree/shrub, tree/heraceous, and shrub/herbaceous ecotones (Zeiner et al. 1990). *Distribution*: Downy woodpeckers are resident in appropriate habitats from western and central Alaska eastward to Newfoundland southward to southern California and southern Florida (AOU 1998). In southern California, the downy woodpecker is present from Los Angeles County southward and eastward locally through San Bernardino County and Riverside County ("...possibly to the vicinity of Temecula...") and into northern San Diego County (Garrett and Dunn 1981). The species primarily occurs in the lowlands and foothills is generally absent in mountainous areas. *Known Populations in Western Riverside County:* Downy woodpeckers are primarily confined to the northwestern and southwestern portions of the study area according to Garrett and Dunn (1981). Important populations include the large concentration in the Prado Basin and contiguous reaches of the Santa Ana River. The downy woodpecker is also present at San Timoteo, Murrieta, and Temecula Creeks and at Railroad Canyon (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Other localities include Potrero Creek, Wilson Creek, Temecula Creek, and Santa Margarita River and their tributaries.[b1]	
Plegadis chihi white-faced ibis	*Habitat:* Migrant and wintering white-faced ibis may be found foraging in marshes, ponds, lakes, rivers, flooded fields, and estuaries. In southern California, "[e]xtensive marshes are required for nesting" (Garrett and Dunn 1981). The species prefers shallow, grassy marshes and nests in dense, fresh emergent wetland (Zeiner et al. 1990). The nest, which is made of dead tules or cattails, is built amidst tall marsh plants, sometimes on mounds of vegetation. It rarely nest in trees (Cogswell 1977). *Distribution:* White-faced ibis breed locally in North America from Oregon eastward to North Dakota southward to the Mexican plateau. The species winters from California eastward to Texas southward to Guatemala. There are also breeding and wintering populations in South America (AOU 1998). Within southern California, the species is most often recorded during migration and winter, with nesting occurring only rarely in the coastal plain (cf. Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Migrants or wintering birds currently could be found in appropriate habitat nearly throughout the study area. Although white-faced ibis have been repeatedly recorded in the Mystic Lake area and previously bred there (see Garrett and Dunn 1981), there currently is only one confirmed breeding colony in western Riverside County. This rookery is in the Prado Basin (L.R. Hays, Fish and Wildlife Service, pers. obs.; fide Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). Approximately 50 pairs have bred at that locale in recent years.[b1]	Fed: smc State: ssc
Progne subis purple martin	*Habitat:* Although purple martins may be found virtually anywhere in aerial habitat during migration (e.g., AOU 1998), birds typically breed in tall sycamores, pines, and other large trees in or near oak woodlands or open coniferous forest (Garrett and Dunn 1981). The species is an uncommon to rare, local summer resident in a variety of wooded, low-elevation habitats throughout the state. The species uses valley foothill and montane hardwood, valley foothill and montane hardwood-conifer, and riparian habitats. It also occurs in coniferous habitats, including close-cone pine-cypress, ponderosa pine, Douglas-fir, and redwood. Nests in old woodpecker cavities mostly, sometimes in human-made structures, in nesting boxes, under bridges, in culverts. Nests may be located in tall, old, isolated trees or snags in open forest or woodland	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	(Zeiner et al. 1990, Dawson 1923). *Distribution*: Purple martins breed locally from British Columbia disjunctly eastward to Nova Scotia southward to Baja California, central Mexico, and the Gulf Coast. Although the species' winter range is not well known, the species primarily winters (presumably) in Amazonia and south-central Brazil. In any case, there are no documented winter records of purple martins for anywhere in North or Central America (AOU 1998). *Known Populations in Western Riverside County:* Currently a rare migrant and breeder in southern California (including the planning area) (Garrett and Dunn 1981). Breeding colonies of purple martins apparently persist in the Thomas Mountain and Dripping Springs areas (Michael Patten, Riverside County Editor for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). The current status of the breeding colony or colonies reported "ÿabove Lake Hemetÿ" in the San Jacinto Mountains (Garrett and Dunn 1981) is unknown. Purple martins visiting probable nest sites in the Orange County portion of the Santa Ana Mountains "ÿvery close to the Riverside County line" in the late 1980s (Gallagher 1997) suggests the possibility of an additional breeding locale within the planning area. Additional observations have been made in the Sage area.[b1]	
Sphyrapicus thyroideus Williamson's sapsucker	*Habitat*: Throughout its range, the Williamson's sapsucker breeds at middle to high elevations in montane spruce-fir, Douglas fir, lodgepole pine, and ponderosa pine forests and also may occur in mixed deciduous-coniferous forest with quaking aspen (Dobbs *et al.* 1997). This species is known from pine habitats of several types (lodgepole, aspen, Jeffery and eastside) generally between 1,500-3,200 meters (Dobbs *et al.* 1997; Zeiner, *et al.* 1990). One study showed the sapsucker prefers *Fomes*-infected aspen, while another shows preference for lodgepole pine, white fir, red fir and Jeffrey pine (in that order) within dry lodgepole, lodgepole-meadow and pine fir habitats (Crockett and Hadow 1975; Raphael and White 1984). The bird typically inhabits forests with large trees and sparse to moderate canopy cover (Zeiner *et al.* 1990). Raphael and White (1984) observed 40% of nesting in snags and 58% using the dead portion of live trees. Williamson's sapsucker nests in tree cavities, possibly for several years (Zeiner *et al.* 1990). During non-breeding season, individuals may occupy a wider variety of conifers (Garrett and Dunn 1984). In the southwestern United States, the winter habitat consists of low-to mid-elevation forests of oak-juniper and pine-oak forests and, to a lesser extent, deciduous riparian and oak forests (Bock and Larson 1986). *Distribution*: The species occurs as a summer resident from southern British Colombia, south through the Cascades, Sierras and Rockies of the western U.S. (Terres 1980). Its distribution appears somewhat disjunct and is described as occurring at middle to high elevation generally between 1,500 and 3,200 meters in several regions including the Pacific Northwest, northern U.S. Rocky Mountains, southern U.S. Rocky Mountains, the Great Basin, and in Mexico (Dobbs *et al.* 1997). Within California, there are several disjunct breeding populations in the mountains of southern California west of the Mojave Desert, including San Gabriel, San Bernardino, and San Jacinto Mountains and at Mount Pinos; there is a major breeding range within the Sierra Nevada-Cascade ranges from the Greenhorn Mountains north to Oregon; and isolated breeding populations in the extreme north in Siskiyou, Trinity, and Warner Mountains, East Warner Mountains, Sweetwater Range, Carson Range, Ruby and Pequop Mountains, Spruce Mountain, and the Snake Range (Dobbs, *et al.* 1997). Wintering habitat occurs at lower elevations in the southern portions of the above mentioned locations and in northern Baja California, Mexico, northwestern Mexico, and western Texas (Terres 1980). In most of California, the breeding populations are generally resident but there is some regular movement to mid-	Fed: – State: –

Species [a1]	Habitat and Distribution	Status [c]
	elevations and irregularly or casually to lowlands surrounding the breeding areas from September to April (Dobbs *et al.* 1997). *Known Populations in Western Riverside County:* In southern California it is found in the San Gabriel, San Bernardino and San Jacinto Mountains between 1,650 and 3,000 meters (Zeiner *et al.* 1990). Large concentrations of breeding birds are thought to occur on the north-facing slopes of the San Bernardino Mountains, behind Big Bear Lake near Mount San Gorgonio (Garrett and Dunn 1984). [b2]	
Strix occidentalis occidentalis California spotted owl	*Habitat:* In southern California, the California spotted owl occurs at low elevations (sea level to 1,000 m; 3,300 ft.), and occupies habitats dominated by hardwoods, primarily oak and oak-conifer woodlands (Garrett and Dunn 1981). At higher elevations, they inhabit areas dominated by conifers (Gutiérrez et al. 1995). Usually searches for small vertebrate prey from a perch and may cache excess food. The species uses dense, multi-layered canopy cover for roost seclusion. Usually nests in a tree or snag cavity or in a broken top of a large tree. May also nest in a large mistletoe clump, abandoned raptor or raven nest, cave or crevice, on a cliff or on the ground (Zeiner et al. 1990, Call 1978). *Distribution*: California spotted owls are an uncommon, permanent resident that range from the south Cascade Range and northern Sierra Nevada from near Burney (Pit River), Shasta County, California south through the remainder of the western Sierra Nevada and Tehachapi Mountains to Lebec, Kern County. Found locally east of the Sierra Nevada crest. In the California coastal ranges from Monterey County south to Santa Barbara County, then in the Transverse Ranges and Peninsular Ranges south to Sierra San Pedro Martir in northern Baja California (see Gutierrez et al. 1995). *Known Populations in Western Riverside County:* California spotted owls in western Riverside County are found within high-elevation coniferous areas primarily within Forest Service lands in the San Jacinto Mountains and Palomar Range.[b1]	Fed: fss,smc State: ssc
Tachycineta bicolor tree swallow	*Habitat:* Although tree swallows may be found virtually anywhere in aerial habitat during migration and winter (e.g., AOU 1998), birds forage primarily over and around ponds, marshes, rivers, lakes, and estuaries (cf. Garrett and Dunn 1981). Tree swallows nest almost exclusively in cavity-containing trees that are near, or preferably in, water (Grinnell and Miller 1944). Suitable habitat is provided by forest and woodland near water. In winter and migration, the species uses more open habitats, grasslands, meadows, brushlands, also near water (Zeiner et al., 1990). *Distribution*: Tree swallows breed locally from western Alaska eastward to Newfoundland southward to California and Georgia. The species winters from northern California to New Jersey southward to northern South America (AOU 1998). *Known Populations in Western Riverside County:* An uncommon to common migrant and rare winter visitor in most of the coastal plain of southern California (including the planning area), the tree swallow is a rare and very local breeder in the study area and southern California as a whole (Garrett and Dunn (1981). The only known breeding population within the study area persists in the Prado Basin and adjacent Santa Ana River. (Loren R. Hays, Fish and Wildlife Service, pers. obs.; Michael Patten, Riverside County Area for American Field Notes and Past Secretary, California Bird Records Committee, pers. comm., 1998). The Prado Basin/Santa River population consisted of approximately 20 pairs during the 1998 breeding season (James Pike, Fish and Wildlife Service Volunteer Field Biologist, pers. comm., 1998). Additional localities include the Sage and Vail Lake areas.[b1]	Fed: – State: –
Toxostoma lecontei Le Conte's thrasher	*Habitat*: This desert inhabitant is uncommon to rare and occurs in open desert wash, desert scrub (creosote bush scrub), alkali desert scrub and desert succulent shrub habitats on sandy and often alkaline soils (Ziener, *et al.* 1990; Unitt 1984; Sheppard 1970). Birds use desert shrubs	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	(commonly saltbush) and cacti (commonly cholla) for cover (Sheppard 1970) and areas of desert washes and flats with scattered bushes (Brown 1996). This species often inhabits areas where soil is fine alluvium or sandy and topography is flat and open, including dunes and gently rolling hills (Sheppard 1996; Miller and Stebbins 1964). It requires areas with an accumulated leaf litter under most plants as diurnal cover for its mostly arthropod prey. Surface water rarely exists anywhere within several kilometers of most of its territories except temporarily following infrequent rains (Sheppard 1996). *Distribution*: The Le Conte's thrasher is a year-round resident throughout its range (Sheppard 1996). The species can be found from central California to southwestern Utah, south to western Arizona, Baja California and northwestern Mexico (Terres 1980). Specifically, it is found in the San Joaquin Valley and Mojave and Colorado deserts of California and Nevada southward into northeast Baja California, Mexico and farther south into central and coastal Baja California. It is found in the Sonoran desert from extreme southwest Utah and western Arizona south into west Sonora, Mexico. Within its range, its distribution is patchy (Sheppard 1996). This species occurs from -85 to 1,600 meters in elevation; its southernmost occurrence is in Mexico at about 26EN and northernmost in northwestern Sonora, Colorado (Sheppard 1970). In California, the species occurs within southern California deserts and in western and southern San Joaquin Valley (Garret and Dunn 1981). The species may have historically extended north to Fresno and Mono counties (Ziener, *et al.* 1990). *Known Populations in Western Riverside County:* In Riverside county the species occurs east of the San Bernardino National Forest as a permanent resident but is not recorded within the western Riverside County area within the general ornithological literature (Ziener, *et al.* 1990). It has been recorded near Moreno within Riverside County. [b2]	
Vermivora ruficapilla Nashville warbler	*Habitat*: This species most commonly breeds in pine, hardwood and conifer forests in the Sierras and in montane chaparral habitats in southern California, and in general, this includes second growth, open deciduous, or mixed species forests, with high levels of light penetration and shrubby undergrowth (Williams 1996; Ziener *et al.* 1990). Summer habitat in the San Gabriel and San Bernardino Mountains, where breeding is presumed but not observed to occur, individuals are found on shaded slopes within mixed coniferous forests with California black oaks and yellow pines and brush communities with manzanita (Bent 1953; Garrett and Dunn 1984). Birds are generally seen migrating through lowland woodland and riparian habitats (Ziener *et al.* 1990). During migration through desert habitats, individuals do not appear to prefer a particular vegetation type, although they have been frequently observed moving through tall trees (Miller and Stebbins 1964). The Nashville warbler requires heterogenous second-growth forests and most frequently used branches but also made considerable use of leaves and twigs (Sodhi and Paszkowski 1995). The wintering habitat is primarily low deciduous open forests and suburban gardens but may also include a wide variety of habitats such as cloud forest, tropical deciduous forest, disturbed deciduous forest, thorn forest and pine-oak-fir forest (Williams 1996). *Distribution*: Two disjunct populations of the Nashville warbler breed in North America: one east of the Mississippi River and a second in the northwestern United States (Williams 1996). The breeding range extends form southern Canada to central California and northern midwest states of the U.S. (Terres 1980). The western population breeds from southern interior British Columbia and north and northwest Washington south through the Cascade Range into north west and southwest Idaho and northwest Montana, also in central and southern Oregon along the Cascade Range, east to Hart Mountain into northern California south along the Coast Range and western slope of the Sierra Nevada and in the extreme west-central Nevada (Williams 1996). The	Fed: – State: –

Species [a1]	Habitat and Distribution	Status [c]
	species occurs in the Sierras, in the coastal range north of Napa county and in coastal and desert lowlands of southern California (Zeiner *et al.* 1990). Birds winter in Mexico, southern Texas, southern Florida down through Guatamala; some may winter in coastal lowlands of southern California (Williams 1996; Terres 1980). It is a highly migratory species, breeding in North America and wintering typically in Mexico and general leaves the breeding territories in August and departs from winter territories to arrive on breeding grounds in April (Williams 1996). *Known Populations in Western Riverside County:* In southern California, breeding populations have been reported to not occur south of San Bernardino and Los Angeles counties (Zeiner *et al.* 1990). A breeding population may be present in northern Riverside county within the San Bernardino Mountains or within the San Jacinto Mountains (Zeiner, *et al.* 1990). The species occurs within the planning area commonly as a spring migrant or transient and less commonly as fall migrant or transient (Garrett and Dunn 1984). [b2].	
Wilsonia pusilla Wilson's warbler	*Habitat*: Breeding habitats include montane meadows and low, dense willow thickets often on steep slopes (Garrett and Dunn 1981). It nests in the Arctic up to the limit of trees and typically nests in habitats such as thickets, second-growth saplings of clearings, in spruce-tamarack, balsam fir, and sphagnum bogs, or in alders and birches near streams and ponds (Terres 1980). Outside of the breeding season, during migration, these birds can be seen passing through woodlands and forests with shrub understories as well as chaparral habitats, and also may occur in well-grown woodlands, city parks, and gardens (Terres 1980; Zeiner *et al.* 1990). Wilson's warblers are migratory, arriving from Mexico in mid-April through early May. The congener, hooded warbler (*Wilsonia citrina*), shows a significant habitat segregation by sex on their wintering grounds in Mexico with the males choosing forest habitat and females choosing shrub or field habitats (Morton 1990; Lopez and Greenberg 1990). Fall migrants arrive in mid-August and remain into late fall and occasionally can be seen in early December (Unitt 1984). In migration over desert habitats, birds can use almost any available vegetation but mostly forage near the ground (Miller and Stebbins 1964). Habitat use differed between spring and fall migration and was affected by the combination of age and sex. Wilson's warblers appear to prefer native willow habitat during spring migration (Yong, *et al.* 1998). Agriculture field/edge habitats may have represented sink habitats because birds in these habitats tended to be immature and had a lower rate of fat deposition and longer stopovers (Yong, *et al.* 1998). *Distribution*: Breeding range for the species is relatively large, extending from northern Alaska, east to Newfoundland, south to southern California into northern New Mexico and northern New England (Terres 1980). Wintering habitat begins in southern Baja California, Mexico and southern Texas to Panama (Terres 1980). In California the majority of the range is occupied by summer migrants and extends along the coast and in the Sierras (Zeiner *et al.* 1990). The winter range extends into San Diego, Orange, Los Angeles, Ventura and Santa Barbara counties along the coast (Garrett and Dunn 1981). *Known Populations in Western Riverside County:* Inland occurrences in southern California are all summer migrants and occur in three areas in western Riverside, southwestern San Bernardino and eastern Los Angeles counties (Zeiner, *et al.* 1990). Within western Riverside County, the Wilson's warbler is a common transient throughout the spring and less common during the fall (Garrett and Dunn 1981). There are no records extending through the winter (Garrett and Dunn 1981). The species currently breeds around montane meadows within the San Bernardino Mountains and the San Jacinto Mountains within the eastern portion of western Riverside County (Garrett and Dunn 1981).[b2]	Fed: – State: –
Mammals		
Antrozous pallidus	*Habitat*: Occupies wide variety of habitats, including grasslands,	Fed: fss

Species a1	Habitat and Distribution	Status c
pallid bat	shrublands, woodlands, and forestes from sea level up through mixed conifer forests. Most common in open, dry habitats with rocky areas for roosting. *Distribution*: Locally common species of low elevations throughout California. Not found in the high Sierra Nevadas from Shasta to Kern counties or the northwestern corner of CA from Del Norte and western Siskiyou counties to northern Mendocino County.[b3] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	State: ssc
Bassariscus astutus ringtail	*Habitat*: Occurs in various riparian habitats, and in brush stands of most foresxt and shrub habitats. Low to mid elevations.[b7] *Distribution*: Throughout most of California and the southwest.[b16] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: --
Canis latrans clepticus coyote	*Habitat*: Coyotes utilize all habitats types and sometimes are found in urban areas when associated with adjacent open land. Natal dens are associated with brush-covered slopes, thickets, hollow logs, rocky ledges, and burrows. *Distribution:* The coyote's geographic range has expanded dramatically in the last 150 years and includes the contiguous United States, western Canada and eastern Alaska, north to Hudson Bay and south to Guatemala (Hall 1981).Marginal records for this subspecies are San Marcos, Julian, and Jacumba in San Diego County, and into Baja California, Mexico (Hall 1981). The type locality for the subspecies is from the San Pedro Martir Mountains in Baja California (Bekoff 1977). The range of the subspecies *C. l. clepticus* appears to include western Riverside County, but the boundary with the range of the subspecies to the north, *C. l. ochropus*, is not clearly defined (Hall 1981). *Known Populations in Western Riverside County:* The coyote occurs throughout the planning area.[b1]	Fed: – State: –
Chaetodipus californicus femoralis Dulzura California pocket mouse	*Habitat:* Coastal sage scrub, chaparral, and riparian/scrub ecotones. Prefers more mesic scrub habitats than other *Chaetodipus* species and tends to be absent from more xeric stands of Riversidean sage scrub in Riverside County (P. Behrends, pers. obs.). *Distribution:* The historic range of the Dulzura California pocket mouse covers southern Orange County and San Diego County and appears to extend into the southwest corner of western Riverside County. Williams *et al.* (1993) note that the species *C. californicus* has never been reviewed systematically and that published occurrence records indicate errors in taxonomic assignment to subspecies. *Known Populations in Western Riverside County:* The Dulzura California pocket mouse typically is not reported from western Riverside County, but there may be confusion of this species with the northwestern San Diego pocket mouse, which is similar in appearance and the common *Chaetodipus* species in the planning area. This species almost certainly occurs on the northern slopes of the Agua Tibia Mountains and on the Santa Rosa Plateau. *C. californicus* is known from Indian Canyon in Beaumont, but it is unclear whether this population is the subspecies *C. c. femoralis* (Behrends, pers. obs.) or another subspecies. Its range within the remainder of the planning area needs to be clarified through field studies.[b1]	Fed: – State: ssc
Chaetodipus fallax fallax northwestern San Diego pocket mouse	*Habitat:* The northwestern San Diego pocket mouse inhabits coastal sage scrub, sage scrub/grassland ecotones, and chaparral communities. It inhabits open, sandy areas of both the Upper and Lower Sonoran life-zones of southwestern California and northern Baja California (in McClenaghan 1983). It generally exhibits a strong microhabitat affinity for rocky substrates and, to a lesser extent, shrubby areas (MWD and RCHCA 1995) and in western Riverside County typically is found in disturbed grassland and open sage scrub vegetation with sandy-loam to	Fed: – State: ssc

Species a1	Habitat and Distribution	Status c
	loam soils (S. Montgomery, pers. comm.). *Distribution:* Marginal records include Claremont; San Bernardino; Banning; and Jacumba (Hall 1981), and San Jacinto Lake, Riverside County (Mearns 1901). The northwestern San Diego pocket mouse occurs throughout western Riverside County and has been collected at elevations from 138 meters (452 feet) at Palm Springs, Riverside County, to 1,835 meters (6,018 feet) on the northern slopes of the San Bernardino Mountains in San Bernardino County (Lackey 1996). *Known Populations in Western Riverside County:* It is widely distributed throughout the planning area in areas of sparse sage scrub (Behrends, pers. comm., Montgomery, pers. comm.) and, based on the UCR data base, has been observed in more than 50 general areas ranging from Pedley in the west, Reche Canyon in the north, Temecula in the south, and Anza in the east. Additional main localities include Lake Mathews/Estelle Mountain/Gavilan Hills, the Badlands, Potrero Valley, Domenigoni Valley, Cactus Valley, Crown Valley, the Sage/Vail Lake area, Aguanga, Santa Rosa Plateau, and the Anza Valley. It has been observed in at least 13 of 22 reserve/public ownerships and has high potential to occur in the remaining nine (based on the current mapping of reserves/public ownerships). Existing reserves/public ownerships that provide substantial habitat for this species include the core Stephens' kangaroo rat reserves: Lake Skinner core reserve, Lake Mathews core reserve; San Jacinto core reserve, Motte-Rimrock core reserve, and Sycamore Canyon core reserve. Other key public ownerships that provide habitat for the species include the Santa Rosa Plateau Reserve, Box Springs Mountain Park, Kabian Park, and Santa Margarita Ecological Reserve.[b1]	
Choeronyeteris mexicana Mexican long-tongued bat	*Habitat*: Desert and montane riparian, desert succulent shrub, desert scrub, and pinon-juniper habitats. *Distribution*: known only from San Diego county, Arizona, and Mexico.[b7] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: ssc
Dipodomys merriami collinus Aguanga kangaroo rat	*Habitat:* Riversidean alluvial fan sages scrub and Riversidean sage scrub in sandy soils, alluvial areas, and along washes with nearby sage scrub. Its habitat requirements probably are very similar to San Bernardino kangaroo rat. *Distribution***:** Within Riverside County the Aguanga kangaroo rat occurs in the Aguanga area, Wilson Creek north of Radec, and probably is scattered throughout sandy wash areas in the region west of the Anza Valley, particularly in Temecula Creek and tributaries east of Vail Lake (P. Behrends, pers. comm.). This subspecies probably also occurs in northern San Diego County where there is potential habitat south along Temecula Creek toward Warner Springs, Cottonwood Creek, and Long Canyon. *Known Populations in Western Riverside County:* Aguanga, Sage, Temecula Creek, Wilson Creek.[b1]	Fed: – State: –
Euderma maculatum spotted bat	*Habitat*: Arid deserts, and grasslands and mixed conifer forests. Up to 10,600 feet in elevation. *Distribution*: Little is known about species in California, as it is one of North America's rarest mammals. It has been found in foothills and mountains and desert regions of southern California.[b7] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: ssc
Eumops perotis californicus California mastiff bat	*Habitat*: Open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, alm oases, chaparral, desert scrub and urban. *Distribution*: southeastern San Joaquin Valley, and Coastal Ranges from Monterey county southward through southern California. From the	Fed: -- State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	coast easterward to the Colorado Desert [b7] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	
Felis concolor mountain lion	*Habitat*: Rocky areas, cliffs, and ledges that provide cover within open woodlands and chaparral, as well as riparian areas that provide protective habitat connections for movement between fragmented core habitat. *Distribution:* From the northern limit of the Canadian forests to Patagonia in South America. Within western Riverside County, mountain lions are found intermittently throughout the mountainous and foothill regions. *Known Populations in Western Riverside County:* Santa Ana Mountains, San Bernardino Mountains, San Jacinto Mountains, Santa Rosa Mountains and adjacent brushy foothills and riparian areas that may serve as habitat connections for movement between core mountainous areas.[b1]	Fed: – State: –
Glaucomys sabrinus californicus San Bernardino flying squirrel	*Habitat*: Throughout their extensive continental range, northern flying squirrels inhabit a wide variety of woodland habitats primarily consisting of conifers, mixed coniferous-deciduous forest and occasionally broad-leaf-deciduous forest (Wells-Gosling and Heaney 1984). Old growth forest may be an important feature of their habitat, at least in some regions (Witt 1992). Diet of the northern flying squirrel consists of fungi throughout its range (e.g., Maser *et al.* 1985). *Distribution*: Within southern California, the northern flying squirrel occurs in the vicinity of Red Ant Creek, Big Bear Lake; San Jacinto Mountains. *Known Populations in Western Riverside County:* Idyllwild and Strawberry Creek in the San Jacinto Mountains. Probably occurs primarily on lands managed by the U.S. Forest Service.[b1]	Fed: fss State: ssc
Lasiurus ega southern yellow bat	*Habitat*: Valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. *Distribution*: Uncommon in California, known only in Riverside, Imperial, and San Diego counties, south to Mexican border (only in spring, summer, and fall).Elevation is below 2000 feet.[b14] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: --
Lepus californicus bennettii San Diego blacktailed jackrabbit	*Habitat:* Occupies many diverse habitats, primarily in arid regions supporting short-grass habitats. Jackrabbits typically are not found in high grass or dense brush, and the openness of Riversidean sage scrub probably is preferred over chaparral. Jackrabbits are common in grasslands that are overgrazed by cattle. The openness of the habitat allows jackrabbits to escape predators and humans by fast, often long-distance sprints (S. Montgomery, pers. comm.). In Riverside County, black-tailed jackrabbits are found in most areas that support annual grassland, Riversidean sage scrub, alluvial fan sage scrub, Great Basin sagebrush, disturbed habitat, and agriculture (P. Behrends, pers. comm.). Jackrabbits also are observed in southern willow scrub and juniper woodland (MWD and RCHCA 1995). *Distribution*: The black-tailed jackrabbit is widespread throughout the western United States west from central Missouri and Arkansas and only is absent from the higher elevations of the Rocky Mountains, the Sierra Nevada, and the Cascades. It ranges south into central Mexico. The subspecies *L.c. bennettii* is confined to coastal Southern California, with marginal records being Mt. Pinos, Arroyo Seco, Pasadena, San Felipe Valley, and Jacumba (Hall 1981). The type locality for *L. c. bennettii* is San Diego. *Known Populations in Western Riverside County:* The San Diego black-tailed jackrabbit is found throughout western Riverside County in suitable habitat. It ranges from being relatively uncommon to locally common. Important locales for this species appear to be the Badlands, the	Fed: – State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	Hemet/San Jacinto area, the Sage/Vail Lake area, the Santa Rosa Plateau, and probably the Anza area, although the number of recorded locations from here are relatively few. [b1]	
Lynx rufus californicus bobcat	*Habitat:* Habitat preferences throughout the year strongly reflect prey abundance (see Larivière and Walton 1997). Although widespread throughout Riverside County, the bobcat is most closely associated with rocky and brushy areas associated with springs or other perennial water sources, primarily in foothills comprised of chaparral habitats (P. Behrends, pers. comm. 1998). They occur in any sizable area of relatively undisturbed scrub habitat (S. Montgomery, pers. comm. 1998). *Distribution*: Bobcats occur throughout the United States, much of Mexico, and southern Canada. The subspecies *L. r. californicus* occurs throughout California, with the exception of the extreme northwestern portion and the Great Basin, Mojave, and Colorado deserts. Marginal records for this subspecies are Mt. Shasta, Lee Vining Creek Grade, Riverside, San Jacinto Mountains, and Santa Rosa Mountains (Hall 1981). *Known Populations in Western Riverside County:* Bobcats occur throughout western Riverside County in suitable habitat. Areas with frequent observations include the Santa Rosa Plateau, Crown Valley, the Badlands, and Lake Mathews/El Cerrito. Most important areas for the bobcat probably are Lake Mathews/Estelle Mountain, Santa Rosa Plateau, Lake Skinner/Crown Valley/Eastside Reservoir, Vail Lake/Sage, Anza, Badlands, Cleveland National Forest, and San Bernardino National Forest.[b1]	Fed: – State: –
Macrotus californicus California leaf-nosed bat	*Habitat*: Desert riparian, desert wash, desert scrub, desert succulent shrub, alkali desert scrub, and palm oasis. Elevation in California is below 2000 feet (elsewhere up to 4200 ft) *Distribution*: Riverside, Imperial, San Diego and San Bernardino counties, south to the Mexican border.[b3, b 5] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: fss State: ssc
Mustela frenata latirostra long-tailed weasel	*Habitat*: The long-tailed weasel prefers habitats with abundant prey, such as those areas where dens of burrowing rodents are numerous and close to cover and areas supporting large populations of small mammals and birds (Polderboer *et al.* 1941). Prey species diversity probably is an important factor in determining suitable habitat for *M. frenata.* The long-tailed weasel also appears to be partially restricted to habitats in close proximity to standing water (Gamble 1981). Waterways provide access to suitable habitat and are a natural avenue for dispersal, particularly in areas that otherwise are unsuitable (Fagerstone 1987). Preferred habitat types include brushland and open timber, brushy field borders, grasslands along creeks and lakes, and swamps (Svendsen 1982). *Distribution*: This species (*M. frenata*) has the largest range of any mustelid in the western hemisphere, inhabiting most life zones from alpine to tropical except desert (Sheffield and Thomas 1997). However, the subspecies *M. f. latirostra* occurs in a very small area of southern California, primarily in portions of eastern Orange County, western Riverside County and northern San Diego County. *Known Populations in Western Riverside County:* Known current and historic location of long-tailed weasels include Moreno Valley, San Jacinto Wildlife Area, the Badlands, San Timoteo Creek, Beaumont, Riverside, Pedley, Cherry Valley, Cabazon, Norco, the San Jacinto Plain, Lake Skinner, Crown Valley, Lake Elsinore/Alberhill, Warm Springs Creek, and Tahquitz Valley in the San Jacinto Mountain range. They probably occur throughout western Riverside County in areas of large open space where diverse prey are available [b1]	Fed: – State: –
Myotis ciliolabrum western small-footed myotis	*Habitat*: The habitat requirements are not well understood for this species. It has been captured near cottonwood-willow riparian woodlands, as well as pinyon-juniper woodlands, reservoirs, and chaparral	Fed: -- State: --

Species [a1]	Habitat and Distribution	Status [c]
	habitats.This species is found in relatively arid wooded and brushy uplands, near waters; prefers open strands in forests and woodlands. [b6, b14] *Distribution*: Along coast from contra Costa County south to the border in Trnsverse Ranges, the west and east sides of the Sierra Nevada; in the great Basin; desert habitat from Modoc to Kern and San Bernardino Countys; absent from Mojave and Colorado Deserts. [b14] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	
Myotis thysanodes fringed myotis	*Habitat*: Wide variety of habitats. Pinyon-juniper, valley foothill hardwood and hardwood-conifer are optimum habitats with elevation ranging from 4000-7000 feet. *Distribution*: Throughout California except Central Valley, and Colorado and Mohave deserts. [b7] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: --
Myotis volans long-legged myotis	*Habitat*: Woodland and forest habitats about 4000 ft. Forages in chaparral, coastal scrub, Great Basin woodlands and forests. Oak woodland is the probable preferred habitat. Uncommon in desert and arid grassland habitas. Elevation range up to 11,400 feet. *Distribution*: Coastal ranges form Oregon to Mexico; the Cascade/Sierra Nevada ranges to southern California, most of the Great Basin region, and in several Mojave Desertmountain ranges. Absent only from the Central Valley, the Colorado and Mojave deserts (except in the mountain ranges) and from eastern Lassen and Modoc Counties. [b7] Known Populations in Western Riverside County: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: – State: –
Neotoma lepida intermedia San Diego desert woodrat	*Habitat*: Desert woodrats are found in a variety of shrub and desert habitats, primarily associated with rock outcroppings or areas of dense undergrowth (P. Behrends, pers. comm.; Bleich and Schwartz 1975). They eat leaves and seeds of forbs. Woodrats often are associated with cholla cactus which they use for water. They also inhabit pinyon-juniper hillsides at lower elevations. and juniper woodland (MWD and RCHCA 1995). The desert woodrat often is associated with large cactus patches (S. Montgomery, pers. comm.), and within coastal sage scrub communities, it almost is invariably associated with prickly pear (*Opuntia occidentalis*). It also is found in rocky outcroppings and boulder-covered hillsides in chaparral or oak woodlands (MWD and RCHCA 1995). In chaparral, rock dens usually are located near primary food sources to minimize travel time and exposure to predators. Availability of suitable shelter materials may influence the shape and distribution of home ranges in a given area. *Distribution*: *N. lepida* is widespread throughout central and southern California and the Great Basin, Mojave, and Colorado deserts. Marginal records for *N. l. intermedia*, the San Diego desert woodrat, in the United States include San Luis Obispo; San Fernando: San Bernardino Mts.; Redlands; and Julian (Hall 1981). *Known Populations in Western Riverside County:* The San Diego desert woodrat occurs in Riversidean and coastal sage scrub and chaparral throughout the planning area. Significant populations probably occur in the Lake Mathews/Estelle Mountain area, Kabian Park, the Badlands, Lake Skinner/Crown Valley, Vail Lake/Sage, and on the Santa Rosa Plateau.[b1]	Fed: – State: ssc
Nyctinimops femorosaccus pocketed free-tailed bat	*Habitat*: Pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshu tree, and palm oasis. Usually found between 6,500 to 9,800 feet. *Distribution*: Riverside, San Diego, and Imperial counties. [b5, b7] *Known Populations in Western Riverside County*: Standard databases	Fed: -- State: scc

Species a1	Habitat and Distribution	Status c
	contain no occurrence records for this species in Western Riverside County.[b15]	
Nyctinimops macrotis big free-tailed bat	*Habitat*: Rugged, rocky terrain up to 8,000 feet. *Distribution*: Rare in California, records from urban areas of San Diego county; New Mexico, southern Arizona, and Texas.[b7] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: -- State: scc
Onychomys torridus ramona southern grasshopper mouse	*Habitat*: The southern grasshopper mouse is found in grasslands and sparse coastal sage scrub habitats. They nest in burrows, often those dug by other rodents. Specific habitat requirements of the southern grasshopper mouse are unknown. *Distribution*: *O. torridus* occurs throughout desert habitats in the southwestern United States and much of Mexico. The subspecies *O. t. ramona* is restricted to coastal Southern California, with marginal records for Mint Canyon west of Palmdale, San Fernando, Riverside, Valle Vista, Warner Pass, La Puerta Valley, Jacumba, Santee Mountains, and the mouth of the Tijuana River Valley (Hall 1981). *Known Populations in Western Riverside County:* There are very few records for the southern grasshopper mouse in the planning area. There are three records for the Badlands between Jackrabbit Trail and Potrero Valley, three from Lake Skinner/Crown Valley, three from the Aguanga area, and scattered individual records from Romoland, Perris, along Highway 74 between Perris and Lake Elsinore, south of Box Spring Mountain, and March ARB. It is unlikely that the latter scattered locations currently support viable populations of the grasshopper mouse because of urban development in these areas.[b1]	Fed: -- State: ssc
Perognathus longimembris brevinasus Los Angeles pocket mouse	*Habitat*: Habitat of the Los Angeles pocket mouse has never been specifically defined, although Grinnell (1933) indicated that the subspecies "inhabits open ground of finely sandy composition" (see Brylski *et al.* 1993). This observation is supported by others who also state that the Los Angeles pocket mouse prefers fine, sandy soils and may utilize these soil types for burrowing (e.g., Jameson and Peeters 1988). This subspecies may be restricted to lower elevation grassland and coastal sage scrub (Patten *et al.* 1992). *Distribution*: The historic range of the Los Angeles pocket mouse was estimated to be from Burbank and San Fernando in Los Angeles County east to the City of San Bernardino, San Bernardino County (the type locality). Their range extends eastward to the vicinity of the San Gorgonio pass in Riverside County, and southeast to Hemet and Aguanga, and possibly to Oak Grove, in north-central San Diego County (Patten *et al.* 1992). *Known Populations in Western Riverside County:* Historic capture locations include Long Valley, Skunk Hollow, in sandy wash habitat downstream from Massacre Canyon near San Jacinto, immediately north of the San Jacinto River channel, March ARB, and along Davis Road in the San Jacinto Wildlife Area (S. Montgomery pers. comm.). Other recent captures of the species include the Lake Perris State Recreation Area; habitat within the San Jacinto River channel in the City of San Jacinto; along Briggs and Matthews Road west of Double Butte Park; Murrieta Hot Springs Road east of Highway 79; and the Silverado Ranch Mitigation Bank in the Anza Valley (Behrends, pers. obs. 1999). Brylski *et al.* (1993) report records from the Temecula area and open space west of Vail Lake. Other locations have been documented at Aguanga, Pauba Valley, French Valley, Crown Valley, Lake Skinner, Winchester, Hemet, Menifee, Banning, Cabazon, Beaumont, and Valle Vista-San Jacinto Valley.[b1]	Fed: fss State: ssc
Pleocotus (Corynorhinus) townsendii townsendii	*Habiat*: Townsend's big-eared bat is found throughout Califonria, but the details of its distribution are not well known. This species is found in all but subalpine and alpine habitats, and may be found at any season throughout its range. Once considered common, Townsend's big-eared	Fed: fss State: ssc

Species [a1]	Habitat and Distribution	Status [c]
western big-eared bat	bat now is considered uncommon in California. It is most abundant in mesic habitats.[b14] *Distribution*: Washingon, Oregon, California, Nevada, Idaho, and possibly southwestern Montana and northwestern Utah.[b6] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	
Pleocotus (Corynorhinus) townsendii pallescens pale big-eared bat	*Habitat*: Lives in a wide vareity of habitats, but most common in Mojave mixed scrub and lowland riparian communities with appropriate roosting, maternity, and hibernacula sites free from human disturbance. Requires access to a nearby water supply due to poor urine concentrating abilities. *Distribution*: Washington, Oregon, California, Nevada, Idaho, Arizona, Colorado, New mexico, Texas, and Wyoming.[b6] *Known Populations in Western Riverside County*: Standard databases contain no occurrence records for this species in Western Riverside County.[b15]	Fed: fss State: ssc
Sylvilagus bachmani brush rabbit	*Habitat*: Brush rabbits inhabit dense, brushy cover, most commonly in chaparral vegetation. They do not dig their own dens, but use the burrows of other species or brush piles. *Distribution***:** The brush rabbit, *S. bachmani*, is a Pacific coastal species that occurs west of the Cascades and Sierra Nevadas from southern Oregon to Baja California, Mexico. It is generally absent from the San Joaquin Valley, except for a small population of *S. b. riparius* known only from the west side of the San Joaquin River in Stanislaus County. Marginal records for the subspecies *S. b. cinerascens*, include San Emigdio Canyon; Reche Canyon; Dos Palmas Springs; Santa Rosa Mountains; Baja California (Hall 1981). *Known Populations in Western Riverside County:* The brush rabbit occurs in appropriate habitat throughout western Riverside County. Populations appear to be centered around Sage, the Santa Rosa Plateau, and the foothills of the San Jacinto Mountains. Additional localities include Domenigoni Valley, Harford Springs area, Vail Lake area, Potrero Valley, Lake Mathews, Lakeview Mountain, Santa Ana River, the Badlands, Reche Canyon, Banning/Beaumont, Calimesa, and Garner Valley.[b1]	Fed: – State: –
Taxidea taxus American badger	*Habitat*: Badgers are generally associated with dry, open, treeless regions, prairies, parklands, and cold desert areas. For example, badger dens on Camp Pendleton Marine Corps Base in San Diego County are located in open, grassy areas of coastal sage scrub. Altitudinally, the badger's range extends from below sea level to over 3,600 meters (11,800 feet) (Lindzey 1982). *Distribution*: The American badger ranges throughout the western United States, north into the western provinces of Canada, and east to Ohio, Michigan and Ontario, Canada. The subspecies *T. t. berlandieri* that occurs in the MSHCP planning area ranges into eastern California from Lake Tahoe south throughout Sierra and west to Coast Ranges, including Baja California, and east through Arizona, New Mexico, southern Texas and south into Mexico. *Known Populations in Western Riverside County:* Badgers occur throughout western Riverside County in appropriate habitat, but at very low (and potentially declining) densities. Recorded locations for badgers include Lake Elsinore, Pinto Basin, San Jacinto Valley, Cahuilla Mountain area, Temecula area, Santa Rosa Plateau, French Valley, Crown Valley, Sage, Badlands, Beaumont, Banning, El Cerrito, Hemet, Pauba Valley, Butterfield Valley, and Pedley.[b1]	Fed: – State: –

Notes: [a1] This list consists of species potentially occuring in Western Riverside County (see Figure. 4.2-1 for boundary) that were considered for coverage by the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) (County of Riverside, 1999), except those species listed in Table 4.2.C.

[a2] For some bird species, the CDFG's Natural Diversity Database contains occurrence data only for certain life stages or conditions, such as nesting, rookery, burrow sites, or wintering (CDFG NDDB, 1999c). This does *not* mean that these are the only conditions under which the species is protected, or even that the species necessarily receives a greater degree of protection under such conditions.

[b1] Habitat and distribution information is from the *August 9, 1999 Draft Proposal* for the Western Riverside County MSHCP (County of Riverside, 1999).

[b2] Habitat and distribution information is from the April 2000 *Revised Draft Species Accounts* for the Western Riverside County MSHCP (County of Riverside, 2000).

[b3] Habitat and distribution information is from the California Department of Fish and Game's *Natural Diversity Database* (CDFG NDDB, 1999a; CDFG NDDB, 2000a).

[b4] Habitat and distribution information is from *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik, 1994).

[b5] Habitat and distribution information is from *Technical Appendix: Coachella Valley Multiple Species Habitat Communities Conservation Plan*. (CVAG, 1998).

[b6] Habitat and distribution information is from *Revised Species Accounts* (Lower Colorado River Multi-Species Conservation Steering Committee, 1999) for the Lower Colorado River MSCP.

[b7] Habitat and distribution information is from *California's Wildlife on CD-ROM* (CDFG, 1999).

[b8] Habitat and distribution information is from *Freshwater Fishes of California* (McGinnis, 1984).

[b9] Habitat and distribution information is from species descriptions written by Cameron Barrows (Kadie Barrows, pers. comm. to Stanley C. Spencer Sept. 22, 1999).

[b10] Habitat and distribution information is from species descriptions from *A Flora of Southern California* (Munz, 1974).

[b11] Habitat and distribution information is from species descriptions from *The Jepson Manual: Higher Plants of California* (Hickman, 1993).

[b12] Distribution information is from collected species at the University of California, Riverside herbarium, September 28, 2000.

[b13] Habitat and distribution information is from the October 2000 Additional Species Accounts for the Western Riverside County MSHCP, Appendix B (County of Riverside, 2000).

[b14] Habitat and distribution information is from *California's Wildlife Volume 3, Mammals* (CDFG, 1990).

[b15] Standard databases for occurrence records include *Rarefind2* (CDFG NDDB 1999a, 2000a), *Inventory of Rare and Endangered Plants of California* (Skinner and Pavlik, 1994), and specimen label information from the Herbarium at the University of California, Riverside.

[b16] Habitat and distribution information is from *Peterson's Field Guide to the North America, north of Mexico: Mammals,* third edition, written by William Henry Burt (Boston: Houghton Mifflin, 1976).

[c] Federal and state status, and California Native Plant Society (CNPS) designations were taken from *Special Plants List* (CDFG NDDB, 1999b) and *Special Animals* (CDFG NDDB, 1999c). Contrary to implications by the California Department of Fish and Game (CDFG NDDB, 1999c), there is no federal listing status called 'species of concern', and this term is *not* synonymous with 'former Category 2 candidates'. Therefore, this table does not follow *Special Plants List* or *Special Animals* in including 'species of concern' as a federal listing status designation. For more information on former Category 2 candidates, see the U.S. Fish and Wildlife Service website at http://endangered.fws.gov/norqa.html.

Federal Status

fss = Forest Service Sensitive: Species considered sensitive by the UDSA Forest Service because of declining populations.

smc = Species of Management Concern: Migratory nongame birds identified by the U.S. Fish and Wildlife Service to be of concern due to (1) documented or apparent decline; (2) small or restriced populations; or (3) dependence on restricted or vulnerable habitats.

State Status

ssc = Species of Special Concern: Species considered by the California Department of Fish and Game as possibly facing extirpation in Calirornia due to declining populations or loss of habitat.

California Native Plant Society (CNPS) Classifications

1a = CNPS list of plants presumed extinct in California.
1b = CNPS list of plants considered rare, threatened or endangered in California and elsewhere.
2 = CNPS list of plants considered rare, threatened, or endangered in California, but more common elsewhere.
3 = CNPS review list of plants for consideration as endangered but about which more information is needed.
4 = CNPS watch list of plants of limited distribution, whose status should be monitored.

4.2.2 Biological Resources in Eastern Riverside County

4.2.2.1 Regional Characteristics of Eastern Riverside County

Eastern Riverside County is here defined as that portion of the County outside of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) area. This is approximately the portion of the County which lies east of the crest of the San Jacinto Mountains (see Figure 4.2.1 for a graphic depiction of the boundary). Almost all of the desert region of the County is contained within Eastern Riverside County. Most of Eastern Riverside County is covered by desert scrub, with chaparral at the western edge, and woodlands and forests at higher elevations in the San Jacinto Mountains and desert mountains. Elevation of Eastern Riverside County ranges from about 230 feet below mean sea level at the Salton Sea to about 9,800 feet in the San Jacinto Mountains. Variation in topography, soil, and climate across this elevational range creates habitats for a wide variety of animals and plants, including many that are rare or endemic to Southern California.

4.2.2.2 Natural Communities of Eastern Riverside County

Generalized Natural Communities

GIS databases recording land cover were obtained from the CDFG, BLM, and Riverside County. The natural communities covered by each database are shown in Table 4.2.A. For purposes of a natural community map for this study, natural communities were grouped into the 16 generalized natural communities in the leftmost column of Table 4.2.A. The generalized natural communities that occur in Eastern Riverside County are described in Table 4.2.E, and illustrated in a map of the County in Figure 4.2.1. The portions of the map covering Eastern Riverside County are from two sources. The framed portion surrounding the Coachella Valley is from GIS data developed for the Coachella Valley Multiple Species Habitat Conservation Plan (CVAG 1998). The remaining unframed areas are from the Gap Analysis of Mainland California CD ROM available from CDFG. Federal and State listed, proposed, and candidate species that may be expected to occur in these communities are listed in Table 4.2.E. This table provides brief descriptions for the generalized natural communities depicted in Figure 4.2.1 for Eastern Riverside County, and lists the species most likely to be encountered in each community that are currently protected by the Endangered Species Act or the California Endangered Species Act.

Table 4.2.E - Generalized Natural Communities of Eastern Riverside County

Name	Description	Federal and State Listed, Proposed, and Candidate Species
Urban and Disturbed	This category includes areas where natural vegetation has been largely destroyed by human activity, other than agriculture. It includes land covered by concrete, asphalt, buildings, lawns, golf courses, etc., as well as areas cleared of vegetation or otherwise significantly disturbed by machinery. In Eastern Riverside County, urban and disturbed areas occur predominantly in the Coachella and Palo Verde Valleys.	California least tern (*Sterna antillarum brownii*) -- utilizes landfills and paved areas Peninsula bighorn sheep (*Ovis canadensis cremnobates*) – may utilize lawns and golf courses adjacent to natural habitat mountain plover (*Charadrius montanus*) – may utilize golf courses and sod farms
Agriculture	Agricultural land may be defined broadly as land used primarily for production of food and fiber. This community includes field croplands, orchards, groves, vineyards, and dairy and livestock feedyards. In Eastern Riverside County, agricultural land is predominantly in the Coachella and Palo Verde Valleys.	mountain plover (*Charadrius montanus*) – may utilize golf courses and sod farms
Water	This category consists of areas permanently or generally flooded, including lakes, reservoirs, ponds, rivers, creeks, and springs. The Salton Sea and the Colorado River are the major water bodies in Eastern Riverside County. Most permanent creeks are in the San Jacinto and San Bernardino Mountains, most ponds are in agricultural areas, canals and aqueducts transport water to agricultural lands and the Salton Sea, and springs are scattered in mountain and desert areas.	desert pupfish (*Cyprinodon macularius*) bonytail chub (*Gila elegans*) razorback sucker (*Xyrauchen texanus*) brown Pelican (*Pelecanus occidentalis californicus*) American Peregrine Falcon (*Falco peregrinus anatum*) bald eagle (*Haliaeetus leucocephalus*) - nesting and wintering.

Name	Description	Federal and State Listed, Proposed, and Candidate Species
		California black rail (*Laterallus jamaicensis colturniculus*) Yuma clapper rail (*Rallus longirostris yumanensis*) California least tern (*Sterna antillarum browni*) California red-legged frog (*Rana aurora draytonii*)
Desert Dune	Desert dunes occur in desert areas where windblown sand has accumulated. Dunes may be actively moving or partially or fully stabilized by shrubs, scattered low annuals and perennial grasses. In Eastern Riverside County, dunes are widely scattered throughout the desert.	Coachella Valley milk-vetch (*Astragalus lentiginosus var. coachellae*) Coachella Valley fringe-toed lizard (*Uma inornata*) desert tortoise (*Xerobates agassizii*)
Coastal Sage Scrub	This plant community consists of low, soft-woody shrubs and subshrubs. Typical stands in Eastern Riverside County are fairly open and dominated by California sagebrush (*Artemesia californica*), California buckwheat (*Eriogonum fasciculatum),* and red brome (*Bromus madritensis* ssp. *rubens)*. In Eastern Riverside County, this community occurs primarily at the southern end of the San Bernardino Mountains.	thread-leaved brodiaea (*Brodiaea filifolia*) slender-horned spineflower (*Dodecahema leptoceras*)
Sonoran Desert Scrub	This plant community is dominated by widely spaced shrubs and occurs on well-drained desert soils of low salinity, in areas where temperatures rarely fall below freezing in the winter. Characteristic species include burro-weed (Ambrosia dumosa), creosote bush (Larrea tridentata), brittlebush (Encelia farinosa), ocotillo (Fouquieria splendens), catclaw (Acacia greggii), agave (Agave desertii), and various species of cactus. This is the predominant natural community in Eastern Riverside County.	Coachella Valley milk-vetch (*Astragalus lentiginosus var. coachellae*) triple-ribbed milk-vetch (*Astragalus tricarinatus*) desert slender salamander (*Batrachoseps aridus*) desert tortoise (*Xerobates agassizii*) gilded flicker (*Colaptes chrysoides*) Gila woodpecker (*Melanerpes uropygialis*) Peninsula bighorn sheep (*Ovis canadensis cremnobates*)

Name	Description	Federal and State Listed, Proposed, and Candidate Species
Mojavean Desert Scrub	This plant community is the Mojave Desert counterpart to Sonoran desert scrub. It is dominated by widely spaced shrubs and occurs on well-drained desert soils of low salinity. It differs from Sonoran desert scrub in occuring in areas where winter temperatures are often below freezing in the winter, and in its characteristic species, which include burro-weed (*Ambrosia dumosa*), creosote bush (Larrea tridentata), burrobush (*Hymenoclea salsola*), box thorn (*Lycium* spp.), ephedra (*Ephedra nevadensis*), blackbush (*Coleogyne ramosissima*), saltbush (*Atriplex* spp.), Joshua tree (*Yucca brevifolia*), and various species of cactus (mostly *Opuntia* spp.). This is the predominant natural community in and around Joshua Tree National Park..	Parish's daisy (Erigeron parishii) triple-ribbed milk-vetch (*Astragalus tricarinatus*) Desert tortoise (*Xerobates agassizii*) Peninsula bighorn sheep (*Ovis canadensis cremnobates*)
Sagebrush Scrub	This plant community consists mostly of widely spaced soft-woody shrubs. Big sagebrush (*Artemisia tridentata*) is the dominant species. In Eastern Riverside County, sagebrush scrub occurs at the northern end of the Santa Rosa Mountains and perhaps in sparsely scattered locations in the desert mountains.	Peninsula bighorn sheep (*Ovis canadensis cremnobates*)
Chenopod Scrub	This community is composed primarily of low, grayish, widely spaced shrubs on poorly drained soils of high salinity and/or alkalinity, often surrounding playas but on slightly higher ground. It is strongly dominated by saltbush (*Atriplex spp*.), sometimes of a single species. In Eastern Riverside County, this community occurs primarily in the Coachella Valley and around playas in the Sonoran Desert.	desert tortoise (*Xerobates agassizii*)
Chaparral	This plant community is dominated by dense, evergreen shrubs up to 10 feet tall. Characteristic species include chamise (Adenostoma fasciculatum), red shank (Adenostoma sparsifolium), scrub and live oaks (Quercus spp.), manzanita (Arctostaphylos spp.), ceanothus (Ceanothus spp.), sugar bush (Rhus ovata), and mountain-mahogany (Cercocarpus spp.). In Eastern Riverside County, Chaparral is found on	slender-horned spineflower (*Dodecahema leptoceras*) Mojave tarplant (*Hemizonia mohavensis*)

Name	Description	Federal and State Listed, Proposed, and Candidate Species
	slopes and foothills of the San Bernardino, San Jacinto, and Santa Rosa Mountains.	
Grassland	Grasslands are dominated by native and exotic grasses to a height of about two feet. In Eastern Riverside County, grasslands occur mostly in the San Jacinto and San Bernardino Mountains and in disturbed areas.	thread-leaved brodiaea (*Brodiaea filifolia*) Mojave tarplant (*Hemizonia mohavensis*) desert tortoise (*Xerobates agassizii*) Peninsula bighorn sheep (*Ovis canadensis cremnobates*) mountain plover (*Charadrius montanus*)
Playa	This community is composed primarily of low, grayish, widely spaced shrubs on poorly drained soils of high salinity and/or alkalinity due to evaporation of water that accumulates in closed basins. Often with high water table and with salt crust on the surface. Total cover usually low due to wide spacing between shrubs and minimally developed understory. This community is similar to chenopod scrub, but with more succulent species. Dominant species include saltbush (Atriplex spp.), iodine bush (Allenrolfea occidentalis), and greasewood (Sarcobatus vermiculatus), and bush seepweed (Sueda moquinii). In Eastern Riverside County, this community occurs in closed basins on the Mojave and Sonoran deserts.	thread-leaved brodiaea (*Brodiaea filifolia*) desert tortoise (*Xerobates agassizii*) California least tern (*Sterna antillarum browni*)
Riparian and Bottomland	This category occurs in bottomlands, canyons, desert washes, floodplains, gravel bars, banks of perennially wet streams, and other places with high water tables. These areas are characteristically dominated by drought- or winter-deciduous trees, tall shrubs, or palms. Characteristic dominant species include cottonwoods (*Populus* spp.), willows (*Salix* spp.), mulefat (*Baccharis salicifolia*), tamarisk, (*Tamarix* spp.), giant reed (*Arundo donax*), California fan palm (*Washingtonia filifera*), arrow weed (*Pluchea sericea*), mesquite (*Prosopis* spp.), smoke tree	Coachella Valley milk-vetch (*Astragalus lentiginosus var. coachellae*) triple-ribbed milk vetch (*Astragalus tricarinatus*) Mojave tarplant (*Hemizonia mahavrnsis*) desert slender salamander (*Batrachoseps aridus*) arroyo toad (*Bufo microscaphus californicus*)

Name	Description	Federal and State Listed, Proposed, and Candidate Species
	(*Psorothamnus spinosus*), desert willow (*Chilpsis linearis*), catclaw (*Acacia greggii*), and palo verde (*Cercidium floridum*). In Eastern Riverside County, riparian and bottomland is widespread and occurs in mountain canyons, along waterways, and in desert washes.	California red-legged frog (*Rana aurora draytonii*) desert tortoise (*Xerobates agassizii*) Gila woodpecker (*Melanerpes uropygialis*) elf owl (*Micrathene whitneyi*) western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) gilded flicker (*Colaptes chrysoides*) southwestern willow flycatcher (*Empidonax traillii extimus*) - nesting. American peregrine falcon (*Falco peregrinus anatum*) bald eagle (*Haliaeetus leucocephalus*) - nesting and wintering Yuma clapper rail (*Rallus longirostris yumanensis*) Arizona Bell's vireo (*Vireo bellii arizonae*) - nesting least Bell's vireo (*Vireo bellii pusillus*) - nesting Peninsula bighorn sheep (*Ovis canadensis cremnobates*)
Oak Woodland/ Forest	This category consists of woodlands and forests dominated by oaks (*Quercus* spp.), and is found in Eastern Riverside County mostly in the San Jacinto and San Bernardino Mountains.	Southern rubber boa (*Charina bottae umbratica*)
Coniferous Woodland/ Forest	This category consists of woodlands and forests dominated by conifers, including pines (*Pinus* spp.), junipers (*Juniperus* spp.), white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*) and bigcone douglas fir (*Pseudotsuga macrocarpa*). In Eastern Riverside County, coniferous woodlands and forests occur on the San Bernardino and San Jacinto Mountains, and at higher elevations in the desert	Parish's daisy (*Erigeron parishii*) Hidden Lake bluecurls (*Trichostema austromomtanum ssp. compactum*) Southern rubber boa (*Charina bottae umbratica*) Bald eagle (*Haliaeetus*

Name	Description	Federal and State Listed, Proposed, and Candidate Species
	mountains.	*leucocephalus*) - nesting and wintering Tahquitz ivesia (Ivesia callida)

Sensitive Natural Communities

The CDFG, through its Natural Diversity Data Base, tracks the occurrence of natural communities which it considers most sensitive in the state. According to the Natural Diversity Database (CDFG NDDB 1999a), the natural communities described below occur in Eastern Riverside County. Community descriptions are from Holland (1986), the Natural Diversity Database, and Sawyer and Keeler-Wolf (1995).

Coastal and Valley Freshwater Marsh

Coastal and valley freshwater marsh is dominated by perennial, emergent monocots, often forming completely closed canopies in quiet sites (lacking significant current) permanently flooded by fresh water. Prolonged saturation permits accumulation of deep, peaty soils. This community is scattered along lakes, rivers, and springs in California. In Eastern Riverside County it occurs along the Colorado River.

Desert Fan Palm Oasis Woodland

Desert fan palm oasis woodlands are dominated by California fan palm (*Washingtonia filifera*), but also potentially including willows (*Salix* spp.), western sycamore (*Platanus racemosa*) canyon live oak (*Quercus chrysolepis*), Fremont cottonwood (*Populus fremontii*), or velvet ash (*Fraxinus velutina*). This community occurs on intermittently flooded or saturated soils in the Sonoran Desert.

Mesquite Bosque

Mesquite bosque is an open to fairly dense, drought-deciduous streamside thorn forest dominated by screwbean (*Prosopis pubescens*) with open, park-like interiors maintained by frequent flooding or fire. Understories historically were open, dominated by annual and perennial grasses and with scattered saltbush (*Atriplex*) species. Mesquite bosque occurs in washes, streambanks, alkali sinks, or outwash plains with substantial near-surface groundwater supplies. This community is apparently restricted to area along the lower Colorado River, was never extensive in California, and is now virtually extirpated by agricultural development, flood control, and tamarisk invasion. It is more extensive in Arizona and northwestern mainland Mexico.

Sonoran Cottonwood Willow Riparian Forest

Sonoran cottonwood-willow riparian forests are winter-deciduous, broadleafed streamside forests to about 60 feet tall, dominated by Fremont cottonwood (*Populus fremontii*) with dense understories of several willow (*Salix*) species, in deep, well-watered, loamy alluvial soils along floodplains of perennial desert rivers and streams. This community was formerly extensive along the lower Colorado River, but now virtually eliminated by flood control projects, agriculture, or by tamarisk (*Tamarix*) invasion. It also occurs in Chino Canyon and Mission Creek (CVAG 1998).

Southern Riparian Forest

Southern riparian forest is a generic category used by the Natural Diversity Data Base for riparian forests of undocumented species composition, but most likely dominated by cottonwoods (*Populus* spp.), willows (*Salix* spp.), western sycamore (*Platanus racemosa*), or coast live oak (*Quercus agrifolia*). Southern riparian forests occur throughout nondesert southern California along streams and floodplains and in bottomlands.

4.2.2.3 Federal and State Listed, Proposed, and Candidate Species of Eastern Riverside County

Thirty-two species in Eastern Riverside County have special status under the ESA and/or the CESA. These include species that are listed as "endangered" or "threatened" under the ESA or that have been "proposed" or are "candidates" for such listing. They also include species that are listed as "endangered," "threatened," or "rare" under the CESA or that have been petitioned (i.e., are "candidates") for listing. Each of these species warrants intensive analysis for purposes of project review under CEQA. Any potential project impacts to these species may involve permitting or other compliance requirements under CEQA. These species are identified with natural communities within which they may be expected to occur in Table 4.2.E. They are also listed in Table 4.2.F along with state and federal status and brief descriptions of habitat and distribution.

Table 4.2.F - Federal and State Listed, Proposed, and Candidate Species of Eastern Riverside County

Species [a1]	Habitat and Distribution	Status [c1]
Vascular Plants		
Astragalus lentiginosus var *coachellae* Coachella Valley milk-vetch	Sandy flats, washes, outwash fans, or dunes at 195-1200 feet in Sonoran desert scrub. Endemic to the Coachella Valley, Riverside County.[b1]	Fed: E State: -- CNPS: 1b
Astragalus tricarinatus triple-ribbed milk-vetch	Hot, rocky slopes in canyons and along edge of boulder-strewn desert washes at 1500-2600 feet in Joshua tree woodland, Sonoran desert scrub. Associated with *Larrea* (creosote bush) and *Encelia* (brittlebush). Known only from Riverside and San Bernardino	Fed: E State: -- CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c1]
	Counties.[b1]	
Brodiaea filifolia thread-leaved brodiaea	Clay soils at 115-2800 feet in cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools. Usually associated with annual grassland and vernal pools; often surrounded by shrubland habitats.[b1]	Fed: T State: E CNPS: 1b
Dodecahema leptoceras slender-horned spineflower	Flood deposited terraces and washes; associates include *Encelia* (brittlebush), *Dalea, Lepidospartum* (scalebroom), etc. at 660-2500 feet in chaparral, coastal scrub (alluvial fan sage scrub). Historically from Los Angeles, Riverside, and San Bernardino Counties. Extirpated from much of range.[b1]	Fed: E State: E CNPS: 1b
Erigeron parishii Parish's daisy	Often on carbonate; limestone mountain slopes; often associated with drainages at 3400-6600 feet in Mojave desert scrub, Pinyon juniper woodland, Joshua tree woodland. Known only from Riverside and San Bernardino Counties.[b1]	Fed: T State: -- CNPS: 1b
Hemizonia mohavensis Mojave tarplant	Low sand bars in river bed; mostly in riparian areas or in ephemeral grassy areas at 2800-5180 feet in Riparian scrub, chaparral. Historically known only from Riverside and San Bernardino Counties.[b1]	Fed: -- State: E CNPS: 1a [c2]
Ivesia callida Tahquitz ivesia	Steep slopes of decomposed granitic outcrops, often in crevices at 7840-8040 feet in upper montane coniferous forest. Endemic to Riverside county.[b1]	Fed: -- State: R CNPS: 1b
Trichostema austromontanum ssp *compactum* Hidden Lake bluecurls	Only one site known, at 8730 feet in upper montane coniferous forest. Endemic to Riverside county.[b1]	Fed: T- State: -- CNPS: 1b
Fish		
Cyprinodon macularius desert pupfish	Can live in salinities from fresh water to 68 ppt, can withstand temperatures from 45-111 degrees F and dissolved oxygen levels down to 0.1 ppm. Desert ponds, springs, marshes and streams in southern California.[b1]	Fed: E State: E
Gila elegans bonytail chub	Apparently extinct in California. Formerly preferred flowing, silty water along the lower Colorado River.[b6]	Fed: E State: E
Xyrauchen texanus razorback sucker	Adapted for swimming in swift currents but also need quiet waters. Spawn in areas of sand/gravel/rocks in shallow water.Found in the Colorado River bordering California.[b1]	Fed: E State: E
Amphibians		
Batrachoseps aridus desert slender salamander	Occurs under limestone sheets, rocks, and talus, usually at the base of damp, shaded, north and west-facing walls. Known only from hidden palm canyon, Riverside county, in barren, palm oasis, desert wash, and desert scrub.[b1]	Fed: E State: E
Bufo microscaphus californicus arroyo toad	Rivers with sandy banks, willows, cottonwoods, and sycamores; loose, gravelly areas of streams in drier parts of range. Semi-arid regions near washes or intermittent streams, including valley-foothill and desert riparian, desert wash, etc.[b1]	Fed: E State: ssc
Rana aurora draytonii California red-legged frog	Requires 11 to 20 weeks of permanent water for larval development. Must have access to estivation habitat. Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation.[b1] Known in Eastern Riverside County only from Hidden Palm Canyon, but that population is now believed extinct. [b7]	Fed: T State: ssc
Reptiles		
Charina bottae umbratica southern rubber boa	Found in vicinity of streams or wet meadows; requires loose, moist soil for burrowing; seeks cover in rotting logs. Restricted to the San Bernardino and San Jacinto Mountains; found in a variety of montane forest habitats.[b1]	Fed: fss State: T
Uma inornata Coachella Valley fringe-toed lizard	Requires fine, loose, windblown sand (for burrowing), interspersed with hardpan and widely spaced desert shrubs. Limited to sand dunes in the Coachella Valley, Riverside County.[b1]	Fed: T State: E

Species [a1]	Habitat and Distribution	Status [c1]
Xerobates agassizii desert tortoise	Require friable soil for burrow and nest construction. Creosote bush habitat with lg annual wildflower blooms preferred. Most common in desert scrub, desert wash, and Joshua tree habitats; occurs in almost every desert habitat.[b1]	Fed: T State: T
Birds [a2]		
Charadrius montanus mountain plover	Forages in open shortgrass plains, plowed fields with little vegetation, and open sagebrush areas. Does not nest in California, but is a winter resident from September through March below 3300 feet, in the Central Valley, Southwest, and Sonoran Desert bioregions. In Eastern Riverside County is found near the Colorado River around Blythe.[b5]	Fed: PT, smc State: ssc
Coccyzus americanus occidentalis western yellow-billed cuckoo	Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape. Riparian forest nester, along the broad, lower flood-bottoms of larger river systems.[b1]	Fed: smc State: E
Colaptes chrysoides gilded flicker	Uses willows, cottonwood, tree yucca and, when available, saguaro cactus. Sonoran desert habitat and riparian woodlands along the Colorado River.[b1]	Fed: -- State: E
Empidonax traillii extimus southwestern willow flycatcher	Riparian woodlands in southern California.[b1]	Fed: E, fss State: E
Falco peregrinus anatum American peregrine falcon	Occurs in a wide variety of habitats, but requires protected cliffs and ledges for cover, usually breeds and feeds near water. In California is a very uncommon breeding resident and uncommon as a winter resident in most of the state, excluding some desert regions In Riverside County occurs in the Sonoran Desert and in much of western Riverside County.[b5]	Fed: smc State: E
Haliaeetus leucocephalus bald eagle	Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter. Ocean shorelines, lake margins, and river courses for both nesting and wintering. Most nests within one mile of water.[b1]	Fed: T State: E
Laterallus jamaicensis coturniculus California black rail	Occurs in tidal salt marsh heavily grown to pickleweed; also in fresh-water and brackish marshes, all at low elevation. Mainly inhabits salt-marshes bordering larger bays.[b1]	Fed: smc State: T
Melanerpes uropygialis Gila woodpecker	Cavity nester in riparian trees or saguaro cactus. In California, inhabits cottonwoods and other desert riparian trees, shade trees, and date palms.[b1]	Fed: smc State: E
Micrathene whitneyi elf owl	Nest in deserted woodpecker holes, often in larger trees which offer insulation from high daytime temperatures. In California, nesting area limited to cottonwood-willow and mesquite riparian zone along the Colorado River.[b1]	Fed: -- State: E
Pelecanus occidentalis californicus brown pelican	Nests on coastal islands of small to moderate size which afford immunity from attack by ground-dwelling predators. Colonial nester on coastal islands just outside the surf line.[b1]	Fed: E, smc State: E
Rallus longirostris yumanensis Yuma clapper rail	Prefers stands of cattails and tules dissected by narrow channels of flowing water; principle food is crayfish. Nests in fresh-water marshes along the Colorado River and along the south and east ends of the Salton sea.[b1]	Fed: E State: T
Sterna antillarum browni California least tern	Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, land fills, or paved areas. Nests along the coast from San Francisco bay south to northern Baja California.[b1]	Fed: E, smc State: E
Vireo bellii arizonae Arizona Bell's vireo	Nests in willow, mesquite, or other small tree or shrub, within 8 feet (usually 2 to 3 feet) of ground. Summer resident along the Colorado River. Chiefly inhabits willow thickets with an undergrowth of *Baccharis salicifolia* (mulefat).[b1]	Fed: smc State: E
Vireo bellii pusillus	Nests placed along margins of bushes or on twigs projecting into	Fed: E, smc

Species [a1]	Habitat and Distribution	Status [c1]
least Bell's vireo	pathways, usually willow, baccharis, mesquite. Summer resident of southern California. Inhabits low riparian growth in vicinity of water or in dry river bottoms; below 2,000 feet.[b1]	State: E
Mammals		
Ovis canadensis cremnobates peninsular bighorn sheep	Optimal habitat includes steep walled canyons and ridges bisected by rocky or sandy washes, with available water. Open desert slopes below 4,000 feet from San Gorgonio Pass south into Mexico.[b1]	Fed: E State: T

Notes:

[a1] This list consists of species of eastern Riverside County (see Fig. 4.2-1 for boundary) that are listed as threatened or endangered by the state or federal governments or that are proposed or candidates for listing. Scientific and common names of species are from

[a2] For some bird species, the CDFG's Natural Diversity Database contains occurrence data only for certain life stages or conditions, such as nesting, rookery, burrow sites, or wintering (CDFG NDDB, 1999c). This does *not* mean that these are the only conditions under which the species is protected, or even that the species necessarily receives a greater degree of protection under such conditions.

[b1] Habitat and distribution information is from the California Department of Fish and Game's *Natural Diversity Database* (CDFG NDDB, 1999a).

[b2] Habitat and distribution information is from *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik, 1994).

[b3] Habitat and distribution information is from *Technical Appendix: Coachella Valley Multiple Species Habitat Communities Conservation Plan*. (CVAG, 1998).

[b4] Habitat and distribution information is from *Revised Species Accounts* (Lower Colorado River Multi-Species Conservation Steering Committee, 1999) for the Lower Colorado River MSCP.

[b5] Habitat and distribution information is from *California's Wildlife on CD-ROM* (CDFG, 1999).

[b6] Habitat and distribution information is from *Freshwater Fishes of California* (McGinnis, 1984).

[b7] Amphibian and Reptile Species of Special Concern in California (Jennings and Hayes, 1994).

[c1] Federal and state status, and California Native Plant Society (CNPS) designations were generally taken from *Special Plants List* (CDFG NDDB, 1999b) and *Special Animals* (CDFG NDDB, 1999c). However, the federal status has been updated for the peregrine falcon and corrected for the mountain plover. Contrary to implications by the California Department of Fish and Game (CDFG NDDB, 1999c), there is no federal listing status called 'species of concern', and this term is *not* synonymous with 'former Category 2 candidates'. Therefore, this table does not follow *Special Plants List* or *Special Animals* in including 'species of concern' as a federal listing status designation. For more information on former Category 2 candidates, see the U.S. Fish and Wildlife Service website at http://endangered.fws.gov/norqa.html.

[c2] The Mojave tarplant was rediscovered in 1994, and will be moved by CNPS to list 1b in the next edition of their *Inventory* (Skinner and Pavlik, 1994).

Federal Status

E = Endangered: Species listed as endangered by the U.S. Fish and Wildlife Service.
T = Threatened: Species listed as threatened by the U.S. Fish and Wildlife Service.
C = Candidate: Candidate for listing as endangered or threatened by the U.S. Fish and Wildlife Service.
fss = Forest Service Sensitive: Species considered sensitive by the UDSA Forest Service because of declining populations.
smc = Species of Management Concern: Migratory nongame birds identified by the U.S. Fish and Wildlife Service to be of concern due to (1) documented or apparent decline; (2) small or restriced populations; or (3) dependence on restricted or vulnerable habitats.

State Status

E = Endangered: Species classified as endangered by the California Fish and Game Commission.

T = Threatened: Species classified as threatened by the California Fish and Game Commission.
R = Rare: Species classified as rare by the California Fish and Game Commission.
ssc = Species of Special Concern: Species considered by the California Department of Fish and Game as possibly facing extirpation in Calirornia due to declining populations or loss of habitat.

California Native Plant Society (CNPS) Classifications
1a = CNPS list of plants presumed extinct in California.
1b = CNPS list of plants considered rare, threatened or endangered in California and elsewhere.
2 = CNPS list of plants considered rare, threatened, or endangered in California, but more common elsewhere.
3 = CNPS review list of plants for consideration as endangered but about which more information is needed.
4 = CNPS watch list of plants of limited distribution, whose status should be monitored.

4.2.2.4 Other Special Interest Species of Eastern Riverside County

In addition to species that have special status under ESA and CESA, many other species are considered rare or sensitive by various state, federal, or private organizations. These include Forest Service "sensitive species," USFWS "migratory non-game bird species of management concern," and species considered by the CDFG as "species of special concern" due to declining populations or loss of habitat. The CDFG also tracks other potentially sensitive species through its Natural Diversity Data Base (CDFG NDDB 1999a), and the California Native Plant Society tracks and categorizes plant species which it considers to be of concern (Skinner and Pavlik 1994). See the notes at bottom of table 4.2.G for more information on these designations. All of these species should be considered during preparation of environmental documentation relating to the CEQA. The level of analysis for each species should be commensurate with its sensitivity and with the potential for the project to impact the species. Table 4.2.G lists special interest species occurring in Easterm Riverside County.

Table 4.2.G - Other Special Interest Species of Eastern Riverside County

Species [a1]	Habitat and Distribution	Status [c]
Vascular Plants		
Acleisanthes longiflora angel trumpets	Generally on limestone at 33-8,200 feet in Sonoran desert scrub. Only known in California from Riverside County.[b1]	Fed:-- State: -- CNPS: 2
Ammoselinum giganteum desert sand-parsley	At about 1,300 feet in Sonoran desert scrub. In California, known only from Hayfield Dry Lake, Riverside County.[b1]	Fed: -- State: -- CNPS: 2
Androstephium breviflorum small-flowered androstephium	Bajadas or sand dunes at 890-5,200 feet in Mojavean desert scrub or desert dunes.[b1]	Fed: -- State: -- CNPS: 2
Antirrhinum cyathiferum Deep Canyon snapdragon	Rocky sites at 0-2,600 feet in Sonoran desert scrub. In California, known only from Riverside County.[b1]	Fed: -- State: -- CNPS: 2
Arabis johnstonii Johnston's rock cress	On granitic soil with Pleistocene, non-marine clay deposits at 4,430-7,050 feet in chaparral or lower montane coniferous forest. Associated with *Adenostoma* (redshank), *Quercus wislizenii* (interior live oak). Known from less than 10 occurrences in the San Jacinto Mountains.[b1]	Fed: -- State: -- CNPS: 1b
Arctostaphylos	At 4,070-4,990 feet in chaparral. In California, occurs only	Fed: --

Species [a1]	Habitat and Distribution	Status [c]
peninsularis ssp *peninsularis* peninsular manzanita	in Riverside County.[b1]	State: -- CNPS: 2
Astragalus crotalariae Salton milk-vetch	Sandy and gravelly areas at -200-820 feet in Sonoran desert scrub. In California, known from Imperial, Riverside, and San Diego Counties.[b2]	Fed: -- State: -- CNPS: 4
Astragalus insularis var *harwoodii* Harwood's milk-vetch	Open sandy flats and sandy or stony desert washes at -160-1,600 feet in creosote bush scrub or desert dunes. In California, occurs in Imperial, San Diego, and Riverside Counties.[b1]	Fed: -- State: -- CNPS: 2
Astragalus lentiginosus var *borreganus Borrego milk-vetch*	Sandy areas at 100-890 feet in Mohavean desert scrub, Sonoran desert scrub. In California, known from Imperial, Riverside, San Bernardino, and San Diego Counties.[b2]	Fed: -- State: -- CNPS: 4
Astragalus leucolobus Big Bear Valley woollypod	Dry pine woods, gravelly knolls among sagebrush, or stony lake shores in the pine belt, at (1,400)5,480-8,250 feet in lower montane coniferous forest, pebble plain, pinyon and juniper woodland, or upper montane coniferous forest.[b1]	Fed: -- State: -- CNPS: 1b
Astragalus nutans Providence Mountains milk-vetch	Sandy/gravelly areas at 1,480-6,400 feet in Joshua tree "woodland", Mohavean desert scrub, Pinyon and juniper woodland, Sonoran desert scrub. Known only from Imperial, Riverside, and San Bernardino Counties, California.[b2]	Fed: -- State: -- CNPS: 4
Atriplex parishii Parish's brittlescale	Usually on drying alkali flats with fine soils, at 13-460 feet in alkali meadows, vernal pools, chenopod scrub, playas. Plant collected only once in California since 1974 (in 1993).[b1]	Fed: -- State: -- CNPS: 1b
Ayenia compacta ayenia	Sandy and gravelly washes in the desert, dry desert canyons at 490-3,600 feet in Mojave desert scrub, Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Brodiaea orcuttii Orcutt's brodiaea	Mesic, clay habitats; sometimes serpentine; usu in vernal pools and small drainages at 100-5,300 feet in vernal pools, valley and foothill grassland, closed-cone coniferous forest, cismontane woodland, chaparral, meadows.[b1]	Fed: -- State: -- CNPS: 1b
Calochortus palmeri var *palmeri* Palmer's mariposa lily	Vernally moist places at 2,000-7,370 feet in meadows and seeps, chaparral, lower montane coniferous (yellow pine) forest.[b1]	Fed: -- State: -- CNPS: 1b
Carnegiea gigantea saguaro	Rocky sites at 160-4,900 feet in Sonoran desert scrub. Barely enters California along the Colorado River in San Diego and Riverside Counties.[b1]	Fed: -- State: -- CNPS: 2
Castela emoryi crucifixion thorn	Gravelly soils, sometimes in alkali playas or washes at 279-2,530 feet in Mojave desert scrub, Sonoran desert scrub, playas. In California, only known from Imperial and Riverside Counties.[b1]	Fed: -- State: -- CNPS: 2
Castilleja lasiorhyncha San Bernardino Mountains owl's-clover	Mesic to drying soils in open areas of stream and meadow margins or of vernally wet areas at 3,720-7,840 feet in meadows, pebble plain, upper montane coniferous forest, chaparral.[b1]	Fed: -- State: -- CNPS: 1b
Caulanthus simulans Payson's jewel-flower	Burned areas, disturbed sites such as streambeds, and rocky, steep slopes at 300-7,200 feet in chaparral, coastal scrub. Only known from Riverside and San Diego Counties.[b1]	Fed: -- State: -- CNPS: 4
Chamaesyce arizonica Arizona spurge	Sandy soils at 160-1,000 feet in Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Chamaesyce platysperma flat-seeded spurge	Sandy places or shifting dunes at 200-3,120 feet in Sonoran desert scrub, desert dunes. Possibly a waif in California; more common in Arizona and Mexico.[b1]	Fed: -- State: -- CNPS: 1b
Chorizanthe parryi var *parryi* Parry's spineflower	Dry slopes and flats; sometimes at interface of two veg types, such as chap and oak wildland; dry, sandy soils at 130-5,600 feet in Coastal scrub, chaparral.[b1]	Fed: -- State: -- CNPS: 3
Colubrina californica	At 33-3,300 feet in Mohavean desert scrub. In California,	Fed: --

Species [a1]	Habitat and Distribution	Status [c]
Las Animas colubrina	known from Imperial, Riverside, and San Diego Counties.[b2]	State: -- CNPS: 4
Condalia globosa pubescens spiny abrojo	At 460-3,300 feet in Sonoran desert scrub. In California, known from Imperial and Riverside Counties.[b2]	Fed: -- State: -- CNPS: 4
Cryptantha holoptera winged cryptantha	At 330-3,900 feet in Mohavean desert scrub, Sonoran desert scrub. In California, known from Imperial, Inyo, Riverside, San Bernardino, and San Diego Counties.[b2]	Fed: -- State: -- CNPS: 4
Cynanchum utahense Utah vine milkweed	Sandy and gravelly areas at 490-4,660 feet in Mohavean desert scrub, Sonoran desert scrub. In California known from Imperial, Riverside, San Bernardino, and San Diego Counties.[b2]	Fed: -- State: -- CNPS: 4
Ditaxis californica California ditaxis	On sandy washes and alluvial fans of the foothills and lower desert slopes at 100-2,990 feet in Sonoran desert scrub. Known only from Riverside and San Diego Counties.[b1]	Fed: -- State: -- CNPS: 1b
Ditaxis clariana glandular ditaxis	Sandy soils in dry washes and on rocky hillsides at 0-1,530 feet in Mojavean desert scrub, Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Escobaria vivipara var *alversonii* foxtail cactus	Sandy or rocky habitat; sites from gravelly slopes and dissected alluvial fans at 245-5,000 feet in Mojave desert scrub, Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 1b
Euphorbia misera cliff spurge	Rocky sites at 33-1,600 feet in Coastal bluff scrub, coastal scrub. In southern California, Baja, and on Guadalupe Island.[b1]	Fed: -- State: -- CNPS: 2
Gilia maculata Little San Bernardino Mountains gilia	Sandy places; microhabitat difficult to pin down. Usually in light-colored quartz sand; often in wash or bajada at 620-3,460 feet in desert dunes, Sonoran Desert scrub, Mojave Desert scrub, Joshua tree woodland. Only known from Riverside and San Bernardino Counties.[b1]	Fed: -- State: -- CNPS: 1b
Heuchera hirsutissima shaggy-haired alumroot	Often near large rocks at 5,950-11,500 feet in subalpine coniferous forest, upper montane coniferous forest. Endemic to Riverside County.[b1]	Fed: -- State: -- CNPS: 1b
Heuchera parishii Parish's alumroot	Rocky places at 4,900-12,500 feet in lower montane coniferous forest, subalpine coniferous forest, upper montane coniferous forest, alpine boulder and rock field.[b1]	Fed: -- State: -- CNPS: 1b
Leptodactylon jaegeri San Jacinto prickly phlox	Dry rocky granitic outcrops; sheer, vertical habitat at 5,950-10,000 feet in subalpine coniferous forest, upper montane coniferous forest. Endemic to the San Jacinto Mountains, Riverside County.[b1]	Fed: -- State: -- CNPS: 1b
Lilium parryi lemon lily	Wet, mountainous terrain; gen in forested areas; on shady edges of streams, in open boggy meadows and seeps at 4,300-9,150 feet in lower montane coniferous forest, meadows and seeps, riparian forest, upper montane coniferous forest.[b1]	Fed: -- State: -- CNPS: 1b
Linanthus floribundus ssp *hallii* Santa Rosa Mountains linanthus	Desert canyons at 3,000-4,200 feet in Sonoran desert scrub. Known only from Riverside and San diego Counties.[b1]	Fed: -- State: -- CNPS: 1b
Lycium parishii Parish's desert-thorn	At 1,000-3,300 feet in Coastal scrub, Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Machaeranthera canescens var *ziegleri* Ziegler's aster	Dry ridges scattered under pines, along roadsides, and in dry, somewhat disturbed clearings at 4,600-8,100 feet in lower montane coniferous forest, upper montane coniferous forest. Endemic to Riverside County.[b1]	Fed: -- State: -- CNPS: 1b
Malaxix monophyllos ssp *brachypoda* adder's-mouth	Hillside bogs and mesic meadows at 7,200-8,900 *feet in* meadows and seeps, bogs and fens, upper montane coniferous forest. In California, known only from Riverside and San Bernardino Counties.[b1]	Fed: -- State: -- CNPS: 2

Species [a1]	Habitat and Distribution	Status [c]
Marina orcuttii var *orcuttii* California marina	Gravelly hillsides, rocky soil at 3,440-3,810 *feet in* Pinyon and juniper woodland, Sonoran desert scrub, chaparral. Known only from Riverside County and Baja.[b1]	Fed: -- State: -- CNPS: 1b
Matelea parvifolia spearleaf	Dry rocky ledges and slopes at 1,440-3,600 feet in Mojavean desert scrub, Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Monardella robisonii Robinson's monardella	Rocky desert slopes, often among granitic boulders at 3,300-4,900 feet in Pinyon-juniper woodland, Joshua tree woodland. Known only from Riverside and San Bernardino Counties.[b1]	Fed: -- State: -- CNPS: 1b
Muhlenbergia californica California muhly	Usually found near streams or seeps at 1,300-6,600 feet in coastal sage, chaparral, lower montane coniferous forest, meadows. From the San Bernardino Valley to the edge of deserts.[b1]	Fed: -- State: -- CNPS: 1b
Nemacaulis denudata var *gracilis* slender woolly-heads	In dunes or sand at 0-1,840 feet in Coastal dunes, desert dunes, Sonoran desert scrub. In California, known only from San Diego and Riverside Counties.[b1]	Fed: -- State: -- CNPS: 2
Opuntia munzii Munz's cholla	Gravel or sand of washes and canyons in the desert at 490-2,000 feet in Sonoran desert scrub. Known only from Imperial and Riverside Counties.[b1]	Fed: -- State: -- CNPS: 1b
Opuntia wigginsii Wiggin's cholla	Sandy soils at 100-2,900 *feet in* Sonoran desert scrub. Sporadic hybrid between *O. ramosissima* (pencil cactus) and *O. echinocarpa* (silver cholla).[b1]	Fed: -- State: -- CNPS: 3
Penstemon californicus California beardtongue	Stony slopes and shrubby openings; sandy or granitic soils at 3,810-7,500 *feet in* chaparral, lower montane coniferous forest, pinyon juniper woodland. Known only from San Diego County and Baja.[b1]	Fed: -- State: -- CNPS: 1b
Penstemon thurberi Thurber's beardtongue	At 1,600-3,900 feet in chaparral, Joshua tree "woodland", Pinyon and juniper woodland, Sonoran desert scrub. In California, known from Imperial, Riverside, San Bernardino, and San Diego Counties.[b2]	Fed: -- State: -- CNPS: 4
Phaseolus filiformis slender-stem bean	Gravelly washes bordered by creosote bush-dominated rocky slopes at 410 feet (single known site in California) in Sonoran desert scrub. In California, known only from Riverside County.[b1]	Fed: -- State: -- CNPS: 2
Pilostyles thurberi Thurber's pilostyles	Sandy alluvial plains, sandstone talus. Parasite on *Psorothamnus emoryi* (buckwheat) at -164-1,200 feet in Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 4
Portulaca halimoides desert portulaca	Sandy areas at 3,300-3,900 feet in Joshua tree "woodland". In California, known only from San Bernardino and Riverside Counties. Known from the Granite, Providence, New York, and Little San Bernardino Mountains, and from Joshua Tree National Park and Valley Wells.[b2]	Fed: -- State: -- CNPS: 4
Potentilla rimicola cliff cinquefoil	Granite crevices; rocky sites at 7,840-9,900 feet in subalpine coniferous forest, upper montane coniferous forest. Known only from Riverside County, and Baja.[b1]	Fed: -- State: -- CNPS: 1b
Salvia greatae Orocopia sage	Broad alluvial bajadas and fans adjacent to desert washes in gravelly or rocky soil, rocky slopes of canyons, always in Mojavean desert scrub, Sonoran desert scrub. Endemic to Riverside County.[b1, b3]	Fed: -- State: -- CNPS: 1b
Selaginella eremophila desert spike-moss	Shaded sites, gravelly soils; crevices or among rocks at 1,000-7,950 feet in Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Senna covesii Coves' cassia	Dry, sandy desert washes, slopes at 660-3,510 feet in Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Streptanthus bernardinus Laguna Mountains jewel-flower	Clay or decomposed granite soils; sometimes in disturbed areas such as streamsides or roadcuts at 4,720-8,200mft in	Fed: -- State: -- CNPS: 1b

Species [a1]	Habitat and Distribution	Status [c]
	Chaparral, lower montane coniferous forest.[b1]	
Streptanthus campestris southern jewel-flower	Open, rocky areas at 2,000-9,150 feet in chaparral, lower montane coniferous forest, pinyon-juniper woodland.[b1]	Fed: -- State: -- CNPS: 1b
Stylocline sonorensis mesquite neststraw	Open sandy drainages at 140 feet (in California) in Sonoran desert scrub. Known in California from a single collection in Riverside County; possibly extirpated.[b1]	Fed: -- State: -- CNPS: 2
Thelypteris puberula var *sonorensis* Sonoran maiden fern	Along streams, seepage areas at 160-1,800 feet in meadows and seeps.[b1]	Fed: -- State: -- CNPS: 2
Wislizenia refracta ssp *refracta* jackass-clover	Sandy washes, roadsides, alkaline flats at 430-2,600 *feet in* Playas, desert dunes, Mohavean desert scrub, Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 2
Xylorhiza cognata Mecca-aster	Steep canyon slopes, in sandstone and clay at 65-1,000 feet in Sonoran desert scrub. Endemic to Riverside County.[b1]	Fed: -- State: -- CNPS: 1b
Xylorhiza orcuttii Orcutt's woody-aster	Arid canyons; often in washes at 870-1,200 feet in Sonoran desert scrub.[b1]	Fed: -- State: -- CNPS: 1b
Invertebrates		
Anodonta californiensis California floater	Requires soft bottom substrate and native fish populations that act as larval hosts. In California, present in the Colorado River.[b4]	Fed: fss State: --
Dinacoma caseyi Casey's june beetle	Alluvial plains bordering the San Jacinto and Santa Rosa Mountains at southern edge of the Coachella Valley, in flat areas with sandy-gravelly soils and native shrubs. Collected from Palm Springs to Indian Wells, but apparently now restricted to a small area of south Palm Springs.[b7]	Fed: -- State: --
Eremarionta immaculata white desertsnail	Found in and around rockslides. Known only from the east slope of Riverside Mountains, Riverside County.[b1]	Fed: -- State: --
Eremarionta millepalmarum Thousand Palms desert snail	Found in and around rockslides. Known from near Thousand Palms in the Little San Bernardino Mountains.[b3]	Fed: -- State: --
Eremarionta rowelli mccoiana California McCoy snail	Inhabits rockslides in gullies. Found in various sites in the McCoy Mountains and the Big Maria Mountains.[b1]	Fed: -- State: --
Euphilotes enoptes cryptorufes San Jacinto blue butterfly	Associated with *Eriogonum davidsonii*, primarily in redshank chaparral. In California, has been found only in the San Bernardino National Forest in the Santa Rosa Mountains.[b3]	Fed: -- State: --
Hesperopsis gracielae MacNiell sootywing skipper	Associated with quail bush (*Atriplex lentiformis*) in alkaline soils below 3,900ft. In California, present along the Colorado River in San Bernardino, Riverside, and Imperial Counties.[b4]	Fed: -- State: --
Macrobaenetes valgum Coachella giant sand treader cricket	Population size regulated by amount of annual rainfall; some spots favor permanent habitation where springs dampen sand.Known from the sand dune ridges in the vicinity of Coachella Valley.[b1]	Fed: -- State: --
Oliarces clara moth lacewing	Found under rocks or in flight over streams. Inhabits the lower Colorado River drainage.[b1]	Fed: -- State: --
Spaniacris deserticola Coachella Valley grasshopper	Adults active during the hottest summer months and apparently restricted to a single food plant, (*Tequilia palmeri*), which occurs in sandy alluvial-aeolian soils in a fairly narrow band across the southern portions of the Indio Hills in Riverside County's Coachella Valley and south into San Diego and Imperial Counties and Mexico..[b7]	Fed: -- State: --
Stenopelmatus cahuilaensis Coachella Valley Jerusalem	Found in the large, undulating dunes piled up at the north base of Mt. San Jacinto. Inhabits a small segment of the sand and dune areas of the Coachella Valley, in the vicinity of Palm	Fed: -- State: --

Species [a1]	Habitat and Distribution	Status [c]
cricket	Springs.[b1]	
Amphibians		
Batrachoseps sp. 5 Guadalupe Creek slender salamander	Seeks cover beneath moss or rocks of talus slope adjacent to waterfall. Found only in Guadalupe Canyon, elevation 3,200ft.[b1]	Fed: -- State: --
Ensatina eschscholtzii klauberi large-blotched salamander	Found in leaf litter, decaying logs and shrubs in heavily forested areas. Found in conifer and woodland associations.[b1]	Fed: fss State: ssc
Rana muscosa mountain yellow-legged frog	Always encountered within a few feet of water. Tadpoles may require up to two years to complete their aquatic development. Streams, lakes, and ponds in montane riparian, lodgepole pine, and ponderosa pine; wet meadows and other montane habitats.[b1]	Fed: fss State: ssc
Scaphiopus couchii Couch's spadefoot	Mesquite and creosote flats, desert washes, short grass prairie, irrigated agricultural fields, and other dryland vegetation. In California occurs near the Colorado River in Riverside, San Bernardino, and Imperial Counties.[b4,b5]	Fed: -- State: ssc
Reptiles		
Anniella pulchra pulchra silvery (or California) legless lizard	Soil moisture is essential. They prefer soils with a high moisture content. Sandy or loose loamy soils under sparse vegetation.[b1]	Fed: fss State: ssc
Cnemidophorus hyperythrus beldingi Belding's orange-throated whiptail	Prefers washes and other sandy areas with patches of brush and rocks. Perennial plants necessary for its major food-termites. Inhabits low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats.[b1]	Fed: -- State: ssc
Kinosternon sonoriense Sonoran mud turtle	Lakes and riversin shallow water. May be extinct in California. Early records from along the Colorado River, including just south of Blythe at the Riverside/Imperial County line.[b5]	Fed: -- State: ssc
Lichanura trivirgata gracia desert rosy boa	Desert and chaparral habitats throughout southern California, including sparse distribution throughout eastern Riverside County except near the Salton Sea. In eastern Riverside County inhabits mountains and scrub flats with good cover.[b5]	Fed: -- State: --
Phrynosoma coronatum blainvillei San Diego horned lizard	Prefers friable, rocky, or shallow sandy soils in coastal sage scrub and chaparral in arid and semi-arid climate conditions.[b1]	Fed: fss State: ssc
Phrynosoma mcalli flat-tailed horned lizard	Critical habitat element is fine sand, into which lizards burrow to avoid temp extremes; require vegetation cover and ants. Restricted to desert washes and desert flats in central Riverside, eastern San Diego, and Imperial Counties.[b1]	Fed: -- State: ssc
Sauromalus obesus chuckwalla	Requires rocky cover. Occurs throughout Mojave and Sonoran Desert from sea level to 1250m.[b5]	Fed: -- State: --
Uma scoparia Mojave fringe-toed lizard	Requires fine, loose, wind-blown deposits in sand dunes, dry lakebeds, riverbanks, desert washes, sparse alkali scrub and desert shcrub habitats. Desert regions of San Bernardino, Los Angeles, Inyo, and Riverside Counties.[b5]	Fed: -- State: ssc
Birds [a2]		
Accipiter cooperii Cooper's hawk	Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks. Woodland, chiefly of open, interrupted or marginal type.[b1]	Fed: -- State: ssc
Accipiter striatus sharp-shinned hawk	North-facing slopes, with plucking perches are critical requirements. Nests usually within 275 feet of water. Breeds in ponderosa pine, black oak, riparian deciduous, mixed conifer and Jeffrey pine habitats. Prefers riparian areas.[b1]	Fed: -- State: ssc
Aquila chrysaetos golden eagle	cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas. Rolling foothill or coast-range terrain, where open grassland turns to scattered oaks, sycamores, or large digger pines.[b1]	Fed: -- State: ssc

Species [a1]	Habitat and Distribution	Status [c]
Ardea alba great egret	Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes. Colonial nester in large trees.[b1]	Fed: -- State: --
Ardea herodias great blue heron	Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows. Colonial nester in tall trees, cliffsides, and sequestered spots on marshes.[b1]	Fed: -- State: --
Asio flammeus short-eared owl	Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in depression concealed in vegetation. Found in swamp lands, both fresh and salt; lowland meadows; irrigated alfalfa fields.[b1]	Fed: smc State: ssc
Asio(Speotyto) otus long-eared owl	Require adjacent open land productive of mice and the presence of old nests of crows, hawks, or magpies for breeding. Found in riparian bottomlands grown to tall willows and cottonwoods; also, belts of live oak paralleling stream courses.[b1]	Fed: -- State: ssc
Athene cunicularia hypugea burrowing owl	Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel. Found in open, dry annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation.[b1]	Fed: smc State: ssc
Botaurus lentiginosus American bittern	Freshwater or saline emergent wetlands,and less often in adjacent shallow water of lakes, rivers, and estuaries. Widely distributed in California, including wintering in most of Riverside County, and nesting around the Salton Sea.[b5]	Fed: smc State: --
Buteo regalis ferruginous hawk	Roost and forage in open areas in grasslands, sparse shrub, and desert habitats. No breeding records in California, but uncommon winter resident and migrant at lower elevations in much of California. May be expected throughout Riverside County.[b5]	Fed: smc State: ssc
Cardinalis cardinalis northern cardinal	Inhabits mesquite brushland and cottonwood riparian along the Colorado River.[b1]	Fed: -- State: ssc
Charadrius alexandrinus nivosus western snowy plover (inland populations)	Requires sandy, gravelly or friable soil substrate for nesting. Sandy beaches on marine and estuarine shores, also salt pond levees and the shores of large alkali lakes.[b1]	Fed: smc State: ssc
Circus cyaneus northern harrier	Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas. Coastal salt marsh and fresh-water marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas.[b1]	Fed: -- State: ssc
Dendroica petechia brewsteri yellow warbler	Also nests in montane shrubbery in open conifer forests. Riparian plant associations. Prefers willows, cottonwoods, aspens, sycamores, and alders for nesting and foraging.[b1]	Fed: -- State: ssc
Dendroica petechia sonorana Sonoran yellow warbler	inhabits cottonwoods and willows, particularly the crown foliage; nests in understory, usually 2-16 ft above ground. Summer resident of the Colorado River valley, in riparian deciduous habitat. Below 600 ft elevation.[b1]	Fed: -- State: ssc
Egretta thula snowy egret	Rookery sites situated close to foraging areas: marshes, tidal-flats, streams, wet meadows, and borders of lakes. Colonial nester, with nest sites situated in protected beds of dense tules.[b1]	Fed: -- State: --
Falco columbarius merlin	Coastlines, open grasslands, savannahs, woodlands, lakes, wetlands, edges, and early successional stages. Uncommon winter migrant from September to May throughout California except heavily wooded areas and open deserts. Rarely in the Mojave Desert.[b5]	Fed: -- State: ssc
Falco mexicanus prairie falcon	Breeding sites located on cliffs. Forages far afield, even to marshlands and open shores. Inhabits dry, open terrain, either level or hilly.[b1]	Fed: -- State: ssc

Species a1	Habitat and Distribution	Status c
Icteria virens yellow-breasted chat	Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forage and nest w/in 10 ft of ground. Summer resident; inhabits riparian thickets of willow and other brushy tangles near watercourses.[b1]	Fed: -- State: ssc
Ixobrychus exilis hesperis western least bittern	Colonial nester. Nests usually placed low in tules, over water.Freshwater and brackish marshes w/dense and tall aquatic/semiaquatic vegetation and clumps of woody vegetation and open water.[b1]	Fed: smc State: ssc
Junco hyemalis caniceps California gray-headed junco	Inhabits white fir association at 7,300 ft (Clark Mountain); also, from dense pinyons above 6,700 ft (Grapevine Mountains). Summer resident of Clark Mountain (eastern San Bernardino County) and Grapevine Mountains (Inyo County).[b1]	Fed: -- State: ssc
Lanius ludovicianus loggerhead shrike	Prefers open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valey foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. Often found in open cropland, but rarely in heavily urbanized areas. Resident throughout most of California. Expected in most of Riverside County.[b5]	Fed: smc State: ssc
Myiarchus tyrannulus brown-crested flycatcher	Requires riparian thickets, trees, snags, and shrubs for foraging perches, nesting cavities, and cover. Inhabits desert riparian habitat along the Colorado River, as well as other desert oases and riparian northwest to Victorville.[b1]	Fed: -- State: ssc
Nycticorax nycticorax black-crowned night heron	Rookery sites located adjacent to foraging areas: lake margins, mud-bordered bays, marshy spots. Colonial nester, usually in trees, occasionally in tule patches.[b1]	Fed: -- State: --
Pandion haliaetus osprey	Large nests built in tree-tops within 15 miles of good fish-producing body of water. Ocean shore, bays, fresh-water lakes, and larger streams.[b1]	Fed: -- State: ssc
Parabuteo unicinctus Harris' hawk	Desert scrub, desert wash, and desert riparian communities. Extirpated from Lower Colorado River Valley in 1960s, but reintroduced along the Colorado River in southeast California.[b5]	Fed: -- State: ssc
Pelecanus erythrorhynchos American white pelican	Nests on large lakes, providing safe roosting and breeding places in the form of well-sequestered islets. Colonial nester on large interior lakes.[b1]	Fed: -- State: ssc
Piranga rubra summer tanager	Require cottonwood-willow riparian for nesting and foraging; prefers older, dense stands along streams. Summer resident of desert riparian habitat along lower Colorado River, and locally elsewhere in California deserts.[b1]	Fed: -- State: ssc
Polioptila melanura black-tailed gnatcatcher	Nests in desert wash containing mesquite, paloverde, ironwood, acacia; absent from areas where salt cedar introduced. Inhabits primarily wooded desert wash habitats; also occurs in desert scrub habitat, especially in winter.[b1]	Fed: -- State: --
Pyrocephalus rubinus vermillion flycatcher	Nest in cottonwood, willow, mesquite, and other large desert riparian trees. During nesting, inhabit desert riparian habitat adj to irrig fields, irrig ditches, pastures, other open, mesic areas.[b1]	Fed: -- State: ssc
Sterna nilotica vanrossemi Van Rossem's gull-billed tern	Nest on low, sandy islets. Known to feed on fishes at mouth of Colorado River and on grasshoppers in alfalfa fields. Only known breeding colony located at southeast end of Salton sea.[b1]	Fed: -- State: ssc
Toxostoma bendirei Bendire's thrasher	Nests in cholla, yucca, paloverde, thorny shrub, or small tree, usually 0.5 to 20 feet above ground.Migratory; local spring/summer resident in flat areas of desert succulent shrub/Joshua tree habitats in Mojave desert.[b1]	Fed: smc State: ssc
Toxostoma crissale Crissal thrasher	Nests in dense veg along streams/washes; mesquite, screwbean mesquite, ironwood, catclaw, acacia, arrowweed, willow.	Fed: -- State: ssc

Species [a1]	Habitat and Distribution	Status [c]
	Resident of southeastern deserts in desert riparian and desert wash habitats.[b1]	
Toxostoma lecontei Le Conte's thrasher	Commonly nests in a dense, spiny shrub or densely branched cactus in desert wash habitat, usually 2 to 8 feet above ground.Desert resident; primarily of open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats.[b1]	Fed: -- State: ssc
Vireo vicinior gray vireo	Forage, nest, and sing in areas formed by a continuous growth of twigs, 1 to 5 feet above ground. Inhabit dry chaparral; w of desert, assoc w/chamise-dominated habitat; mountains of Mojave desert, associated with juniper and artemisia.[b1]	Fed: -- State: ssc
Mammals		
Antrozous pallidus pallid bat	Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites. Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting.[b1]	Fed: fss State: ssc
Corynorhinus (Pleocotus) townsendii pallescens pale (or Townsend's or western) big-eared bat	Need appropriate roosting, maternity, and hibernacula sites free from human disturbance. Lives in a wide variety of habitats but most common in mesic sites.[b1]	Fed: fss State: ssc
Euderma maculatum spotted bat	feeds over water and along washes. Needs rock crevices in cliffs or caves for roosting.Occupies a wide variety of habitats from arid deserts and grasslands through mixed conifer forests.[b1]	Fed: -- State: ssc
Eumops perotis western mastiff bat (incl. California mastiff bat)	roosts in crevices in cliff faces, high buildings, trees and tunnels. Many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral etc.[b1]	Fed: -- State: ssc
Felis concolor brownii Yuma mountain lion (or Yuma puma)	The mountain lion (*Felis concolor*) occurs in nearly all habitats in California, except croplands in Central Valley and regions of Mohave and Colorado deserts that do not support mule deer populations. The Yuma mountain lion purportedly inhabits or historically inhabited the Colorado River Valley, but the taxonomic designation of this subspecies is currently in doubt.[b4, b5]	Fed: -- State: ssc
Lasiurus ega or *xanthinus* southern yellow bat	Roosts in trees, primarily palm trees, and forages over water and among trees. In California, restricted to soughteastern part of the state.[b3]	Fed: -- State: --
Macrotus californicus California leaf-nosed bat	Needs rocky, rugged terrain with mines or caves for roosting.Desert riparian, desert wash, desert scrub, desert succulent scrub, alkali scrub and palm oasis habitats.[b1]	Fed: fss State: ssc
Myotis ciliolabrum small-footed myotis	Relatively arid wooded and brushy uplands near water, preferring open stands in forests and woodlands, and roosting in caves, mines, buildings, bark, crevices, and under bridges. Occurs in much of California from Contra Costa County south to the border, but is absent from the Mojave and Colorado Deserts.[b3]	Fed: -- State: --
Myotis occultus (= M. lucifigus o.) occult little brown bat (myotis)	A variety of habitats, but usually associated with open water sources such as rivers, ponds, or reservoirs. Roost in trees, under rocks or wood, or occasionally in buildings or mines. In California occurs in eastern part of state.[b4]	Fed: -- State: ssc
Myotis thysanodes fringed myotis	Wide range of habitats ranging from desert scrub to high elevation conifer forest throughout California. In Southern California most roosts are in buildings and mines.[b3]	Fed: -- State: --
Myotis velifer cave myotis	Require caves or mines for roosting. Lowlands of the Colorado River and adjacent mountain ranges.[b1]	Fed: -- State: ssc
Myotis volans long-legged myotis	Mostly in coniferous montane forest between 2,000 and 3,000 feet elevation, roosting in buildings, mines, rock crevices, and trees. In California, occurs throughout most of the state	Fed: -- State: --

Species [a1]	Habitat and Distribution	Status [c]
	except portions of the Central Valley and of the Mojave and Sonoran Deserts. In eastern Riverside County expected in forested mountains.[b3, b5]	
Myotis yumanensis Yuma myotis	Prefers open forest areas with sources of water over which to feed. Roosts in buildings, mines, caves, crevices, and under bridges. In California is widespread except in the Mojave and Sonoran deserts, where is is mostly limited to mountain ranges bordering the Colorado River Valley.[b3, b5]	Fed: -- State: ssc
Neotoma albigula venusta Colorado Valley (white-throated) woodrat	Intolerant of cold temps. Eats mainly succulent plants. Distribution influenced by abundance of nest building material. Low-lying desert areas in southeastern California. Closely associated with beaver-tail cactus and mesquite.[b1]	Fed: -- State: --
Nyctinomops femorasaccus pocketed free-tailed bat	Rocky areas with high cliffs. Variety of arid areas in southern California, pine-juniper woodlands, desert scrub, palm oasis, desert wash, desert riparian, etc.[b1]	Fed: -- State: ssc
Ovis canadensis nelsoni Nelson's (desert) bighorn sheep	Open, rocky, steep areas with available water and herbaceous forage. Widely distributed from the White Mountains in Mono County to the Chocolate Mountains in Imperial County.[b1]	Fed: -- State: --
Perognathus longimembris bangsi Palm Springs pocket mouse	Sonoran creosote bush scrub in eastern Riverside and San Diego Counties.[b3]	Fed: -- State: ssc
Perognathus longimembris brevinasus Los Angeles pocket mouse	Open ground with fine sandy soils. May not dig extensive burrows, hiding under weeds and dead leaves instead. Lower elevation grasslands and coastal sage communities in the Los Angeles Basin.[b1]	Fed: fss State: ssc
Sigmodon arizonae plenus Colorado River cotton rat	Intolerant of cold temps. Eats mainly succulent plants. Distribution influenced by abundance of nest building material. Low-lying desert areas in southeastern California. Closely associated with beaver-tail cactus and mesquite.[b1]	Fed: -- State: ssc
Spermophilus tereticaudus chlorus Coachella Valley round-tailed ground squirrel	Prefers open, flat, grassy areas in fine-textured, sandy soil. Density correlated with winter rainfall. Restricted to the Coachella Valley. Prefers desert succulent scrub, desert wash, desert scrub, alkali scrub, and levees.[b1]	Fed: -- State: ssc
Spermophilus tereticaudus coachellae Palm Springs (round-tailed) ground squirrel	Sandy open desert flats in creosote bush scrub and saltbush/alkali scrub in the Coachella Valley of Riverside County.[b3]	Fed: -- State: --
Taxidea taxus American badger	Need sufficient food, friable soils and open, uncultivated ground. Prey on burrowing rodents. Dig burrows. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.[b1]	Fed: -- State: --

Notes: [a1] This list consists of species of eastern Riverside County (see Figure. 4.2.1 for boundary) that are considered by the California Department of Fish and Game to be 'Special Plants' or 'Special Animals' (CDFG NDDB, 1999b, 1999c) as of June 1999, or that are under consideration for coverage by the Coachella Valley Multispecies Habitat Conservation Plan (CVAG 1998) or the Northern and Eastern Colorado Desert Coordinated Management Plan (Richard E. Crowe, Bureau of Land Management, pers. comm. to Stanley C. Spencer, July 21, 1999) or that were suggested by the U.S. Fish and Wildlife Carlsbad Office for inclusion (Matt McDonald, pers. comm. to Stanley C. Spencer, August 2, 1999), except for those species already listed in Table 4.2-6. Scientific and common names of species generally follow *Special Plants List* (CDFG NDDB, 1999b) and *Special Animals* (CDFG NDDB, 1999c). However, nomenclature for white throated woodrat is from the electronic version of the Natural Diversity Database (CDFG NDDB, 1999a), and nomenclature for Casey's June beetle, the Coachella Valley grasshopper, the "dotted blue" butterfly, the Palm Springs (round tailed) ground squirrel, and the southern yellow bat, is from the Coachella Valley MSHCP *Technical Appendi* (CVAG, 1998).

[a2] For some bird species, the CDFG's Natural Diversity Database contains occurrence data only for certain life stages or conditions, such as nesting, rookery, burrow sites, or wintering (CDFG NDDB, 1999c). This does

not mean that these are the only conditions under which the species is protected, or even that the species necessarily receives a greater degree of protection under such conditions.

[b1] Habitat and distribution information is from the California Department of Fish and Game's *Natural Diversity Database* (CDFG NDDB, 1999a).

[b2] Habitat and distribution information is from *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik, 1994).

[b3] Habitat and distribution information is from *Technical Appendix: Coachella Valley Multiple Species Habitat Communities Conservation Plan*. (CVAG, 1998).

[b4] Habitat and distribution information is from *Revised Species Accounts* (Lower Colorado River Multi-Species Conservation Steering Committee, 1999) for the Lower Colorado River MSCP.

[b5] Habitat and distribution information is from *California's Wildlife on CD-ROM* (CDFG, 1999).

[b6] Habitat and distribution information is from *Freshwater Fishes of California* (McGinnis, 1984).

[b7] Habitat and distribution information is from species descriptions written by Cameron Barrows (Kadie Barrows, pers. comm. to Stanley C. Spencer Sept. 22, 1999).

[c] Federal and state status, and California Native Plant Society (CNPS) designations are from *Special Plants List* (CDFG NDDB, 1999b) and *Special Animals* (CDFG NDDB, 1999c). Contrary to implications by the California Department of Fish and Game (CDFG NDDB, 1999c), there is no federal listing status called 'species of concern', and this term is *not* synonymous with 'former Category 2 candidates'. Therefore, this table does not follow *Special Plants List* or *Special Animals* in including 'species of concern' as a federal listing status designation. For more information on former Category 2 candidates, see the U.S. Fish and Wildlife Service website at http://endangered.fws.gov/norqa.html.

Federal Status

fss = Forest Service Sensitive: Species considered sensitive by the UDSA Forest Service because of declining populations.

smc= Species of Management Concern: Migratory nongame birds identified by the U.S. Fish and Wildlife Service to be of concern due to (1) documented or apparent decline; (2) small or restriced populations; or (3) dependence on restricted or vulnerable habitats.

State Status

ssc = Species of Special Concern: Species considered by the California Department of Fish and Game as possibly facing extirpation in Calirornia due to declining populations or loss of habitat.

California Native Plant Society (CNPS) Classifications

1b = CNPS list of plants considered rare, threatened or endangered in California and elsewhere.

2 = CNPS list of plants considered rare, threatened, or endangered in California, but more common elsewhere.

3 = CNPS review list of plants for consideration as endangered but about which more information is needed.

4 = CNPS watch list of plants of limited distribution, whose status should be monitored.

4.2.3 Literature Cited

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4.3 Water Resources

4.3.1 Introduction

Riverside County is limited in its use of water resources by regulation, climate, agricultural practices, population growth, and dependence on low quality imported water. Water supply and water quality are unavoidably linked in a County whose climate is semi-arid to arid. The economy of the developed portions of western Riverside County -- the inland valley -- is sustained in its magnitude primarily by water imported from Northern California and the Colorado River and secondarily by production of local groundwater. The eastern portion of the County -- the desert -- also relies on water from the Colorado River, Northern California, and local groundwater. This portion of the County is largely undeveloped with water resource reliability being the major factor which might constrain future development.

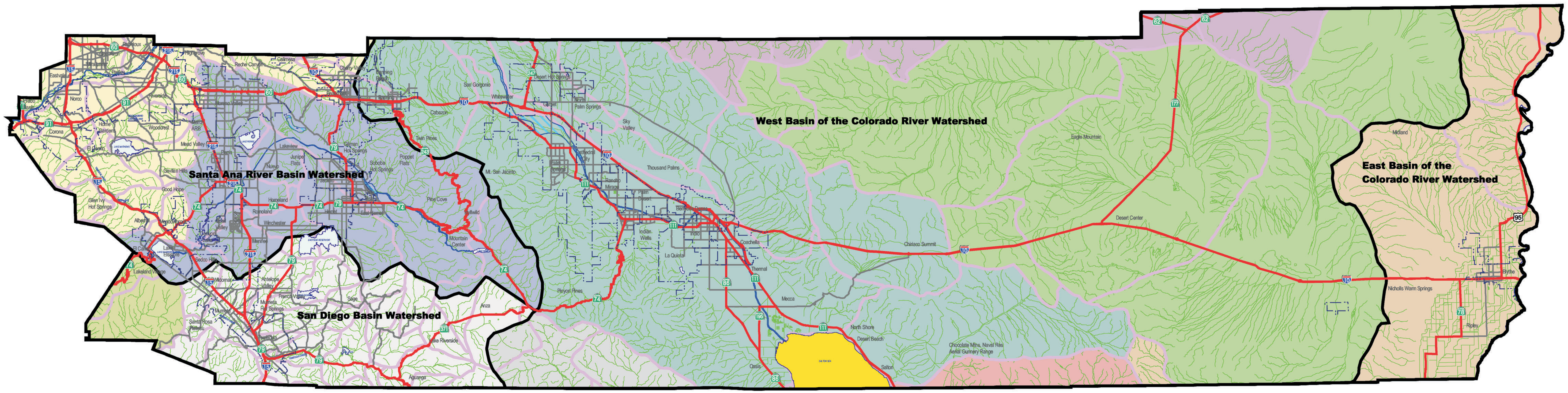
4.3.2 Watersheds

Riverside County is within four distinct watershed areas. These are the Santa Ana River Basin, San Diego Basin, and the East and West Basins of the Colorado River. The East Basin of the Colorado River drains into the Colorado River, the West Basin of the Colorado River drains primarily into the Salton Sea Trough, the Santa Ana River Basin drains into the Pacific Ocean in Orange County, and the San Diego Basin drains into the Pacific Ocean in San Diego County. These large watersheds are further divided into smaller sections by internal surface water drainage areas and groundwater basins (see Figure 4.3.1).

4.3.2.1 Santa Ana River Basin Watershed

The Santa Ana River Basin lies within Los Angeles, Orange, San Bernardino, and Riverside Counties, with 400 of its 2,780 square miles located in Riverside County. The northwest portion of Riverside County, north of the Santa Margarita River Watershed and west of the San Jacinto and San Bernardino Mountains lies within the Santa Ana Watershed and includes the San Jacinto and Santa Ana Upper and Lower Watersheds.

The Santa Ana region is a group of connected inland basins and open coastal basins drained by surface streams flowing generally south-westward to the Pacific Ocean. Major Earthquake faults in the region include the San Andreas Fault and its large branches, the San Jacinto Fault, and the Elsinore-Whittier Fault. The San Jacinto Fault splits off the San Andreas near San Bernardino and affects groundwater flows associated with both the Santa Ana and San Jacinto Rivers. The Elsinore-Whittier Fault passes under Prado Dam. There are also many branching and parallel faults in the region.



LEGEND

Cities
Highways
Major Roads

Hydrologic Features

Creek or River
Waterbodies (Suitable as drinking water source)
Flood Water or Ephemeral Stream (May not be suitable as drinking water source)
Hydrologic Basins
Watershed

Planning Areas/Hydrologic Units

Anza-Borrego Planning Area
Coachella Valley Planning Area
Colorado Hydrologic Unit
Hayfield Planning Area
Imperial Valley Planning Area
Lucerne Valley Planning Area
Salton Sea Planning Area (Brackish Water - Not suitable as drinking water source)
San Jacinto River Hydrologic Unit
San Juan Hydrologic Unit
San Luis Rey Hydrologic Unit
Santa Ana River Hydrologic Unit
Santa Margarita Hydrologic Unit

Figure 4.3.1

5 0 5 10 Miles

WATERSHED AREAS

Deep alluvial deposits make up the large groundwater basins in the region. The Santa Ana River, and its tributaries recharge several groundwater basins. The San Jacinto river recharges a deep (greater than 2,000 feet) graben as it leaves the mountains and several other basins on its way to Lake Elsinore. In especially wet weather, Lake Elsinore overflows to Temescal Creek which flows to the Santa Ana River near Corona. With development has come diversion of most natural surface flows for agriculture and domestic use. The creeks and rivers now carry only stormwater flows, urban and agricultural runoff, and reclaimed water. High groundwater, springs, and marshes have all but disappeared.

The Santa Ana River is the principal river in the Santa Ana Watershed. It originates in the San Bernardino Mountains, and travels southwest approximately 60 miles where it reaches the Pacific Ocean near Huntington Beach. Flows in the Santa Ana River are "effluent dominated." Without effluent discharges from area wastewater treatment plants into the River, surface flow within Riverside County would be rare during dry weather. A minimum flow to protect downstream water rights and groundwater recharge (measured at Prado Dam) is maintained by wastewater discharge to the River.

Groundwater basins in the Riverside County portion of the Santa Ana River Hydrologic Unit are referred to as the Lower Santa Ana River, Middle Santa Ana River, Lake Mathews, Colton-Rialto, and San Timoteo Hydrologic Areas.

The San Jacinto River is the principal river in the San Jacinto Watershed. It originates in the San Jacinto Mountains, and flows northwest for the first half of its course and then southwest. The San Jacinto River occasionally reaches Canyon Lake and more rarely Lake Elsinore. As noted above, water from Lake Elsinore may discharge into Temescal Wash which is a tributary of the Santa Ana River. In this way, the Santa Ana and San Jacinto Watersheds are linked.

Groundwater basins in the Riverside County portion of the San Jacinto River Hydrologic Unit include the Perris, San Jacinto, and Elsinore Valley Hydrologic Areas.

Climate within the Santa Ana Basin

The climate of the Santa Ana Region is considered Mediterranean with dry summers and mild, wet winters. Average annual rainfall in the Santa Ana River Basin is approximately 15 inches, with most of it falling between November and March. As the rainfall in the region occurs in the winter and over a period of only a few days, major flooding can result. This danger is minimized by an extensive concrete-lined flood control system in much of the watershed. Consequently, replenishment of groundwater from natural precipitation is severely limited. There are several percolation ponds in the Santa Ana River designed for groundwater replenishment, but most of the storm flows are lost to the ocean.

Surface Water Storage

The surface water storage areas in this area of Riverside County are Lake Hemet, periodically Mystic Lake, Canyon Lake, and Lake Elsinore. Drinking water storage is also available in Lake Mathews and Lake Perris.

Lake Elsinore is normally a sink, with no outflow. High evaporation rates have limited the amount of water in the lake, which has gone dry several times during this century. Extreme wet weather has caused flooding in the surrounding area. Several lake stabilization plans are being implemented.

4.3.2.2 San Diego Basin Watershed

The northeastern portion of the San Diego Basin Watershed crosses into Riverside County with the Santa Margarita River Watershed and small portions of the San Juan, San Luis Rey, and San Mateo Creek drainages. The Santa Margarita River watershed covers approximately 560 square miles in southwestern Riverside County and drains the southern part of the Perris fault block and southern end of the Santa Ana Mountains. The Santa Margarita River is formed by the confluence of Murrieta and Temecula Creeks.

This region northeast of the Elsinore Fault Zone contains broad, relatively flat valleys which are structurally of block fault origin. The grabens contain thick sections of alluvial deposits. The groundwater basins are relatively small and usually shallow with highly permeable alluvium.

Groundwater basins in the Riverside County portion of the San Diego Basin Watershed are divided into the San Juan, Santa Margarita, and San Luis Rey Hydrologic Units. The groundwater basins in the San Juan Hydrologic Unit within the County are referred to as the Mission Viejo and San Mateo Canyon Hydrologic Areas. The groundwater basins within the Santa Margarita Hydrologic Unit are referred to as the Ysidora, DeLuz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguana, and Oak Grove Hydrologic Areas. The groundwater basin in the San Luis Rey Hydrologic Unit is referred to as the Monserate Hydrologic Area.

Climate of the San Diego Basin Watershed

The climate in this area is considered mild. Precipitation varies widely in the Santa Margarita Watershed from 10 inches at the coast (in San Diego County) to more than 40 inches in the mountains in Riverside County. Surface runoff, with accompanying stream discharge, peaks significantly after storm events in the Santa Margarita River system and has caused significant flooding in the Murrieta and Temecula areas. Flows in some parts of the river are considered ephemeral in the absence of these significant storm events.

Surface Water Storage

The primary surface water storage area in this region of Riverside County is Vail Lake. Drinking water storage is also available in Lake Skinner and the Eastside Reservoir. The majority of water supply in the area is imported from the Colorado River with some water from Northern California and a significant amount of groundwater use.

4.3.2.3 Colorado River Watershed Region

The Colorado River Region of the County extends from the San Bernardino and San Jacinto mountain ranges east to the Colorado River. It is divided into the west and east basin planning areas.

A distinctive geographical feature of the region is the Salton Trough which is a structural extension of the Gulf of California. The trough contains the Salton Sea, and Coachella and Imperial Valleys. The valleys are separated by the Salton Sea which covers the lowest part of the area.

The Salton Sea was formed most recently by an overflow of the Colorado River between 1905 and 1907. It is California's largest inland body of water. Water sources for the Sea are the drainages of irrigation return water and stormwater from the Coachella, Imperial, and Borrego Valleys in the United States and Mexicali valley in Mexico.

Development near the Colorado River includes the agricultural areas of the Palo Verde and Bard Valleys and the community of Blythe. Some mining operations are also located in this area.

The sediments in the groundwater basins of this region are generally weakly consolidated to consolidated. The San Andreas Fault cuts across the region bordering the northeast side of the Salton Trough. The Borrego Valley is formed by the San Jacinto Fault. Valleys, mountains, and dry lakes are oriented by the major fault systems. These systems also influence groundwater flow.

The Coachella and Imperial Valleys were created when the Colorado River formed the delta which isolated the Salton Trough from the Gulf of California. The Trough contained lakes at various times and consequently, there are rich deposits of fertile soils in this area suitable for agricultural uses.

The East Colorado Basin consists of deep alluvial deposits of silt, clay, and sand that were laid down by ancient streams preceding the Colorado River.

In addition to the Colorado River and Salton Sea, there are numerous drains. These drains are ephemeral, flowing only intermittently, with thunderstorm and agricultural runoff as source waters. Canals distribute water from the Colorado River throughout the region and Lake Cahuilla is used for imported water storage.

West Basin of the Colorado River Watershed

The West Basin is divided into six planning areas, all but two of which drain into the Salton Trough, an extension of the Gulf of California. Because the area is primarily desert, most of the precipitation is evaporated or used by vegetation during evapo-transpiration. The area is characterized by ephemeral streams which contain water only for short periods after thunderstorm events in the summer and, rarely, in the winter. There are a few perennial streams. Those from natural runoff in the western half of the watershed are used by local communities as a water supply. Most are fed predominantly by agricultural runoff. This area is the driest in California with very little rain.

Water sources are scarce in this area with surface water a minor source. The ground-water resources, though more substantial than those in the East Basin, cannot meet local demand. Water is imported from the Colorado River to meet the gap in demand. Irrigation needs in the Coachella Valley are met almost exclusively by the imported supply. Historical extraction of groundwater in the Coachella Valley has caused overdraft. There is currently an extensive groundwater recharge project being under-taken by the Coachella Valley Water District which recharges Colorado River Water in spreading basins.

A description of each of the Planning Areas that fall in entirety or partially within Riverside County follows:

- ***Lucerne Valley***. Only about 5 percent of this Planning Area lie within Riverside County. The other 95percent are within San Bernardino County. The average precipitation in this area is 5 inches annually. Drainage of this area is to internal sinks or dry lakes.

  Most groundwater is stored in unconsolidated alluvium and is unconfined. The depth of water-bearing deposits is not known, but basins have accumulated up to 1,200 feet of sediments. The groundwater basins in this area are the Joshua Tree, Dale, Cadiz, and Ward Hydrologic Units. Each of the Hydrologic Units contains one or more Hydrologic Areas within the County.

- ***Hayfield***. Almost all of this area lies within Riverside County. The Planning Area is largely desert with mountains, valleys, and dry lake beds. Annual precipi-tation is from 3 to 8 inches and annual runoff in the area is approximately 5,000 acre feet. The area drains to internal dry lakes or sinks.

  Runoff from higher elevations is the principal source of groundwater replenish-ment. The aquifer is generally unconfined with water-bearing sediments to a depth of 1,200 feet. The groundwater basins in this area are the Rice, Chuckwalla, and Hayfield Hydrologic Units. Each of the Hydrologic Units contains one or more Hydrologic Areas within the County.

- ***Coachella Valley***. This planning area lies almost entirely in Riverside County. It has varied terrain, ranging from desert in the Coachella Valley floor to evergreen forest with perennial streams in the San Jacinto Mountains. Annual precipitation varies accordingly with 3 inches in the valleys to 40 inches in the mountains. Runoff resulting from precipitation at higher elevations is the principal source of groundwater replenishment in the area. This area drains to the Salton Trough.

The Whitewater River is the major drainage course in the area and has perennial flow in some areas, becoming dry as water percolates the groundwater basin or is diverted for use. Lake Cahuilla is also in this watershed.

Groundwater is stored in unconsolidated deposits with depths of greater than 1,000 feet. The water is unconfined except by old lake beds near the Salton Sea where clay deposits restrict water movement. An extensive fault system also alters groundwater movement, preventing flow between some subbasins.

The groundwater basins in this area are the Whitewater and East Salton Hydrologic Units. There are 12 hydrologic areas within these hydrologic units which fall within Riverside County.

- ***Anza-Borrego.*** Most of this area is located in San Diego County and Imperial Counties with only a small portion in Riverside County. Elevations range from below sea level at the Salton Sea to over 6,000 feet on the western boundary. The majority of the drainage is to the Salton Sea. Average annual rainfall varies with topography, with less than 3 inches in the desert to 25 inches in the mountains. There are a few creeks with perennial flow.

  Groundwater is replenished from stormwater runoff and is stored principally in unconsolidated deposits. Approximately 10,000 acre feet per year subsurface flow reaches the Salton Sea. Total storage capacity of the basin is estimated at 7 million acre feet.

  The groundwater basins in this area are the Clark, West Salton, and Anza-Borrego Hydrologic Units. Each of the hydrologic units contains one or more hydrologic areas within the County.

- ***Imperial Valley***. This Planning Area, which is almost exclusively within Imperial County, is generally a flat valley. The average annual rainfall in the Riverside County portion of this area in less than 3 inches. Most surface water drains to the Salton Sea. However, some agricultural runoff, stormwater runoff, and municipal and industrial wastewaters enter the New and Alamo Rivers outside Riverside County.

  The fine-grained sediments in the area inhibit groundwater movement and production. Few wells have been drilled as yield is low and the water saline.

  The groundwater basin in this area is the Imperial Hydrologic Unit. One hydrologic area within this hydrologic unit falls within Riverside County.

- **_Salton Sea_**. This area encompasses the Salton Sea which lies between the Coachella and Imperial Valleys in Riverside and Imperial Counties. The sea is 30 miles long and 10 to 15 miles wide with an area of 360 square miles. The mean surface elevation is 227 feet below sea level. The Salton Sea acts as a natural salt sink for the surrounding area which is a watershed of approximately 7,500 square miles. The Salton Sea's replenishment is generally from farm runoff and occasionally from storm runoff. The average annual precipitation is under 3 inches.

East Basin of the Colorado River Watershed

The East Basin is a 200-mile long strip of land with an east-west width of up to 40 miles in the easternmost portion of San Bernardino, Riverside, and Imperial Counties. Its boundaries are the Nevada state line, the Colorado River, Mexico, and the drainage area of the California streams that are tributary to the Colorado River with desert peaks of approximately 4,000 feet. The Palo Verde and Bard Valleys lie within this area.

The winters are mild and summers hot. Precipitation is 3 to 4 inches annually with half of this occurring from summer thunderstorms and the other half from mild winter storms. All drainage is to the Colorado River except for a small portion which flows into the Colorado River Aqueduct via MWD's Gene Wash and the Copper Basin Reservoirs.

Irrigation and domestic water is provided by the Colorado River with only about 1 percent groundwater use and little direct reclamation. Agricultural runoff and some domestic wastewater do get returned to the Colorado River. Therefore, the water source at the southern end of the watershed is actually a mixture of Colorado River water, agricultural runoff, and reclaimed water.

Groundwater is generally unconfined in these basins with sediments up to 700 feet in depth. Approximately 10,000 acre feet of precipitation percolates to the groundwater table annually. The combined total groundwater storage of the East Colorado River Basin is found at a depth of at least 200 feet and is approximately 35 million acre feet. Approximately 20 percent of this storage may be within Riverside County.

The groundwater basin in this area is the Colorado Hydrologic Unit. This hydrologic unit contains five hydrologic areas which fall within the County.

4.3.3 Water Quality

In the past, some of the water quality problems that have occurred in Riverside County were related to inadequate subsurface sewage disposal, waste disposal management of the Santa Ana River, agriculturally-related problems such as citricultural runoff in the western county and increasing salinity of the desert groundwater basins, sediment buildup of water bodies from construction-related erosion, lake water quality problems, and "non-point" source pollution due to urban stormwater system runoff.

The Regional Water Quality Control Boards (RWQCB) which oversee water quality in the County have determined that water supply plans and groundwater management are the most important components in quality management planning. Although these plans address water quality, they significantly impact the quantity of water available. Their plans recommend integration of supply, area and type of use, salt additions from use, point of discharge after use, reclamation, downstream uses, and long-term management of groundwater basins. Imported water from Northern California through the State Water Project is a preferred water source along with high quality groundwater. Use of imported water from the Colorado River, although the predominant source of water in the region, is discouraged by the RWQCB as it is of poor quality (high total dissolved solids [TDS]), and contributes significantly to the salinity problems in the area.

RWQCBs seek to protect the long-term beneficial uses of a region's water supply. To this end, they regulate the quality of water that can be discharged into a lake or stream or used to recharge a groundwater basin. The designated beneficial uses in the County are as follows:

- Municipal and domestic supply
- Industrial service supply
- Groundwater recharge
- Agricultural supply
- Hydropower generation
- Non-contact recreation
- Industrial process supply
- Freshwater replenishment
- Water contact recreation
- Commercial and sportfishing
- Cold freshwater habitat
- Wildlife habitat
- Aquaculture
- Limited warm freshwater habitat
- Rare, threatened, or endangered species
- Spawning, reproduction, and development
- Preservation of biological habitats of special significance.

In general, water for drinking is considered to be of good quality if it has a TDS below 300 mg/L, acceptable if TDS is between 300 and 500 mg/L, fair between 500 and 700 mg/L TDS, poor between 700 and 1,000 mg/L TDS, and unacceptable above 1,000 mg/L TDS. The County's drinking water supplies range from good to unacceptable, depending on the area. These standards are subjective and, for the most part, purely aesthetic. However, TDS in water supply is an important factor for industry, agriculture, medical services such as dialysis, and many of the other designated beneficial uses.

4.3.3.1 Santa Ana Basin

Over half the water used in this region is imported water. Much of this is from the Colorado River, and is high in salts. The most serious problem in the Santa Ana Region is the buildup of dissolved minerals, or salts, in the ground and surface waters. TDS and nitrogen levels in the Basin currently or will soon exceed the water quality objectives set by the Santa Ana RWQCB to protect beneficial uses of the ground and surface waters.

Each use of water adds an increment of dissolved minerals and salts. These minerals and salts may be added to the water as it is used, or the concentration of minerals and salts can be increased by reducing the volume, such as by evaporation or evapo-transpiration. One of the principal causes of the mineralization problem in the region is irrigated agriculture, particularly citrus, which in the past required large applications of water, resulting in large losses due to evaporation. TDS and nitrate concentrations are increased both by this reduction in volume of return water and by the direct application of these salts in fertilizers.

Dairy operations, which began in the region about 50 years ago, also contribute large amounts of salts to the basin. Significant increments of salt have also been added to the basin by municipal and industrial wastewater and their reuse through recycling as they move from higher areas towards the ocean. Salts are added as water is used for municipal or industrial purposes; in some cases, the wastewater which was generated was discharged to the same groundwater basins from which the source waters were derived. These basins were then pumped and the waters used again, adding more salts.

The Stringfellow Acid Pits Federal Superfund site is located approximately 9 miles northwest of downtown Riverside. From 1956 to 1972, it was used as a hazardous waste disposal facility. Industrial wastes, primarily from metal finishing, electroplating, and pesticide production were deposited in evaporation ponds. In 1969, excessive rainfall caused the ponds to overflow and contaminate Pyrite Creek. In 1978, there was a controlled overflow, and, following that, liquid waste was removed to another facility. Cleanup of the site has removed approximately 6.3 million gallons of waste. Groundwater in the area contains volatile organic compounds (VOCs) and heavy metals. A groundwater treatment system and other clean-up efforts are gradually reducing the risk of further contamination to the surrounding area and restoring beneficial uses to the nearby ground and surface water sources.

Another water quality problem in the planning area originates from the March Air Reserve Base area. The base is listed as a Superfund site due to soil and groundwater contamination with trichloroethylene (TCE), assorted fuels and their breakdown products, and landfills. The extensive clean-up operations will render the base and surrounding area virtually free of contaminants by the year 2005. Prior to this date, however, groundwater pumpers in the area should consider the effects of pumping on possible migration of a contaminant plume from the Base into the uncontaminated portions of the groundwater basin.

Water supply continues to be the biggest factor impacting the region's overall water quality. Using supplies which are high in TDS, such as poor quality groundwater and Colorado River water supplies, have an adverse effect on the long-term use of groundwater and on agriculture. Even conservation practices that encourage the use of low-flush toilets in new developments concentrate the constituents in sewage and further degrade the quality of reclaimed water used in the basin.

The quality of the water resources in the region is expected to continue to be degraded. Degradation can be slowed by using high quality (low TDS) water sources and exporting minerals through desalting and disposal of the brine into the Pacific Ocean.

Several desalters, which will help utilize local water supplies and remove salts from the groundwater, are either in operation or planned for the region. These are the Arlington, Chino Basin, Riverside/Colton, Temescal, and Menifee desalters.

Studies are underway to explore conjunctive use of groundwater and evaluate the nitrogen and total organic carbon removal in the Prado Basin area. Salt balance and capacity of groundwater basins to accumulate salt from agricultural drainage and use of reclaimed water are being studied in the groundwater basins of the San Jacinto Watershed where salinity is threatening the long-term use of a large water supply. Lake Elsinore is currently being managed by the Santa Ana Water Project Authority (SAWPA). It will manage quality and quantity of water in the Lake. To further protect water quality, non-point source pollution programs, stormwater programs, and control of point sources of pollution are all being implemented.

4.3.3.2 San Diego Basin Watershed

Water quality within this basin, particularly within the Santa Margarita River Watershed has been degraded by non-point source runoff. With increasing population, and consequently more runoff containing oil and grease, pesticides, fertilizers, landscape irrigation runoff, and other contaminants associated with suburban development, the watershed water quality has become a concern. Drinking and irrigation water sources include the increasingly saline Colorado River which, though safe to drink, does not meet the quality requirements for discharge into the Santa Margarita River as set by the San Diego RWQCB, and contributes to the degradation of water quality in the area.

Although programs to control point and non-point source pollution are being implemented, there continues to be a threat to water quality. Rapid development in the Temecula and Murrieta areas has increased stormwater runoff increasing erosion and silting of Murrieta and Temecula Creeks. Non-point source pollution from increased urban runoff threatens sensitive habitat and the combination of increased stormwater flows and pollutants may impact the habitat of the Santa Margarita River. In addition, use of high salinity Colorado River water or reclaimed water for irrigation may eventually degrade the area groundwater basins causing a loss of beneficial uses.

Currently, this portion of the San Diego Basin has several million acre feet of high quality groundwater. Groundwater management and water supply programs should be given priority as the southwest portion of the County develops in order to prevent the type of degradation in groundwater quality that has occurred in the Santa Ana Basin.

4.3.3.4 West Basin of the Colorado River Watershed

Imported Colorado River water is the major source of water in the West Basin of the Colorado River Watershed. Water quality in this area is most significantly impacted by the increasing salinity of the Colorado River and overdraft which dropped groundwater more than 50 feet in the Coachella Valley. Fewer problems are related to waste disposal or inadvertent failure of subsurface disposal systems.

The increasing salinity of the Colorado River virtually precludes the reuse of irrigation runoff or reclaimed water. Larger quantities of this saltier water are required in agricultural practices to dilute the high salinity of the root zone increasing the costs of agriculture. Increased salinity also has an economic impact on municipal and industrial uses and on wastewater treatment and disposal.

The Salton Sea has significant water quality problems. With no natural outlet and a drainage area of approximately 7,500 square miles, it acts as a natural salt sink for the surrounding area. The Salton Sea's replenishment is generally from irrigation runoff and occasionally from storm runoff. As the quality of irrigation water and, therefore, the Colorado River deteriorates, so does that of the Salton Sea. In fact, as its source waters have often been used several times since conveyance from the Colorado River, the rate of degradation of the Salton Sea is greater than that of the Colorado River. The salinity of the sea's source water increases with each use as salt is added or the salts in the water concentrate through evaporation.

The salinity of the Salton Sea is above 40,000 mg/L TDS, and is rising. Fish that live in the Sea may not be able to survive and breed in water that is above 45,000 mg/L TDS. The Salton Sea is in a closed basin replenished primarily by 3000 mg/L TDS water, and there is a high evaporation rate due to climate. Consequently the salinity of the Sea is projected to rise 1 to 2 percent per year if no salinity control measures are taken.

Selenium from agricultural return flows is also a water quality concern in the Salton Sea, along with other chemicals found in agricultural runoff such as nitrate and pesticides. Selenium, and many pesticides, bioaccumulate in fish and wildlife and pose a threat to many species including migratory birds, endangered species, and local waterfowl. Many options for water quality management are under investigation.

4.3.3.5 East Basin of the Colorado River Watershed

Water quality problems in the East Basin are directly related to supply issues and the area of the watershed. Irrigation practices have also played a major role along with the alkaline and saline soils and high evaporation rates in the region. There are some degradation of water quality due to occasional failure of subsurface disposal systems, but this problem becomes insignificant when compared with the other water management issues in the watershed.

The Colorado River is the major water source in the East Basin. The River and its tributaries drain portions of seven states with a watershed area of approximately 246,000 square miles. The increasing salinity of the Colorado River water with each passing decade, and as it flows from north to south, has become a major problem for agricultural users. Each year, larger quantities of the increasingly degraded water are required to flush the salinity from the soil in the root zone to allow crops to grow. This increases the cost of agriculture in the region. Municipal and industrial uses are also impacted by the increasing salinity of the Colorado River with far-reaching effects which include increased cost of wastewater treatment. Subsequent agricultural runoff and wastewater returns to the River further magnify the water quality problems.

4.3.4 Location of Existing and Future Supplies

4.3.4.1 State of California Overview

None of the major urban areas within California have enough local water supply to meet current or future needs. Much of the State has little rainfall, or other precipitation, and cannot support the level of agricultural and urban development currently being enjoyed without relying heavily on imported water. Most of the agricultural and urban development in the southern quarter of the state, which is semi-arid to arid, would not exist without imported water from the Colorado River. Without the continuation of substantial water planning and program efforts, the demand created by the current level of development and any future development will not be met.

Most of California's water supply is within the northeastern portion of the State, or is imported from the Colorado River.

4.3.4.2 Local Water Supply

Riverside County relies on local groundwater, imported water from the Colorado River and Northern California, some desalting, and reclaimed water to meet water demand. Most of these sources are at capacity.

Groundwater is limited by its quality as well as quantity. Increasing production in good quality basins puts them at risk for overdraft or intrusion of poorer quality groundwater from nearby aquifers. Imported water is limited by environmental uses, legal entitlement, and quality. Desalting is limited by quantity of groundwater, expense, and disposal of brine. Reclaimed water is limited by quantity, quality, and use restrictions. Conservation programs have a minor impact on water supply, but do not markedly influence long-term water reliability.

Water storage to meet peak demand, or a two-day to one-week supply, is provided by many local water agencies within Riverside County. However, long-term storage of large quantities of water is provided only in MWD and California Department of Water Resources (DWR) facilities. Total storage capacity in the existing reservoir system is 871,000 acre feet[1]. Three of these storage facilities are located in Riverside County: Lake Mathews, Lake Skinner, and Lake Perris. Together, these storage facilities have a total of 342,300 acre feet of storage capacity. The completion of the Eastside Reservoir south of Hemet will almost triple this capacity with an additional 800,000 acre feet of storage, bringing the total storage capacity available within Riverside County to 1,142,300 acre feet. Currently, approximately three-eighths of existing storage capacity may be used to meet seasonal demand. The remaining five-eighths is reserved for emergency need such as severe droughts and/or use when a natural disaster, such as an earthquake, makes it impossible to meet demand through usual supply facilities.

Most groundwater basins within Riverside County store local and imported water for later use to meet seasonal and drought year demands. Under these conjunctive-use groundwater programs, groundwater is artificially replenished in wet years with surplus imported water. Water is then extracted during drought years or during emergency situations. Conjunctive use, also known as aquifer storage and recovery, which may also involve the recharge of reclaimed water, enhances the region's ability to meet water demand during years of short supply and increases overall local supply reliability.

4.3.4.3 Reliability of Imported Water Supply

Since 1941, the Colorado River has played a critical role in supplying supplemental water to Southern California and Riverside County. Californians have become accustomed to taking more than their allocation of Colorado River water, currently using approximately 5.8 million acre feet (maf) of Colorado River water with a 4.4 maf allocation, and have built a lifestyle based on a seemingly endless water supply. However, this situation is likely to change dramatically in the near future as development in Arizona and Nevada increases their demand for water. Arizona and Nevada will be taking almost all of their apportionments by the year 2000.

In 1922, the Colorado River Compact was passed, dividing the Colorado River Basin into upper and lower basins. Under the 1931 "Seven Parties Agreement," over 5.362 maf of Colorado River water was allocated to California. Under the Seven Party Agreement, the Coachella Valley Water District is one of the four agricultural agencies that receives the first three priorities to use no more than 3.8 maf while the MWD holds the third and fourth priorities at 1.212 maf. In 1964, a U.S. Supreme Court De-

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1 An acre foot of water is the volume of water represented by a one foot depth of water over a one acre area (43,560 cubic feet of water or approximately 326,000 gallons), and is enough to supply the water needs of two families for one year.

cree established new allocations for the use of Colorado River water. Under this decree, the State of Arizona is entitled to receive 2.8 maf, California is entitled to 4.4 maf, and Nevada is entitled to 0.3 maf. States are allowed to divert unused portions of water from other states and any water that exceeds 7.5 maf under this decree is split between all three states.

With the expected decrease in water from the Colorado River, reduction of California's dependence on Colorado River water is under consideration by the DWR and the MWD. Dependence may be decreased through the following steps:

- Encourage water conservation in Imperial Valley.
- Recover seepage from the All American Canal and Coachella Canal.
- Store surplus water supplies in wet years in groundwater basins for use in dry years.
- Make surplus water available from Lake Mead.
- Continue to expand water conservation in the Imperial Valley.
- Use desalted water and reuse agricultural drainage water.

Imported water supply from Northern California is impacted by the priority placed on environmental uses of water which protect habitat and prevent salt water intrusion in the Delta, or contribute to stream enhancement and protection of similar beneficial uses. Unlike the amount of Colorado River water available to California, the amount of Northern California water available to Southern California, through the State Water Project, can vary greatly with the weather. In wet years, water demand may be easily met and surplus water may also be available to Southern California. However, in an extremely dry year, Southern California may be able to secure very little Northern California water for delivery.

4.3.4.4 Coachella Valley Water Supply

The Coachella Valley Water District (CVWD) began serving urban water in 1961. It uses groundwater and imported water from the Colorado River and northern California. CVWD contracts with the State of California to deliver 23,100 acre feet of water from Northern California annually. The Desert Water Agency of Palm Springs also has a contract for 38,100 acre feet per year from the State Water Project. In 1986, the CVWD entered an agreement with the DWR to enlarge the east branch of the California Aqueduct. This agreement has not increased the entitlement for the CVWD but, does triple the capacity of the CVWD and the Desert Water Agency to allow for the increased growth that is anticipated in the Coachella Valley.

4.3.4.5 Santa Ana Watershed Project Authority (SAWPA)

The SAWPA is a joint powers agency which conducts water-related investigations and planning studies, and builds physical facilities for water supply, wastewater treatment, and water quality improvement. SAWPA is considered an important manager and protector of water resources in the region. SAWPA was created in part to bring a more regional approach to planning the use of water supplies for the beneficial use of all users within the Santa Ana watershed. The ultimate goal was to obtain 100 percent reliability in water delivery.

Groundwater is the largest supply source for SAWPA. The three other major sources are surface water, reclaimed water, and imported water. SAWPA projects a doubling of imported water demand and a 7 percent increase in the use of surface water by 2020. It also predicts increased use of spreading basins for groundwater recharge.

Desalting facilities are considered integral to addressing the salt balance problems in the Santa Ana Watershed. Although expensive to operate because of high energy requirements and labor needs, they provide a way to use local water that would normally be considered unsuitable for drinking. SAWPA's SARI (Santa Ana Regional Interceptor) line is designed to transport desalter brine out of the upper region of the Santa Ana watershed for ultimate disposal in the Pacific ocean. Water agencies in the region can use the SARI line to dispose of desalter brine. This moves salt out of the basin improving the salt balance.

4.3.4.6 Alternative Water Supply Programs

Programs to help bridge the gap between supply and demand include urban conservation programs, agricultural efficient water management practices, reclamation, recycling, desalination of brackish groundwater and seawater, groundwater recharge with reclaimed or raw surplus water, and transfers of water from agricultural to urban uses. The least expensive and efficient of these is the transfer of water from agricultural to urban uses.

MWD has entered an agreement with farmers in the Palo Verde Irrigation District for a transfer of 185,978 acre feet of Colorado River water from farmers to MWD over a two-year period. MWD has paid the equivalent of $143 per acre foot of water to farmers. To make the water available for the transfer, the farmers have left approximately 20,215 acres fallow. More agreements which transfer water from agricultural to urban uses are expected as well as those from water-rich agencies to those agencies with a supply shortage.

The DWR and local water agencies support the implementation of a variety of water resource programs. The Reclamation, Recycling, and Water Conservation Act of 1996 authorized federal cost-sharing in wastewater recycling projects. It includes funding for desalination of sea water and groundwater, reclaimed water treatment, and reuse. The Water Desalination Act of 1996 encourages desalination research by providing the funding for exploration of this developing technology.

The State Water Resources Control Board policy encourages substitution of potable water with reclaimed water where possible. There is a set of strict regulations that govern its uses which are designed to protect the existing and proposed designated beneficial uses of the receiving ground or surface water. The Santa Ana, San Diego, and Colorado Region RWQCBs have written Water Quality Control Plans for their respective regions. They contain water quality objectives for the groundwater basins and for the surface waters. Any use of reclaimed water which results in planned recharge of an aquifer or discharge into a surface water must meet the water quality standards set forth by these objectives and/or have prior approval from the RWQCB.

Reclaimed water can be used to recharge aquifers for future use as a potable supply and also used to stop intruding higher TDS water from contaminating a groundwater basin as in the prevention of salt water intrusion along the coast or the boundary between a basin of poor quality and a basin of good quality.

The TDS of reclaimed water is directly related to the TDS of the domestic water supply. Reclaimed water is typically approximately 200 to 250 mg/L TDS higher than the potable source water. In order to have high quality reclaimed water, high quality source water is required.

Issues to consider when using reclaimed water as part of a water management program include the following:

- Long-term effects on salinity, and other water quality parameters.

- Reclaimed water can be used to artificially recharge a groundwater basin if all basin objectives are met and all applicable health regulations are followed. However, Department of Health Services guidelines for recharge of reclaimed water make it difficult and expensive to recycle water and store it in the aquifer for future use as domestic supply.

- When using multiple reclaimed water sources, it is important to consider the basin plan objectives of the receiving groundwater basin. Each effluent quality and each blend of effluents must be quantifiable so that the quality of reclaimed water is known at all times. This is especially important when using water in basins of higher quality.

- Live-stream discharge of reclaimed water is often held to water quality limits that are more stringent than drinking water standards, especially in the areas of nutrients. In addition, the toxicity limits, in essence, require that a stable, "buffered," reclaimed water be released for live-stream discharge. This is in addition to the numerical limits set and helps meet the regulatory agencies' mandate to make the waters of the United States “fishable and swimmable” as required in the Clean Water Act.

4.3.5 Capacity of Existing and Future Supplies to Support New Development

4.3.5.1 State Water Demand

The largest portion of demand for water in the state is from environmental protection programs. These environmental protection programs include implementation of the CALFED and the Bay-Delta Accord, maintenance of wild and scenic river flows, and increased in-stream flow requirements to maintain habitats. Water dedicated for environmental protection is unavailable for future development. Environmental protection programs accounted for approximately 46 percent of the total water demand within California in 1995, and are expected to require the same percentage of water demand through 2020.

Agricultural uses have the second greatest water demand in the state, accounting for 43 percent of statewide water demand in 1995. Agricultural water use is expected to decrease proportionally to 39 percent of total demand by 2020. Water supply for agriculture is generally considered available for future development when agricultural lands are converted to urban uses or agricultural practices reduce water demand and make supply available for urban or environmental uses.

Urban uses, which include domestic, municipal, commercial, and industrial uses, accounted for 11 percent of the state's total water demand in 1995. Based on population projections, water demand from urban uses are expected to increase to 15 percent of total water demand by 2020.

In order to determine the need for water resource planning and programs, the DWR (DWR Bulletin 160-98) has estimated expected water shortages for California at 1995 and 2020 demand. The 1995 demand for water is actual water use in 1995 and demand for 2020 is based on the California Department of Finance population forecasts for the year 2020. In a year with normal precipitation, and assuming California takes only its entitlement of water from the Colorado River and does not use water in long-term storage, DWR estimates water supply shortage at 1995 demand to be 1.6 maf, and 5.1 maf during a drought year. Using 2020 water demand, the statewide shortage increases to 2.4 maf in a normal year and 6.2 maf in a drought year. DWR estimates implementation of water resource programs throughout the state can reduce that shortage to 0.2 maf and 2.7 maf, respectively.

As California's population increases, demands placed on urban and agricultural water supplies will become strained. The greatest demands on water supplies will occur in Southern California, where a 46 percent increase in California's population is expected. Even with water conservation and recycling technologies, the DWR projects urban water demands to increase by 3.2 maf.

The DWR projects the use of water recycling and desalinization plants will help to increase California's water supply by 3 percent, or 0.4 maf per year, by 2020.

4.3.5.2 Local Water Demand

Riverside County faces a growing gap between water demand and water supply. Increased regulation, environmental protection use needs, and competition for supplies from other states, and from other parts of California have resulted in a reduction in supply of available imported water. Groundwater basins cannot produce enough water to fill the expected supply gap. At the same time, demand is rising due to population growth.

MWD, which serves water agencies in the western part of the County, projects at least doubling of water demand between 2000 and 2020. This agrees with the DWR projections for the same time period.

Riverside County falls within two of the DWR's planning areas, the South Coast and Colorado River Regions. Though these regions include most of Southern California, and not just Riverside County, they are each representative of the types of supply and demand within the County. The South Coast Region has similar patterns of growth, demand, and supply as developed western Riverside County and the Colorado River Region has similar patterns of growth, demand, and supply as eastern Riverside County.

Tables 4.3.A through 4.3.D show the projected water budgets for the two regions for 2020 assuming only current supplies and facilities are in place.

Table 4.3.A - South Coast Region Water Budget with Existing Facilities and Programs (Thousands of acre feet)

	1995		2020	
	Average	Drought	Average	Drought
Water Use				
Urban	4,340	4,382	5,519	5,612
Agricultural	784	820	462	484
Environmental	100	82	104	86
Total	**5,224**	**5,283**	**6,084**	**6,181**
Supplies				
Surface Water	3,839	3,196	3,625	3,130
Groundwater	1,177	1,371	1,243	1,462
Recycled and Desalted	207	207	273	273
Total	**5,224**	**4,775**	**5,141**	**4,865**
Shortage	***0***	***508***	***944***	***1,317***

Table 4.3.B - South Coast Region Water Budget (Percent)

Average Year	1995	2020
Water Use		
Urban	83	91
Agriculture	15	8
Environmental	2	2
Supplies		
Surface water	73	71
Groundwater	23	24
Recycled or desalted	4	5

Table 4.3.C - Colorado River Region Water Budget with Existing Facilities and Programs (thousands of acre feet)

	1995		2020	
	Average	Drought	Average	Drought
Water Use				
Urban	418	418	740	740
Agricultural	4,118	4,118	3,583	3,583
Environmental	39	38	44	43
Total	**4,575**	**4,574**	**4,367**	**4,366**
Supplies				
Surface Water	4,154	4,128	3,920	3,909
Groundwater	337	337	285	284
Recycled and Desalted	15	15	15	15
Total	**4,506**	**4,479**	**4,221**	**4,208**
Shortage	***69***	***95***	***147***	***158***

Table 4.3.D - Colorado River Region Water Budget (percent)

Average Year	1995	2020
Water Use		
Urban	9	17
Agriculture	90	82
Environmental	1	1
Supplies		
Surface water	92	93
Groundwater	7	7
Recycled or desalted	<1	<1

The DWR projections make it clear that supply in these two regions and Riverside County is expected to fall short of demand. Even though there is a slight increase in supply in the South Coast Region, it will not meet demand. The Colorado River Region supply will also not meet demand as it experiences decreases in both demand and supply. These projections also show a shift away from agricultural to urban use of water in both regions. This will be accomplished by decreasing the number of acres in agriculture or through improving water efficiencies in agricultural practices. Local environmental uses will not be a significant factor in the regions, though water management programs at Lake Elsinore, The Salton Sea, and the Lower Colorado River Multi-Species Habitat Conservation Program may increase in their impact to water supply as they are fully implemented in the future.

4.3.5.3 Environmental Uses of Water within Riverside County

Salton Sea National Wildlife Refuge

The Salton Sea, which has no natural outlet, is the largest inland water body west of the Rocky Mountains. With an area of approximately 360 square miles, its present form, was created between 1905 and 1907 when the Colorado River burst out of its man-made irrigation levees and flooded an alkaline basin in the Imperial Valley. Today, the Salton Sea receives its water supply from agricultural runoff from the surrounding Imperial, Mexicali, and Coachella Valleys.

The Salton Sea National Wildlife Refuge was formed in 1930 to help provide habitat for migrating and wintering water fowl and endangered species. The USFWS stocks the sea with fish that are popular for sport fishing, though fears are rising that the sea's increasing salinity level will one day be too high to support its fish population. The Salton Sea is approximately 25 percent saltier than ocean waters and the salinity continues to rise due to high evaporation rates and poor quality source water. Currently, a multi-agency task force is addressing water quality in the Salton Sea.

Lower Colorado River System

In 1995, the U.S. Department of the Interior entered into agreements with California, Nevada, and Arizona to develop a multi-species habitat conservation program to protect the ESA-listed species and non-listed species within the 100-year floodplain of the Colorado River. USFWS has designated the Lower Colorado River Multi-Species Conservation Program steering committee as an ecosystem conservation and recovery implementation team pursuant to the ESA. This program, designed to restore habitat for endangered and sensitive species will affect water resource uses, quality, and availability from Lake Mead south to the international border.

Prado Wetlands

Located behind the Prado Dam along the effluent-dominated Santa Ana River, 465 acres of constructed wetlands are used as a nitrogen sink and provide habitat to several rare and endangered birds. A total of 226 acres are also set aside as least Bell's vireo habitat. These are maintained with a year-round flow of reclaimed water. Water that flows through the wetlands is then recharged in groundwater recharge ponds as it travels down the Santa Ana River toward the Pacific Ocean. Wildlife habitat and groundwater recharge are both dependent on reclaimed water availability. Minimum discharges into the Santa Ana River are set for reclamation facilities so that these needs are met.

Multi-Purpose Constructed Wetlands

Eastern Municipal Water District (EMWD), in partnership with the United States Bureau of Reclamation, has developed a constructed wetland at its Hemet/San Jacinto Regional Water Reclamation Facility. Reclaimed water is used to provide wetlands marsh and open water habitat to migratory and resident waterfowl, as it is being treated prior to reuse by agricultural customers.

4.4 Agricultural Resources

4.4.1 Introduction

In terms of dollar value, agriculture is today the largest industry in Riverside County, providing employment for a significant portion of the county's population. Currently, agriculture faces continuing pressure from urbanization, foreign competition, and rising production costs. Despite these pressures, those areas which remain in agricultural production represent a significant open space and economic resource for the County.

4.4.2 Prime Agricultural Soils

The United States Soil Conservation Service (SCS) has mapped soils within Riverside County to identify soil types, their location, and their potential uses. The general classification used in the mapping is called a soils association, each of which has a distinctive proportional pattern of specific soil types and consists of one or more major soils and at least one minor soil. The soils within an association vary in depth, stoniness, drainage, and other characteristics which may affect their management. This broad classification provides a general idea of the soils present in a particular area and are useful for locating large tracts that may be suitable for particular types of land uses.

Capability groupings show, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not consider major and generally expensive landform modifications which would change slope, depth, or other characteristics of the soil, reclamation projects; horticultural crops, or other crops requiring special management. In the capability system, soils are grouped at three levels, the capability class, subclass and unit.

The SCS has identified eight separate soil classes (Classes I through VIII). The Roman numeral designation indicate progressively greater limitations and narrower choices for practical use (see Table 4.4.A). Class I, II, and III soils are considered to be "prime soils."

Capability subclasses are soil groups within one class, designated by adding a small letter, *e, w, s, or c* to the class number.

- *"e"* indicates the main limitation is risk of erosion.
- "*w*" indicates that water in or on the soil interferes with plant growth or cultivation.
- "*s*" indicates that the soil is limited mainly due to salinity, droughty, or stony character.
- "*c*" indicates that the chief limitation is climate (too hot, cold, dry, etc.)

Table 4.4.A - SCS Soil Classes

Soil Class	Description of Limitations
I	Soils that have few limitations which restrict their agricultural use.
II	Soils which have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
III	Soils which have severe limitations that restrict the choice of plants, require special conservation practices, or both.
IV	Soils which have very severe limitations that reduce the choice of plants, require very careful management, or both.
V	Soils which are not likely to erode, but have other limitations that are impractical to remove, and that limit their use largely to pasture, range, woodland or wildlife habitat.
VI	Soils which have severe limitations that make them generally unsuitable for cultivation, and that limit their use largely to pasture or range, woodland, or wildlife habitat.
VII	Soils which have very severe limitations that make them unsuitable for cultivation, and that restrict their use largely to pasture or range, woodland, or wildlife habitat.
VIII	Soils and landforms which have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife habitat, water supply, or aesthetic purposes.

There are no subclasses in Class I because the soils in this class have few limitations.

Capability units is a convenient grouping for making many statements about the management of soils. This designation, represented by an Arabic numeral (1-9) indicates a particular hazard or condition which may impact cultivation of the soil (i.e., poor drainage, hardpan, low inherent fertility).

4.4.3 Agricultural Production

The existing Riverside County General Plan defines productive agricultural lands as land "which is involved in a long-term, substantial investment to agricultural use, and which has a long-term economic viability for agricultural use." Some of the factors which affect the economic viability of these areas include weather, water prices, crop selection, management techniques, commodity prices, new technology, and proximity of developed lands. The total of gross valuation of agricultural crops in the County in 1997[1] was $1,087,920,000. Although this represents a $53.9 million decrease from 1996 crop values, Riverside County remains the leading agricultural county in Southern California.

1 This is the most recent year for which agricultural statistics are available.

Agricultural statistics are maintained by the County in four districts: Riverside/Corona, San Jacinto/Temecula Valley, Coachella Valley and Palo Verde Valley. The Coachella Valley District recorded highest valuation in non-livestock related agricultural production, followed by the Palo Verde Valley District, the San Jacinto/Temecula Valley District, and the Riverside/Corona District (see Table 4.4.B).

Table 4.4.B - Crop Valuation (in millions)

	1993	1994	1995	1996	1997
Riverside/Corona	$71.1	$47.4	$46.7	$40.7	$29.0
San Jacinto/Temecula Valley	$92.6	$85.6	$93.1	$95.3	$97.8
Coachella Valley	$341.1	$324.4	$406.1	$319.6	$331.7
Palo Verde Valley	$79.2	$89.6	$100.2	$103.1	$102.9
County Total	$584.0	$547.0	$646.1	$558.7	$561.4

Note: Crop valuations do no include the value of livestock and poultry produced in the County.
Source: Riverside County Agricultural Commissioner.

The 1997 Agricultural Production Report, prepared by the County Agriculture Commissioner, identified nine categories of agricultural production: citrus; tree and vine crops; vegetables, melons and miscellaneous crops; field and seed crops; livestock and poultry; livestock and poultry products; nursery stock production; aquaculture production; and apiculture (beekeeping). Of these, livestock/poultry products (milk, eggs, wool, etc.) recorded the highest valuation ($391,863,500), comprising approximately 36 percent of the County's agricultural value. Milk products comprised the largest portion of this valuation ($296,281,400). Table grapes were the next most valuable agricultural product ($129,443,300), followed by eggs ($93,250,100), nursery stock ($82,827,400), and hay ($60,343,200). Dates, avocados, cattle and calves, grapefruit and lemons were also among the County's top ten agricultural products.

Although the number of full-time farms in Riverside County decreased 9 percent over a five-year period (1992-1997), the average size of farms increased 38 percent from 121 acres in 1992 to 167 acres in 1997. The U.S. Department of Agriculture (USDA), California Agricultural Statistics Service estimated (1997) that in Riverside County, 509,031 acres (or 11 percent of the County's total land area) were devoted to agricultural production. More land (approximately 56,394 acres) was devoted to the cultivation of alfalfa than any other crop. Table 4.4.C identifies crop acreages.

Table 4.4.C - Planted Crop Acreage (in acres)

	1993	1994	1995	1996	1997
Citrus	36,676	36,303	35,901	35,211	33,376
Trees and Vines	36,714	36,545	36,282	32,499	31,222
Vegetables, Melons, Misc.	34,370	38,121	42,254	43,065	43,296
Field and Seed Crops	211,500	201,369	230,113	218,027	210,727
Total Planted Acreage	319,500	312,338	344,550	328,802	318,621

Source: Riverside County Agricultural Commissioner

4.4.4 Williamson Act Land Preserves

In 1965, The California Land Conservation Act, also known as the Williamson Act, was adopted. This voluntary program allows property owners to have their property assessed on the basis of its agricultural production rather than at the current market value. The property owner is thus relieved of having to pay higher property taxes, as long as the land remains in agricultural production. The purpose of the Act is to encourage property owners to continue to farm their land, and to prevent the premature conversion of farmland to urban uses. Participation requires that the area consist of 100 contiguous acres of agricultural land under one or more ownerships.

Upon approval of an application by the Board of Supervisors, the agricultural preserve is established, and the land within the preserve is restricted to agricultural and compatible uses for 10 years. Williamson Act contracts are automatically renewed annually for an additional one period, unless the property owner applies for non-renewal or early cancellation. The Williamson Act also contains limited provisions for cancellation of contracts. Specific findings regarding the non-viability of the agricultural use must be made, and a substantial penalty for the cancellation is assessed.

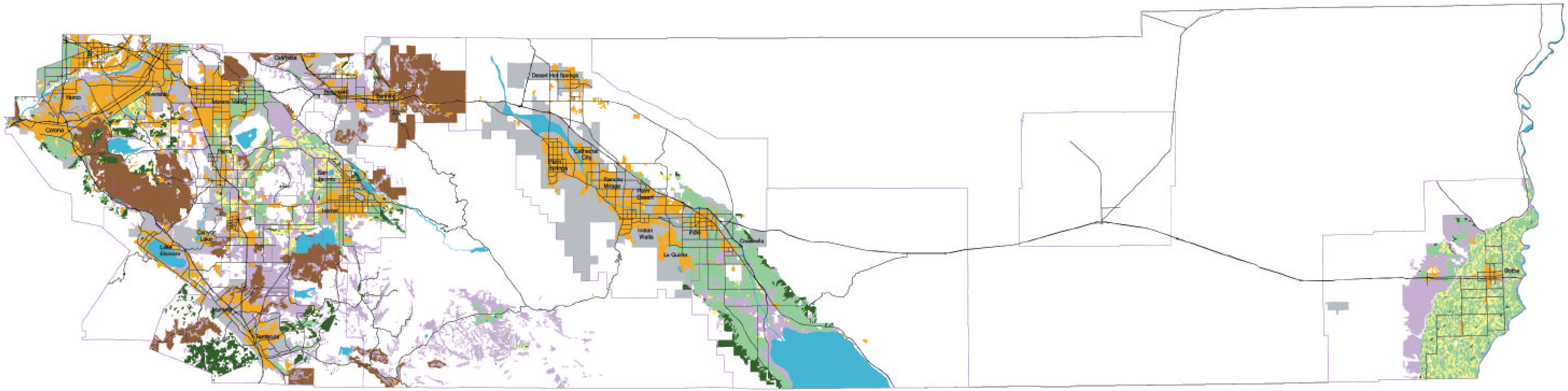
According to the State of California, Department of Conservation, Land Resource Protection Division, 63,725 acres of land within Riverside County are within Williamson Act Preserves in 1996. Of these 57,734 acres are on “prime” soils, while 5,991 are listed as being on “non-prime” soils.

As part of the Williamson Act, the State also provides subventions to local participating governments. Subventions provide fiscal assistance to local governments that take part in the land preservation programs. The purpose of this assistance is to provide an incentive for local governments to take on these contracts by partially replacing property tax revenues lost on contracted lands and offsetting some local costs for administering the program. A formula allocates funds according to three categories of land. Per acre amounts are established for urban prime, other prime, and nonprime lands.

Agricultural preserves under Williamson Act contract are shown on the map in Figure 4.4.1.

4.4.5 Important Farmlands

Important farmland maps are compiled by the California Department of Conservation, Farmland Mapping and Monitoring Program (FMMP), pursuant to the provisions of Section 65570 of the California Government Code. These maps utilize data from the USDA Natural Resource Conservation Service (NRCS) soil survey and current land use information using eight mapping categories and represent an inventory of agricultural resources within Riverside County. The maps depict currently urbanized lands and a qualitative sequence of agricultural designations. Maps and statistics are produced biannually using a process which integrates aerial photo interpretation, field mapping, a computerized mapping system, and public review.



- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Farmland of Local Importance
- Grazing Land
- Urban Built-up Land
- Water
- Area Not Mapped
- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure 4.4.1

Source Information: LSA Associates

Scale is approximate
0 6 12 Miles

AGRICULTURAL RESOURCES

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State and federal agencies have established several classifications of important agricultural land based on factors such as soil characteristics, climate, and water supply.

The Countywide Agriculture Resource Map (Figure 4.4.1) identifies the categories of important agricultural land, as defined by state and federal agencies. Categories of land mapped by the FMMP include the following:

- ***Prime Farmland***. Prime Farmland is land which has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yield crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date. These lands are best suited for producing food, feed, forage, fiber and oilseed crops and have minimal management problems. Prime Farmland does not include publicly owned lands for which there is an adopted policy preventing agricultural use. According to the FMMP, 168,756 acres of agricultural land within Riverside County is designated as "Prime Farmland." This amount represents a 4.7 percent decrease in this farmland designation over 1994 values.

- ***Farmland of Statewide Importance***. Farmland of Statewide Importance is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for production of irrigated crops at some time during the two update cycles prior to the mapping date. Lands within this category may have associated management problems such as increased alkaline or salinity, and have a moderate erosion hazard. Farmland of Statewide Importance does not include publicly owned lands for which there is an adopted policy preventing agricultural use. In 1996, 55,838 acres of Riverside County farmland were designated as being of statewide importance. This acreage is 4.4 percent less than the amount of farmland in this category during 1994.

- ***Unique Farmland***. Unique Farmland is land of lesser quality soils currently and specifically used for the production of the State's leading agricultural crops (as listed in *California Agriculture*, California Department of Food and Agriculture). It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Unique Farmland is usually irrigated, but may include nonirrigated orchards or vineyards found in some climatic zones in California. Examples of crops on Unique Farmland include oranges, olives, avocados, rice, grapes, and cut flowers. Land must have been cropped at some time during the two cycles prior to the mapping date. Unique Farmland does not include publicly owned lands for which there is and adopted policy preventing agricultural use. Within Riverside County, the amount of agricultural land within this designation declined 3.0 percent from 1994 to 1996 to 41,320 acres.

- ***Farmland of Local Importance***. Farmland of importance to the local agricultural economy is determined by the County Board of Supervisors and a local advisory committee. These farmlands include agricultural areas with soils that would be classified as "Prime" and "Statewide Important" but lack available irrigation water, lands producing major (but not unique) crops, dairylands (including corrals, pasture, milking facilities, etc.), lands identified by City or County ordinance as agricultural zones or contracts (including Riverside City "Proposition R" lands, and lands planted in jojoba which are under cultivation and are of producing age. Locally important farmlands amounted to 241,490 acres in 1996, registering a 3.1 percent increase over 1994 figures.

- ***Grazing Land***. This includes land on which the existing vegetation is suited to the grazing of livestock.

- ***Urban and Build-up Land***. These lands are occupied by structures with a building density of at least one unit to 1.5 acres. Agricultural lands surrounded by urban areas must exceed 40 acres in order to be mapped by the FMMP.

- ***Water***. Water bodies measuring at least 40 acres in size are included in agricultural mapping data.

- ***Other Land***. This refers to lands which do not meet the criteria of any other category.

4.5 Mineral Resources

Mineral resources have been important to the growth and economic well-being of Riverside County since the middle 1800s and, as the county enters the 21st century, mineral resources will continue to be of significant value. Mineral resources are categorized as either metallic or non-metallic. Metallic minerals include base metals, such as iron and tin, and precious metals, such as gold and silver. Non-metallic commodities include minerals such as fluorite and gem stones, as well as the large class of industrial minerals that includes limestone, clay, gypsum, talc, sand and gravel, specialty sands, dimension stone, crushed stone, volcanic cinders, and others.

Mineral resources of all types are of value to society, and the use of industrial minerals is integral in the continued development of urban areas. Industrial commodities are used in the construction of roads and highways, and in the production of building materials. The California Division of Mines and Geology has developed consumption figures that indicate the importance of mineral and industrial commodities to each individual living in the Inland Empire.

- 40,000 pounds of new mineral resources are used annually for each individual.
- 1.2 million pounds of cement, sand and gravel, and stone will be needed in a lifetime.
- The average home contains the following:
    - 60 tons of concrete
    - 27 tons of sand and gravel
    - 18 tons of brick and concrete block
    - 7.5 tons of gypsum wallboard and plaster.

Rapid urbanization in Riverside County produces intense competition for land, as well as increased need for industrial commodities. The long-term viability of mines producing industrial building commodities could easily become threatened by the urban communities that they enable to expand.

Expanding urban areas typically force resource production away from its core; however, it is the urbanizing area that most needs an affordable source of mineral resource for continued growth. Some minerals can be marketed worldwide; however, the marketability of industrial commodities is directly dependent on the distance of transport. When hauling sand and gravel, for instance, the cost of the commodity doubles for every 50 miles of truck transport. In such cases, the best market is one near the source. Escalating building expenses may even force the development of alternative building materials, including recycled products.

4.5.1 Mineral Resource Zones

The State of California has recognized that mineral resources are essential to the needs of society and the economic well-being of the state. In 1975, the Legislature passed the Surface Mining and Reclamation Act (SMARA). The intent of SMARA is to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. The non-renewable characteristic of minerals creates the need to carefully regulate extraction from the deposits. Reclaiming land for other uses once mining operations are completed is important for the general health, safety, and welfare of the community. Under SMARA, permits are required for all mining industries commencing operation on, or after, January 1, 1976. In addition, all new and existing mining operations are required to file a reclamation plan with the appropriate jurisdiction, addressing how the land will be brought back to a productive status once mining operations cease. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Under this authority, Riverside County has set forth regulations for mineral extraction and reclamation in the unincorporated area of the county in Ordinance No. 555.18.

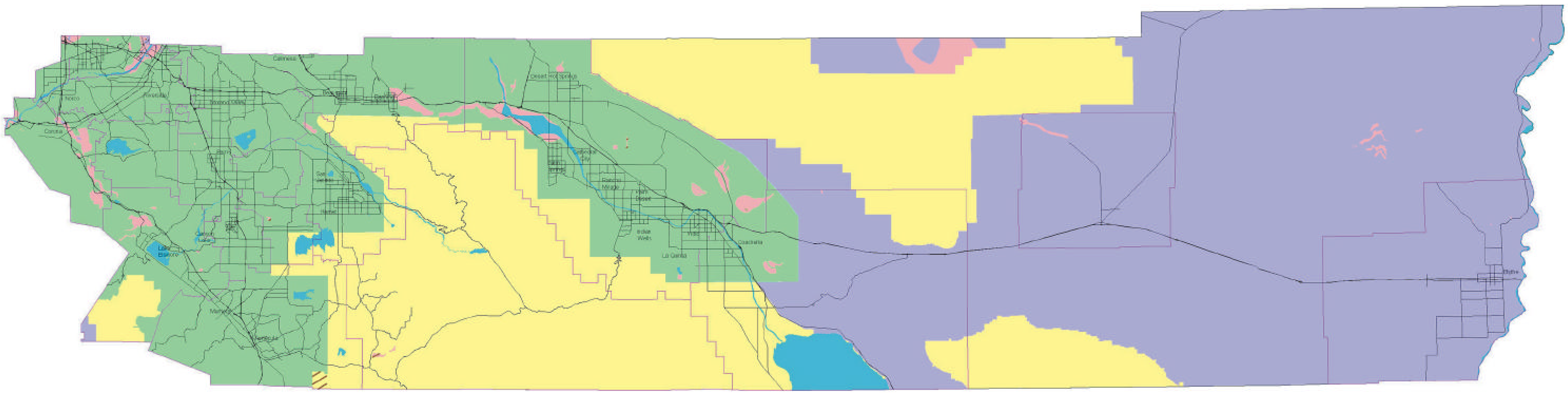
High demand for mineral commodities has resulted in the need to maintain access to mineral deposits for current and future extraction. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Classification of land within California takes place according to a priority list established by the State Mining and Geology Board (SMGB) in 1982, or when the SMGB is petitioned to classify a specific area. Once classification of an area has taken place, the SMGB transmits the information to the appropriate lead agencies for mandated incorporation into their land use planning process.

The SMGB has established Mineral Resource Zones (MRZ) to designate lands that contain mineral deposits. Use of the MRZs is designed to help protect mineral deposits from encroaching urbanization and land uses that are incompatible with mining. The MRZ classifications reflect varying degrees of mineral significance, determined by available knowledge of the presence or absence of mineral deposits as well as the economic potential of the deposits. In this process, it is important to recognize that the mineral-bearing land classified by the State Geologist has not been reserved for mining. Rather, the state has developed and presented data to planning agencies that allow decisions concerning mineral resources and mining to be made on a local level. Riverside County is rich in mineral deposits, and many areas of the county have been assessed according to MRZ classifications in order to protect production from the deposits and to alleviate land use decisions that are inconsistent with mining operations.

MRZs are divided into four basic categories, based on the presence and significance of mineral deposits. Figure 4.5.1 identifies current Mineral Resource Study Areas within Riverside County. Table 4.5.A is a diagram of the MRZs.

The classifications used by the state to define MRZs are as follows:

- ***MRZ-1***: Areas where the available geologic information indicates no significant mineral deposits or a minimal likelihood of significant mineral deposits.



MRZ-2
MRZ-3
MRZ-4
Unstudied
State Designated Aggregate Resource Area
Water
Major Roads & Highways
Area Plan Boundaries
Cities

Figure 4.5.2

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0 6 12Miles

MINERAL RESOURCE AREAS

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Table 4.5.A - California Mineral Land Classification Diagram

	Areas of Identified Mineral Resource Significance		Areas of Undetermined Mineral Resource Significance		Areas of Unknown Mineral Resource Significance
	<u>Demonstrated</u> Measured/ Indicated	Inferred			
	MRZ-2a Reserves	**MRZ-2b** Inferred Resources	**MRZ-3a** Known Mineral Occurrence	**MRZ-3b** Inferred Mineral Occurrence	**MRZ-4** No Known Mineral Occurrence
MARGINALLY ECONOMIC	**MRZ-2a** Marginal Reserves	**MRZ-2b** Inferred Marginal Resources			
SUB-ECONOMIC	**MRZ-2b** Demonstrated Subeconomic Resources	**MRZ-2b** Inferred Subeconomic Resources			
NON-ECONOMIC	AREAS OF NO MINERAL RESOURCE SIGNIFICANCE **MRZ-1**				

increasing economic value

increasing knowledge of resources

- ***MRZ-2a***: Areas where the available geologic information indicates that there are significant mineral deposits.
- ***MRZ-2b***: Areas where the available geologic information indicates that there is a likelihood of significant mineral deposits.
- ***MRZ-3a***: Areas where the available geologic information indicates that mineral deposits exist, however, the significance of the deposit is undetermined.
- ***MRZ-3b***: Areas where the available geologic information indicates that mineral deposits are likely to exist, however, the significance of the deposit is undetermined.
- ***MRZ-4***: Areas where there is not enough information available to determine the presence or absence of mineral deposits.

4.5.2 Existing Mineral Resources

Riverside County has diversified mineral resources that have been important to the development of the area. Metallic and non-metallic minerals have been mined in Riverside County during the last 160 years. Early in Riverside County's history gold was the most important mineral commodity to be mined. In the early 1900s, the importance of gold was diminished by the need for industrial commodities. The shift in production was necessitated by the need for urban infrastructure to fulfill the demands of the growing population in Riverside County and adjacent Southern California counties. World War II brought increased prospecting and production of minerals to the area as the nation sought materials necessary for the production of military equipment. In the latter half of the 20th century, exploration has decreased and many of the resources have been diminished. Currently, the majority of production in Riverside County is in rock commodities. Figure 4.5.2 identifies significant natural resources in the County.

4.5.2.1 Metallic Minerals

- ***Gold***. The earliest gold claim in Riverside County dates back to 1857, and until 1902, it was the most important mineral commodity mined in the county. A total of 260 gold mines are listed by the CDMG (Saul and others, 1970). Highest production was recorded in 1895. There was a brief rise in gold production during the 1930's depression. Gold has been mined from the Perris region, as well as the Big Maria, Pinto, Chuckwalla, and Riverside Mountains.

- ***Lead/Silver/Zinc/Arsenic.*** Each of these minerals is frequently found adjacent to gold ore, and in Riverside County all four were mined and processed as by-products of gold production.

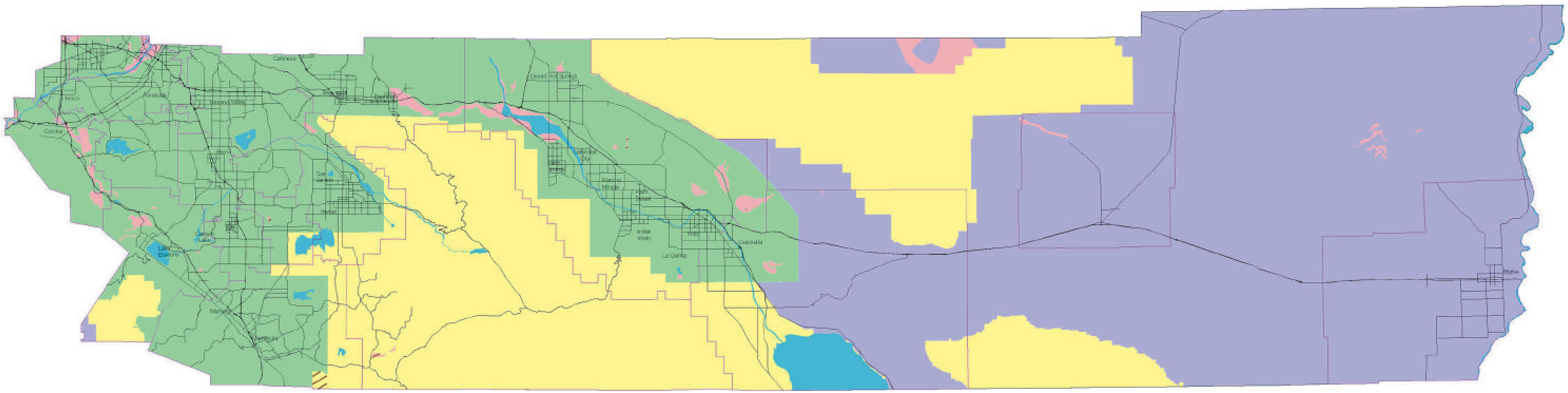
- ***Copper***. Copper was first refined from gold ore in1907 from mines in the northeastern portion of the county in the Riverside Mountains.

- ***Iron***. The largest iron deposit in the western United States is at Eagle Mountain in central Riverside County. Production of iron from a magnetite ore body started in 1948, and was halted by 1990. Reserves of iron remain in the Palen and Maria Mountains.

- ***Tin***. The Temescal (Cajalco) Mine, and the surrounding Temescal tin district southeast of Corona, was the most important tin deposit in California. Tin production occurred between 1869 and 1929.

4.5.2.2 Strategic Minerals

The Strategic and Critical Materials Stockpiling Act (Public Law 520, 1946) and the Defense Production Act (Public Law 744, 1950) prompted prospecting, production, and stockpiling of certain minerals for defense purposes. The term of the acts ran out in 1959 and prospecting wound down rapidly. The following strategic minerals have been mined in Riverside County.



- MRZ-2
- MRZ-3
- MRZ-4
- Unstudied
- State Designated Aggregate Resource Area
- Water
- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure 4.5.2

Scaleisapproximate
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MINERAL RESOURCE AREAS

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- ***Antimony***. The Mountain Group of mines southwest of Corona first shipped antimony prior to 1895. Long idle, it shipped again in 1948 in response to the Critical Materials Acts.

- ***Magnesite***. Deposits are located primarily in eastern Riverside County in the McCoy Mountains and the Little Maria Mountains.

- ***Rare Earths***. Monazite and xenotime are known from four deposits in Riverside County, which have not been brought into production.

- ***Tungsten***. Scheelite has been found with the gold deposits in the Chuckawalla and the Big Maria Mountains in eastern Riverside County and in tactite deposits of the Garnet Queen Mine on Mount San Jacinto. The largest deposit is at the Pawnee Mine near Beauty Peak along the border between Riverside and San Diego Counties.

- ***Uranium***. Prospecting for uranium after World War II was prompted by the Critical Materials Act. Uranium prospecting in Riverside County did not uncover any deposits of significance.

4.5.2.3 Non-Metallic Minerals

Non-metallic minerals are primarily used in the production of glass, ceramics, glazes, and paints. Gypsum is a non-metallic mineral very important to the production of building products, animal food, and soil conditioners.

- ***Feldspar - Quartz/Silica***. These non-metallic minerals come primarily from pegmatite dikes in the area between Lakeview, Elsinore, and Anza. Feldspar was originally used to produce tile, but this mineral was replaced by talc. Quartz and specialty silica sands have historically been used for production of glass and optical materials.

- ***Wollastonite***. This variety of asbestos and its "relative" tremolite are used in mineral paints, ceramics and as decorative rock and have been produced from the Big and Little Maria Mountains in eastern Riverside County.

- ***Mica***. Mica varieties have been used in paint and the variety vermiculite has been used as a soil conditioner. Mica has been mined at Desert Hot Springs, Joshua Tree, and Cahuilla Mountain.

- ***Fluorite***. Fluorite has been produced in Riverside from the Palen Mountains, from Midland, and from the Orocopia Mountains. Uses have been in the optical, metallurgy, and chemical compounds industries.

- ***Gypsum***. The U.S. Gypsum Mines in the Little Maria Mountains are major producers of gypsum products such as wallboard, plaster products, and cement retarder for the building industry. Gypsum from the Santa Ana Mountains near Corona has been used to condition orchards and as a livestock food additive.

- ***Gemstones***. Crystalline gem minerals were discovered in Riverside County in 1872 on Thomas Mountain prior to gem discoveries in San Diego County. The gems include colored tourmaline, beryl, and spodumene variety kunzite. Since World War II, recreational collecting of semi-precious materials has become very popular in the desert areas of eastern Riverside County. Materials sought for lapidary and jewelry work are chalcedony varieties including fire agate and psilomelane.

4.5.2.4 Industrial Commodities

As Riverside County entered the 20th century, natural building materials became scarce, and the industry turned to cement and clay products as durable structural replacements. Resources in Riverside County were so rich that in the early 1900s, the value of these commodities surpassed the value of all other mineral products in the County. Today, industrial commodities are the most significant mineral resources extracted in Riverside County.

It is anticipated future mineral production will be focused on industrial commodities critical for the urban expansion that will likely accompany the projected increases in population. The estimated value of California's mineral production for 1992 was about $2.5 billion, 80 percent of which was from industrial minerals. Riverside County's mineral production mirrors that of the state, and in 1997 the county produced over 21.27 million tons of mineral commodities, the largest group being from mines that produced construction aggregate (see Table 4.5.B).

Table 4.5.B - 1997 Mineral Production in Riverside County

Mineral Resource	Tonnage Produced
Sand and Gravel	17,444,706 tons
Stone	2,261,465 tons
Clay	284,528 tons
Decomposed Granite	169,092 tons
Gypsum	900 tons
Iron Ore	50 tons
Other	1,114,476 tons

- ***Clay***. A 20-mile long area along the Elsinore Fault Zone is known as the Alberhill-Temescal-Corona Clay District. This is the oldest and most productive clay district in southern California. Alberhill has seen production since 1885, with a peak in

1962 of 250,000 tons per year. The CDMG (Saul and others, 1970) lists 75 clay deposits in Riverside County that have produced clay for pipe, brick, tiles, sewer lines, storm drains, and insulated conduits for telephone and power lines. The production value of clay outstripped that of gold in 1902.

- ***Limestone***. The first commercial mining in Riverside County was of limestone. Limestone was mined from the Jurupa, Santa Rosa, and Big Maria Mountains. Lime was used for whitewash, tanning, and mortar. In 1890, Crestmore produced building stone, lime, and products for purification of beet sugar. In 1900 limestone was used for the production of cement for buildings, bridges, and ditch liners. Production of cement at Crestmore began in 1905, followed by production of Portland cement for industrial construction in 1909 when Riverside Cement Company completed the Crestmore Plant. Today, it manufactures Portland cement, cement blocks, gun plastic cement, and white cement. Raw limestone is no longer extracted in Riverside County.

- ***Sand and Gravel***. Since 1950, the worth of sand and gravel production in Riverside County has been measured in the millions of dollars. Rapid growth in Riverside County in the 1950s and 1960s increased development of gravel plants in Riverside, Corona, and the Whitewater/Coachella area. This material was used to upgrade road base and as aggregate in concrete used for structural purposes. Types of deposits include stream channel, terrace deposits, and alluvial fans throughout the eastern portion of the County. The best source for all grades of sand and gravel material comes from alluvial fans and channel deposits along the north side of San Gorgonio Pass.

- ***Specialty Sands***. Specialty sands from Corona have been used since the 1920s for the production of glass products and as foundry sands for mold making.

- ***Rock Commodities***. Broken and crushed stone products have been quarried from the entire county, generally from the fringes of the mountainous areas. Dimension stone and monument stone have been used both in cemeteries and as building facades around the southland. The 1930s saw extensive production of rock commodities from Riverside County destined primarily for counties along the coast. Various grades and sizes of broken and crushed rock and quarried rock were used for railroad ballast, canal and levee walls and flood control channels and break waters. This material also was used for rubble, rip rap, derrick stone, dam toe rock, MWD dams, and dams along the Colorado River at Palo Verde. Decorative rock, landscaping rock, roofing gravel, and poultry grit are byproducts from the quarrying of larger blocks. Decomposed granite is often preferred for use in road bases.

- ***Coal***. Between 1883 and 1902, 50,000 tons of coal were produced from seams in Paleocene strata in the Alberhill area.

4.6 Cultural and Paleontological Resources

The cultural and paleontological resources characteristic of Riverside County are reviewed in this section. Cultural resources reflect human settlement, exploitation, arts, crafts, technology, and ideology. The heritage values of cultural resources are typically expressed in the disciplines of architecture, anthropology (including archaeology), history, and engineering. Paleontological resources are the fossilized biotic remains of ancient environments. They are valued for the information they yield about the history of the earth and its past ecological settings. Fossils also provide important chronological information used to interpret geological processes and regional history.

The sensitivity of the various landscapes of Riverside County to contain cultural and paleontological resources is also reviewed in this section. Text descriptions of factors contributing to sensitivity are provided, and figures depicting relative sensitivity are included for reference.

Information on the consideration and management of cultural and paleontological resources during project planning is provided in Chapter 10. Cultural and paleontological resources are recognized as non-renewable resources and receive protection under CEQA. Native American interments and associated funerary objects receive additional protection under Public Resources Code §5097.98.

4.6.1 Cultural Resources

Cultural resources are places, structures, or objects that are important for scientific, historic, and/or religious reasons to cultures, communities, groups, or individuals. Cultural resources include historic and prehistoric archaeological sites, architectural remains, engineering structures, and artifacts that provide evidence of past human activity. They also include places, resources, or items of importance in the traditions of societies and religions.

The culture history of Riverside County is divided into three general chronological units -- prehistory, ethnohistory, and history -- the last two of which overlap in the early years. The first two divisions are restricted to Native American traditions, beginning with the settlement of the Southern California region 10,000 to 12,000 years ago and extending through time to initial Euro-American settlement in the late 18th century when the mission system was established, disrupting native lifeways. Nearly a century later, between 1875 and 1891, at least ten reservations were set aside in Riverside County and nearby vicinities (Bean, 1978:Table 3). Most natives were removed to these reservations, further disrupting, and to a large extent ending, the persistence of native lifeways. The historic era begins around 1774 with the exploratory expeditions of Juan Bautista de Anza and continues into 1955, or 45 years before the present as defined by CEQA.

4.6.1.1 Prehistoric Overview

During the millennia of human occupation in Riverside County, significant changes occurred in the environment, and native populations adapted to these changes with modifications in settlement patterns, subsistence practices, social organization, and technology. Riverside County, incorporating over 7,200 square miles and over 10,000 feet of relief, provides a number of diverse habitats in its extent from the Santa Ana Mountains eastward to the Colorado River. The late Pleistocene vegetation of Riverside County was a mosaic of forest, wetland, grassland, and cold and warm desert plant communities. Ensuing times experienced warming temperatures, glacial retreat, evaporation of pluvial lakes, major vegetative shifts, and the extinction of Rancholabrean fauna. This was the setting when humans first came to settle in Riverside County, and continued to live and prosper within the evolving local and regional environments.

Changes in climate during the late Pleistocene and Holocene periods had far reaching effects on the nature of the environment to which humans adapted. The late Pleistocene was cooler than today, and greater quantities of water in numerous locations were available. For example, large freshwater lakes occupied many of the basin floors in Riverside County, including Lake Cahuilla (Salton Trough) and Pinto Lake (Pinto Basin, Joshua Tree National Park). These favorable late Pleistocene conditions fostered an ecologically rich region as compared with modern day conditions. Significant changes in the environment of Riverside County were created by an overall trend toward increasing aridity and warmer temperatures during the latest Pleistocene through the late Holocene. This 14,000-year period includes some temporary reversals in this general trend as well as periods of climatic stability.

Three primary geomorphic provinces are found in Riverside County: the Mojave Desert, the Colorado Desert, and the Peninsular Ranges. The Mojave Desert is a large province, extending over 50,000 square kilometers in southern California and continuing into the states of Nevada, Arizona, and Utah. It comprises the majority of Riverside County and is characterized by broad, internally drained basins surrounded by mountains. These basins were the sites of large pluvial lakes in early prehistory, and were a focus for human settlement of the region. The Colorado Desert, or Salton Trough, is a depressed block between forks of the San Andreas Fault, and elevations fall to 75 meters below sea level in this province. Much of the trough in ancient times was covered by Lake Cahuilla, and today the area is occupied by the Salton Sea and the Coachella Valley. Several times in the past, the Colorado River drained into the Salton Basin, forming an immense freshwater lake as much as 55 kilometers wide and 98 kilometers deep (Moratto 1984:18). The status of Lake Cahuilla strongly affected the course of prehistory in the Colorado Desert. The Peninsular Range province in Riverside County is primarily limited to the western portion of the county. Prominent ranges include the Santa Ana, San Jacinto, and Santa Rosa mountains; San Jacinto Peak at 3,293 meters is the highest point in the extensive Peninsular Range province, as well as in Riverside County. These diverse landscapes, and their characteristic habitats, were used for millennia by ancient and more modern native societies, leaving a rich archaeological heritage.

A number of cultural chronologies have been developed for the desert and coastal portions of Southern California, and these are shown in Figure 4.6.1. Two primary chronologies will be used in the following description and discussion of the prehistory of Riverside County. Warren's (1984, 1986) chronology for the California Desert region is applicable to the desert expanses of Riverside County, and Wallace's (1955) regional synthesis forms the basis for the discussion of those eastern county areas where settlement by and interaction with coastal populations occurred. Summary information characteristic of these two chronologies is shown in Table 4.6.A. In using these chronological systems, it must be remembered that the definition of a chronological unit is *not* the equivalent of a cultural unit. A review of the characteristics of each of these chronological periods in Riverside County prehistory is provided in the following sections.

Table 4.6.A - Characteristics of the Prehistoric Periods of Riverside County

Mojave and Colorado Desert			Westernmost County		
Period	**Chronological Range**	**Diagnostic Projectile Points**	**Period**	**Chronological Range**	**Diagnostic Artifacts/Features**
Protohistoric	A.D. 1200-1850	Desert Side-notched	Late Prehistoric	A.D. 500-historic	Ceramics, Cottonwood Triangular and Desert side-notched projectile points (arrow points), cremations
Saratoga Springs	A.D. 500-1200	Rosegate series			
Gypsum	2000 B.C.-A.D. 500	Elko Series, Gypsum, Humboldt series	Intermediate	3000 B.C.-A.D. 500	Mortars, pestles, discoidals, abundant projectile points (dart points), land and sea mammal bone
Pinto	5000-2000 B.C.	Pinto series	Millingstone	5500-3000 B.C.	Metates, manos, cogstones, discoidals, core tools, paucity of projectile points, inhumations
Lake Mojave	10,000-5000 B.C.	Lake Mojave series	Early Man	10,000^{+} B.C.-?	Large, often fluted, points, such as Clovis and Folsom types in association with extinct fauna

Lake Mojave Period (10,000 ! 5000 B.C.)

Despite the chronological period's extensive time span, Lake Mojave cultural assemblages reflect a relatively small variation in artifact types, and the artifact assemblages tend to be quite similar from site to site. Sites are generally distributed on the margins of lakes and streams and, more rarely, adjacent to springs or other resources, especially sources of toolstone materials. Most properties recorded are surface sites,

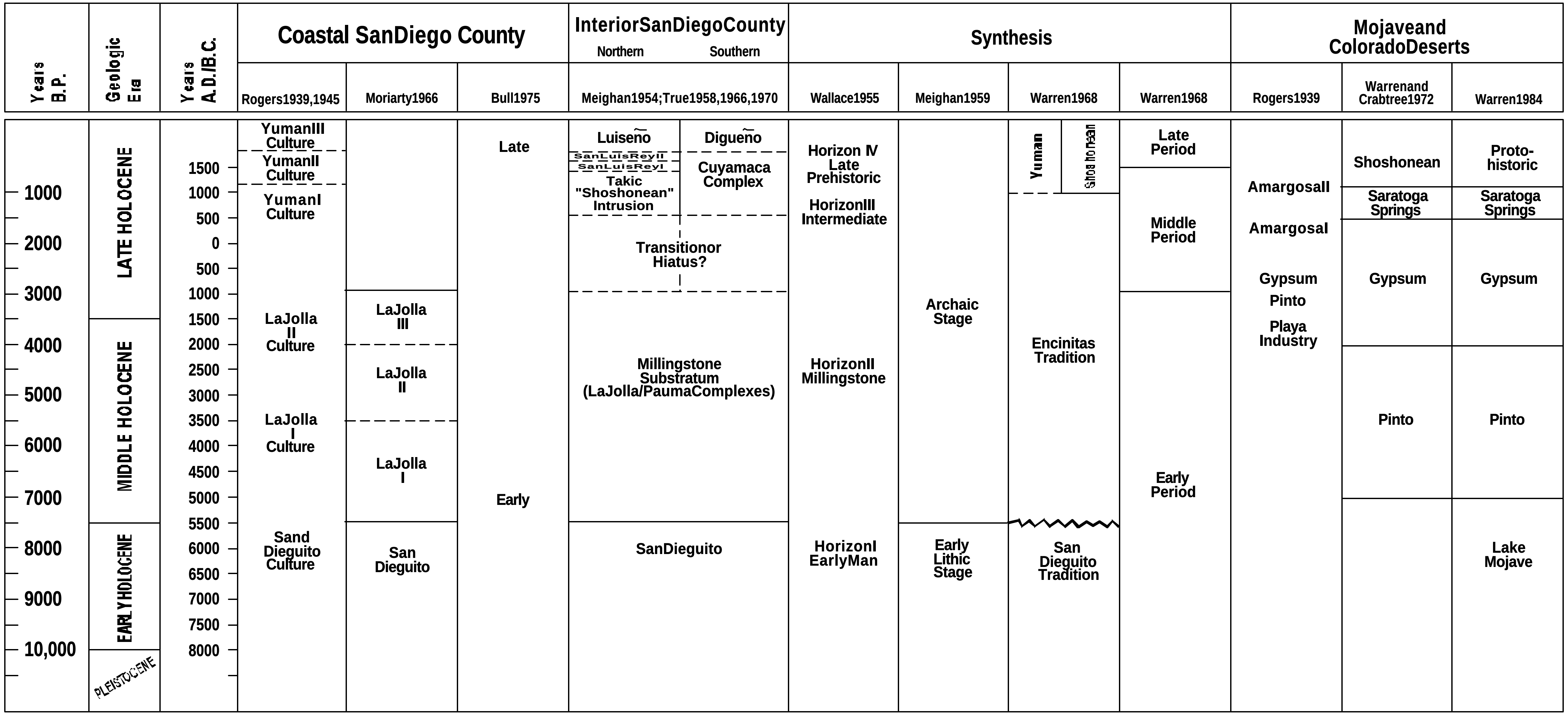


Figure 4.6.1

REGIONAL CULTURAL CHRONOLOGIES

varying considerably in size, with diffuse scatters of lithic materials. A few have some depth, containing sparse midden debris.

The Lake Mojave assemblage is characterized by a large number of leaf-shaped bifaces that functioned as preforms for projectile points and cutting implements, as cores from which flake tools were struck, and perhaps also as coarse cutting, chopping, and digging tools. Also occurring within the assemblage are a range of stemmed and leaf-shaped projectile points, the characteristic forms being the Lake Mojave and Silver Lake types and a variety of leaf-shaped and lanceolate forms.

Other well-made implements include unifacial “scraping” tools that use-wear analysis were employed for processing animal products (Bamforth, 1990). These most often take the form of a circular, plano-convex, turtleback-shaped tool, or have an elongated keel form. Both scraper forms were well made recurring artifact types in the cultural assemblage. Engraving tools apparently used in woodworking (Bamforth, 1990) were made by producing one or more narrow, sharp, delicate, unifacially flaked beaks on the edges of flakes and broken artifacts. Another important category of chipped stone is crescents or eccentric bifacial forms that had an unknown function, but have been characterized as amulets and transverse projectile points.

Manos and millingstones occur, but are relatively rare. These typically are simple slab millingstones and small “one handed” manos ground on one or both faces. Both implements are shaped only by use as grinding tools, and as hammerstones and anvils.

Similar assemblages of lithic tools are found in Riverside County. The tool assemblages in sites of this age reflect a reliance on cutting and piercing tools and contain few, if any, millingstones. This has suggested to some that there was a reliance on hunting, but faunal remains are lacking in most sites, and when they occur, lagomorphs and small mammals are well represented, along with lesser numbers of artiodactyls (usually) and sometimes numerous tortoise bones. This indicates that some technologies for taking smaller mammals are not preserved in the lithic assemblages recovered from these open sites. These remains have led to several different interpretations of the subsistence activities of the Lake Mojave period.

One interpretation is that the settlement distribution suggests an adaptation to lacustrine resources characteristic of the Western Pluvial Lakes Tradition (WPLT) (Bedwell, 1973). Other archaeologists question this premise, since the artifact assemblage contains little to suggest the use of only or primarily *lacustrine* resources. Furthermore, it is clear that the sample of sites investigated has been toward locations in close proximity to pluvial lake margins. Warren (1967, 1986, 1991) has suggested that the early sites represent the remains of a generalized hunting strategy that emphasized the hunting of artiodactyls, and was not adapted specifically to lacustrine resources. Basgall and Hall (1992; Basgall, 1992) argue for broad spectrum “hunting” with much effort put into taking lagomorphs, rodents, and tortoises, and relatively little time spent hunting artiodactyls.

The assemblages of the Lake Mojave period are generally considered regional representatives of the Western Pluvial Lakes Tradition. In the eastern Mojave, the occasional Clovis point has usually been a surface find and, if associated with cultural material, that material is identified as Lake Mojave in age and Western Pluvial Lake in tradition.

Since current research has yet to demonstrate a Clovis occupation distinct from Western Pluvial Lakes Tradition sites, Clovis materials are incorporated within the early portion of the Lake Mojave period for Riverside County. The characteristic Clovis big-game hunting tradition, with a focus on extinct megafauna, is not documented in the southern California region. Further research may reveal the association of Clovis points with extinct fauna. At that time, it would be necessary to consider incorporation of a short-lived Clovis occupation within the cultural chronology of southern California. If such were to occur, then that brief Clovis occupation would be defined to precede the Lake Mojave period.

For the southern California coast, and adjacent inland areas such as westernmost Riverside County, Wallace (1955) developed a regional synthesis of coastal prehistory, including four widespread cultural horizons (period), each reflecting significant local variation in archaeological assemblages. Table 4.6.A provides a brief outline of the key characteristics of each of Wallace's periods, including rough chronological controls. The earliest period, Early Man, has yet to be demonstrated in southern California, but it would correspond with the latest Pleistocene and earliest Lake Mojave period. It is characterized as a Big Game Hunting tradition focused on the hunting of extinct fauna with fluted points such as Clovis and Folsom types.

Pinto Period (5000 ! 2000 B.C.)

The artifact assemblages of the Pinto period represent a continuation of the cultural traditions that began in the Lake Mojave period. Assemblages of the Pinto period usually contain a wide range of bifaces and domed scrapers, and exhibit the same or very similar technology in the production of bifaces and unifacial tools. The major differences seem to be the introduction of Pinto points and drills and the increased use of milling tools, along with the exclusion of crescents, beaked gravers, and the later loss of the Lake Mojave point type. The great majority of artifact forms are the same or similar to those of the Lake Mojave complex, and the artifact assemblages for early Pinto period properties continue to reflect little functional differences between sites.

The type locality for defining the Pinto period for the Mojave, Colorado, and southern Great Basin deserts lies in Riverside County: Pinto Basin (Campbell and Campbell 1935; Campbell 1936). The cultural assemblages of what is the earliest portion of the Pinto period appear to represent a clear continuation of the technology and subsistence patterns established during the Lake Mojave period. However, it is during the Pinto period that a transition from a primarily foraging subsistence strategy to a more logistically oriented collecting strategy occurs, with sites exhibiting considerable functional differences. During the latter part of the Pinto occupation, specialized activity sites become relatively more numerous, indicating that the collector pattern and a logistically oriented seasonal round of activities dominated the subsistence system (Warren, 1991).

Subsistence strategies during the late Pinto and later periods were being adapted to changing environmental conditions, and featured exploitation of a wider variety of plant and animal resources from a broader range of ecological zones than were utilized earlier. This pattern of settlement and subsistence is often termed the Archaic lifestyle, and the broad period (into historic times in much of the Mojave and Great Basin deserts) characterizing this lifestyle is called the Desert Archaic. Native peoples dispersed across the landscape to hunt large game and to gather small game and specific plant foods as they became seasonally available. Technological changes in the tool assemblage in support of these adaptations during the Pinto period included development of seed grinding tools and the atlatl and dart hunting technologies.

In westernmost Riverside County, Wallace's (1955) Horizon II, or the Millingstone period, roughly coincides with the beginning of the Pinto period and extends to around 3000 B.C. This period is characterized by the extensive use of milling equipment, especially metates and manos, and core tools, with a concomitant scarcity of projectile points, bone, and shell artifacts (Moratto, 1984:159). Shellfish, along the coast, and vegetal foods provided the bulk of the native diet, and hunting and fishing were less important (Wallace, 1955).

Wallace's (1955) subsequent Horizon III, the Intermediate period, is marked by the abundant presence of projectile points, both land and sea mammal faunal remains, and an emphasis on the mortar and pestle for milling, which is projected as probably indicative of initial reliance on acorns as a staple food. Both burials and cremations were represented in the mortuary practices of the Intermediate period. This period extended through the last thousand years of the Pinto period and throughout the entire Gypsum period for the native societies of the southern California coast and adjacent regions.

Gypsum Period (2000 B.C.! A.D. 500)

It was during the Gypsum period that human populations adapted to the arid desert environment through technological changes, emphasis on traditional religious practices, and increased socioeconomic ties through trade. The Gypsum period is a time of apparent increased activity in the southern desert region, a time of important creativity in rock art, a time when the kinds of tool assemblages necessary for successful adaptation to arid conditions came together. Cultural assemblages of the Gypsum period are more elaborate and diversified than any that preceded. An extended period of increased moisture in the region (Neoglacial) occurred at the onset of these cultural developments. This favorable climatic episode probably lasted hundreds of years, during which time natural resources increased and maintained a greater carrying capacity than those of pre-Gypsum times.

Gypsum period artifact assemblages included relatively high frequencies of large dart points of the Elko, Gypsum (cf., Gatecliff Contracting Stem in some classification systems), and Humboldt series, and extremely well made, large, broad, thin, triangular and lanceolate knives or bifaces. Manos and metates were common during this period, and the mortar and pestle were reported for the first time. Other artifacts included shaft smootheners, incised slate and sandstone tablets and pendants, and drilled slate tubes. Evidence for the use of the atlatl includes atlatl hooks, dart shafts, foreshafts, and butts. There were also such perishable items as sandals, S-twist cordage, feathered plumes, and split-twig figurines. Also found in assemblages of the period were bone awls and *Haliotis* rings, beads, and ornaments from the California coast (Middle period in coastal chronologies), and *Olivella* shell beads from the California coast and probably the Gulf of California. These represented trade items that began arriving in the central Mojave before the end of the Pinto period, and continued in increasing numbers through the Saratoga Springs period.

The importance of hunting rituals during the Gypsum period was suggested by the elaborate rock art, for example the classic pictographs panels in the Coso Range, depicting the hunting of sheep with atlatls, with both atlatls and bows and arrows, and with bows and arrows only. These panels suggested the beginning of the ritual during the Gypsum period and its continuation into the Saratoga Springs period, when the bow and arrow became the dominant hunting weapon. Additional data suggested that mountain sheep hunting was of major importance to aboriginal populations during the Gypsum period. From the beginning of this occupation, the presence of large projectile points indicated that hunting with atlatl was an important economic activity. This is further supported by faunal assemblages in which artiodactyls make up a large percentage of the total bone recovered.

The distribution of Gypsum period sites is not well documented, and is not well known in Riverside County. Elsewhere in the southern California deserts, large occupation sites appear to be located in valley bottoms near mesquite groves, as at Mesquite Flat in Death Valley (Wallace 1977) and at Salt Springs in San Bernardino County (Rogers 1939). The Gypsum settlement pattern is at least partially characterized by permanent, seasonally occupied sites in the lower valleys where mesquite or another reliable subsistence staple was available. The location of residential sites near mesquite groves suggests that mesquite beans were being harvested during the Gypsum period, processed by use of mortars and pestles, and probably stored in granaries.

Mt. San Jacinto, as well as other more elevated areas in Riverside County, support dense groves of pinyon pine, the nut of which was a food staple during ethnohistoric and protohistoric times. Gypsum period residential sites may be found in these locales In the western part of the county, the rich oak woodlands, with the food staple acorn, may have also been a site of Gypsum and later occupation in upland Riverside County habitats. Coastal populations exploited the uplands of the Santa Ana Mountains, and seasonal or more permanent villages were often sited near a dependable source of water near this staple food source. Use of upland environments throughout the Mojave Desert has demonstrated occupation of the higher elevations, where mesquite is not available. This suggests that Gypsum peoples were capable of processing a wide range of resources that facilitated stability in their settlement system. Artiodactyl populations (e.g., deer, antelope, and bighorn sheep) were probably abundant, and extensive rock art has been recorded in many locales.

Wallace's (1955) Intermediate period, described previously under the Pinto period, began around 3000 B.C. and extended throughout the Gypsum period until approximately 500 A.D. Like the desert assemblages, the archaeological manifestations of Intermediate Period sites show a greater knowledge of local resources and an increased sophistication in extracting important resources.

Saratoga Springs Period (A.D. 500 ! 1200)

The Saratoga Springs period is one of generally successful adaptation to the desert environments with increasingly complex technology and subsistence systems, and increased variability across the desert. Cultural diversification with strong regional developments characterizes this period in portions of the Mojave and Colorado deserts, while elsewhere the Archaic lifestyle, characterized by seasonal transhumance, remains important. Throughout much of the Riverside County deserts, the basic pattern established during the Gypsum period may have persisted with little change through the Saratoga Springs period. The major technological change was the introduction of the bow and arrow, which resulted in production of small arrow points, rather than the large dart points of preceding periods. The Saratoga Springs period is identified by the presence of small stemmed Rosegate series points and distinctive pottery wares, which were manufactured by Puebloan (Greywares) and lower Coloradan peoples (Buffwares and Brownwares [e.g.,Tizon Brownwares]). Trade continued to be an important ameliorating and unifying factor contributing to cultural stability.

The spread of lower Coloradan culture traits across Riverside County and neighboring regions occurred during the Saratoga Springs period, and sufficient archaeological evidence is documented to demonstrate Hakatayan (prehistoric lower Coloradan) occupation, not just contact or trade. Hakataya culture traits include Tizon Brownwares and Lower Colorado Buffwares, the first ware occurring earlier in time, and Cottonwood Triangular projectile points. Hakataya occupations are documented at Snow Creek Rockshelter on San Gorgonio Pass in Riverside County, Indian Hill Rockshelter in Imperial County (Wallace et al., 1962), in Culp Valley and Grapevine Canyon in Anza-Borrego State Park (Townsend 1960),Twenty Nine Palms, and elsewhere in the region.

The shoreline of Lake Cahuilla was occupied heavily by lower Coloradans during this period, documenting the importance of lakefills to aboriginal populations. Numerous sites have been analyzed along the shoreline of Lake Cahuilla during its last high stand, including four along the northern shore in Coachella Valley (Wilke, 1978). Analysis of coprolites recovered from these sites indicates a heavy reliance on shellfish, fish, aquatic birds, and freshwater marsh plants, as well as animals and plants from nearby lowland, creosote bush scrub, and adjacent upland communities (Warren, 1984:407). Wilke (1978) postulated that a large population occupied the shores of Lake Cahuilla between A.D. 900 and 1500 with a subsistence based primarily on lacustrine resources. Buffware, Cottonwood Triangular, and Desert Side-notched points are characteristic components of the archaeological assemblages of these sites. Also present are large quantities of shell beads that originated along the southern California Coast and the Gulf of California, indicating the operation of substantial interregional trade networks. Analysis of the shell beads indicated they were diagnostic of the period of A.D. 800 to 1500 (Wilke, 1978:56).

Southwestern influence is also evidenced by the development of the Anasazi cultural core in southern Nevada and establishment of the Fremont culture in southwestern Utah during the Saratoga Springs period. Virgin Branch Anasazi settlement was centered around Lost City (*Pueblo Grande de Nevada*), located in northeastern Clark County, Nevada. Agriculture was the primary subsistence base, with corn, beans, and squash as the primary foodstuffs raised. Anasazi influence extended across the Mojave and Colorado desert frontiers. Exploitation of resources within the Anasazi frontier would have required expertise with local subsistence strategies and commodities.

Use of Riverside County lands by these Puebloan (Anasazi) peoples may have begun as early as A.D. 800 and continued until A.D. 1200 or 1300. In San Bernardino County, Puebloan occupation is most evident around Halloran Springs, where turquoise was mined from hundreds of localities with ground stone axes for centuries. Interestingly, turquoise was not traded to the California coast, but rather was reserved for trade into the Southwest. Diagnostic pottery (Graywares) representative of Puebloan peoples have been found at springs and short-term camps as far west as Joshua Tree National Park in Riverside County, and classic Puebloan pithouses have also been reported for this locale (Warren, personal communication, 1994).

Vigorous trade relationships existed between the Anasazi of the eastern Mojave and peoples of the Southern California coast during the Saratoga Springs period, and similar strong relationships existed between the lower Colorado populations and coastal peoples. Riverside County was probably a favored locale for trade routes during this period because of the wealth of subsistence resources and significant population concentration around the shores of Lake Cahuilla.

Along the southern California coast and neighboring inland regions, Wallace's (1955) Late Prehistoric period, or Horizon IV, coincides with the start of the Saratoga Springs period, around A.D. 500, but persists into historic times. This period in the coastal regions is characterized by dense populations and cultural elaborations (Moratto 1984). The increased use of the bow and arrow is evident, pottery is introduced around A.D. 800 or 900 (seen initially as influence or tradeware from the Lower Colorado River peoples), and circular shell fishhooks are relatively common. Numerous shell and bone artifacts, including beads, generous use of asphaltum, and along the southern coast, cremations for treatment of the dead are characteristic traits of this period. The migration of Takic peoples to the coastal environs occurred during this period, and this migration is thought to be the major cause for the cultural change evident along the southern California coast. Collecting remained the primary subsistence strategy, but hunting of sea mammals and fishing became much more common during this period. Ethnic ties between the desert and coastal peoples were strong during this period, but those peoples settling along the coast in many ways quickly adopted the lifeways of their northern neighbors, the Chumash, resulting in a material culture markedly different from their desert relatives.

Protohistoric Period (A.D. 1200 ! historic)

The Protohistoric period began around A.D. 1200 with the introduction of Desert Side-notched projectile points throughout the Mojave and Colorado deserts. Around this time, the Puebloan occupation of the eastern Mojave ended, and Numic speaking peoples, including the Southern Paiute and Chemehuevi, began to spread southeastward from the Great Basin into southern California. The Numic subsistence pattern was characterized by attenuated travel, reduced dependence on large game, and increased reliance on seed plants. Late in this period, Euro-Americans made their first contacts with the various Takic and Numic peoples, which ultimately led to the end of traditional aboriginal lifeways.

In central Riverside County after around A.D. 1500, Lake Cahuilla was in decline, and the large populations once supported by the rich lacustrine resources began to disperse, with many people taking up residency along the Colorado River, and others moving westward toward the Peninsular Ranges. This migration of native peoples to more favorable habitation locales resulted in population pressures along the southern California Coast (Hokan and Takic territory) and the lower Colorado River. The proto-Chumash (Hokan) became restricted to the northern coast, as the southern Los Angeles and Orange County coasts became specifically proto-Gabrielino (Takic) territory. Along the eastern perimeter of Riverside County, along the Colorado River, lands formerly occupied by the Hakataya and Anasazi were populated by the Chemehuevi (Numic), who practiced agriculture to some extent. The Yuman (lower Coloradan peoples) also practiced agriculture along the Colorado south of the Chemehuevi.

Protohistoric period sites are identified by the presence of Desert Side-notched projectile points and Brownware and Buffware pottery. Numic settlements are identified by the presence of coarse-tempered Brownwares. In southern California, especially, but elsewhere in the surrounding region including the southern Great Basin and California coastal region, Protohistoric period sites can be identified by the presence of obsidian artifacts manufactured from Obsidian Butte raw materials. The Obsidian Butte source became exposed when Lake Cahuilla declined, and this important source only became available to native populations at that time. It was extensively exploited for local consumption and trade during Protohistoric times.

Throughout the Protohistoric period, native peoples followed a characteristic Archaic lifestyle throughout most of Riverside County. The subsistence economy was based on gathering and hunting practices, with a strong reliance on plant foods and small game. A broad range of resources was harvested as they became seasonally available in different environmental zones. Seasonal transhumance was common, resulting in an archaeological record comprising a broad range of site types (e.g., winter camps, quarries, task locations, hunting blinds, caches, short-term camps, and others) that include many small sites or isolated finds dispersed across the landscape. Favorable hunting and gathering commodities were augmented by cultivated foods along the Colorado River, which supported a lifestyle that minimized the need to travel extensively and facilitated the support of larger family or band units.

In westernmost Riverside County, Wallace's Late Prehistoric period, described previously under the Saratoga Springs period, continues throughout the Protohistoric period. Extensive exchange, including trade with the southern Channel Islands, which are occupied by Takic peoples, is evident in the archaeological assemblages. Obsidian Butte, an obsidian source exposed by the desiccation of Lake Cahuilla around A.D. 1000, became the source of obsidian used in exchange for exotic items manufactured or available at some distance from the southern California region. The archaeological record demonstrates cultural continuity between protohistoric and ethnohistoric populations.

4.6.1.2 Ethnohistoric Overview

At the time of Euro-American contact with native populations, the future Riverside County was occupied by eight distinct cultural groups speaking various dialects or languages of the Uto-Aztecan or Hokan language stocks (Shipley, 1978). Ethnohistorically, Riverside County incorporated one primary culture, the Cahuilla, and seven bordering groups: Gabrielino, Juaneño, Luiseño, Quechan, Halchidhoma, Chemehuevi, and Serrano. Figure 4.6.2 (Southern California Tribal Territories) shows the distribution of native cultures in Southern California during this period, including Riverside County and the surrounding region. The culture boundaries illustrated are arbitrary in that they represent the peripheries of what is known of traditional gathering and hunting territories, with considerable overlap by neighboring groups. Based on the archaeological record, significant changes are known to have occurred in the distribution of tribal territory late in the Protohistoric period, primarily as the result of the desiccation of Lake Cahuilla and the necessary out-migration of natives toward the coast and the Colorado River. In much of Riverside County, population densities were low during the Ethnohistoric period, and territorial boundaries were not an issue, as these areas were more or less frontiers between population clusters.

At the time of Euro-American contact, the majority of Riverside County was occupied by the Cahuilla who spoke a Cupan language within the Takic family of the Uto-Aztecan language stock. The western part of the county, in the vicinity of the Santa Ana Mountains fell within the territory of the Gabrielino, Juaneño, and Luiseño, who also spoke Cupan languages within the Takic family. These three populations had territories that extended from the coast eastward and northeastward across the Santa Ana and Palomar mountains, incorporating Temescal Valley and Lake Elsinore, and extending toward the foothills of the San Jacinto and Santa Rosa mountains.

The eastern part of the county was strongly influenced by the presence of the Colorado River. Three native cultures were present in this area at the time of Euro-American contact: the Halchidhoma, Quechan, and Chemehuevi. The first two spoke languages belonging to the Colorado Branch of the Yuman family of the Hokan language stock. The Chemehuevi spoke a language belonging to the Numic family of the Uto-Aztecan language stock. Except for the Washo, Numic languages were the only ones spoken throughout the Great Basin at the time of Euro-American contact. Directly north of the Cahuilla, the Serrano occupied a large territory that encompassed much of San Bernardino County, edging southward into Riverside County. The Serrano spoke a language classified within the Serran group of the Takic family of the Uto-Aztecan language stock.

The characteristics of each of the ethnohistoric populations of Riverside County are briefly reviewed below.

Cahuilla

The name Cahuilla is of unknown origin, but possibly comes from the term Kawiya meaning master or boss (Kroeber, 1925:693; Bean, 1978:575). "The Cahuilla occupied

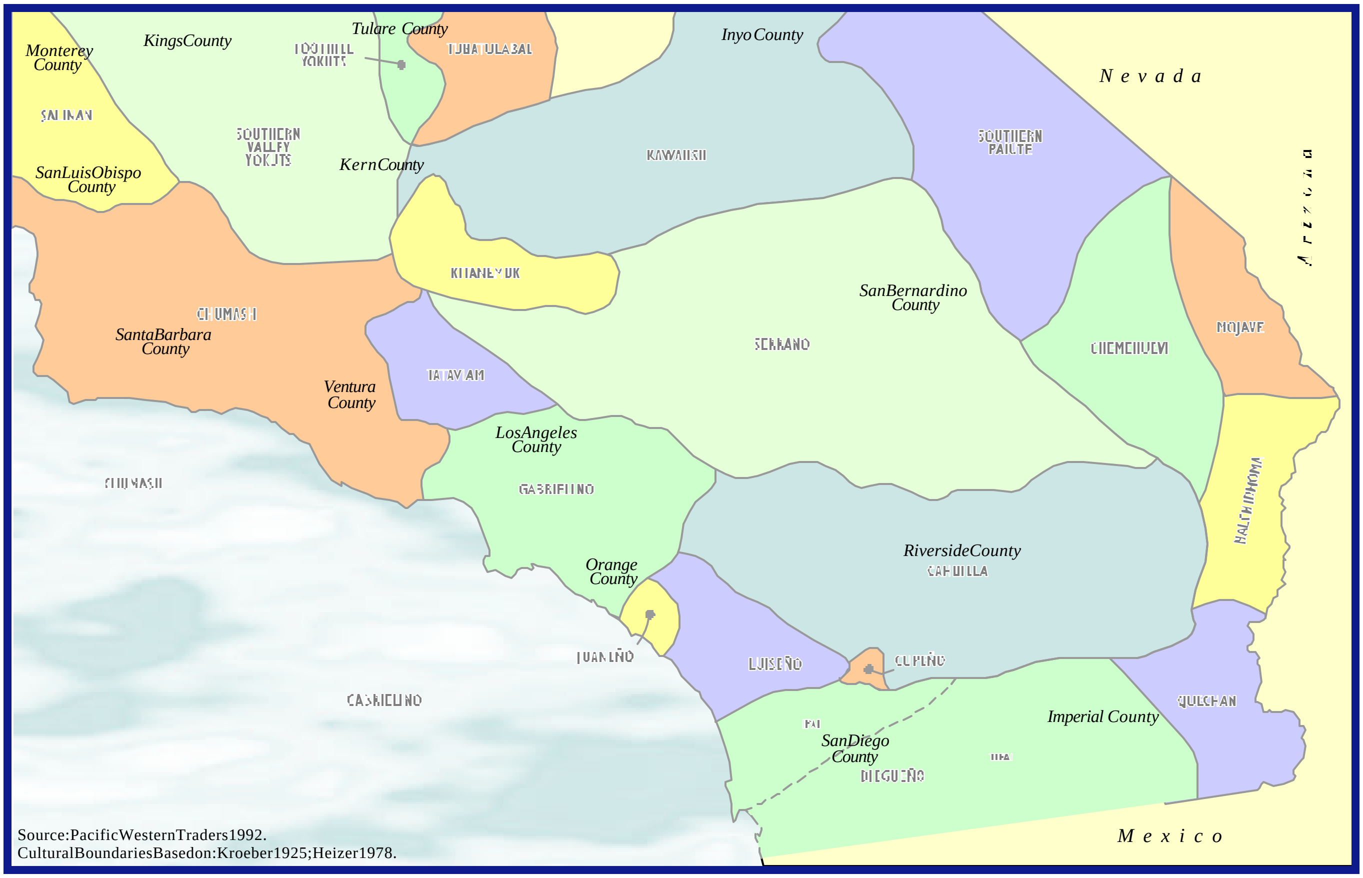


Figure 4.6.2

Scale is approximate

0 70 140 Miles

SOUTHERN CALIFORNIA TRIBAL TERRITORIES

R:\SVC931-Graphics\ExistingSetting\Nativeterr_2.cdr (7/5/02) most of the area from the summit of the San Bernardino Mountains in the north to Borrego Springs and the Chocolate Mountains in the south, a portion of the Colorado Desert west of Orocopia Mountain to the east, and the San Jacinto Plain near Riverside and the eastern slopes of Palomar Mountain to the west" (Bean, 1978:575). As a result of a detailed study, Wilke (1978) believes the oral tradition of the historic Cahuilla is sufficiently detailed to indicate that they were the descendants of aboriginal occupants of the prehistoric Lake Cahuilla area in the Coachella Valley, at least 450 to 1,000 years ago.

The Cahuilla territory can be generally described as an inland area of Southern California between the San Bernardino Range and the mountains that extend to the south of Mount San Jacinto. Three divisions create a more definitive boundary: the San Gorgonio Pass, the Colorado Desert, and the mountains south of Mount San Jacinto. These areas range in elevation from 11,000 feet above to 273 feet below mean sea level. The Cahuilla, therefore, inhabited a varied environment; the lowest regions were in the vicinity of the Colorado desert, specifically the Salton Trough. Although group classifications are believed to be primarily geographic, linguistic and cultural differences are also thought to have existed in varying degrees (Strong, 1929):

The Cahuilla inhabiting the area around the San Gorgonio Pass are referred to as the Western or Pass Cahuilla, those occupying the Colorado Desert are referred to as the Desert Cahuilla, and those around Mount San Jacinto are referred to as the Mountain Cahuilla. Villages were usually situated within canyons or on alluvial fans near water and food resources. A primary factor in siting villages and other types of habitation sites was the presence of a dependable supply of potable water. Deep, walk-in wells are characteristic of the Pass Cahuilla; from these wells, the name of the town of Indian Wells was derived (James, 1960:48: Santa Fe Federal Savings and Loan Association, 1977). The living structures varied in size and shape, and included brush shelters that were dome shaped or rectangular. The shape varied according to the use.

Cahuilla villages were usually situated in the lower part of the Upper Sonoran life zone, centrally located in the richest food gathering areas. As food ripened in different areas, individuals and groups moved to harvest the bounty. While at no time would an entire village move to resource exploitation sites, a considerable component of the village could be absent during certain seasons in pursuit of gathering activities in especially productive areas (Bean and Saubel 1972:19!20). For example, in October and early November, the bulk of each village traveled 5 or 10 miles to their traditional oak groves to harvest the economically important staple, acorn (Bean and Saubel 1972:21). No village was located more than 16 miles from its food-gathering ranges, and about 80 percent of a village's food resources could be found within 5 miles (Bean and Saubel 1972:20).

Villages were settled by Cahuilla of a common lineage; lineages had certain rights to traditional oak or mesquite trees or food gathering areas, such as specific canyons or particular stands of cacti. The San Jacinto and Hemet area contained a substantial Cahuilla Indian population during the Ethnohistoric period. The San Jacinto Valley is reported to have once contained seven native Cahuilla villages, and the tribes living here were among the most powerful of any in the Southwest (Hoover et al., 1962:31).

Next to the oak tree, mesquite and screwbean, both *Prosopis* species, were the most extensive food producing trees utilized by the Cahuilla. While oak comprised the staple food of the Pass and Mountain Cahuilla, mesquite and screwbean provided the primary foods of the Desert Cahuilla. Mesquite is commonly found below 3,000 feet.

Cahuilla subsistence staples and the environmental zone that supports them are shown in Table 4.6.B. The Cahuilla collected and utilized a wide variety of flora. The Cahuilla subsistence strategy was characterized by a seasonal round of gathering supplemented by animal foods (Bean and Saubel 1972:20-21). From January through March, there was little gathering, except for agave, and people subsisted on stored foods and game, which was plentiful in the lower elevations. With the onset of spring, many green shoots and buds became available within walking distance of a village. Among the many plants harvested in April and May were yucca, wild onion, barrel cactus, tuna cactus, goosefoot, catclaw, and ocotillo.

Table 4.6.B - Distribution of Essential Plant and Animal Foods of the Cahuilla by Biotic Community

Zone	Altitude	Significant Habitats	Plant Foods	Animal Foods	Percentage of Tribal Area	Percentage of Diet Acquired in Zone
Lower Sonoran	-200 to 3,500 feet	Sand dune-creosote, creosote-palo verde, cholla-palo verde, rocky slopes, agave-ocotillo	Cacti, palm, mesquite, agave, Mohave yucca, screwbean, catclaw, Mariposa lily, desert lily, ephedra, corn, beans, squash, melons	Deer, rabbit, antelope, mice, rats, mountain sheep, reptiles, insects, larvae, fish, quail, doves, ducks, roadrunners	60	25
Upper Sonoran	3,500 to 6,300 feet	Piñon-juniper, chaparral	Cacti, agave, nolina, yucca, piñon, oak, juniper, manzanita, sugar bush, tule, various grass seeds, chia, cattails, wild onion, wild rose	Deer, mountain sheep, rabbits, rats, mice, reptiles, insects and larvae, fish, quail, dove, roadrunners	28	60
Transition	6,300 to 9,000 feet	Coniferous forests, meadows	Oak, elderberry, service berry, manzanita, wild cherry, yucca, tule, various grass seeds, chia, cattail	Mountain sheep, deer, pack rats, squirrels, mice, chipmunks, fish	7	15
Canadian-Hudsonian	9,000 to 10,000+ feet	Alpine	Few	Deer, mountain sheep, rabbits, squirrels, mice, some reptiles	5	less than 1

Source: Bean, 1977, 1978:Table 1.

In June and July, staple tree crops such as the honeybean and screwbean mesquite were harvested, and people living in the higher elevations such as Gorgonio Pass and the foothills neighboring the Borrego Desert moved down into the Lower Sonoran to gather this staple. Manzanita and other berries, yucca, and various *Opuntia* cacti were also harvested from the foothills in the summer months. Gathering of a variety of foodstuffs continued through August and September, and fall brought the availability of numerous grass seeds, chia, saltbush seeds, pinyon nuts, palm tree fruit, thimbleberry, wild raspberry, wild blackberry, juniper berry, and chokecherry. Many of these food plants were concentrated in the higher elevations. The last important gathering season of the year occurred in October and November when the acorn ripened.

Specialized tools were used to process gathered foods. A mortar and pestle was used to grind acorns and berries, manos and metates were used to grind seeds, and wood mortars and pestles were used on soft, fibrous materials. The Cahuilla roasted yucca and agave in stone ovens. In some areas, the gathering of wild foods was supplemented with cultivated crops. Horticultural and marginal agricultural techniques were used to produce corn, beans, squash, and melons (Lawton and Bean, 1968; Bean, 1978:578).

Hunting of bighorn sheep, deer, antelope, rabbit, small rodents, reptiles, quail, dove, and duck using bow and arrow, throwing sticks, traps, and communal drives is well documented (James, 1960:58; Bean, 1978:576; Wilke, 1978). Men hunted or captured animals, then prepared the meat for cooking by skinning and butchering. The women cooked the meat by roasting or boiling. They also preserved meat by cutting it into strips for sun drying.

Artifacts common to the Cahuilla included coiled pottery that was often incised and painted, baskets, manos, metates, mortars, pestles, arrow shaft straighteners, mesquite or willow bows and arrows, wooden throwing sticks, charmstones, bull roarers, and small, bifacially worked stone points (Kroeber, 1925:695-704; Bean, 1972, 1978:579). Marine shells, including *Olivella* spp. beads, are often associated with cremations (Davis and Bouscaren, 1980:8).

The more sacred Cahuilla areas were marked with pictographs or petroglyphs. Villages relocated only for specific reasons, including alterations in resource availability, changes in the environment, and/or changes in political affiliation.

The large central inland location of the Cahuilla, extending almost to the Colorado River on the east and the Orange County coast on the west, fostered its use for several major and minor aboriginal trails. The Cocopa-Maricopa trail approximately bisects Cahuilla territory, as well as Riverside County. The Santa Fe and Yuman Trails run along the periphery of the territory. The Colorado Desert separated and isolated the Cahuilla from the Ipai, the Tipai to the south, and the Mojave and Halchidoma to the east. Mountain ranges separated them from the Luiseño, Gabrielino, and Serrano. Each of these culture groups interacted with the others regularly; in fact, they intermarried, traded, and participated in ritualistic activities together.

The region in the vicinity of Mount San Jacinto is replete with Indian lore, including the tale of *Takwish*, a powerful Cahuilla monster or divinity associated with the moaning sound created by Mount San Jacinto's cold winds roaring down Tahquitz Canyon into Palm Springs. The term *Takwish* means "eater" or "eating," and Tahquitz is the modern name derived from the legendary appellation. *Takwish*, said to have been born in Poway in Diegueño territory, lives on San Jacinto Mountain, although ". . .part of his career was run among the Luiseño, especially in association with Temecula. . ." (Kroeber, 1925:680). *Takwish* usually appears as a low-flying meteor or ball of lightning, but is also depicted in bird like form or as a man in feathers. The creature is said to carry off and devour humans, and simply the sight of this creature portends disaster and death.

A similar Gabrielino term, *Toowish,* is reported by McCawley (1996:48) to be the same as the Luiseño word, meaning "devil." Interestingly, the Juaneño term *towish* means ghost, and was applied to both the corpse and associated spirit (Kroeber, 1925:679).

Serrano

Ethnohistorically, the Serrano Indians lived in the area north of Cahuilla territory, occupying much of present-day San Bernardino County and northeastern Los Angeles County (Figure 4.6.2). The northern boundary of Riverside County is the approximate boundary between the Serrano and the Cahuilla, There is some overlap in the perceived culture areas. The term *serrano* is Spanish for "mountain dweller," or “ mountaineer, highlander” (Bean and Smith, 1978:570), and is derived from *sierra,* meaning "mountain range" (Bean and Smith, 1978:574). This term was given to those people who inhabited the areas of the San Bernardino Mountains that had no associated mission. The Serrano spoke a language that falls into the Uto-Aztecan family, more specifically the Takic subgroup of that family (Warren, 1984:343). The Serrano culture group actually incorporates four distinct cultures of people that have similar linguistic patterns. These people are the Serrano proper, the Vanyume, the Alliklik, and the Kitanemuk.

The Serrano enjoyed a patrilineal social organization that was composed of clans and families linked by both ancestry and ceremony. Three clans divided this group: the Mohineyam, the Yuhevatam, and the Maringayam. The Serrano were also divided by moieties: the Wildcats and the Coyotes. The basic living conditions were a village with small satellite camps. The Serrano lived in tule covered, cup shaped structures; ceremonial houses and sweat houses were incorporated into their religious activities. The leader of the village was called the *Kika*, his assistant was the “paha,” and the shaman was called a “huremitic.”

The Serrano, like the Cahuilla, were hunter/gatherers that relied on the women to do much of the collecting while the males captured various animals. The primary flora that they exploited depended on the exact area they inhabited, but generally speaking they collected acorns, pinion nuts, honey, mesquite, yucca, and cactus fruits, in addition to various seeds, bulbs, and roots. The men hunted antelope, deer, mountain sheep, rabbits, and rodents.

The most common hunting implements were the bow and arrow, throwing stick, traps, snares, and deadfalls. The bow and arrow were used for hunting large game, while the other items were used for smaller game and birds (Bean and Smith, 1978:571). Meat was prepared in earth ovens, by boiling in watertight baskets or by parching. Plants were consumed both raw and cooked. Food processing involved the use of manos, metates, mortars, and pestles. Flint knives, stone and bone scrapers, ceramic trays and bowls, baskets, and horn and bone spoons and stirrers were also used (Bean and Smith, 1978:571).

The Serrano were prolific pottery makers and extensive basket makers. The terra cotta style vessels were built utilizing a coil and spatula method to adorn their ollas, and their jars have complex designs with concentric circles, triangles, dots, and lines. They repaired their vessels with pitch (Johnston, 1980).

Most Serrano lived in small villages near water, usually perennial seeps, streams, and small lakes. The availability of water largely determined the nature, duration, and distribution of Serrano settlements (Benedict, 1924:368 in Bean and Smith, 1978:570-571). Family dwellings were circular domed, willow frame structures covered with tule thatching (Bean and Smith, 1978:571). Dwellings contained a central fire pit, and were used primarily for sleeping and storage. Most activities occurred outdoors or under a *ramada*, which was a thatched willow pole roof supported by four or more vertical posts (Benedict, 1924; Kroeber, 1925; Drucker, 1937 in Bean and Smith, 1978:571).

Other village structures included granaries, sweathouses, and large ceremonial houses in which the ceremonial leader resided. Sweathouses were usually constructed near streams. They were typically large, circular, and semi-subterranean. Sweathouses were covered with earth, supported by willow poles, thatched with tule, and usually contained just one door. Families gathered in the sweat house in order to cleanse themselves by sweating. After sweating, they would dip in the nearby water.

The Late Prehistoric natives of the Serrano area practiced cremation of the dead. Most of a deceased individual's personal possessions were burned with the deceased individual. One month after death, other possessions were burned. A seven day mourning ceremony was held annually. At this time, gifts and shell money were distributed (Strong, 1929 in Bean and Smith, 1978:573).

Gabrielino, Luiseno, and Juaneño

The Gabrielino, Luiseno, and Juaneño were hunters and gatherers who used both inland and coastal food resources. Their territory included the coastal Orange County region and portions of Los Angeles and San Diego counties during Ethnohistoric times, and extended inland into western Riverside County, generally in the vicinity of the Santa Ana Mountains and neighboring areas of the Peninsular and Transverse ranges. Figure 4.6.2 shows the distribution of these native populations relative to the boundaries of Riverside County.

Typically, the native culture groups in southern California are named after nearby Spanish period missions, and such is the case for these coastal Takic populations. For instance, the term, “Gabrielino” is applied to the natives inhabiting the region around Mission San Gabriel, and “Luiseño" was given to those native people living within the "ecclesiastical jurisdiction of Mission San Luis Rey... [and who shared] an ancestral relationship which is evident in their cosmogony, and oral tradition, common language, and reciprocal relationship in ceremonies" (Oxendine, 1983:8). Similarly, the name “Juaneño” was assigned to any native living in the vicinity of San Juan Capistrano.

The Gabrielino, Luiseno, and Juaneño caught and collected seasonally available food resources, and led a semi-sedentary lifestyle, living in permanent communities along inland watercourses and coastal estuaries. Individuals from these villages took advantage of the varied resources available. Seasonally, as foods became available, native groups moved to temporary camps to collect plant foods such as acorns, buckwheat, chía, berries, and fruits, and to conduct communal rabbit and deer hunts. They also established seasonal camps along the coast and near bays and estuaries to gather shellfish and hunt waterfowl (Hudson, 1971).

The coastal Gabrielino, Luiseno, and Juaneño had a marine oriented economy similar to the coastal Chumash. Their subsistence strategy combined shellfish collecting, marine fishing, and sea mammal hunting, as well as land mammal hunting and plant collecting. They processed acorn meal, and extensively utilized plant resources near their coastal villages (Hudson, 1971).

The Gabrielino, Luiseno, and Juaneño lived in small communities, which were the focus of family life. Patrilineally linked, extended families occupied each village (Kroeber, 1925; Johnson, 1962; Bean and Smith, 1978; McCawley, 1996). Both clans and villages were apparently exogamous, marrying individuals from outside the clan or village (Heizer, 1968). Gabrielino, Luiseno, and Juaneño villages were politically independent, and were administered by a chief, who inherited his position from his father. Shamans guided religious and medical activities, while group hunting or fishing was supervised by individual male specialists (Bean and Smith, 1978).

Halchidhoma and Quechan

The Halchidhoma, Quechan, and, farther north, Mojave were Yuman groups who practiced agriculture along the Colorado River. While floodplain agriculture provided more than 50 percent of their subsistence, the remainder of their diet was supplied by collecting wild plants, fishing, and hunting. When crops failed, collecting activities were intensified, including the gathering of wild crops along the river and desert plants as far as 5 to 10 kilometers inland (Knack, 1981; Warren, 1984). River agriculturalists were later joined by the Kamia from the Colorado Desert during historic times. The Chemehuevi also moved into the Colorado River Valley and took up agriculture in the early historic period, displacing the Halchidhoma southward (Warren, 1984:344).

The Colorado River tribes had a material culture more complex than that of neighboring desert peoples. They were organized militarily and traveled great distances to do battle, to visit, and to trade. These peoples influenced their neighbors in the California deserts by introducing new items and ideas.

The Quechan had patrilineal clans and a strong tribal identity, which was particularly embodied in the *Kwoxot*, or tribal chief. Usually, there was only one *Kwoxot* in the tribe at a given time, and he served as economic, political, and religious leader. The Quechan and Mojave often united in military actions against the Halchidhoma and western Arizona tribes (Knack, 1981).

The small area that represents the Halchidhoma in Figure 4.6.2 is actually the westernmost area of the Halchidhoma, which are incorporated within a more widespread culture in Arizona, the Maricopa. In California, the Halchidhoma are neighbors of the Yuma and the Mojave (the Mojave to the north and the Quechan [Yuma] to the south). "At the beginning of the nineteenth century, the term Halchidhoma or its variants, designated Yumans along the Colorado River south of the Mojave" (Harwell and Kelly, 1983:74). Some of the representative traits belonging to this group of people include a patrilateral or bilateral descent, emphasis on personal dreams, cremation, and flood water agriculture (Harwell and Kelly, 1983:71).

Chemehuevi

Generally, the California distribution of the Chemehuevi includes the area east of Twentynine Palms, south of Baker, and west of Needles. Their primary area of occupation during ethnohistoric times, however, was the southern Nevada region in the vicinity of the Colorado River. Although their name shows no mention or association to the Paiute, they are actually a subdivision of the Southern Paiute; the term, Chemehuevi, is Yuman nomenclature for Paiute. The Chemehuevi comprise a group of Southern Paiute who settled along the Colorado and adopted floodplain agriculture in late prehistory (Knack, 1981). They maintained strong ties to the Southern Paiute and other Numic peoples, especially the Western Shoshone of Nevada and Utah.

The Chemehuevi are a people that had a varied subsistence strategy that depended upon where they lived. They farmed whenever possible; however, inland populations relied heavily on the traditional gathering and hunting strategies. Chemehuevi hunted large as well as small animals, specifically, deer, rabbits, rats, lizards, and other reptiles. They collected seeds of different types, and gathered mescal whenever possible.

The Chemehuevi manufactured baskets and pottery. Their brownwares are distinctive, visually different from those of the Lower Colorado River peoples, and the baskets were coiled. They also made caps, trays, and carrying baskets. Painted designs were placed on them, rather than woven into them. The bows that they manufactured were shorter than those of the Mojave, and had recurved ends. Their arrows had a foreshaft with a projectile point.

4.6.1.3 Historic Overview

The line that separates the historic period from the prehistoric period is simply the advent of written documentation of events. In California, the historic period is associated with the founding of the first mission, *San Diego de Alcala*, on July 16, 1769.

Riverside County's entrance into the historic record, however, followed a more vernacular route. In 1772, Lieutenant Pedro Fages, then the military governor of San Diego, inadvertently crossed the San Jacinto Valley while in hot pursuit of deserting soldiers (Priestley, 1972:x). The history of Riverside County is reviewed in the following text. Table 4.6.C lists historical resources of Riverside County. These are referred to in the text discussion by the prefix **R-**. Figure 4.6.3 illustrates the locations of select historical resources in Riverside County.

Early exploration of the Riverside County area began slowly. On January 8, 1774, Juan Bautista de Anza, with Fathers Garces and Diaz, 20 soldiers, 11 muleteers, servants, and Sebastian Tarabal as a guide, began an expedition from the Mission in Tubac (near Tucson) and headed west seeking a practical overland route to Alta California. Traveling between 2 and 3 miles per hour, Anza crossed the Colorado River and entered California. Heading north and west, Anza skirted the Santa Rosa Mountains and made his way up through Coyote Canyon, stopping at a small spring he named for Saint Catherine (Santa Catarina) (State Historical Landmark #103; R-2) (Brown, 1985; Bowman and Heizer, 1967). The following day, de Anza descended into San Jacinto Valley, likely passing through Riverside's Sycamore Canyon and Tequesquite Arroyo, and camped near what is now Pedley Meadows (State Historical Landmark #787; R-1). Anza's vivid portrayal of the expedition created an alluring vision for future travelers. By the time he reached the San Gabriel Mission on March 21, 1774, Viceroy Antonio Bucareli and Carlos III were already making plans for a second expedition, to establish a pueblo at San Francisco Bay. Anza's second excursion into Riverside County included 29 soldiers, their wives and children, who would form the new community at the Presidio of San Francisco (Brown, 1985; Bowman and Heizer, 1967).

Early settlement in Riverside County was slow and sporadic. By the time Lieutenant Pedro Fages crossed into Riverside County, 5 of the 21 California missions were already established. During the Mission period (1769-1833), Riverside County proved to be too far inland to establish any missions or asistencias, although San Luis Rey claimed a large part of southwestern Riverside County for livestock grazing.

Table 4.6.C - Historical Resources of Riverside County

		NRHP	CRHL	CPHI	RCHL	Present	Location	Theme
Exploration (1772-1818)								
1	Anza Crossing of Santa Ana River, Site of		X			X	E/Van Buren on Jurupa	E/S
2	Anza Camp and Crossing, Site of		X			X	S/Terwilliger on Coyote Can	E/S
3	Indian Wells, site of			X	X		17 miles SE on SR111	W, E/S
Mission Period 1769-1833								
4	Dos Palmas			X	X	X	S/111, exit on Parkside Drive	W, E/S, T
5	Jose Romero Expedition						S/I-10, ½ mile east of SR 111	E/S
6	Old Temescal Road		X				Approximates Temescal Cyn Rd	E/S
7	Palm Springs, site of			X	X		NE corner of Indian Avenue	W,A/L,E/S
8	Serrano Boulder		X				Approx 1 mile N of Glen Ivy	E/S

		NRHP	CRHL	CPHI	RCHL	Present	Location	Theme
9	Serrano Tanning Vats			X		X	Hot Springs 8 miles S/Corona W/I-15	E/I,NA
Mexican/Rancho (1833-1848)								
10	Bandini-Cota Adobe			X	X	X	Prado Flood Control Basin	E/S
11	First Bandini Adobe, site of			X	X		1000 feet W/Hamner Avenue	E/S
12	La Placita del Los Trujillos, site of	X					295 North Orange Street	S/E
13	Louis Robidoux House, Site of		X	X	X		W/ Rubidoux, 5500 Mission Blvd	E/S
14	MT. Rubidoux			X	X	X	7th & Mt. Rubidoux Drive	E/S, S/E, REL
15	Rancho Santa Rosa		X	X	X	X	W/ Murrieta on Clinton-Keith Road	E/S
16	Rubidoux Grist Mill, Site of		X	X	X		S/60, E/Rubidoux, end of Fort Drive	E/S
17	Trujillo Adobe			X	X	X	W/215, N/Center, on Orange	E/S
18	Weaver Adobe			X	X	X	N/10, 10055 Avenida Miravilla	E/S
Early Californian (1848-1869)								
19	Agua Mansa Bell	X				X	3649 7th Street	REL
20	Bradshaw Ferry Crossing			X	X		I-10 to Rivera Drive, Blythe Marina	W, T
21	Butterfield Stage Station, site of		X				20730 Temescal Canyon Rd	E/S, T
22	Corn Springs			X	X	X	S/I-10 to Corn Springs Road	NA, W, E/S
23	First Post Office, site of			X	X		28636 Front Street	GOV
24	Frink Ranch			X	X	?	W/10, N/60 on Timoteo Canyon, near El Casco	E/S, T
25	Jensen Alvarado Ranch	X	X			X	S/Mission E/Limonte	E/S
26	Little Temecula Rancho Adobe, site of	X					20730 Temescal Canyon Rd	E/I
27	Pincate Mining District			X	X		Orange Empire RR Museum	E/I
28	SAAHATAPA	X				?	W/10, N/60 on Timoteo Canyon	E/S, NA
29	Southern Hotel	X				?	445 S. D Street	ARC, E/I
30	Temescal Tin Mines			X	X	?	E/I-10, N/Cajalco	E/I
31	Third Serrano Adobe, site of		X				S/E corner of I-15 & Temescal Canyon Rd	E/S
32	Toro Village			X	X	?	S/I-10, to end of Jackson	NA,T,E/S
33	Whitewater Ranch, Site of			X	X		S/I-10, ½ mile east of SR 111	E/S, T
(1869-1919)								
34	Adair House	X				X	4310 Orange Street-R	ARC
35	Administration Building, Sherman Institute	X				X	9010 Magnolia Avenue-R	ARC,S/E, NA
36	African Methodist Episcopal Church	X				X	2433 10th-R	REL
37	All Souls Universalists Church	X				X	NW Corner of Lemon & 7th-R	REL
38	Armory Hall	X				X	252 N. Main Street	ARC, MIL
39	Banning Woman's Club			X	X	X	175 W. Hayes Street	S/E

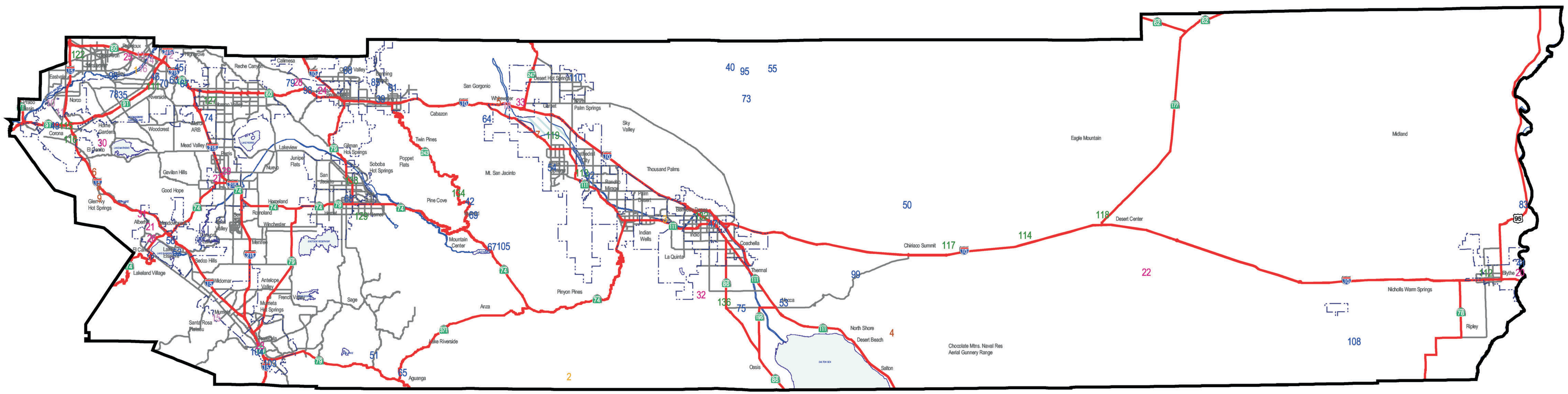
		NRHP	CRHL	CPHI	RCHL	Present	Location	Theme
40	Barker Dam	X				X	N/I-10, SR62, to Utah Trail	W/E/S
41	Blythe Intake Site	X					N/I-10 on US 95 near Palo Verde Diversion Dam	W, E/I
42	Camp Emerson			X	X	X	243 to West Canyon Dr, to McKinney Lane	S/E
43	Chase House	X				X	5145 Myrtle-R	ARC
44	Chinatown, Site of	X		X	X		Brockton & Tequesquite-R	ETH
45	Citrus Experiment Station			X	X	X	UCR-R	S/E,E/I
46	Citrus Machinery Pioneering			X	X	X	S/7th, E/91, SE Corner of Vine & Birtcher-R	E/I
47	Coachella Valley Water District			X	X	X	Avenue 52 & SR111	W, E/I
48	Coplin House			X	X	X	12 S. San Gorgonio Avenue	S/E
49	Corona Carnegie Library, site of	X					S/E corner of Main & 8th	S/E
50	Cottonwood Oasis	X				X	N/I-10, SR62, to Utah Trail	W/E/S
51	Cottonwood School			X	X	X	1 mile N of CR 3 & SR 79	S/E
52	Cresent Bath House	X		X	X	X	Corner of West Graham	ARC, A/L
53	Date Industry Birthplace			X	X	X	National Avenue between Johnson and Grand	E/I
54	Desert Inn, site of			X	X		NW Corner of Palm Canyon & Tahquitz	A/L
55	Desert Queen Mine	X				X	N/I-10, SR62, to Utah Trail	E/I
56	Elsinore's Hottest Sulpher Spring			X		X	Graham @ Spring-E	A/L
57	Evans Adobe	X				X	7606 Mount Vernon	ARC
58	Farimount Park	X				X	N/Redwood Drive-R	A/L
59	First Church of Christ	X				X	3606 Lemon Street-R	ARC,REL
60	First Congregational Church			X	X	X	SW corner of Lemon and 7th	ARC,REL
61	Gilman Ranch	X				X	N/10, E/22st,on WilsonSt	E/S,W,T
62	Grant School Fountain	X				X	Brockton Avenue-R	A/L
63	Greystones	X				X	6190 Hawarden Drive-R	ARC
64	Hall City & Grade			X	X	X	N slope of San Jacinto S/I-10 around Cabazon	E/I
65	Hamilton School			X	X	X	56481 Cahuilla Road	S/E
66	Harada House	X				X	3356 Lemon Street	ETH
67	Hemet Dam & Lake Hemet			X	X	X	1 mile E of 243 & SR 74	W,E/I
68	Hemet Depot			X	X	X	NW corner State Street & Florida Avenue	E/I, T
69	Heritage House	X				X	8193 Magnolia Avenue	ARC,S/E
67	Highgrove Hydroelectric Plant, Site of			X	X		W/Iowa, S/Center, Electric & W. Spring-R	E/I,W
68	Highland Springs			X	X	?	N/10 5 miles on Highland Springs Ave.	T,A/L
69	Idyllwild			X	X	X	County Park Rd, 1 mile N of SR 243-CO	A/L
70	La Altalya	X				X	5800 Hawarden Drive	ARC
71	Loring Block	X				X	7th & Main	A/L
72	Loring Opera House			X	X	X	3745 7th Street	ARC,A/L
73	Lost Horse Mine	X				X	N/I-10, SR62, to Utah Trail	E/I

		NRHP	CRHL	CPHI	RCHL	Present	Location	Theme
74	March Field			X	X	X	I-215 @ Van Buren	MIL
75	Martinez Historic District	X		X	X	X	S/SR111, W/Avenue 66 to Martinez Rd	NA, S/E
76	Masonic Temple	X					3650 11th Street	S/E
77	Mission Inn	X	X	X	X	X	N/7th, S/6th,W/Orange, E/Main	ARC,A/L
78	Mount Rubidoux Cross	X				X	Buena Vista Avenue	S/E
79	Nobles Ranch			X	X	X	Singleton Canyon off Timoteo Canyon	E/S
80	North Park	X				X	7th & Vine	GOV
81	Old YWCA Building	X				X	3225 7th Street	ARC,S/E
82	Palmdale Railroad			X	X		248 E. Ramon Road	T, E/S
83	Palo Verde Diversion Dam, site of	X					11 miles N of I-10 on US 95	W, E/i
84	Parent Navel Orange Tree	X				X	SW corner Magnolia Avenue, E/Arlinton	E/I,E/S
85	Pedley-Type Dam			X	X	?	Banning Canyon via San Gorgonio Ave.	E/I
86	Peter Weber House	X				?	1510 University Ave	ARC
87	Presbyterian Church	X				X	7200 Magnolia Avenue	REL
88	Raincross Street Heights	X				X	Buena Vista Drive	ARC
89	Reid Building			X	X	?	N/E corner of San Gorgonio & Livingstone	E/S
90	Riverside Cement Company			X	X	X	N/60, 1500 Rubidoux-J	E/I
91	Riverside County Courthouse			X	X	X	4050 Main Street	ARC,GOV
92	Riverside Federal Post Office	X				X	SE Corner Orange & 7th	ARC,GOV
93	Riverside-Arlington Heights Fruit Exchange	X				X	3397 7th Street	ARC,E/I
94	Rumsey House	X				X	6700 Victoria Avenue	ARC
95	Ryan House & Lost Horse Well	X				X	N/I-10, SR62, to Utah Trail	E/S, W
96	Salt Lake Bridge	X				X	Union Pacific Railroad, over the Santa Ana River	E/I,T
97	San Pedro, LA & Salt Lake Railroad Depot	X				X	3751 Vine St	ARC,T
98	San Timoteo Canyon Schoolhouse			X	X	X	W/10, N/60 on Timoteo Canyon	NA,S/E
99	Shaver's Well			X	X	X	Box Canyon, 12 miles NE of Mecca	W, E/I
100	St.Boniface School & Cemetary			X	X	?	14700 Manzanita Park Road	S/E
101	Streeter House	X				X	5211 Central Avenue	REL
102	Sutherland Fruit Company	X				X	NE Corner 7th & Vine	ARC, E/I
103	Temecula Old Town Historic District				X	X	Front Street between 1st and 6th.	E/S
104	Temecula Quarries			X	X		Monument @ Front Street& Sam Hicks Park	E/I
105	Thomas-Garner Ranch			X	X	X	SR 74, across highway from Lake Hemet Store-CO	E/S
106	Victoria Avenue	X				X	Victoria Avenue	A/L
107	White Park	X				X	Market Street	A/L

		NRHP	CRHL	CPHI	RCHL	Present	Location	Theme
108	Wiley's Well			X	X	X	N/I-10 @ Wiley Well exit	W, E/I
109	Woman's Improvement Club	X				X	SE corner of Main & 10th	ARC, S/E
110	Yerxa's Discovery			X	X	X	67616 East Desert View	W, E/S
(1920-1945)								
111	Benedict Castle	X				X	1850 Benedict Avenue	ARC
112	Blythe Depot			X	X	X	Corner of Commerical & Rice, N/I-10	T, E/I
113	Buena Vista Drive	X				X	Buena Vista Drive	A/L
114	Contractor's Hospital, site of	X					I-10, 6 miles W of Desert Center	W, S/E
115	Corona Founders Monument	X				X	City Park @ South Street	E/S
116	Corona Theater	X				X	NE corner Ramona & 6th	ARC, A/L
117	Desert Training Center	X		X	X	X	I-10 to Chiriaco Summit	MIL
118	Eagle Mountain Iron			X	X	X	35 miles E of Indio @ Desert Center Café	E/I
119	El Mirador Hotel and Tower			X	X		1150 N Indian Avenue	A/L
120	Fairmount Park Bandshell	X				X	Fairmont Park-R	S/L
121	Fruit Exchange	X				X	3391 7th Street	ARC
122	Galleano Winery			X	X	X	S/ 60 at 4231 Wineville Rd	ARC,E/I
123	John W. North Park			X	X	X	S/7th/University/Evergreen/Vine	A/L
124	M.H. Simon Undertaking Chapel	X				X	SW corner of 11th & Orange	ARC
125	Main Street Clock	X				X	Downtown Mall	E/I
126	Neighbors of Woodcraft	X				X	8432 Magnolia	S/E
127	Old Moreno School			X	X	X	28780 Alessandro Blvd.	S/E
128	Pergolas	X				X	7th Street	ARC
129	Ramona Bowl		X			X	S/Florida to Girard	A/L
130	Riverside Baptist Temple	X				X	9015 Magnolia	ARC
131	Riverside Municipal Auditorium	X				X	3485 7th	ARC,A/L
132	Smiley Place			X	X	X	82616 Miles Avenue	ARC
133	Soviet Transpolar Landing Site		X	X	X	X	Hofmann Mem Park @ 6th Street	GOV
134	Speed of Light Experiment			X	X	X	Pine Cove Rd, N of SR 243	E/I
135	St Anthony's Church	X				X	3074 Madison	REL
136	Valerie Jean Date Garden			X	X	X	Avenue 66 & SR 86	E/I
137	Victoria Bridge	X				X	Victoria Avenue	E/I
138	WCTU Fountain	X				?	7th & Orange	ARC

Notes:

NRHP: National Register of Historic Places
CRHL: California Registered Historic Landmarks Architecture
CPHI: California Points of Historical Interest
RCHL: Riverside County Historical Landmarks
A/L : Arts and Leisure
E/I: Economic/Industrial
E/S: Exploration /Settlement
GOV: Government
MIL: Military
NA: Native American
REL: Religion
T: Transportation
W: Water



LEGEND

- Cities
- Highways
- Major Roads

Historical Period

- 1 Exploration (1772 - 1818)
- 4 Mission (1769 - 1833)
- 10 Mexican Rancho (1833 - 1848)
- 19 Early Californian (1848 - 1869)
- 34 Pre WWI to WWI (1869 - 1919)
- 111 Post WWI to WWII (1920 - 1945)

Id	Site Name
1	Anza Crossing of Santa Ana River
2	Anza Camp and Crossing
3	Indian Wells
4	Dos Palmas
5	Jose Romero Expedition
6	Old Temescal Road
7	Palm Springs
8	Serrano Boulder
9	Serrano Tanning Vats
10	Bandini-Cota Adobe
11	First Bandini Adobe
12	La Placita del Los Trujillos
13	Louis Robidoux House
14	MT. Rubidoux
15	Rancho Santa Rosa
16	Rubidoux Grist Mill
17	Trujillo Adobe
18	Weaver Adobe
20	Bradshaw Ferry Crossing
21	Butterfield Stage Station
22	Corn Springs
23	First Post Office
24	Frink Ranch
25	Jensen Alvarado Ranch
26	Little Temecula Rancho Adobe
27	Pincate Mining District
28	SAAHATAPA
29	Southern Hotel
30	Temescal Tin Mines
31	Third Serrano Adobe
32	Toro Village
33	Whitewater Ranch
35	Administration Building
39	Banning Woman's Club
40	Barker Dam
41	Blythe Intake Site
42	Camp Emerson
45	Citrus Experiment Station
46	Citrus Machinery Pioneering
47	Coachella Valley Water District
49	Corona Carnegie Library
50	Cottonwood Oasis
51	Cottonwood School
52	Cresent Bath House
53	Date Industry Birthplace
54	Desert Inn
55	Desert Queen Mine
56	Elsinore's Hottest Sulpher Spring
61	Gilman Ranch
63	Greystones
64	Hall City & Grade
65	Hamilton School
67	Hemet Dam & Lake Hemet
67	Hemet Dam & Lake Hemet
68	Hemet Depot
68	Hemet Depot
69	Heritage House
70	La Altalya
73	Lost Horse Mine
74	March Field
75	Martinez Historic District
78	Mount Rubidoux Cross
79	Nobles Ranch
83	Palo Verde Diversion Dam
85	Pedley-Type Dam
92	Riverside Federal Post Office
95	Ryan House & Lost Horse Well
96	Salt Lake Bridge
98	San Timoteo Canyon Schoolhouse
99	Shaver's Well
103	Temecula Old Town Historic District
104	Temecula Quarries
105	Thomas-Garner Ranch
108	Wiley's Well
110	Yerxa's Discovery
111	Benedict Castle
112	Blythe Depot
113	Buena Vista Drive
114	Contractor's Hospital
115	Corona Founders Monument
116	Corona Theater
117	Desert Training Center
118	Eagle Mountain Iron
119	El Mirador Hotel and Tower
122	Galleano Winery
127	Old Moreno School
129	Ramona Bowl
132	Smiley Place
133	Soviet Transpolar Landing Site
134	Speed of Light Experiment
136	Valerie Jean Date Garden

Historical resources located within the City of Riverside and immediately adjacent areas.

Early Californian (1848 - 1869)

19 Agua Mansa Bell

Pre WWI to WWI (1869 - 1919)

34 Adair House
36 African Methodist Episcopal Church
37 All Souls Universalists Church
38 Armory Hall
43 Chase House
44 Chinatown, Site of
57 Evans Adobe
58 Farimount Park
59 First Church of Christ
60 First Congregational Church
62 Grant School Fountain
66 Harada House
71 Loring Block
72 Loring Opera House
76 Masonic Temple
77 Mission Inn
80 North Park
81 Old YWCA Building
82 Palmdale Railroad
84 Parent Navel Orange Tree
86 Peter Weber House
87 Presbyterian Church
88 Raincross Street Heights
89 Reid Building
90 Riverside Cement Company
91 Riverside County Courthouse
93 Riverside-Arlington Heights Fruit Exchange
94 Rumsey House
97 San Pedro, LA & Salt Lake Railroad Depot
100 St.Boniface School & Cemetary
101 Streeter House
102 Sutherland Fruit Company
106 Victoria Avenue
107 White Park
109 Woman's Improvement Club

Post WWI to WWII (1920 - 1945)

120 Fairmount Park Bandshell
121 Fruit Exchange
123 John W. North Park
124 M.H. Simon Undertaking Chapel
125 Main Street Clock
126 Neighbors of Woodcraft
128 Pergolas
130 Riverside Baptist Temple
131 Riverside Municipal Auditorium
135 St Anthony's Church

Figure 4.6.3

N

5 0 5 10 Miles

HISTORICAL RESOURCES

RIVERSIDE COUNTY RCIP INTEGRATED PROJECT

Leandro Serrano is credited as the first non-native to settle in the Riverside County area. In 1818, Serrano obtained permission from the priests at San Luis Rey to settle "five leagues of land in the Temescal" (Brown, 1985:35) (State Historical Landmarks # 185, 186, 224, and 638; R-6, R-8, R-9, and R-31). Three years later, Native American neophytes from the San Gabriel Mission established the Rancho San Gorgonio near Banning and Beaumont.

In 1821, Mexico successfully overthrew Spanish rule; however, news of the victory did not reach Alta California until the following year. Without the backing of Spain, the missions lost the financial and political support required to keep them going. In 1824 and 1829, the Chumash revolted and temporarily controlled Mission Santa Barbara, Sante Ines, and La Purisima. By 1833, the Mexican government passed the Secularization Act. The missions, reorganized as parish churches, lost their vast land holdings and "released their neophytes" (Rawls, 1984). To facilitate the transition of landholding, the Mexican government established the office of *Comisionados*, appointed by the Governor, to supervise the transition of missionary lands into the hands of private citizens (Rawls, 1984:21).

During the Rancho period (1821-1848), the ranchos were predominately devoted to the cattle industry, with their great tracks of land used for grazing. Until the gold rush of 1849, livestock and horticulture dominated the economics of California (Ingersoll, 1904; Beattie, 1939; Brown, 1985).

Sixteen ranchos were granted in Riverside County. In 1839, the first of these, Rancho Jurupa (over 32,000 acres), was granted to Juan Bandini (R-10, R-11). Among the large ranchos established during this period, the Santa Rosa Rancho (located on the Santa Rosa Preserve) is a prime example of cattle ranching in Southern California (State Historical Landmark # 1005, R-15).

As travel along the Sante Fe Trail brought more settlers, the pattern of settlement developed along the Santa Ana and San Jacinto waterways. With the influx of new settlers, some of the larger ranchos were divided into smaller parcels. Among these, Louis Rubidoux purchased 6,700 acres in the center of Rancho Jurupa. After his death in 1868, a portion of his ranch would become part of the Riverside Colony (Brown, 1985) (State Historical Landmarks # 102, 303; R-13 and R-16).

With the 1848 signing of the Treaty of Guadalupe Hidalgo ending the Mexican American War, California entered into the American period. Within two years, on September 9, 1850, California entered the union as a free state. On September 15, 1858, the first Butterfield stage carrying overland mail left Tipton, Missouri, and passed through Temecula, arriving in Los Angeles on October 7, 1858 (State Historical Landmark # 188; R-21). The event was momentous; finally Southern California had a reliable, relatively fast link to the rest of the union.

The floods of 1862 and the smallpox epidemic of 1862-1863 did little to encourage settlement in the area. The pattern of growth remained slow until after the Civil War and the completion of the transcontinental railroad. Transportation, agriculture, and the control of water are central themes in the settlement, development, and growth of Riverside County.

In 1869, the California Silk Center Association purchased the entire eastern section of the Rubidoux Rancho with the intention of planting mulberry trees for silkworm cultivation on Mount Rubidoux (R-14). Their plan failed, and the property was purchased by Thomas Cover. In 1870, John North, James Greves, and Ebenezer Brown were among 100 prospective colonists to sign up for an excursion from Chicago to see California. Fortuitously, Cover was able to convince Greves and Brown to view his parcel. On September 19, 1870, John North, Charles Felton, John Broadhurst, James Greves, John Stewart, and Tom Cover, as superintendent of canal construction, formed the Southern California Colony Association.

Within three months, the new colonists voted to name their "colony" Riverside. Laid out on a square-mile plan, North's vision included small-scale farms fed by Cover's ditch. The first plantings for the new colony included citrus, deciduous fruit, wine and raisin grapes, almonds, walnuts, and, reportedly, the opium poppy (Brown, 1985). The site of John North's original home in Riverside is preserved as John North Park (R-80). While North, with a great overarching vision of the future, was the founder of Riverside, perhaps one of the most influential early settlers in Riverside was Eliza Tibbets. In 1873, Mrs. Tibbets gained fame when she persuaded the U.S. Department of Agriculture to ship her two navel orange trees from Bahia Province, Brazil. The oranges flourished and provided the bud grafts for the Washington Navel orange industry in Riverside (Brown, 1985) (State Historical Landmarks # 20; R-23).

Throughout the County's history, the control of water would play a decisive role in growth and settlement. In 1862, Bradshaw opened a route from Los Angeles to La Paz, Arizona, in response to the gold strike. To cross the Colorado, he established a ferry at "Providence Point." The ferry continued, albeit with some interruption, until the first bridge was built in 1929 (R-20). In 1877, Thomas Blythe and Oliver Calloway filed the first legal claim for Colorado River water rights. The diversion dam and canal provided irrigation for the Palo Verde Valley, creating the town of Blythe from the desert (State Historical Landmarks # 948; R-13).

Wherever water flowed, growth followed, figuratively and literally. With the completion of the Gage Canal in 1886, the colony of Riverside grew at a remarkable rate. Land sales and bumper citrus harvests created a wealthy corporate class. Buildings such as the Loring Opera House (R-71, R-72), Riverside National Bank, the Glenwood Mission Inn (State Historical Landmarks # 761; R-13), and the first commercially significant hydroelectric plant (R-67) were symbols of the region's economic growth.

In 1893, as Jackson Turner stood at the World's Columbian Exposition and announced the closing of the great frontier, Riverside County came into being (Brown and Boyd, 1922; Limerick, 1987; Turner, 1938). Riverside County was incorporated on May 9, 1873. Formed from the southern portion of San Bernardino County and a large portion of northern San Diego County, Riverside County totaled a little over 7,200 square miles, becoming the fourth largest county in the State.

From 1900 to 1940, the population of Southern California blossomed, increasing by a staggering 1,107 percent (McWilliams, 1946:113). While many credit the railroad for boom years, historians Tobey and Wetherell believe the citrus industry was responsible for the region's exponential growth:

> The economics of citrus and, specifically, the sheer scale of production, revenues, profits, and land development, that attended the expansion of the citrus industry in Los Angeles and its hinterlands in the first four decades of the twentieth century belie a minor role. Citrus was simply too big an economic engine not to have powered the region's growth in a fundamental way (Tobey and Wetherell, 1995:12).

While Mrs. Tibbets may have inadvertently initiated Riverside County's citrus industry, the rise of "citriculture" left its mark on the educational, cultural, scientific, and built environment of Riverside County. While no longer visible, Riverside's Chinatown (National Register of Historic Places; R-44), rebuilt after the 1893 fire, housed up to 2,500 Chinese workers until the 1920s. In 1894, Charles Stoddard described the crews of Chinese packing house workers:

> Chinese citrus crews worked at night "rapidly seizing and wrapping and placing oranges in prepared boxes," while other Chinamen, using a simple machine, press them down and nail on the covers, and stack them for packing in the refrigerator cars (McWilliams, 1946:90).

In 1893, a group of Riverside Growers formed the Pachappa Orange Growers Association. Within a year, the exchange became known as Sunkist Growers, Inc., a label recognized nationally and internationally. In 1900, two of Sunkist's local "exchanges" combined to form the Arlington-Heights Exchange. In 1923, the exchange chose renowned architect Stanley Wilson to design and build The Riverside-Arlington Heights Fruit Exchange building (National Register Property; R-93).

While the citrus industry was responsible for many of the historic structures in Riverside County, one of the more shining examples of citriculture is the Citrus Experiment Station (R-45). Established in 1906 by the Regents of the University of California, the facility later moved to the present-day campus of University of California, Riverside. The two Mission style laboratory buildings on this campus were dedicated in 1918, and a third wing was added in 1931.

In the eastern portion of the County, the foundations were being set for the Coachella Valley date industry. With backing from R. Holtby Myers (founder of Mecca), Bernard B. Johnson traveled to Algeria in 1903 to obtain Deglet Noor date offshoots (Brown, 1985). Johnson's initial plantings were successful and, together with Walter T. Swingle, he convinced the U.S. Department of Agriculture to establish a date experiment station in 1904. Johnson returned to Algeria in 1908 and 1909, bringing back over 3,000 offshoots. By 1913, the Coachella Valley Date Growers Association was established and sent Johnson on a return trip to Algeria, this time for 10,000 Deglet Noor offshoots (R-53). With the up-and-coming date industry, Coachella Valley's future as an agricultural base seemed well grounded. The only problem was that the artesian wells were beginning to fail.

By 1917, the Coachella Valley appeared to have reached its maximum growth potential, with only 5,552 acres of land utilized for agriculture. In response, the Coachella Valley County Water District was established by voters in 1918 (R-47). By 1919, the water district negotiated with the federal government to obtain water from the Colorado River. Thirty years later, on March 29, 1949, the Coachella Branch of the All-American Canal delivered water to the valley.

On June 28, 1914, Archduke Franz Ferdinand, heir to the Austro-Hungarian Empire was assassinated in Sarajevo and almost three years later, on April 6, 1917, the United States declared war on Germany. Congress responded by appropriating funds for the expansion of the Army's Air Service and the establishment of new airfields. On March 1, 1918, the Allessandro Aviation Field opened. Three weeks later, the field was officially named for Lieutenant Peyton C. March, Jr., a pilot killed the previous month in Fort Worth, Texas (R-74).

After the Great War, Riverside County prospered. From 1920 through 1930, only 20 percent of California's population was born in California. The legendary lure of California's Mediterranean climate was just one of Southern California's draws. In the early 1920s, it was estimated that 125,000 visitors were spending $3,000,000,000 a year in Southern California (McWilliams, 1946:242).

During the Great Depression, the federal government kept people employed with a number of programs. Among these programs was the construction of the Colorado River Aqueduct, directed by MWD. In 1933, Dr. Sydney Garfield opened the Contractor's General Hospital six miles west of Desert Center (California State Historical Landmark # 992; R-114). Garfield's plan included a prepaid insurance program whereby he kept workers healthy and on the job. Later, in association with Henry Kaiser, the Kaiser Permanente program was born.

While some elements in Riverside County's history could be foreseen, perhaps one of the most unusual events occurred on July 14, 1937. Three Soviet fliers, pilot Mikhail Gromov, co-pilot Andrei Yumashev, and navigator Sergei Danlin, flew the first successful aerial navigation over the North Pole region. The airplane, a 1937 Soviet, single engine ANT-25 monoplane, was unable to land at San Francisco or San Diego due to fog and touched down in San Jacinto (California State Historical Landmarks # 989; R-133). The Soviets became overnight celebrities, and the airmen from March Field had to set up barricades to prevent sightseers from taking souvenirs from their aircraft. The Riverside Chamber of Commerce greeted them at a dinner, and President Franklin Roosevelt welcomed them at the White House before their return to Moscow.

This historical overview ends with the United States entry into World War II and Riverside County's commitment to that endeavor. On April 30, 1942, with General George S. Patton Jr. as commander, the Desert Training Center began operations, billed as the largest training center in the world (California State Historical Landmarks # 985; R-117). The training ground encompasses 18,000 square miles in three states: California, Arizona, and Nevada. Designed to train soldiers for desert survival and as an armored vehicle training ground (reportedly, tank tracks can still be seen), the Center includes a landing strip. During its four years of operation, over one million men and women served there. Of 11 camps established within Patton's exercise area, seven were located in California: Clipper, Coxcomb, Granite, Ibis, Iron Mountain, Pilot Knob, and Young. In the late 1980s, a museum named for General Patton was established at Chiriaco Summit to commemorate the activities of the Center.

The development of transportation systems has played a key role in the settlement of Riverside County. The historian Frederick Jackson Turner described the European settlement of the west as a progressive series of steps along a path. These steps included initial exploration by explorers following trails established by Native Americans and expanding these trails into a regular network for overland travel. Turner believed that the opportunity for "free" land served to drive exploration and settlement of the western frontier. While the earliest non-native forays into Riverside County were individuals passing through to other regions of Southern California, the earliest settlements did develop along many of the early trails and paths into the region, and many are still in use today.

Trails and Roads

In 1818, when Leandro Serrano settled in Temescal, he followed the traditional paths used by the Luiseno and Gabrielino. By 1831, this path became the route used by J.J. Warner of Warner's Ranch. In 1849, the explorer John Fremont followed this well-worn route, and from 1849 through 1851 it was well traveled during the gold rush. From 1858 through 1861 it became the Butterfield Stage route, and today it is the old Temescal Road (R-5, R-6, California Historic Landmark # 638, California Historic Landmark # 188), which approximates the current Temescal Canyon Road.

In the San Gorgonio pass area, a similar chain of events occurred. In 1854, Dr. Isaac W. Smith and his family built an adobe residence in the area now known as Highland Springs. While the Smiths were the first non-native settlers to the area, this adobe was built on the foundations of an earlier adobe associated with an outpost of the Mission San Gabriel. Even earlier, the springs were associated with the Serrano and Cahuilla. In 1860, the Smith homestead became a stage stop on the Bradshaw Trail, the route between Los Angeles and the gold strike in LaPaz, Arizona. In 1927, the property was developed into a tourist retreat and renamed Highland Springs by Frederick Hirsch (R-68).

While exploration, settlement, and growth followed a fairly reliable pattern, as expounded by Turner, the effect of railroads on settlement not only emulated the Turnerian pattern but also in some instances created it.

Railroads

The railroads and Southern California have a unique give-and-take relationship. While much of the early settlement and growth in Riverside County is linked to railroad "boosterism," the later growth of the railroad can be linked to the expansion of the Southern California citrus industry.

When the Southern Pacific Railroad began construction in the 1870s, most of the work was completed by Chinese labor. Ten years later, the California Southern railroad began construction in San Diego; by 1881 it reached Temecula Canyon, again largely built by Chinese labor. The first Chinatown in the City of Riverside was located within the historic Mile Square district in 1880. In 1893, Chinatown was destroyed by fire and relocated west of Brockton in the Tequesquite Arroyo (R-44). The California Southern railroad from the San Diego area reached to San Bernardino via Riverside in September, 1883. By 1885, the California Southern linked with the Sante Fe, establishing a second transcontinental railroad.

From 1876 to 1890, the Southern Pacific Company promoted Southern California through publicity, settlement agents, and land bureaus. McWilliams notes that the railroad agents ". . . sold lots in Southern California towns to prospective settlers in Ireland before they had booked passage for America" (1973:126). Perhaps the best known examples of the railroads promoting sales in Southern California were the excursion parties and emigrant trains. In fact, the colony of Murrieta was promoted as an area "which for richness of soil, salubrity of climate, excellence of water and healthfulness cannot be excelled (California Southern Railroad poster circa 1880)." The history of Temecula and Murrieta exemplifies some of this early settlement and growth in Riverside County.

The area around Temecula was used extensively by the Luiseno and Juaneno. During the Mexican era, it served as a crossroads and the center of ranching activities. In 1873, Louis Wolf and John Magee began the Temecula settlement with their store and stage station. With the construction of the railroad through the canyon in 1882, the first railroad station and post office was established on January 24, 1883 (R-23, R-26). The colony of Murrieta, promoted by the California Southern, started as a small ranching area settled by Juan Murrieta. With the establishment of the train station, Murrieta became a shipping point and center of commerce for local ranchers and farmers.

4.6.1.4 Cultural Resource Sensitivity

The relative sensitivity of the diverse landscapes of Riverside County for cultural resources is shown in Figure 4.6.4. Three classifications are used: high, undetermined, and low.

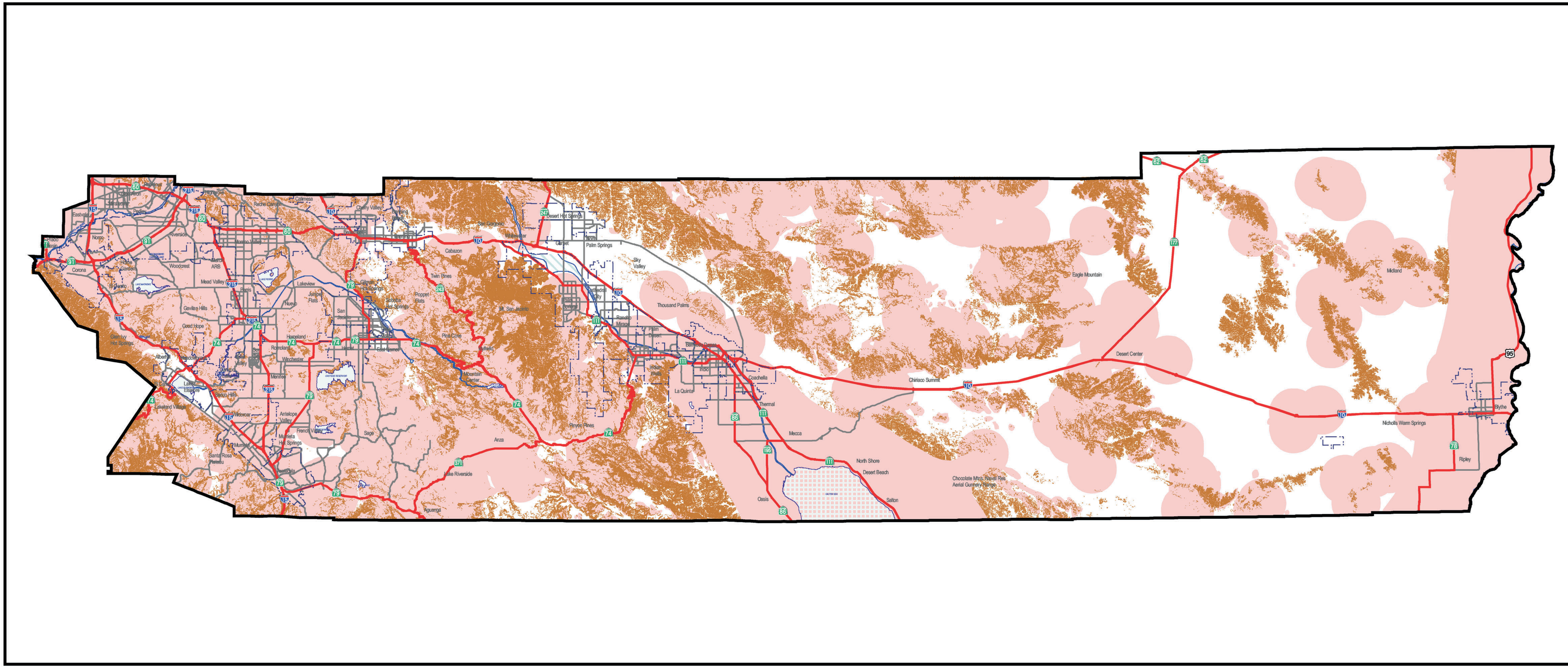
Properties with high potential include those listed or determined eligible for listing in the National Register of Historic Places. Table 4.6.D provides a summary of those Riverside County properties listed on the National Register.

4.6.2 Paleontological Resources

4.6.2.1 Paleontological Resource Overview

Regional Geology

Riverside County falls within several geologic provinces. The Transverse Range Province and the Peninsular Range Province encompass the western county, and the Mojave Desert Province and the Colorado Desert Province cover the east county region. These provinces are cut by major northwest trending fault zones which are,



LEGEND

- Cities
- Highways
- Major Roads

Sensitive Resources

- High Sensitivity
- Undetermined Sensitivity
- Low Sensitivity

Figure 4.6.4

5 0 5 10 Miles

RELATIVE ARCHAEOLOGICAL SENSITIVITY OF DIVERSE LANDSCAPES

from the southwest, the Elsinore Fault Zone, the San Jacinto Fault Zone and the San Andreas Fault Zone.

Table 4.6.D - Riverside County Properties Listed on the National Register of Historic Places

Property Name	Location	Date Listed
Administration Building, Sherman Institute	9010 Magnolia Ave., Riverside	1/9/80
All Souls Universalist Church	3657 Lemon St., Riverside	9/18/78
Andreas Canyon	Address Restricted, Palm Springs	1/8/73
Arlington Branch Library and Fire Hall	9556 Magnolia Ave., Riverside	7/22/93
Armory Hall	252 N. Main St., Lake Elsinore	1/29/92
Barker Dam	SE of Twentynine Palms in Joshua Tree National Monument, Twentynine Palms	10/29/75
Blythe Intaglios	Address Restricted, Blythe	8/22/75
Buttercup Farms Pictograph	Address Restricted, Perris	5/3/76
Carnegie, Andrew, Library	8th and Main Sts.,Corona	6/29/77
Chinatown	Brockton and Tequesquite Aves., Riverside	3/1/90
Coachella Valley Fish Traps	Address Restricted, Valerie	6/13/72
Corn Springs	Address Restricted, Desert Center	10/30/98
Crescent Bathhouse	201 W. Graham Ave., Lake Elsinore	7/30/75
Desert Queen Mine	South of Twentynine Palms in Joshua Tree National Monument, Twentynine Palms	1/17/76
Federal Post Office	3720 Orange St., Riverside	11/20/78
First Church of Christ, Scientist	3606 Lemon St., Riverside	9/22/92
First Congregational Church of Riverside	3504 Mission Inn Ave., Riverside	4/3/97
Gilman Ranch	1937 W. Gilman St., Banning	11/17/77
Harada House	3356 Lemon St., Riverside	9/15/77
Heritage House	8193 Magnolia Ave., Riverside	2/28/73
Jensen, Cornelius, Ranch	4350 Riverview Dr., Rubidoux	9/6/79
March Field Historic District	Eschscholtzia Ave., March Air Force Base, Riverside	12/6/94
Martinez Historical District	Off SR 86 Torres-Martinez Indian Reservation	5/17/73

Fossils -- non-renewable paleontological resources -- are very important for dating sedimentary rocks, and thus determining the time of movement of faults against which those sediments lie. Eastern and western Riverside County have fossiliferous sediments that occur in different settings. In the western portion of the County, fossils occur in sediments lying on the surface of crystalline bedrock, or are deposited in or between the major fault zones.

Eastern Riverside County has fault block mountains that contain the older fossiliferous sediments. Younger deposits containing fossils are found around dry lakes, along high stands of the Salton Sea, and in terraces left by the Colorado River.

The oldest fossils in California are of Proterozoic age (900 million years old). Fossils in Riverside County of comparable age have been destroyed by the natural process of metamorphism. The oldest fossils found in Riverside County are from the late Jurassic Period (150 million years). Fossils from the late Cretaceous, the end of the Age of Dinosaurs, include ammonites, clams, and giant oysters.

The Cenozoic Era, the Age of Mammals, is divided into the Tertiary Period (65 million years to 2 million years) and the Quaternary Period, which includes the Pleistocene (2 million years to 10 thousand years) and the Holocene (10,000 years ago to present). The Tertiary Period records depositional events where continental sediments mixed with marine sediments. These important fluctuations in sea level are recorded in the Elsinore Fault Zone to the west and, in the Salton Trough of eastern Riverside county, as far west as Cabazon. Large fossils from the Tertiary Period include whales, sharks, primitive elephants and oreodonts, camels, and horses.

During the Quaternary Epoch, Riverside County was affected by increased Pleistocene rainfall which filled basins and fault zones and turned depressions into lakes. The influx of new sediment buried remains of large and small animals. Deposition of fossiliferous sediment occurred along the margins of the Salton Sea and along the Colorado River. The climate changed drastically ten thousand years ago from the end of the wet Pleistocene to the very dry Holocene. The record of changing plants and animals is preserved as mummified samples in the nests built by pack rats.

Summary of the Fossil Record

Riverside County has an extensive record of fossil life (Table 4.6.E). The record starts in Jurassic time, 150 million years ago, with diverse marine mollusks. The oldest Tertiary flora in southern California is found east of Lake Elsinore, and dates to around 60 million years ago. The 23 million year old oreodonts and camels, and the tracks of camels, come from the Orocopia Mountains in central Riverside County.

Marine advances are recorded at Corona, and in the Salton Trough. Marine sandstones of the Imperial Formation in the Salton Trough are found as far northwest as Cabazon. Three million years ago, near the present I-15/SR-91 interchange, was the white sand beach at the edge of the Pacific Ocean. The Ice Ages left fossils of giant sloths, elephants, camels, and bison that were preyed upon by giant bear, American lion, and sabercats. Their remains lie waiting a few feet below the surface to be unearthed by construction excavation.

Table 4.6.E - Paleontological Resources by Age, Formation, and Location

	Western Riverside County	Central Riverside County	Eastern Riverside County
	Mesozoic Era: The Age of Dinosaurs		
Jurassic Period 150 million years ago	The Bedford Canyon Formation in western Riverside County has been dated by a distinctive fauna of ammonites, brachiopods, and mollusks as Late Jurassic in age.		
Late Cretaceious Period 75 million years agp	The Ladd Formation contains the Holz Shale which produces large ammonites and giant clams distinctive to that time period. Dinosaurs have not yet been found in Riverside County, but are likely to occur in this unit, which encompasses the Santa Ana Mountains. Hadrosaur bones from a duck bill dinosaur have been found in nearby Santiago Canyon, in Orange County.		
	Cenozoic Era: The Age of Mammals		
General	Western Riverside County has a long Tertiary record of marine advances and retreats. The fossiliferous marine sediments interfinger with sediments from the continent which contain land mammals. This record spans a period of time from 65 million years to 2 million years.	The fossils in central Riverside County are located on the bedrock isthmus between troughs of marine advances in western and eastern Riverside County. In part, the marine advances were simultaneous, and only 40 miles apart.	The Tertiary record of the eastern county includes Eocene marine fossils and the earliest record of Miocene land mammals in Riverside County. Deposition of late Miocene and early Pliocene marine sediments and their fossils have separate histories in the San Jacinto and San Andreas Fault Zones, and along the Colorado River.
Paleocene Epoch 65-55 million years ago	The “Martinez Formation,” marine and non-marine siltstone, sandstone and coal north of Lake Elsinore contains Riverside County’s oldest fossil flora. The Silverado Formation in southwestern Riverside County and Temescal Canyon consists of non-marine silty sands that grade upward into marine sediments which contain a diverse molluscan fauna.		
Eocene Epoch 55-34 million years ago	The Santiago Formation crops out in Santa Ana Canyon. The marine and non-marine sandstone contains abundant marine molluscs.		The Orocopia Mountains contain marine clams, snails and foraminifera. These sediments have been moved 200 miles away from their counterparts at Tejon Pass by the San Andreas Fault.

	Western Riverside County	Central Riverside County	Eastern Riverside County
Oligocene Epoch 34-24 million years ago	The Sespe and Vaqueros formations are non-marine and marine, respectively, interfingering across a broad, ancient coastal plain, that now includes Corona and Temescal Canyon. The green and white marine sediments contain fossil clams, snails, plants, crabs, and the teeth of sharks and rays. The non-marine red beds contain extinct camels, oreodonts, horses, rhinos, and carnivores. Important small finds are primates, insectivores, and rodents which help date portions of this formation that spans 10 million years.		
Miocene Epoch 24-4.5 million years ago	The Puente Formation in the Chino Hills is late Miocene in age, deposited from 12 to 7 million years ago. These marine sediments contain extremely well preserved fish, whales, sharks, clams, nautiloids and seaweed. Of great importance are fossil logs and leaves of many species of land plants, including palm fronds and pine cones and needles.	The Lake Mathews Formation, from Lake Mathews east to Val Verde, contains rare fossil oreodonts and camels from the period between 11 - 9 million years. These fossils were deposited in lakes and stream channels cutting through granitic bedrock. The Mount Eden Formation along Gilman Springs Road signals the initial basin filling of the Perris Block in late Miocene time (6 million years ago). Fossils used to date the formation are bear, rhinoceros, giant sloth, peccary, camel, deer, antelope and horse.	The Orocopia Mountains also contain the oldest Miocene mammals in Riverside County. These are a small oreodont and a camel. Tracks of the small camel are also found. Mid -Miocene sediments (15 million years) in the Palo Verde Mountains and the Mule Mountains have produced the bones of a three toed horse and the tracks of a large extinct camel. The Imperial Formation (6 million years) records a marine advance from the Gulf of California into the proto-Salton trough. Fossil whales, sharks teeth, and marine molluscs are found as far northwest as Cabazon, in west - central Riverside County. In addition to whales, walrus and sea cow are also found in the Imperial Formation. These marine mammals invaded the opening gulf in clean ocean water, prior to when silts were carried in by the Colorado River.
Pliocene Epoch 4.5-2 million years ago	The Fernando Formation crops out around Prado dam and Corona and is late Miocene to Pliocene in age, dated	The San Timoteo Formation makes up the Badlands north of Moreno Valley. It was deposited on top of the Mount Eden	The first sign of deposition by the Colorado River is the Bouse Formation, exposed between Parker and Blythe in the Colo-

	Western Riverside County	Central Riverside County	Eastern Riverside County
	by the presence of rhinoceros and primitive mastodon (5 million years) and distinctive small rodents (3 million years). Sediments containing fossils are in a near-shore marine deposit. The view at the time from Corona to the southwest was of the Pacific Ocean - before the Santa Ana Mountains were to rise!	Formation 4.5 to 1.3 million years ago, through Pliocene and Pleistocene time. The age of the formation has been determined by the fossil mammals that are very different than those that occur in the area today. Porcupine, muskrat, voles, lemmings and cotton rats are found in the sandstone of the Badlands, and suggest a cool well watered environment. Also present were giant bear, coyote, horse, tapir, camel, deer, mammoth, and giant ground sloth. The Elsinore Fault Zone around Murrieta and through Pauba Valley contains sediments which span early Pliocene time (4 million years) to the late Pleistocene (0.3 million years). Sediments equivalent to the Pauba Formation are exposed in the Elsinore Fault Zone from Temecula northwest to Norco. The age is based on a very important fossil record which includes ground sloths, mastodons, camels, horses, peccary, skunk, porcupine, rabbits, rodents and shrews. Birds, reptiles, amphibians, fish and clams and snails have also been described.	rado Trough. Fresh water fish and barnacles of unusual shape indicate that the marine waters of the Imperial formation were being freshened by the silty waters of the newly formed Colorado River at about 4.5 million years ago. The Mecca Hills contain fossils of extinct horses and cotton rats which date the start of deposition in the mid-Pliocene.
Pleistocene Epoch 2.5 million-10,000 years ago	Pleistocene deposits containing Ice Age fossils are found across Riverside County. The remains of large mammoths, mastodons, ground sloths, bison, horse and camel are associated with important remains of small rodents and insectivores that describe changes in habitat and age of deposit.	Buried Ice Age fossils occur in stable or subsiding areas in western Riverside County. Fossil antelope and horse have been found near Norco. Saber cat, giant ground sloth, and camel have been found further north in the Chino Basin. Ice Age fossils have been found buried only four feet below the surface of the Perris Plain. These near surface finds include saber cat, deer, horse and mammoth and large juniper logs from a time when the climate was colder.	Mammoths and bison occur in the Chemehuevi Formation along the Colorado River. Camels and horses are found in Ice Age lake sediments around Ford and Palen Basins, and in the lake sediments of Pinto Basin. Large fish fossils from the Colorado River system are found in ancient Lake Cahuilla sediments deposited in the Salton Trough.

	Western Riverside County	Central Riverside County	Eastern Riverside County
		A spectacular buried assemblage of Ice Age fossils has been unearthed by excavation for the Eastside Reservoir. At least 1500 fossil localities below eight feet of depth have produced fossils the same age as, and as significant as those from the La Brea Tar Pits. Mastodon, giant ground sloth and bison are abundant but horse, camel, sabercat, dire wolf, and many other medium and small mammals are present, associated with reptiles, amphibians and birds.	

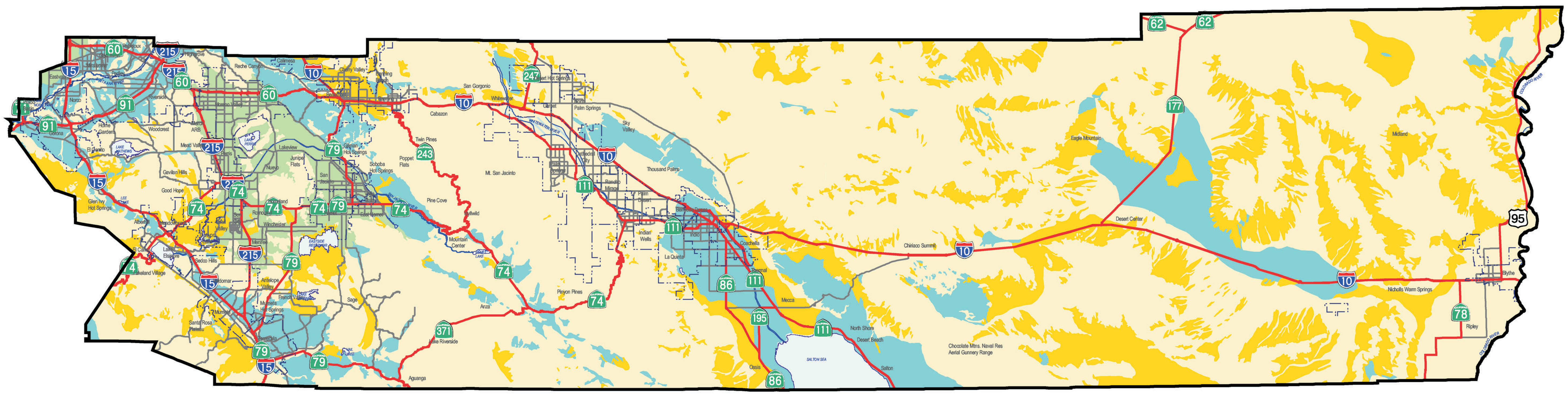
4.6.2.2 Paleontological Sensitivity

Figure 4.6.5 identifies the sensitivity of lands within Riverside County in relation to the potential for finding paleontological resources. The Paleontological Sensitivity map classifies lands into the following categories:

- ***Low Potential***. This category encompasses lands for which previous field surveys and documentation demonstrates as having a low potential for containing significant paleontological resources subject to adverse impacts. The mapping of low potential was determined based on actual documentation, and was not generalized to cover all areas of a particular rock unit on a geologic map. For instance, an area mapped as "Qal" may actually be a thin surficial layer of non-fossiliferous sediments which covers fossil-rich Pleistocene sediments. Also, an area mapped as granite may be covered by a Pleistocene soil horizon that contains fossils. Thus, actual sensitivity must be ultimately determined by both a records search and a field inspection by a paleontologist, and those areas designated as having a low potential include those for which field inspections have been completed.

- ***Undetermined Potential***. Areas underlain by sedimentary rocks for which literature and unpublished studies are not available have undetermined potential for containing significant paleontological resources. These areas need to be inspected by a qualified vertebrate paleontologist before a specific determination of high potential or low potential for containing significant non-renewable paleontological resources can be made.

- ***High Potential***. Sedimentary rock units with high potential for containing significant non-renewable paleontological resources are rock units within which vertebrate or significant invertebrate fossils have been determined to be present or likely to be present. These units include, but are not limited to, sedimentary formations



LEGEND

Cities
Highways
Major Roads

Paleontological Sensitivity

- High A (Ha)
- High B (Hb)
- Low
- Undertermined

5 0 5 10 Miles

Figure 4.6.5

PALEONTOLOGICAL SENSITIVITY

which contain significant non-renewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. High sensitivity includes not only the potential for yielding abundant vertebrate fossils, but also for production of a few significant fossils that may provide new and significant (taxonomic, phylogenetic, ecologic, and/or stratigraphic) data. High sensitivity areas are mapped as either "High A" or "High B."

- ***High Sensitivity A (High A)*** is based on geologic formations or mappable rock units that are known to contain or have the correct age and depositional conditions to contain significant paleontological resources. These include rocks of Silurian or Devonian age and younger that have potential to contain remains of fossil fish and Mesozoic and Cenozoic rocks that contain fossilized body elements, and trace fossils such as tracks, nests, and eggs.

- ***High Sensitivity B (High B)*** is a sensitivity equivalent to High A, but is based on the occurrence of fossils at a specified depth below the surface. The category **High B** indicates that fossils are likely to be encountered at or below 4 feet of depth, and may be impacted during excavation by construction activities.

4.7 Parks and Recreation

Riverside County has a variety of natural and recreational resources, ranging from the mile-high alpine wilderness of San Jacinto State Park to the blistering expanses of the Colorado Desert floor, and from historic parks such as California Citrus State Historic Park to the rolling hills of the Santa Rosa Ecological preserve. Riverside County parks and recreational areas also offer residents and visitors a myriad of recreational opportunities while providing a valuable buffer between built-up urban spaces. The locations of parks and recreation areas are shown in Figure 4.7.1.

4.7.1 Existing and Proposed Parks and Recreational Lands

4.7.1.1 National Park Service: Joshua Tree National Park

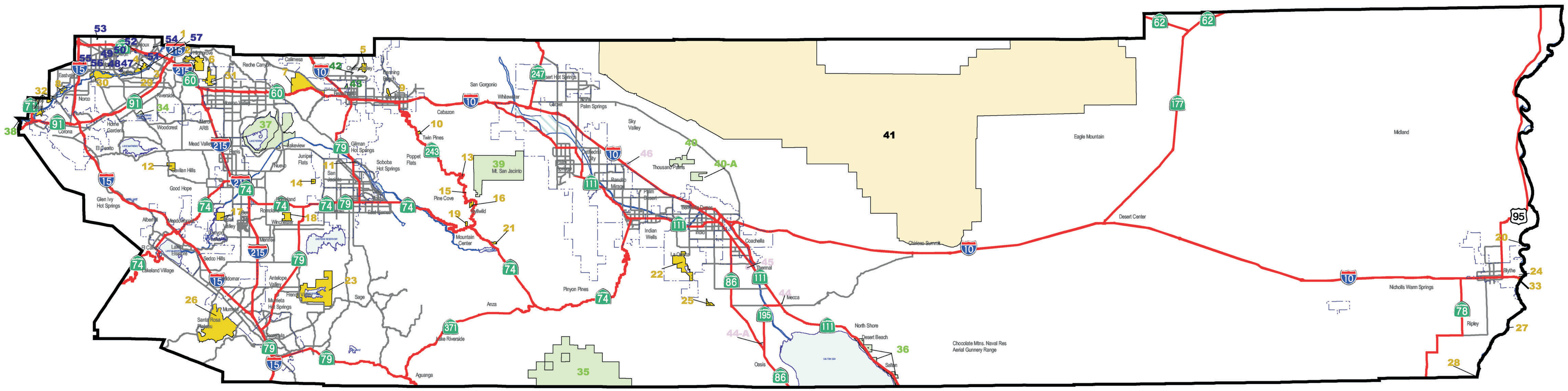
Joshua Tree National Park encompasses 794,000 acres, in north central Riverside County. Joshua Tree, proclaimed a National Monument in 1936 and designated a National Park in 1994, spans the transition between the Mojave and Colorado deserts of Southern California. A significant portion (approximately 630,000 acres) of this park is designated as the Joshua Tree Wilderness. The park has a rich human history and a pristine natural environment. Below 3,000 feet, the Colorado Desert encompasses the eastern part of the park and features natural gardens of creosote bush, ocotillo, and cholla cactus. The higher, moister, and slightly cooler Mojave Desert is the special habitat of the Joshua Tree. Joshua tree forests occur in the western half of the park. This portion of the park also contains some of the most interesting geologic displays found in California's desert. Five fan palm oases dot the park, providing naturally occurring water where wildlife abounds.

Visitor activities within the park include, hiking, rock climbing, picnicking, wildflower viewing, birding, interpretive walks and talks, and camping. The park is always open, with visitor centers open daily from 8 a.m. to 5 p.m. There are no concessions within the park. Communities that surround the park can fulfill most visitor needs.

4.7.1.2 State Parks

Anza-Borrego Desert State Park

The northernmost portion of this 600,000-acre state park lies in southern Riverside County. With 500 miles of dirt roads, 12 wilderness areas, and miles of hiking trails along two dozen separate trails, Anza-Borrego Desert State Park provides visitors with an opportunity to experience the wonders of the Colorado Desert. The park features washes, wildflowers, palm groves, cacti and sweeping vistas, as well as wildlife viewing opportunities. Anza-Borrego Desert State Park has two well developed campgrounds (one with electricity, water, sewer hookups) and offers back country camping.



LEGEND

- Cities
- Highways
- Major Roads

Parks

- County Parks
- JARPD
- CVRPD
- BCVRPD
- National Park
- County Park
- State Parks

ID	Park Name	Owner
1	Trujillo Adobe Park	County
2	Box Springs Mtn Park	County
3	Jensen Alvarado Rch Park	County
4	Santa Ana River Regional Park	County
5	Bogart Park	County
6	Box springs Mtn Park	County
7	De Anza Cycle Park	County
8	Prado Basin Park	County
9	Gilman Ranch Park	County
10	Valley Hi Park	County
11	San Jacinto River park	County
12	Harford Springs Park	County
13	Lawler Lodge Park	County
14	Maze Stone Park	County
15	Pine Cove Park	County
16	Idyllwild Park	County
17	Kabian Park	County
18	Double Butte Park	County
19	Mc call Memorial Park	County
20	Mayflower Park	County
21	Hurkey Creek Park	County
22	Lake Cahuilla Park	County
23	Lake Skinner Park	County
24	Blythe Marina Park	County
25	Fish Traps Archeological Site	County
26	Santa Rosa Plateau Reserve	County
27	Mcintyre Park	County
28	Miller Park	County
29	Louis Rubidoux Native Center	County
30	Hidden Valley Wildlife Area	County
31	Box Springs Mtn Park	County
32	Prado Park	County
33	Goose Flats Wildlife Area	County
34	California Citrus State Park	State
35	Anza-barrego Desrert State Park	State
36	Salton Sea State Recreation Area	State
37	Lake Perris State Recreation Area	State
38	Chino Hills State Park	State
39	Mount San Jacinto State Park	State
40	West Berdoo Canyon State Park	State
40-A	Indio Hills Palms State Park	State
41	Joshua Tree National Monument	Federal
42	Edgar Canyon Nature Park	BCVRPD
43	Noble Creek Park	BCVRPD
44	Mecca Sports Complex	CVRPD
44-A	Oasis Park	CVRPD
45	Thermal Park	CVRPD
46	Thousand Palms Park	CVRPD
47	Clay Park	JARPD
48	Felspar Park	JARPD
49	Knowles Park	JARPD
50	Agate Park	JARPD
51	Memorial Park	JARPD
52	Paramount Park	JARPD
53	Rancho Mira Loma Park	JARPD
54	Avalon Park	JARPD
55	Wineville Park	JARPD
56	Laramore Park	JARPD
57	Rancho Jurupa Park	JARPD

Figure 4.7.1

5 0 5 10 Miles

PARKS AND RECREATION AREAS

Chino Hills State Park

Chino Hills State Park has 13,000 total acres of wilderness area within the counties of Orange, Riverside, and San Bernardino. There are 296.45 acres within Riverside County. Camping, hiking, mountain bike riding, and horseback riding are permitted activities inside the park boundaries.

Lake Perris State Recreation Area

Formed by Perris Dam, Lake Perris offers a variety of water recreation opportunities, including swimming, fishing, boating, sailing, waterskiing, and an area for scuba diving. Wildlife includes ducks and Canadian geese. Anglers can find rainbow trout, catfish, and Alabama spotted bass. The area also offers opportunities for hikers, bikers, and equestrians. Rock climbing is featured in an area south of the dam.

Salton Sea State Recreation Area

One of the world's largest inland seas, this 360-square-mile basin is a popular site for boaters, water-skiers, and anglers. The recreation area offers camping (5 campgrounds with 1,600 campsites), fishing, hiking, and boating opportunities. Educational programs and bird watching are also popular at the Salton Sea State Recreation Area.

Indio Hills Palms

A branch of the San Andreas fault system captures groundwater in this 2,206-acre park, supporting native California palms. This park, east of Palm Springs, is operated by The Nature Conservancy.

Mount San Jacinto State Park

Most of Mount San Jacinto State Park is wilderness and contains three mountain peaks exceeding 10,000 feet. The mountain's high points offer spectacular views of nearby desert and mountain ranges. Visitors can drive into the park from the park's west side or ride a tram on the mountain's east side 2.5 miles from the Coachella Valley.

California Citrus State Park

California Citrus State Park is a 400-acre park created in 1982 that produces citrus fruits. The park contains an activity center, interpretive structure, amphitheater, picnic area, and demonstration groves. Preserving and promoting the citrus industry is the mission of the California Citrus State Park.

4.7.1.3 County Parks

Riverside County maintains 35 regional parks, encompassing approximately 22,317 acres. More than half of these parks are located in the western portion of the County, with other facilities scattered in desert, mountain, and Colorado River regions. The extent of these holdings ranges from Miller Park, (5 undeveloped acres), southwest of Blythe to Lake Skinner Recreation Area (6,040 acres, offering a range of recreational facilities).

Prado Basin Park

There are a variety of family activities at this park. Prado Basin Park has 1,837 acres that include picnic facilities and hiking trails. It is located 4.5 miles northwest of Corona. Camping is permitted to tents and RVs.

Jensen Alvarado Historic Ranch and Museum

A 30-acre museum operated by Riverside County Parks and Recreation Department, the museum provides interactive programs that depict living conditions in the 1880s. The museum is located at 4307 Briggs Street in the Rubidoux area.

Santa Ana River Wildlife Area

Interactive trails provide a scenic wildlife setting that displays numerous animals on display. The wildlife area serves as a nature center that includes hiking and equestrian activities. Various environmental education programs discuss animal habitats and behavior. The nature center is located 2 miles southeast of Limonite on Riverview Drive near the community of Pedley.

Rancho Jurupa Park

Numerous outdoor activities are offered on this 350-acre park in western Riverside County. Camping is permitted on 80 camp sites with water and electricity connections. Equestrian trails, hiking trails, and fishing are permitted at the park. The park is located in the City of Riverside.

Box Springs Mountain Reserve

Equestrian and hiking trails are located in the rolling hills west of Moreno Valley. The reserve's 1,155 acres of open space provides a view to the valley located to the east. Some sections of the reserve are used by the University of California Riverside for biological research studies.

Hanford Springs Reserve

Access is permitted to hiking and equestrian trails. The reserve is 325 acres located near Perris.

Kabian Park

Picnic facilities are available at the 640-acre park located near Perris. Equestrian and hiking trails are also available.

Santa Rosa Plateau Ecological Reserve

The ecological reserve is 6,925 acres and located near Murrieta. Educational presentations are given by the park staff that emphasize the importance of preserving animal and plant habitats. Hiking trails provide recreational activity.

Norton Younglove Reserve

This unique park is designed for off-road vehicles. The reserve has roads with various widths and inclines available. Concession stands provide refreshments for drivers, passengers, and spectators. The park is 640 acres and located near Moreno Valley.

Double Butte Park

The 600 acres of undeveloped open space in Double Butte Park blends with the surrounding landscape. The park has controlled access southwest of the City of Hemet.

Lake Skinner Recreation Area

Lake Skinner is a popular recreational facility that offers a variety of outdoor activities. The park has 259 developed campsites. Launch ramps are available for boating. Fishing and sailing are the only permitted uses on the lake. There is also a swimming pool. Hiking and equestrian trails are located within the park boundaries. Lake Skinner is located near the City of Temecula.

Maze Stone Park

This park is 6 acres, and displays the Maze Stone. The park is located northwest of Hemet.

San Jacinto River Park

This 60-acre park of undeveloped land has controlled access. The park is located 2 miles north of San Jacinto.

Bogart Park

This is a 414-acre day use camping and picnic park. Equestrian and hiking trails are located on the park grounds. The park is located north of Beaumont.

Gilman Historic Ranch and Wagon Museum

Numerous artifacts depicting the west of the 19th and 20th centuries are on display at this historic museum. Staff members participate in educational presentations that portray living conditions of the past. The museum is 135 acres, and is located in the City of Banning.

Valley Hi Oak Reserve

This reserve is a 90-acre park with controlled access located 8.5 miles south of Banning.

Lawler Lodge Park

This park provides lodging for individuals that are seeking accommodations in the San Jacinto Mountain Range. The park is located 1 mile north of Idyllwild.

Pine Cove Park

This park is a 19-acre facility with controlled access near Idyllwild.

Idyllwild Park

This park is 202 acres and is located in the San Jacinto Mountain Range. Equestrian and hiking trails are located inside the park. Camping and picnic facilities are also available. The park is located near Idyllwild.

Idyllwild Park Nature Center

The nature center offers environmental education programs presented by staff members that identify various animal habitats and behavior. Multiple plants are on display and their significance to the environment is analyzed. Several Native American artifacts are on display for the public at the Indian Relic Archaeological Site. The nature center is located near Idyllwild.

McCall Memorial Park

Equestrian trails are the focus of this 88-acre park in which horse camping is permitted. Picnic facilities are available. Fifty-four corals are available for overnight campers to place their horses. The park is located near Mountain Center.

Hurkey Creek Park

Camping is provided in a mountain setting at Hurkey Creek Park. Ninety-one campsites are available on 59 acres. Hiking trails and picnic facilities are located on the premises. The park is located north of Lake Hemet in the Santa Rosa Mountains.

P.V.I.D. Fishing Access

This is a 2-acre fishing only area located 10 miles north of I-10 near Blythe.

Mayflower Park

This is a 24-acre recreational facility with RV hookups and a dump station along the Colorado River. Mayflower Park has camping and swimming facilities. The park is located northeast of Blythe.

Blythe Marina Recreation Area

The marina consists of 14 acres of camping and fishing facilities. The Marina is located off I-10 along the Colorado River.

Goose Flats Wildlife Area

Fishing and boating are permitted at this 230-acre recreational area. The park is located southeast of the City of Blythe on the Colorado River.

McIntyre Park

Various water sport activities are offered at McIntyre Park. Launch ramps are available for boating and fishing. Camping is permitted in the park. Camping and food supplies are available through privately owned businesses inside the park. The Park is located southeast of Blythe on the Colorado River.

Miller Park

This park is 5 acres of undeveloped land located 12 miles southwest of Blythe.

4.7.1.3 Beaumont Cherry Valley Recreation and Park District

Noble Creek Park

This park is 65 acres, and includes a community center, five baseball fields, an equestrian arena, tennis courts, a roller hockey rink, horseshoe pits, and picnic facilities. Soccer fields, volleyball courts, and a model airplane airfield are currently being added to the facility and will be completed in December 1999. The park is located west of Beaumont.

Edgar Canyon Nature Park

This park is an 8-acre facility in which 3 acres are developed. The developed property includes a community center. A nature center is proposed for the facility. The park is located north of Beaumont.

4.7.1.4 Coachella Valley Recreation and Park District

Mecca Community Park

This park is 6 acres, featuring baseball fields, basketball courts, picnic areas, snack bar, rest rooms, playground equipment, and swimming pool. The park is located in Mecca.

Mini Parks

Within the community of Mecca are two 0.5-acre picnic facilities: Mecca Mini Park and Triangle Park.

Oasis Park

Oasis Park is a 5-acre park with playground equipment, baseball fields, and basketball courts located near the Salton Sea near the convergence of Highway 86 and Pierce Street.

Thermal Park

Thermal Park is a 4-acre park with three baseball fields. The park is located on the corner of Polk Street and Church Street near Thermal Airport.

Indio Hills Park

Indio Hills Park is a 7-acre park with playground equipment, basketball courts, softball fields, and a community center. The park is located on Dillon Road, north of Indio.

Thousand Palms

Thousand Palms Park is a 14-acre park with a community center, three baseball fields, soccer fields, picnic facilities, restroom facilities, and a jogging/walking track. A water park is proposed to be added to the facility. The park is located in the community of Thousand Palms.

Bermuda Dunes

This is a proposed 20-acre park with a community center, baseball fields, basketball courts, and restroom facilities. The park is proposed to be located off 42nd Avenue in the community of Bermuda Dunes.

4.7.1.5 Jurupa Area Recreation and Park District

Aggate Park

Aggate Park is a 12-acre facility with baseball fields, playground equipment, and restrooms. The park is located at the Glen Avon Area.

Avalon Park

Avalon Park is a 10-acre multi purpose park with two softball fields, soccer fields, football fields, playground equipment, picnic facilities, and restrooms facilities. In addition, there is a gymnasium with multi purpose floor with volleyball and basketball courts. The park is located in the community of Rubidoux.

Clay Park

Clay Park is a 7-acre multipurpose athletic facility with baseball field backstops, basketball courts, restrooms, playground equipment, and picnic facilities. Clay Park is located on the corner of Clay Street and Haven View in Glen Avon area.

Felspar Park

Felspar Park is 1 acre, located on Jurupa Unified School District property. The facility has an equestrian arena with parking facilities for horse trailer accommodations. The park is located in the community of Pedley.

Knowles Park

Knowles Park is a 6.5-acre multi purpose athletic field with three baseball fields, snack bar, and restrooms. The park is located in Glen Avon Area.

Laramore Park

This facility is 5 acres and has an equestrian arena with restrooms, playground equipment, and picnic facilities. Equestrian trails available for riding are on the park grounds. The facility is located in the community of Mira Loma.

Memorial Park

Memorial Park is a 10-acre facility with a swimming pool, community center, three baseball fields, and picnic facilities. The park is located in the community of Rubidoux.

Paramount Park

Paramount Park is a 0.5-acre facility with a basketball court and open space located in the Sunny Slope area.

Rancho Mira Loma Park

Rancho Mira Loma Park is a 6.5-acre park with open space, baseball fields, picnic tables, and playground equipment. The park is located in the community of Mira Loma.

Wineville Park

Wineville Park is a 5-acre park with open space, baseball fields, picnic tables, and playground equipment. The park is located in the community of Mira Loma.

Centenial Park

Centenial Park is a proposed 13-acre park to be located on the site where a flood control detention basin currently exists. The park is located in the Glen Avon area.

4.7.1.6 Valleywide Park & Recreation District

Valle Vista Community Center is a multipurpose facility that has a basketball court, racquetball court, and child care services. The facility is located near the City of Hemet.

Valle Vista Park is a 4-acre park with open space, picnic area, and playground equipment. The park is located near the City of Hemet.

Winchester Park is a 20-acre park with picnic area and playground equipment. There are plans to build additional facilities at the park. The park is located in the community of Winchester.

La Paloma Park is a 5-acre park with picnic and children's play area.. The park is located in the community of Menifee.

Wheat Field Park is a 25-acre park with four lighted baseball diamonds and children's play area. The park is located in the community of Menifee.

Cottonwood Park is a 10-acre park with a picnic area and baseball diamond. The park is located in the community of Aguanga.

Facility Name	Valley-Wide Facilities and Services		
	Acres	Facilities/Services	Location
Valle Vista Community Center		Indoor basketball court, racquetball court, child care, adult sports	43935 Acacia Ave., Hemet
Valle Vista Park	4	picnic area, play area, turf area	25175 Fairview, Hemet
Winchester Park	20	Picnic and play areas. Additional facilities are under construction	100 block of Haddock Street, Winchester
Cottonwood Park	10	Picnic and sports area	Across from the Cottonwood School, Aguanga
La Paloma Park	5	Picnic and children's play area.	Menifee
Wheat Field Park	25	Sports park with 4 lighted ball diamonds, and children's play area.	30627 Menifee Road, Menifee
Cottonwood Park	10	Picnic area, ball diamond	44260 Sage Road, Aguanga

4.7.2 Existing And Proposed (As of 1999) Trails

Trails are located throughout Riverside County, and come in a variety of designs for pedestrians, equestrians, bicyclists, and all terrain vehicle enthusiasts to enjoy. The CalTrans *Bikeway Planning and Design Manual* (Chapter 1000; 1993) provides a standard by which bikeways are designed and implemented in California. The manual addresses specific design standards for several conditions.

CalTrans standards provide for three distinct types of bicycle facilities:

- ***Class I Bike Path*** - Provides for bicycle travel on an exclusive right-of-way separated from any street or highway with minimal motorist cross flows.
- ***Class II Bike Lane*** - Provides a striped lane for one-way bicycle travel on a street or highway.
- ***Class III Bike Route*** - Provides for shared use with motor vehicle traffic, and signing designating the street or highway as a bicycle route.

4.7.2.1 Existing Trails

Santa Ana River Trail

The Santa Ana River Trail consists of 60 miles of trails that extend from San Bernardino Mountains to Orange County. Seven and half miles of the trail travels through Riverside County. The Santa Ana River Trail is accessible to bikers and joggers. The Santa Ana River Trail is the only existing trail maintained by the Riverside County Regional Park and Open Space District.

Big Morongo Canyon Preserve

Big Morongo Canyon has one of the 10 largest cottonwood and willow riparian habitats in California. For centuries, the preserve was used by nomadic Indians, who found water and game plentiful here. The water attracts desert bighorn sheep, raccoons, bobcats, coyotes, and other mammals. A 3-mile stream and marsh habitat is located between canyon walls of the desert. The Bureau of Land Management (BLM) designated Big Morongo Canyon as an Area of Critical Environmental Concern in recognition of its special values. Big Morongo Canyon is the home to endangered wildlife, enhance sensitive riparian areas, and a wide variety of plants. The reserve is located 15 miles north of Palm Springs on Highway 62. Below is a list of trails located on the premises.

- Hiking Trail Permit, Pedestrian Hiking, and Horses

- Desert Willow Trail - 0.8 mile
- Barn Trail - 0.1 mile
- Yucca Ridge - 0.7 mile
- Mesquite - 0.5 mile
- The Marsh (handicap assessable) - 0.5 mile
- Canyon Trail - 5.5 miles.

C Bradshaw Trail - The Bradshaw Trail is a 70-mile dirt road that is occasionally graded by the Riverside County Transportation Department. The road was formally used in the late 1800s by gold miners as an access route to La Paz, Arizona. Four-wheel-drive vehicles are recommended on the trail due to stretches of soft sand. This east-west trail begins near the Salton Sea State Recreation Area near the community of North Shore. Its extends northeast toward the City of Ripley.

4.7.2.2 Off-Road Vehicle Parks

Rice Valley Dunes

Rice Valley Dunes is a 3,770-acre multi-vehicle use area wherein all-terrain vehicles, dune buggies, and motorcycles are permitted. The site is located in the city of Palm Springs 5 miles south of Rice Valley off of Highway 62.

Wildomar

A 760-acre multi-use vehicle area with 4 miles of trails. All-terrain vehicles, dune buggies, and motorcycles are permitted. The riding area is located in the city of Corona on 6th Street.

Ira G. Long

Off-Highway Vehicle Grant Coordinator of Riverside BLM Office is the contact of off-road vehicle parks.

4.7.2.3 Proposed Trails

Proposed trails can be found on the existing Riverside County Comprehensive General Plan Open Space and Conservation Regional Trails Map. In addition, trails that may be maintained by grass roots organization, mountain bike clubs, and community organizations can be found on community plan maps and bicycling club maps.

4.8 Visual Resources

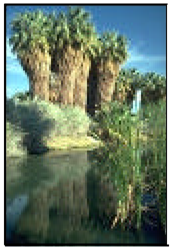
The following section describes the existing visual character of Riverside County. Due to the size of the County, a comprehensive analysis of every visual asset and feature is not feasible. However, the visual character of Riverside County is depicted and described in a general manner to provide a basic understanding of the major physical features, landmarks, and characteristics of the County.

The visual character of the County is described on two levels: the County as a whole and by region or area. The countywide description, as shown in Figure 4.8.1, provides an overview of the major geographic features, such as valleys, deserts, mountain ranges, and water bodies. Pictures depicting this general character are keyed to a topographic map of the County. Text is provided to describe the major features and provide a general framework for the County.

The region or area descriptions help the reader to gain a greater understanding of the unique aspects, features, and characters of the County. The boundaries of the regions are selected to capture areas of common physical characteristics and similar development patterns. The boundaries of the regions are shown in Figure 4.8.2.

Figures 4.8.3 through 4.8.17 provide the region or area descriptions. Each regional description includes a photographic display keyed to a regional map to provide a general description of the area's features. The major geographic features, landmarks, historical characteristics, officially designated or eligible scenic highways, water bodies, incorporated cities and unincorporated communities are described and/or depicted in each region.

1.ChuckwallaValley



2.ThousandPalms

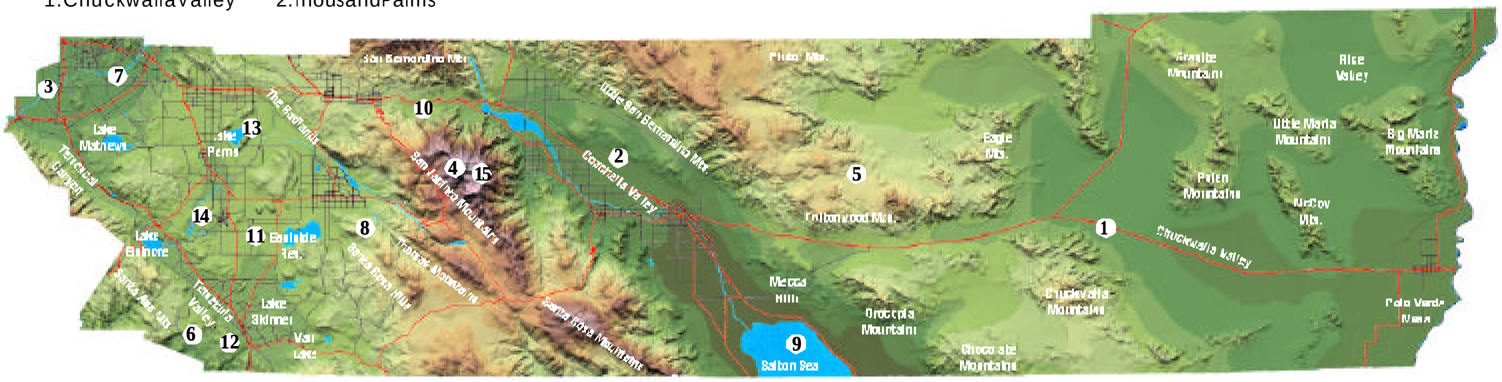
Riverside County

RiversideCountycomprisesover7,200squaremilesextendingroughly200milesinwidthfromtheColoradoRivertowithin14miles ofthePacificOcean.RiversideCountysharesborderswithOrange,SanDiego,ImperialandSanBernardinoCounties. Withinthe County,thereare24incorporatedcitieswithindividualidentitiessetamongamixtureofruralcommunities,small towns,desertsand openspaceareas.Thevariouscommunitieswithintheunincorporatedareasaredefinedbyboththebuiltenvironment andthe surroundingtopography,whichincludesrivervalleys,lakes,lowdeserts,mountains,foothillsandrollingplains.

TheCountyisdividedintoeasternandwesternregionsbytheSanJacintoMountains.AdeepvalleyknownastheSanGorgonio Pass,framedbytheSanJacintoandSanGorgonioMountains,servesasanaturallinkbetweenthesetwovastareas.TheSan Bernardino,LittleSanBernardinoandPintoMountainsformaportionoftheCounty'snorthernboundarywhilenumerousmountain ranges,includingthoseintheSantaRosaWildernessandClevelandNationalForest,serveasboundariesalongthesouthernand westernedgesoftheCounty.

10.SanGorgonioPass

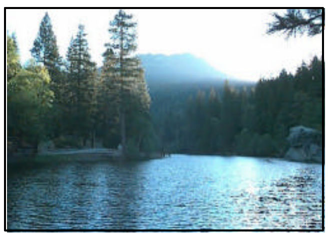
11.GrazingLand



12.MurrietaCreek

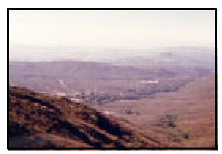
13.LakePerris

3.PradoDamBasin

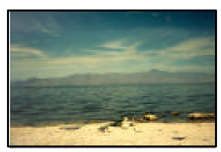


4.FulmorLake

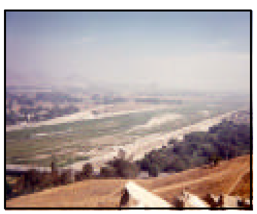
5.JoshuaTree



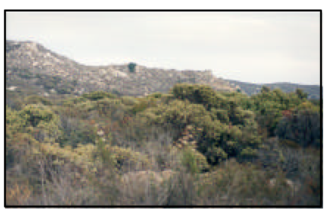
6.ClevelandNat'lForest



9.SaltonSea



7.SantaAnaRiver



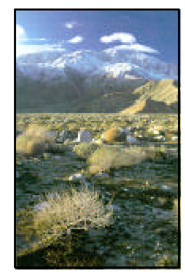
8.SimpsonPark

WesternRiversideCounty

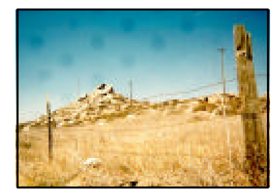
WesternRiversideCountyisboundedbytheSantaAnaMountainsandClevelandNationalForeston thewestandtheSanJacintoMountainsandtheSanBernardinoNationalForestontheeast. Topographyvariesdramaticallyinthisregion,rangingfromlow-lyingvalleystorollinghillsidesand steepmountainousterrainwithlargerockoutcroppings.MajorfeaturesofthisareaincludetheSanta AnaRiverbasin,LakeMathews,LakePerris,LakeElsinore,LakeSkinner,VailLake,theSanJacintoRiver, MurrietaCreektheSantaMargaritaRiver,andthevineyard/citrusregionnearTemecula.TheEastside ReservoirsouthofHemetwillsoonbethelargestreservoirinSouthernCalifornia.WesternRiverside Countyincludesnumerousunincorporatedcommunitiesaswellasthecitiesof Corona,Riverside, Beaumont,Banning,Norco,LakeElsinore,Perris,Hemet,SanJacinto,MorenoValley,Calimesa, CanyonLake,MurrietaandTemecula.

EasternRiversideCounty

EasternRiversideCountyisboundedbytheColoradoRiverontheeastandtheSantaRosaandSan JacintoMountainsonthewest.ThisareaincludestheJoshuaTreeNationalPark,WhitewaterRiver, andaportionoftheSaltonSea.Themosturbanizedareasinthisportionofthecountyarecontained intheCoachellaValley.ThisareaincludestheincorporatedcitiesofDesertHotSprings,PalmSprings, CathedralCity,RanchoMirage,IndianWells,PalmDesert,LaQuinta,Indio,CoachellaandBlythe.The areanearPalmSpringsisnotedforitsgolfresortsnestledamongtheSantaRosaMountainsandDate Palms. ThevastmountainousterrainofJoshuaTreeNationalParkandthedeserttopographyofthe ChuckwallaValleyliebetweentheCoachellaValleyandBlytheandtheColoradoRiver.



15.Mount SanJacinto



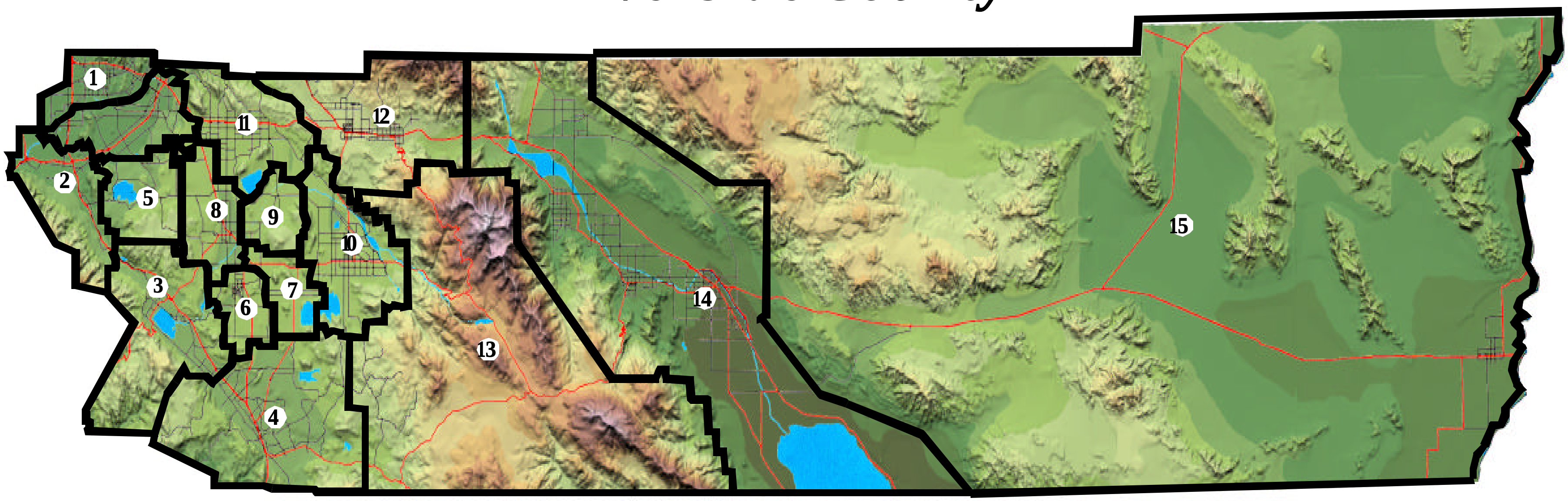
14.RockOutcroppings

Figure4.8.1

Figure 4.8.1

VISUAL RESOURCE RIVERSIDE COUNTY

Riverside County



1. Jurupa/Eastvale
2. Temescal Valley
3. Greater Elsinore
4. Southwest
5. Lake Mathews
6. Highway 74-79
7. Menifee Valley
8. Perris Valley
9. Lakeview/Nuevo
10. San Jacinto Valley
11. Reche Canyon/Lake Perris
12. SanGorgonioPass
13. Riverside Extended Mountain
14. CoachellaValley
15. Eastern Riverside County

Figure 4.8.2

VISUAL ANALYSIS AREAS

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Jurupa Valley is located in the northwestern portion of Western Riverside County immediately north of the Santa Ana River and the Santa Ana River Regional Park. Jurupa is bounded by the City of Riverside to the south, the San Bernardino County line to the east, north and west, and the Eastvale area to the west. Jurupa contains the unincorporated communities of Jurupa Hills, Pedley, Rubidoux, Mira Loma, Sunnyslope, Belltown and Glen Avon. Belltown is a rural community characterized by large-lot and low density single-family residences, a large industrial area and scattered commercial uses. Rubidoux is a growing community of single-family residential neighborhoods with some industrial uses set among the rolling hills in the northern portion of Jurupa. Sunnyslope is a largely rural community with large lot residences adjacent to the Jurupa Mountains. Glen Avon is a rural community with large residential lots and scattered commercial uses. Pedley is another growing community in the southern portion of Jurupa. It contains a variety of single family residential neighborhoods, some of which are amidst rolling foothills, and a thriving commercial district along Limonite Avenue. Adjacent to the community of Eastvale, the fast-developing community of Mira Loma contains a combination of rural and suburban style residential development along with a commercial corridor and scattered agricultural uses such as dairies and grazing lands. Jurupa Hills is a predominantly single-family residential enclave located in the foothills between the Santa Ana River and the community of Pedley. The area around the Flabob Airport and Mission Boulevard contains a large commercial core and residential areas of varying densities.

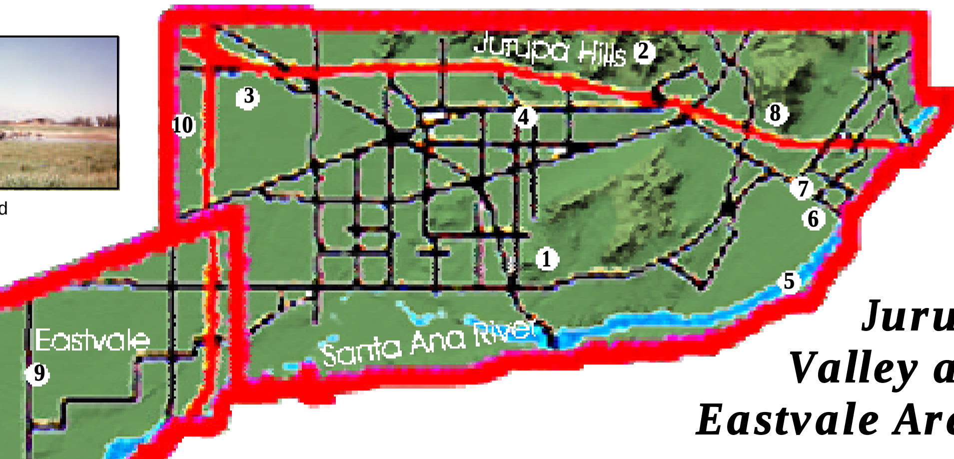

10. Dairy Land


9. Grazing Land


8. Hills Near Rubidoux


1. Pedley


3. Grazing Land



Jurupa Valley and Eastvale Areas


7. Mission Boulevard


2. Jurupa Hills


4. Sunnyslope

The Jurupa area contains a number of scenic resources within its territory, including the Santa Ana River and a number of scattered hillside and valley areas. The Jurupa Mountains are located in the northern portion of Jurupa, while the Pedley Hills are situated in the community of Pedley in Jurupa's south-central area. Mount Rubidoux, located in the City of Riverside, affords Jurupa residents a magnificent backdrop to the southeast. The Santa Ana River corridor with its adjacent floodplain is largely undeveloped and in its natural state. It contains the Santa Ana River Wildlife Area, the Louis Rubidoux Nature Center, and a campground area, and is located adjacent to two golf courses and scattered residential areas, including the Jurupa Hills.

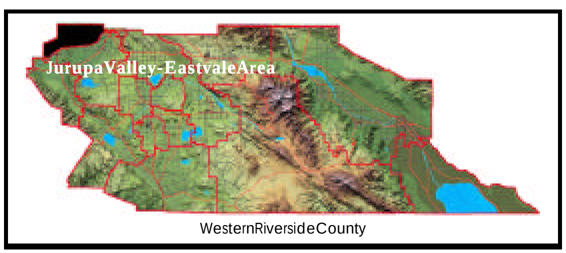
The Eastvale area is located in the northwest section of Riverside County. Eastvale is bordered by the Jurupa area and the community of Mira Loma to the east, the Santa Ana River to the south, and San Bernardino County to the west and north. This area includes the growing community of Eastvale and portions of the Prado Dam Flood Control Basin.

The Eastvale area is primarily flat in topography. Agriculture, public facilities, industrial and scattered residential districts are the primary land uses in the region. From the area one can enjoy views of the riparian corridor along the Santa Ana River as well as the nearby mountainous terrain of the Chino Hills and the Cleveland National Forest.

Located in the western portion of the Eastvale area, State Route 71 from State Route 91 to the San Bernardino County Line is designated a State-eligible Scenic Highway. This roadway passes along the Prado Dam Flood Control Basin and the adjacent Chino Hills.


6. Eastern Jurupa


5. Santa Ana River

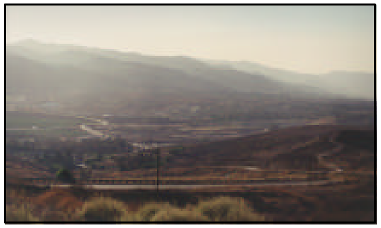


Western Riverside County

Figure 4.8.3

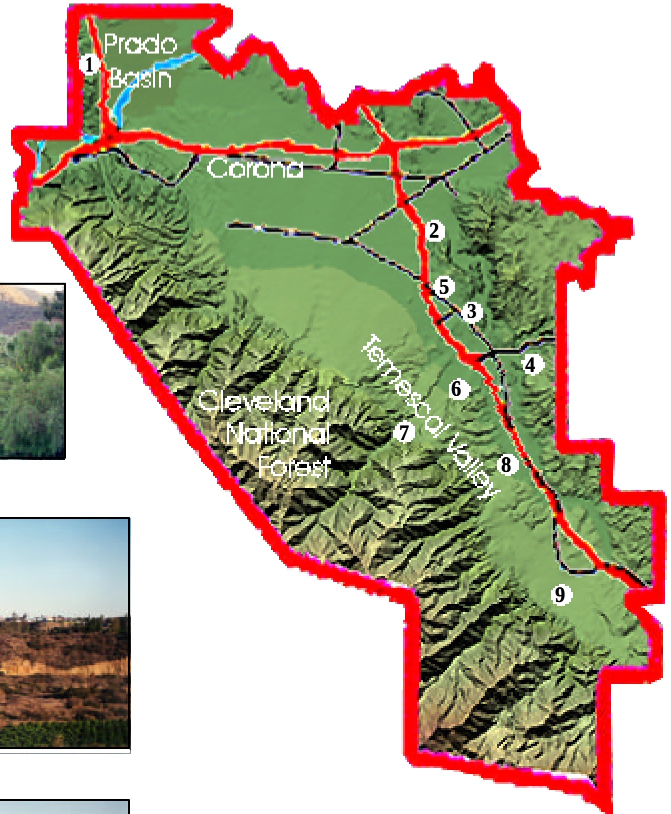
VISUAL RESOURCE
JURUPA VALLEY - EASTVALE AREA

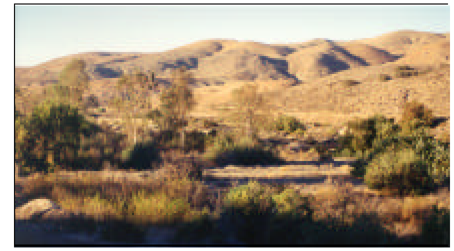
1. Prado Basin



2. Canyon View

Temescal Valley





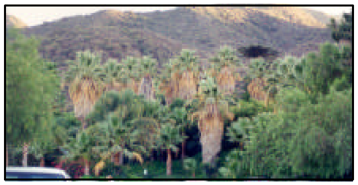
3. Temescal Wash

The Temescal Canyon area is framed by the Santa Ana Mountains and Cleveland National Forest to the west and the Gavilan Hills to the east. The City of Corona lies to the north. This valley runs north to south from the City of Corona to just north of the City of Lake Elsinore. Interstate 15, Temescal Canyon Road and an abandoned railroad right of way run through the valley. Land uses in this area are predominantly rural and suburban style single-family residences set among open space.

Temescal Canyon contains three unincorporated communities. Located west of Lake Mathews and adjacent to I-15, El Cerrito is a hilly, rural, equestrian oriented community with a variety of residential developments. Home Gardens is a residential community adjacent to the City of Corona. Coronita is an older, hilly, golf course community completely surrounded by the City of Corona. Additionally, the southern portion of the Temescal Canyon area contains the Glen Ivy Hot Springs, a lush, landscaped setting complete with hot springs and mud baths.

The Temescal Canyon region is largely characterized by the extensive mountain ranges that frame the Temescal Valley. These mountainous areas are filled with numerous rock outcroppings and sparse low-lying vegetation typical of the region. Scattered oak trees and riparian areas like the Temescal Wash are also found throughout the area. Most of the gently sloping residential neighborhoods of the valley area are afforded splendid views of the Cleveland National Forest and other hillside areas in and around the region.

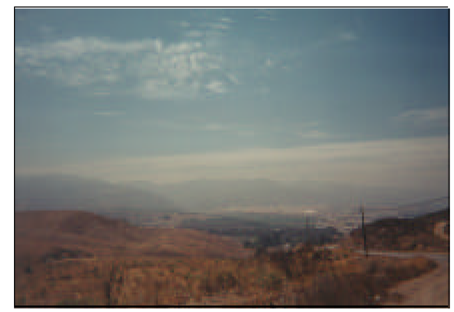
State Route 15 from the San Diego County line to Corona serves as one of the area's two State-eligible Scenic Highways. This roadway travels through the Temescal Valley along the eastern edge of the Santa Ana Mountains. The second scenic corridor is State Route 91 from the State Route 55 junction near Santa Ana to the Interstate 15 junction in Corona. This roadway passes between the Chino Hills and Santa Ana Mountains, just north of the Temescal Valley and adjacent to the Prado Flood Control Basin.



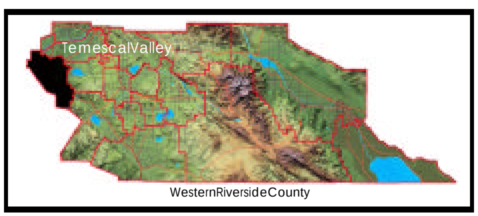
9. Glen Ivy Hot Springs

4. Gavilan Hills

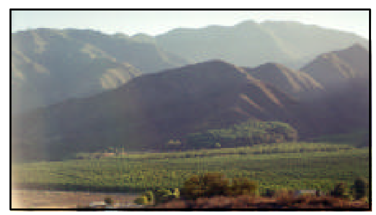
8. Hillside Residential



5. Temescal Valley



7. Cleveland National Forest



6. Agriculture, Cleveland NF

Figure 4.8.4

VISUAL RESOURCE
TEMESCAL VALLEY

TheGreaterLakeElsinoreareaislocatedinwesternRiversideCountyandsurroundsandincludesLake Elsinore. TheGreaterElsinoreregionissetoneithersideoftheMurrietaValleyandisframedonthewestby theSantaAnaMountainsandClevelandNationalForest,andontheeastbytheGavilanHills.Thisarea includestheincorporatedcitiesofLakeElsinoreandCanyonLakeandtheunincorporatedcommunitiesof LakelandVillage,Sedco,Wildomar,Meadowbrook,LeeLakeandHorsethiefCanyon.

TheSantaAnaMountainsonthewesternslopeofthisareacontainaportionoftheClevelandNational Forestandarecharacterizedbyoakandpineforestswithscatteredresidencesandrecreational campgrounds. LakelandVillagesitsatthefootoftheSantaAnaMountainsadjacenttoLakeElsinore.This communityischaracterizedbylakesideresortsandcampgroundssetamongsingle-familysubdivisions, commercialusesandolderresidentialneighborhoods.

LocatedsouthoftheCityofLakeElsinorearethecommunitiesofSedcoandWildomar.SedcoHillsis primarilylocatedeastofInterstate15,whileWildomarislocatedbetweenInterstate15andtheCityof Murrieta. Thesecommunitiesarediversesemi-urbanizedareaswithawiderangeofresidentialdensities andcommercialuses.TheareaeastofInterstate15ischaracterizedbylargelotruralresidentialuses scatteredamongsteeppeaksandrollinghills.Afewhigherdensityresidentialenclaves,suchastheFarm SpecificPlanarea,arelocatedhere.Thewesternportionofthisareacanbecharacterizedbyhigher densityresidentialuseswithcommercialuseslocatedalongMissionTrailsandPalomarStreet.

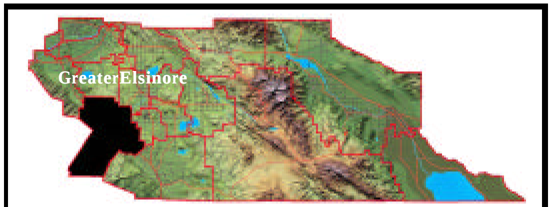
TheHorsethiefCanyonareaislocatedgenerallynorthoftheCityofLakeElsinore.TheHorsethiefCanyon specificplanareaisaresidentialdevelopmentwestofI-15whichterracesdownahillsidewiththe ClevelandNationalForestasitsbackdrop.LeeLake,aprivatefishinglake,islocatedeastoftheI-15,atthe baseoftheGavilanHills,alongwithpocketsoflargelotruralresidentialdevelopmentandheavy equipmentstoragealongTemescalCanyonRoad.LargeopenlandholdingsforPacificClayarelocated westoftheI-15northoftheCityofLakeElsinore.

1.Highway74View

2.LakeElsinore&SedcoHills

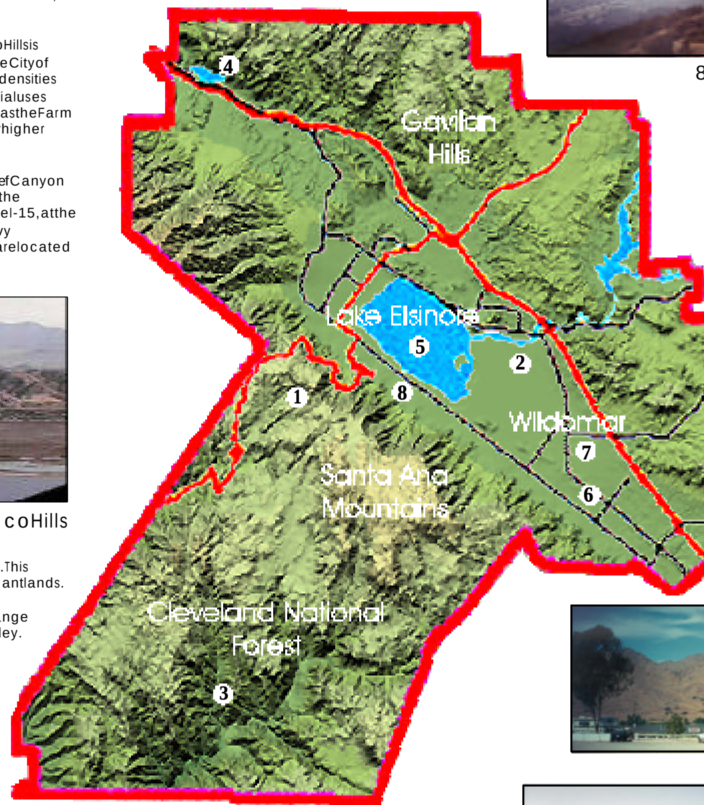
ThecommunityofMeadowbrookislocatednorthofCanyonLakeandsouthofStateRoute74.This communityischaracterizedbylargeresidentiallotssetamongrockypeaks,rollinghillsandvacantlands.

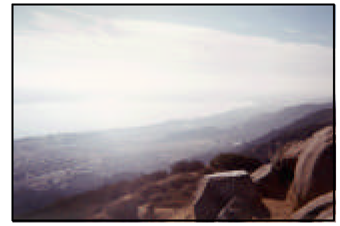
TheGreaterElsinoreareacontainstwoState-eligibleScenicHighways.Highway74fromtheOrange CountyLineintheSantaAnaMountainsnortheastpastLakeElsinoretothefoothillsofMeadValley. Interstate15fromCoronatotheSanDiegoCountylinetravelsthroughtheTemescaland MurrietaValleysalongtheeasternedgeoftheSantaAnaMountainsandthenorthern edgeofLakeElsinore.



WesternRiversideCounty

Greater Elsinore

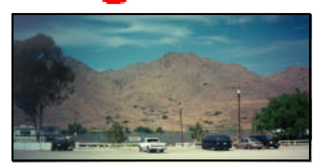




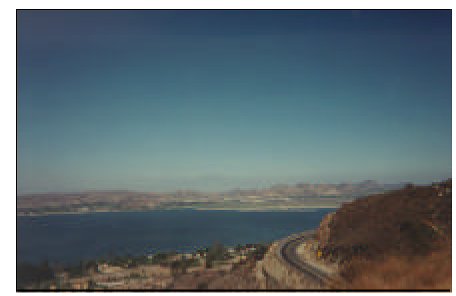
8.LakelandVillage

7.Wildomar-Sedco&Santa AnaMts

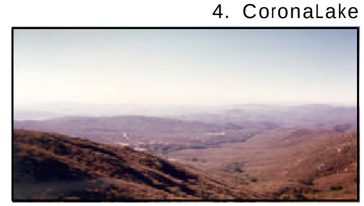
6.Wildomar



4. CoronaLake



5.LakeElsinore



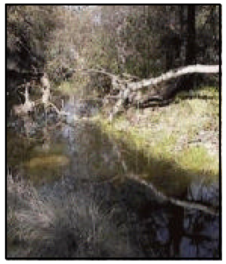
3.ClevelandNationalForest

Figure 4.8.5

VISUAL RESOURCE
GREATER ELSINORE

The Southwest region is located north of the San Diego County line, east of the Cleveland National Forest, southeast of the Greater Elsinore area, south of the Menifee Valley and Highway 74/79 areas, and west of the Riverside Extended Mountain area. The Southwest area is framed topographically by the Santa Ana Mountains on the west, the Santa Margarita and Agua Tibia ranges on the south, the Black Hills on the east. The Murrieta Creek runs along the floor of the Murrieta Valley, separating the Southwest area into western and eastern halves.

A series of valleys separated by rolling hills connect into the Murrieta Valley. The French Valley runs in a north-south manner and includes the Warm Springs, Tucalota and Santa Gertrudis Creeks. The Temecula Creek forms the Pauba Valley, which runs east-west along the southern boundary, and the Pechanga Creek forms the Wolf Valley, which runs north-south just south of the City of Temecula. The Santa Margarita River drains the area and flows west to the Pacific Ocean.



10. Tenaja Creek

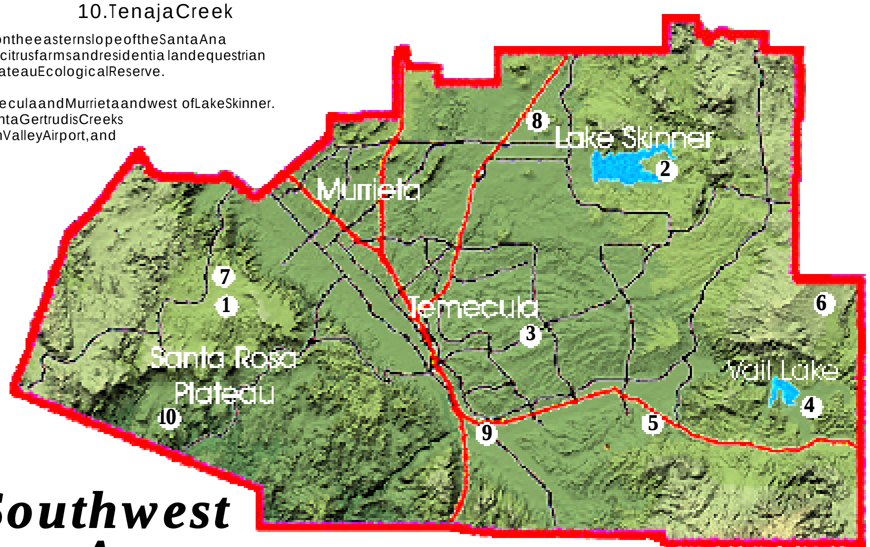
9. Murrieta Creek

8. Highway 79 North

7. Santa Rosa Ecological Reserve

The Santa Rosa Plateau forms the western half of the unincorporated area and is located on the eastern slope of the Santa Ana Mountains. This community is characterized by steep slopes and valleys with avocado and citrus farms and residential and equestrian uses scattered among open spaces. This community includes the 8,200-acre Santa Rosa Plateau Ecological Reserve.

The Antelope/French Valleys are located in the middle of the Southwest region, east of Temecula and Murrieta and west of Lake Skinner. This community is located in a shallow valley formed by the Warm Springs, Tucalota and Santa Gertrudis Creeks and is characterized by vacant properties, large residential lots, agriculture uses, the French Valley Airport, and surrounding business park/industrial uses.



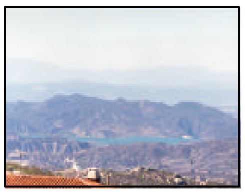
Southwest Area

6. Sage Area

1. Santa Rosa Plateau

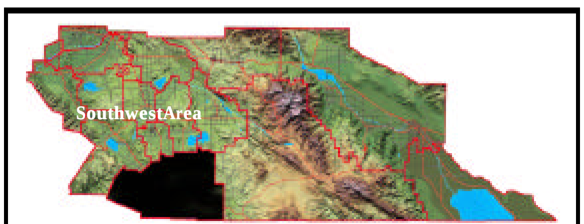
3. Vineyards

2. Lake Skinner



4. Vail Lake

5. Highway 79 South



Western Riverside County

Glen Oaks Hills, which forms the southeastern corner of the Southwest area, is characterized as a rural community with large residential lots and equestrian facilities seamong gentle rolling hills. Privately owned Vail Lake is located approximately 15 miles east of Temecula and north of Interstate 79.

The Vineyard/Citrus area is located east of the City of Temecula and is characterized by vineyards and citrus groves, tourist related facilities and large residential and equestrian estates.

Lake Skinner forms the northeastern portion of the Southwest region and contains the Lake Skinner Reservoir and Regional Park. This area is characterized by rolling hills, with agricultural uses on the west and mostly vacant lands to the east.

The Southwest area contains a number of scenic highways. Interstate 215 is a County-Eligible Scenic Highway which originates at its junction with Interstate 15 and heads north through the Perris Valley and into San Bernardino County. State Route 79 from the junction with State Route 371 near Aguanga to State Route 15 in the City of Temecula is another County-Eligible Scenic Highway, traversing the Pauba Valley in the southern portion of the plan area. Interstate 15 from the San Diego County line to Corona is a State-Eligible Scenic Highway. This roadway travels through the Murrieta Valley along the eastern edge of the Santa Ana Mountains, through the cities of Temecula and Murrieta.

Figure 4.8.6

VISUAL RESOURCE SOUTHWEST AREA

TheLakeMathewsareaislocatedinWesternRiversideCounty, immediatelysouthoftheCityofRiverside.ThePerrisValleyarea, MarchAirForceBase,Southwestarea,GreaterElsinorearea, TemescalValleyareaandtheCityofRiversideserveasboundaries fortheLakeMathewsregion.Woodcrest,locatedinthenorthern portionofthearea,isthesoleunincorporatedcommunitywithinthe LakeMathewsarea.

TheLakeMathewsregionprimarilyconsistsofrollinghillsidesand mountainousterrain,withlarge-lotsingle-familyresidentialareasand citrusvineyardsdominatingthelanduses.ElSobranteRoad,La SierraAvenue,MockingbirdCanyonRoad,GavilanRoadand CajalcoRoadserveasthearea'sCountyEligibleScenicCorridors.El SobranteRoadlinksLaSierraAvenueonthewestsideofLake MathewswithMockingbirdCanyonRoadontheeastsideofthe Lake.GavilanRoadconnectsCajalcoRoadwiththesouthern portionoftheplanarea.CajalcoRoadstretchesfromInterstate15 toInterstate215inthePerrisValley.ElSobranteRoad,LaSierra Avenue,andCajalcoRoadaffordusersviewsbothofLakeMathews andthesurroundinghillsideterrain.

TheLakeMathewsareacontainsasignificantamountofnatural openspace,includingLakeMathewsandadjacentrecreational areas,themountainousterraininthesouthernandwesternportions oftheplanarea,theMockingbirdCanyonArchaeologicalSite northeastofLakeMathews,andtheHartfordSpringsReserveinthe southeastsectionofthearea.Naturalrockoutcroppingsare particularlyprominentthroughoutthearea.

Lake Mathews

2.Agriculture

3.HillsideResidential

4.Woodcrest

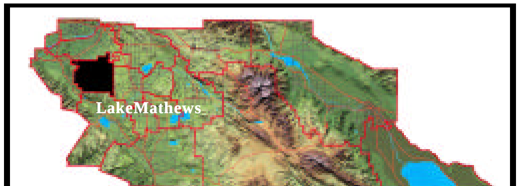
1.ElSobrante

5.Agriculture

10.LakeMathews

9.SouthwestArea

6.GavilanSprings



WesternRiversideCounty

8.GlenValley

7.HartfordSpringsReserve

Figure 4.8.7

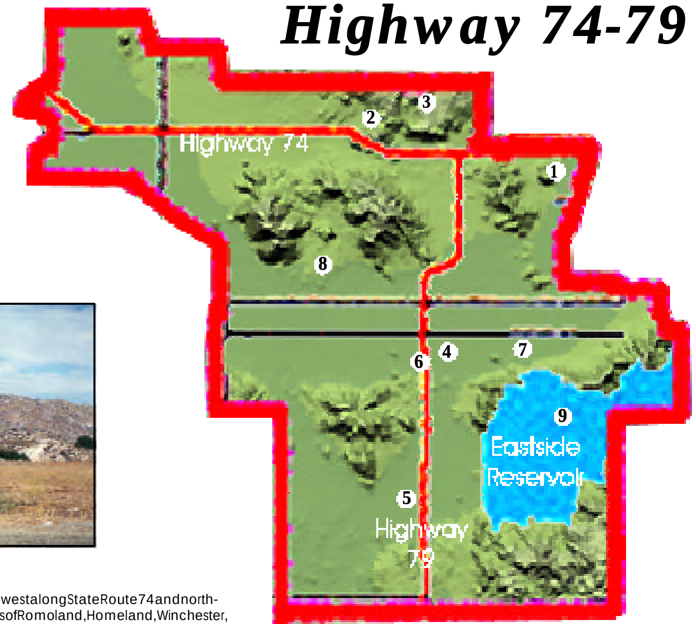
VISUAL RESOURCE
LAKE MATHEWS

1.NortheastArea

2.Homeland

3.JuniperFlats

Highway 74-79



9.EastsideReservoir(future

The Highway 74/79 area is located westerly of Hemet and easterly of Interstate 215, Sun City, and the City of Perris, extending east-west along State Route 74 and north-south along State Route 79. The Highway 74/79 area does not contain any incorporated cities but encompasses the communities of Romoland, Homeland, Winchester, and Green Acres. This region also includes the Metropolitan Water District's Eastside Reservoir, which will serve as a recreational activity center and habitat preserve for the area. The Highway 74/79 region is characterized by large residential lots and agricultural and equestrian uses set among low-lying flatlands and rocky peaks.

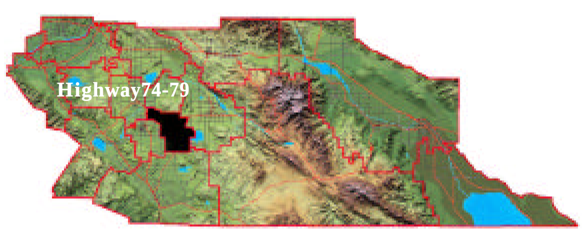
The Homeland area has a rural character and is comprised mainly of scattered single family dwellings on large lots, mobile homes and mobile home subdivisions. A few commercial uses are located along Highway 74. The Romoland area is a rural, agricultural community characterized by mobile home parks and single family dwellings. Within Romoland there are a number of industrial and commercial uses located along Highway 74. Green Acres is a small, rural community located at the junction of Highways 74 and 79. It consist of mobile homes on relatively small lots connected by dirt roads. The Winchester Area is similar in many ways to a number of other rural communities in the County. It is characterized by scattered large lot residential development, agricultural uses, and local, service related commercial uses. A commercial core centers this community. Double Butte Peak is located north of Winchester and south of Homeland.

Highway 74 is the regions sole State-eligible Scenic Highway. Originating in the coastal mountain ranges of Orange County, Highway 74 winds through the mountainous terrain and valleys of the Greater Elsinore and Mead Valley areas towards Interstate 215, where it heads in an easterly direction through the Highway 74/79 area towards the foothills of the San Jacinto Mountains.

8.DoubleButtePark

5.Dairy

7.DomenigoniParkway



WesternRiversideCounty

4.Winchester

6.Highway79

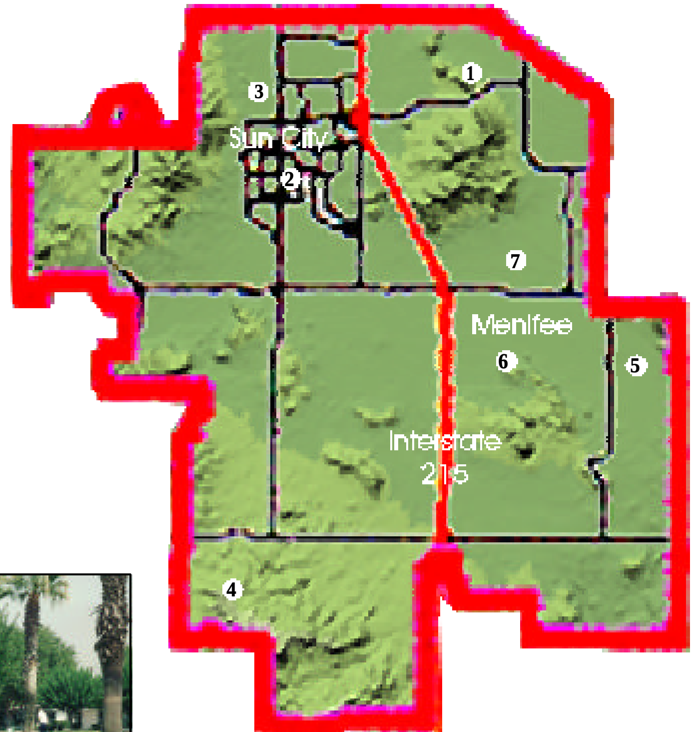
Figure 4.8.8

VISUAL RESOURCE
HIGHWAY 74-79

The Menifee Valley area is bordered by Kabian Regional Park and the City of Perris on the north, the Southwest and Greater Elsinore areas on the south, and the Highway 74/79 region on the east. Menifee Valley is located within a flat valley floor ringed with ridgelines. Rugged rock outcroppings are typical physical features in the area. Pockets of rural residential development are located around the edges of the Valley, with estate developments scattered throughout the mountain and hillside areas.

The Menifee Valley area encompasses the community of Sun City, located just west of I-215 and north of Newport Road, and the rural residential community of Quail Valley. Sun City, built initially as a "seniors only" housing development focused around a golf course, now includes a variety of residential areas. Supporting commercial and retail shops have also been added as the population of the community has grown. Also located in this region is the newer community of Menifee east of Interstate 215, on both sides of Newport Road. Menifee Village is a growing, planned residential community focused around a lake and golf course, and incorporating parks, schools, and supporting commercial development. Mt. San Jacinto Community College is located immediately south of Menifee Village.

The Interstate 215 County Designated Scenic Highway runs the length of the Menifee Valley from north to south, and the Newport Road scenic corridor from east to west. The Salt Creek Channel also bisects the plan area east to west. While channelized within the developed areas of Sun City and Menifee, the Salt Creek returns to its natural state as it flows toward the western boundary of the area and the City of Canyon Lake. The rural, hilly area along the southern border of the area is characterized by large lot residential development and served by dirt roads. A large parcel of undeveloped land between Keller and Baxter Roads, along the southern boundary of the plan, is physically separated from the Menifee Valley by a ridgeline from which a view of the entire Valley is afforded. A single citrus grove agricultural preserve is located in the northeastern section of the Valley just east of the Menifee Valley Medical Center.



7. Menifee Lake

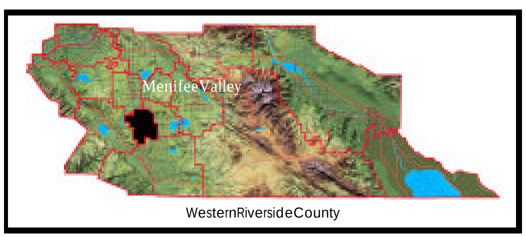
6. Typical Rock Outcropping

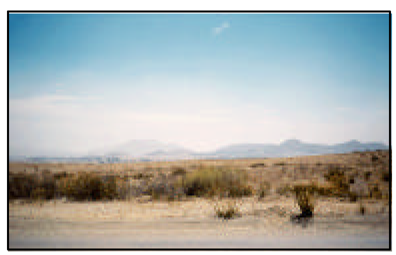
5. Agricultural Land

Menifee Valley

1. Agriculture Preserve

2. Sun City





3. Menifee Valley Floor

4. Rural Area

Figure 4.8.9

VISUAL RESOURCE
MENIFEE VALLEY

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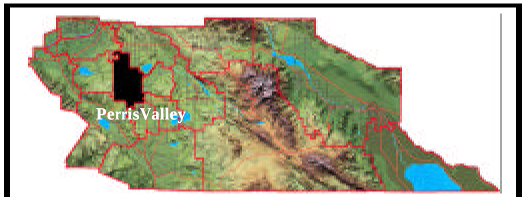
1. Cajalco Road area

2. Mead Valley

3. Bernasconi Mountains

4. Mead Valley



Western Riverside County

The Perris Valley area encompasses the flatlands and adjacent foothills of the Perris Valley in western Riverside County, bordered by March Air Force Base and Lake Perris to the north, the Lakeview/Nuevo area to the east, the Southwest and Highway 74/79 regions to the south, and the Lake Mathews area to the west. The Perris Valley area includes the City of Perris, which covers nearly the entire eastern portion of the region. The area also includes three unincorporated communities; Mead Valley and Glen Valley in the northern part of the area and Good Hope in the southwest portion of the Plan area.

The Perris Valley area is primarily a combination of flat, low-lying areas and rolling foothills west of I-215. Land uses in the unincorporated area are almost exclusively rural residential and agriculture. Perris Valley residents and visitors enjoy views of the Lakeview Mountains to the east, the Bernasconi Hills south of Lake Perris, and the Box Springs Mountains to north.

Two scenic highways are located in the Perris Valley area; the Ramona Expressway and State Highway 74. Ramona Expressway is actually the easterly extension of Cajalco Expressway which originates at I-15 in the Temescal/El Cerrito area. It is a County Designated Scenic Highway that traverses the northern portion of Perris Valley in an east-west direction, and affords users tremendous views of the surrounding mountainous terrain. State Highway 74 connects I-215 with the Lake Elsinore area through the hilly terrain in the southern and western portions of the Perris Valley area.

5. Perris Valley

Perris Valley

8. Highway 74 area

7. March Air Force Base

6. Ramona Expressway area

Figure 4.8.10

VISUAL RESOURCE
PERRIS VALLEY

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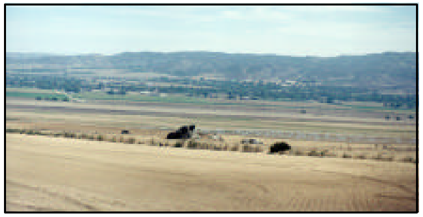


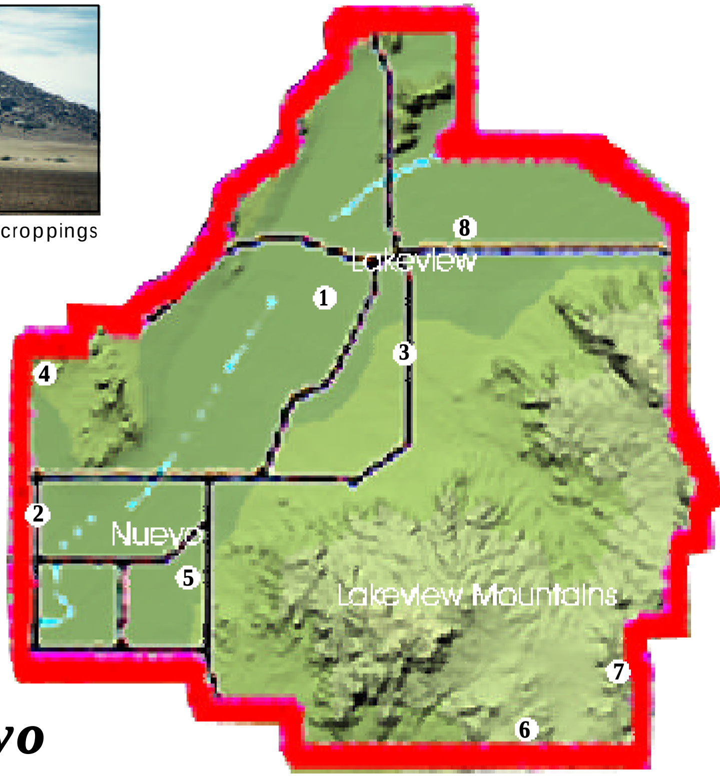
1. Valley

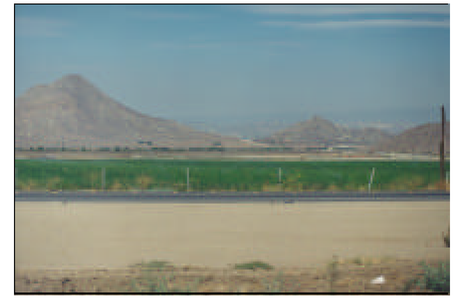
2. Typical Rock Outcroppings

The Lakeview/Nuevo area is located in the central portion of western Riverside County and is bordered primarily by the City of Perris and the Lake Perris State Park to the west, Moreno Valley to the north, the cities of Hemet and San Jacinto to the east, and the Highway 74/79 region to the south. The Lakeview/Nuevo area consists of three unincorporated communities; Lakeview, Nuevo, and Juniper Flats.

The Lakeview/Nuevo area contains a wide variety of geographical features, from low-lying valley floors to rolling hills and rocky, mountainous terrain, including large prominent rock outcroppings. Development around the area is primarily large-lot rural residential, along with a small number of public facilities and scant commercial development. Large single-family residential lots can be found on many of the hillsides within the Lakeview/Nuevo area, affording many residents spectacular views of the surrounding valleys and mountains, including the Lakeview Mountains, Bernasconi Hills and the San Jacinto Wildlife Area. The San Jacinto River runs through the northern portion of the plan area in the San Jacinto Valley.

The Ramona Expressway is identified as a County-eligible Scenic Highway. Starting from I-215 in the Perris Valley area west of the Lakeview/Nuevo area, Ramona Expressway runs in an east-west direction through the northern portion of the area as it travels eastward through the City of San Jacinto and terminating at Highway 74 in East Hemet. Driving along this roadway affords users tremendous views of the terrain of the Lakeview/Nuevo region.





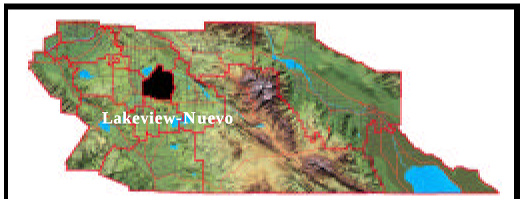
8. Ramona Expwy area

7. Lakeview Mountains

6. Juniper Flats

3. Hansen Avenue area

Lakeview and Nuevo



Western Riverside County

4. Bernasconi Mountains

5. Nuevo

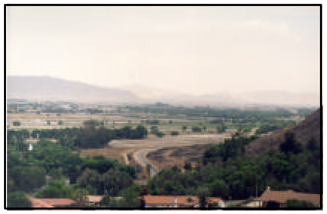
Figure 4.8.11

VISUAL RESOURCE LAKEVIEW - NUEVO

TheSanJacintoValleyareaencompassestheSanJacintoValleyandportionsoftheadjacentmountainsandfoothillsinwesternRiverside County,boundedbytheSanJacintoMountainstotheeast,TheBadlandstothenorth,theLakeview/NuevoandHighway74/79areasto thewest,andtheSouthwestandRiversideExtendedMountainareastothesouth.

TheSanJacintoValleyareaincludesthecitiesofSanJacintoandHemet,SobobaHotSpringsandtheSobobaIndianReservation,Gilman HotSprings,andthecommunitiesofEastHemetandValleVista.AsidefromtheurbandevelopmentwithinHemetand SanJacinto,land usesintheunincorporatedareasconsistoflowtomediumdensityresidential,scatteredcommercialuses,agriculturalusesincluding dairies,andpublicfacilities.


1.SanJacintoMts


2.SanJacintoValley


3.RamonaBowlArea


4.SobobaSprings

SurroundedprimarilybytheLakeviewMountains,theBadlands,andthe SanJacintoMountains,SanJacintoValleyresidentsenjoysomeofthe mostspectacularmountainousterrainintheCounty.TheSanJacintoRiver traversestheregioninanorthwest-southeastdirection.Theriveranditsnumerous tributariesthroughoutthemountainousregionsserveasimportantriparian habitatareaswithanabundanceoffloraandfauna.Residentsandvisitorsenjoy viewsofthesurroundingmountainsandfoothillswiththeirnumerousrock outcroppingsandsparse,lowlyingvegetation.

TheSanJacintoValleyregioncontainsanumberofsceniccorridorsaffording viewsofthesurroundingmountainousterrain.Theseincludetheeastern extensionofRamonaExpressway,SobobaSpringsRoad,LambCanyon Road/Highway79ontheeasternedgeoftheBadlands,thesoutheastportionof GilmanSpringsRoad,andtheportionofHighway74/79extendingwestfromthe foothillsoftheSanJacintoMountains.

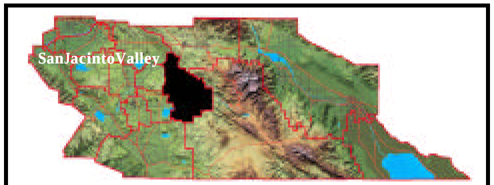

11.EastsideReservoir


10.RamonaExpwyView


9.Orchards


8.SanJacintoRiver

San Jacinto Valley



WesternRiversideCounty


5.SanJacintoRiver&Agriculture


6.ValleVista

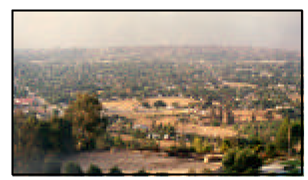

7.HemetValley

Figure 4.8.12

**VISUAL RESOURCE
SAN JACINTO VALLEY**

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1.BoxSpringsMts(Highgrove)

2.Highgrove

3.MorenoValley

4.BoxSpringsMountains

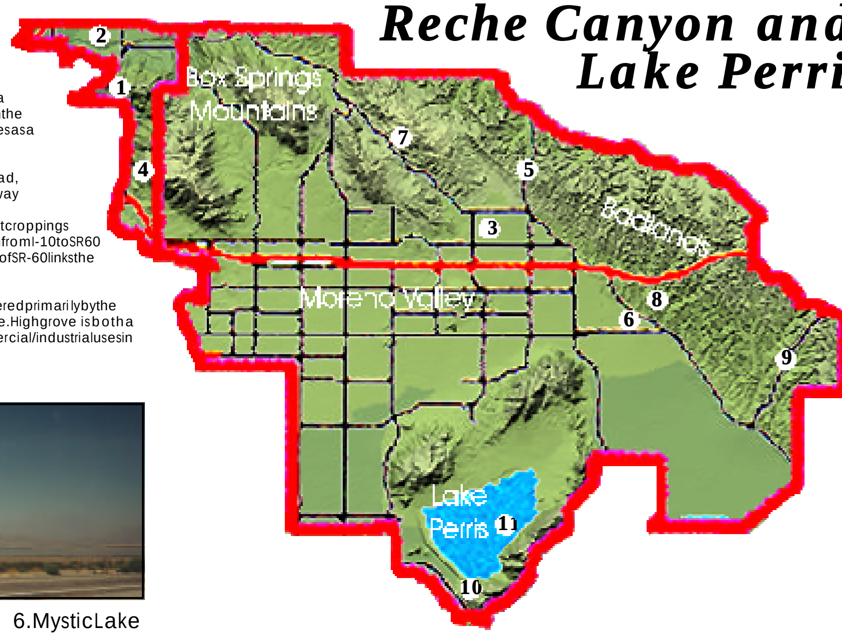
11.LakePerris

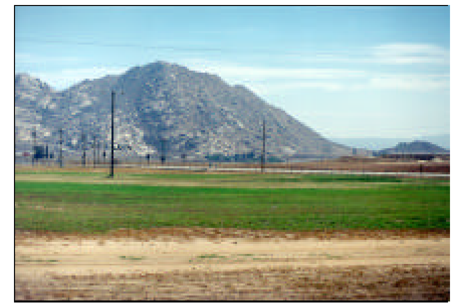
TheRecheCanyonareaislocatedinthenorthernportionofwesternRiversideCounty.Itis borderedbySanBernardinoCounty,theCityofMorenoValley,theSanGorgonioPass,the BernasconiHills,theCityofRiverside,andthePerrisValley,Lakeview/NuevoandSanJacintoValley regions.TheRecheCanyonareaconsistsmostlyofmountainousterrainwithlowlyingvegetation characterizedprimarilybyscatteredlargelotsinglefamilyresidences.Thesmallremotecommunityof RecheCanyonislocatedinthenorthwestportionofthearea,whiletheLakePerrisStateRecreationArea islocatedinthearea'ssouthernportion.AlsolocatedinthestudyareaisthecommunityofHighgroveinthe northwestsectioneastofInterstate215.TheexpanseoftheBoxSpringsandBadlandsMountainsservesasa dramaticbackdropforlocalresidentsanddriversonStateHighway60.

TheRecheCanyonregioncontainsfourdesignatedscenicroads;StateHighway60,GilmanSpringsRoad, LambCanyonRoadandRedlandsBoulevard.GilmanSpringsRoadfromSR60totheRamonaExpressway affordsusersviewsoftheSanJacintoWildlifeAreaandMysticLakeandthesurroundinghillsides.Lamb CanyonRoadandRedlandsBoulevardlinkusersthroughthemountainousterrainandnumerousrockoutcroppings oftheRecheCanyonregion.SanTimoteoCanyonRoad,whichrunsinanorthwest-southeastdirectionfromI-10toSR60 throughtheBadlands,parallelsSanTimoteoCreekanditslushripariancorridor. PigeonPassRoadnorthofSR-60linksthe MorenoValleyareawithHighgrovethroughtheBoxSpringsMountains.

TheHighgrovecommunityabutsInterstate215inthenorthernportionofwesternRiversideCounty,borderedprimarilybythe BoxSpringsMountains,theCityofGrandTerraceinSanBernardinoCounty,I-215andtheCityofRiverside.Highgrove isbotha ruralandurbancommunityconsistingoforangegrovesandresidentialusesonitseastsideandcommercial/industrialusesin itswesternportionnearI-215.ThebaseoftheBoxSpringsMountainsborderstheeastsideofHighgrove.

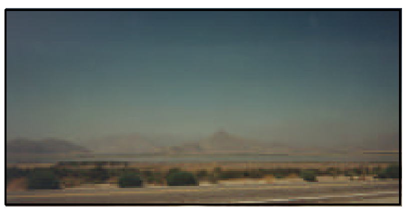
Reche Canyon and Lake Perris





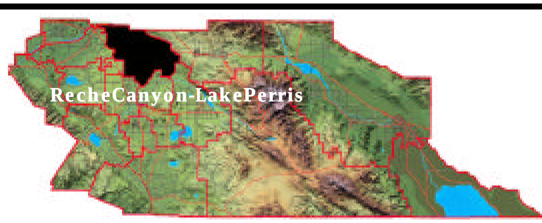
10.BernasconiHills

5.RedlandsBoulevard&TheBadlands



6.MysticLake

9.LambCanyonRoadarea



WesternRiversideCounty

7.SanTimoteoCreek

8. Badlands

Figure 4.8.13

VISUAL RESOURCE
RECHE CANYON - LAKE PERRIS

1. The Badlands

2. San Gorgonio Mts.

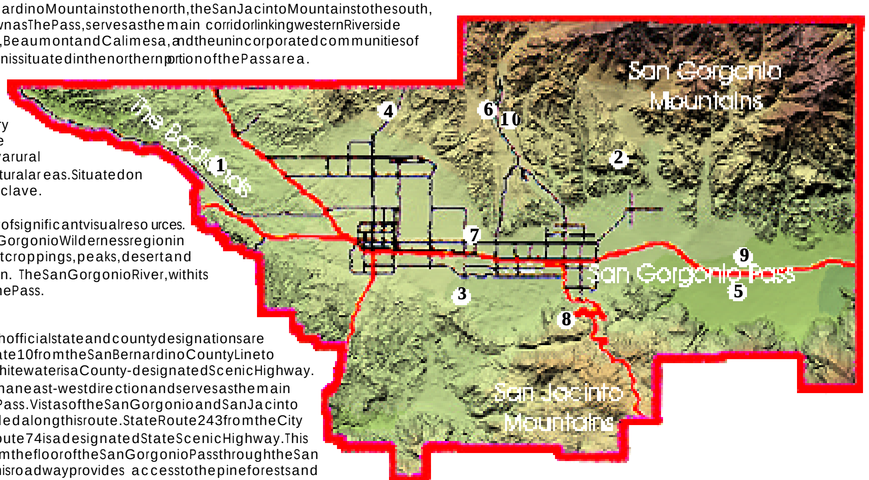
3. San Jacinto Mountain Range foothills

10. San Gorgonio River

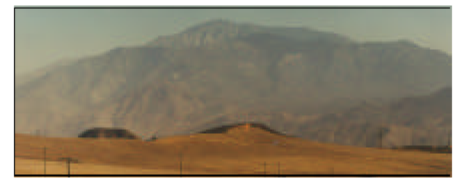
The San Gorgonio Pass area is located in northern Riverside County. Bordered by the San Bernardino Mountains to the north, the San Jacinto Mountains to the south, and the Badlands Mountains to the southwest, the San Gorgonio Pass area, commonly known as The Pass, serves as the main corridor linking western Riverside County with the Coachella Valley. The San Gorgonio Pass area contains the cities of Banning, Beaumont and Calimesa, and the unincorporated communities of Cabazon, Banning Bench, Cherry Valley and San Gorgonio. The Morongo Indian Reservation is situated in the northern portion of the Pass area.

In the western portion of the Pass, the cities of Calimesa, Banning and Beaumont are small town urban areas with a combination of both rural and a variety of urban-type land uses. Banning Bench is a quaint rural residential area located in the foothills north of Banning. Cherry Valley is another rural foothill community located north of Beaumont. Cabazon, located in the eastern portion of the Pass south of Interstate 10, is a small rural community characterized by a rural and low density single-family residences, scattered commercial and public uses, and agricultural areas. Situated on the eastern edge of the Pass north of I-10, San Gorgonio is primarily a small rural residential enclave.

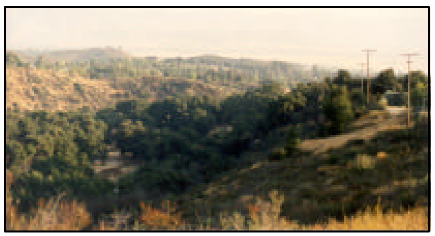
Due to the area's dramatic topographical setting, the San Gorgonio area contains a number of significant visual resources. These include portions of the San Bernardino National Forest, the San Gorgonio River, the San Gorgonio Wilderness region in the northern part of the area, the Highland Springs, Bogart County Park, and numerous rock outcroppings, peaks, desert and hillside vegetation, and drainage courses within the mountainous terrain ringing the Pass region. The San Gorgonio River, with its abundant tributaries, provides important habitat areas which further define the character of the Pass.



9. San Gorgonio Pass--Cabazon area



8. San Jacinto Mountains

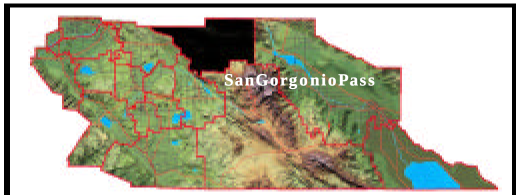


4. Cherry Valley

Among roadways with official state and county designations are the following: Interstate 10 from the San Bernardino County Line to State Route 62 near Whitewater is a County-designated Scenic Highway. This roadway travels in an east-west direction and serves as the main corridor through the Pass. Vistas of the San Gorgonio and San Jacinto Mountains are provided along this route. State Route 243 from the City of Banning to State Route 74 is a designated State Scenic Highway. This roadway extends from the floor of the San Gorgonio Pass through the San Jacinto Mountains. This roadway provides access to the pine forests and mountains of the San Bernardino National Forest. Both Cherry Avenue and Beaumont Avenue are County-Eligible Scenic Highways linking I-10 with the foothill areas north of Beaumont.

San Gorgonio Pass

7. San Gorgonio Pass--Banning/Beaumont



Western Riverside County

5. Cabazon & San Jacinto Mts.

6. Banning Bench

Figure 4.8.14

RIVERSIDE COUNTY INTEGRATED PROJECT RCIP

VISUAL RESOURCE
SAN GORGONIO PASS

The Riverside Extended Mountain region is located in the southeast portion of western Riverside County. This area is bordered by the San Jacinto Valley and Southwest regions to the west, the San Gorgonio Pass area to the north, the Coachella Valley to the east, and San Diego County to the south.

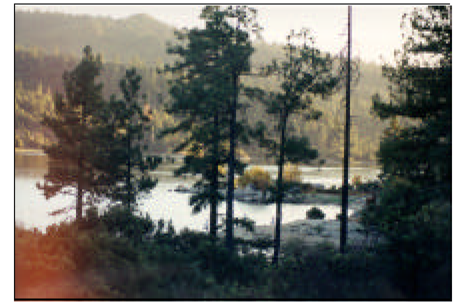
The Riverside Extended Mountain area includes the communities of Idyllwild, Poppy Flats, Sage, Twin Pines, Pine Cove, Mountain Center, Anza, Aguanga, Pinyon Pines, Pine Meadow, Alpine Village, Spring Crest, and Cahuilla. The Cahuilla Indian Reservation is located in the southern portion of the area. Most of the communities in this region are primarily rural residential enclaves with scattered commercial areas, in addition to numerous public recreational areas.

The Riverside Extended Mountain region contains some of the most picturesque scenery in all of Riverside County, including mountain peaks, rolling foothills, rock outcroppings, numerous springs and streams, low-lying valleys, and a wide variety of flora ranging from desert scrub to pine forests. Some of the more prominent areas of scenic interest include the rugged mountainous terrain of the San Bernardino National Forest and the San Jacinto Mountains, Lake Hemet and the Garner Valley along Highway 74, Lake Riverside, the Anza Valley, the Santa Rosa Mountains National Scenic Area and Santa Rosa Wilderness, the Anza Borrego State Park, Mount San Jacinto State Park, and numerous passive recreational areas. Strategic vista points throughout the mountainous terrain access panoramic views of the Coachella Valley and some of the lower-lying eastern portions of western Riverside County.

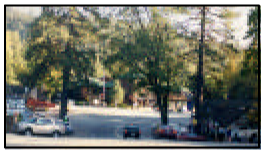
This region contains a number of scenic roadway corridors. State Route 79 from the San Diego County line to State Route 15 in the City of Temecula is a State-designated Scenic Highway. This roadway passes through and Agua Tibia Wilderness and the Black Hills in the southwest portion of the area. State Route 243 from the City of Banning to State Route 74 is also a designated State Scenic Highway. This roadway extends from the floor of the San Gorgonio Pass through the San Jacinto Mountains, and provides access to the pine forests and mountains of the San Bernardino National Forest. State Route 74 is another designated State Scenic Highway extending from the western boundary of the San Bernardino National Forest to State Route 111 in Palm Springs. This roadway traverses the San Jacinto and Santa Rosa mountains and San Bernardino National Forest, providing views of pine forest, mountain peaks and pristine desert.

Riverside Extended Mountain Area

11. Coachella Valley from Santa Rosa Mountains



12. Lake Hemet



1. Idyllwild

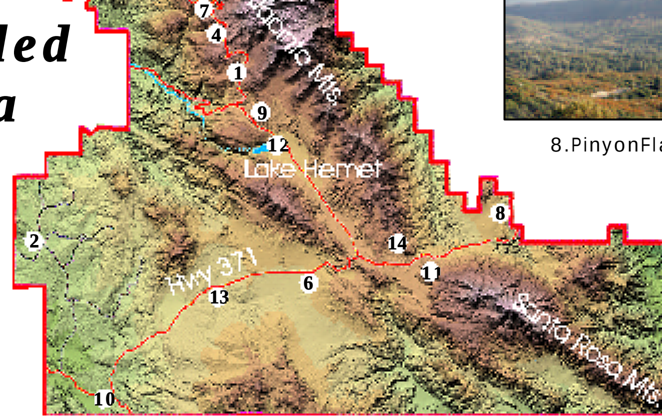
10. Aguanga

9. San Bernardino National Forest

2. Sage-Tucalote

13. Cahuilla Valley

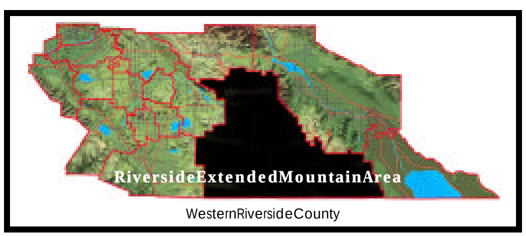
8. Pinyon Flat-Hwy 74



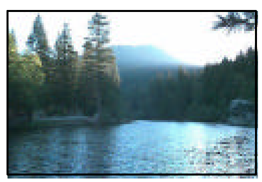
14. San Jacinto Mountains

3. Mt San Jacinto

4. Highway 243



Western Riverside County



5. Lake Fulmor

6. Anza Valley

7. Pine Forest

Figure 4.8.15

VISUAL RESOURCE
RIVERSIDE EXTENDED MOUNTAIN AREA

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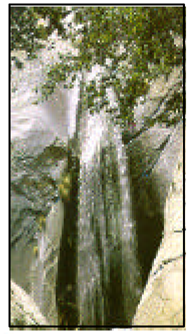
The Coachella Valley is bounded on the west by the Santa Rosa and San Jacinto Mountains, on the east by the Little San Bernardino Mountains, the Cottonwood Mountains and the Mecca Hills, on the south by the Salton Sea, and on the north by the San Bernardino Mountains and the San Gorgonio Wilderness. The cities of Desert Hot Springs, Palm Springs, Cathedral City, Rancho Mirage, Indian Wells, Palm Desert, La Quinta, Indio and Coachella are located in the Coachella Valley. Most of these cities are nestled at the foot of the Santa Rosa Mountains and can be characterized primarily as golf-oriented resort communities. Unincorporated communities in the western Coachella Valley include North Palm Springs, Thousand Palms, Sky Valley, Bermuda Dunes, Indio Hills, Garnet and Whitewater. Within the eastern portion of the Coachella Valley, unincorporated communities include Valerie, Arabia, Mecca, Flowing Wells, North Shore, Desert Beach, Oasis, Salton, and Thermal. The Agua Caliente Indian Reservation is located in the Santa Rosa Mountains south of Palm Springs.

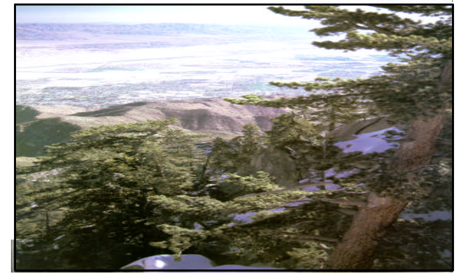
The Coachella Valley contains an abundance of important visual resources. These include the date groves and agricultural fields in the eastern portion of the Valley, the Living Desert located east of Palm Desert, Mount San Jacinto and the Tramway in the Santa Rosa foothills west of Palm Springs, Lake Cahuilla in the foothills southwest of Indio, the Whitewater River along the western edge of the Valley, the numerous golf courses and resorts, the contrasting desert floor and surrounding mountainous terrain, Salton Sea, the Mecca Hills Wilderness north of Salton Sea, and the Coachella Valley Preserve near Indio Hills. A unique feature of the Santa Rosa Mountains is the variety of cove-like communities nestled at the base of this range. Residential and resort communities now abut many of these intimate coves. The Valley also contains a number of desert oasis areas, where locals have taken advantage of groundwater springs to create attractive resorts and residential communities amidst the desert floor of the Valley.

3. Indio Agriculture



4. Tahquitz Falls

5. Date Groves

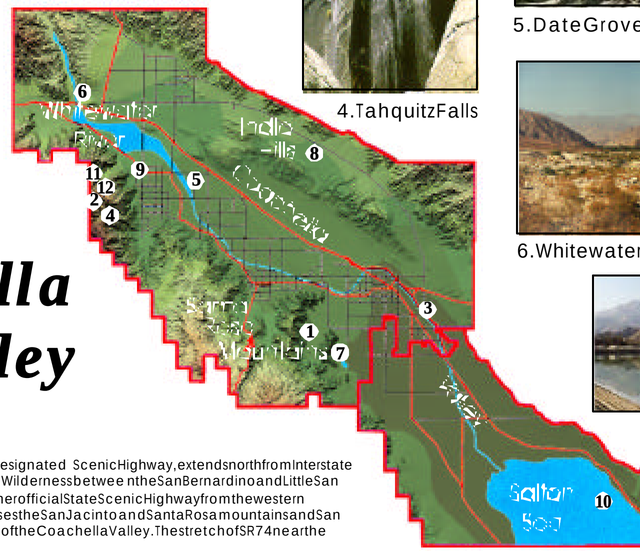


12. Coachella Valley from Mount San Jacinto

6. Whitewater River

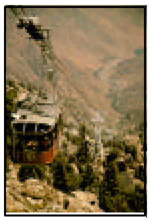
11. Mount San Jacinto

Coachella Valley



7. Lake Cahuilla

1. Santa Rosa Cove

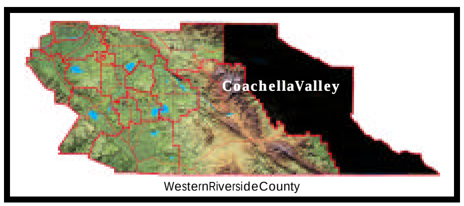


2. Palm Springs Tram

10. Salton Sea

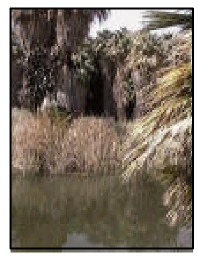
The Coachella Valley contains numerous officially designated scenic corridors. State Route 62, a State Designated Scenic Highway, extends north from Interstate 10 to the San Bernardino County Line. This roadway passes along the eastern edge of the San Gorgonio Wilderness between the San Bernardino and Little San Bernardino Mountains and provides access to desert landscape and desert hills. State Route 74 is another official State Scenic Highway from the western boundary of the San Bernardino National Forest to State Route 111 in Palm Springs. This roadway traverses the San Jacinto and Santa Rosa mountains and San Bernardino National Forest, providing views of pine forest, mountain peaks and the pristine desert areas of the Coachella Valley. The stretch of SR74 near the Santa Rosa Foothills is designated a National Scenic Area.

State Route 111 from State Route 74 to Interstate 10 near Whitewater Canyon Road is a State-eligible Scenic Highway. This roadway passes along the eastern side of the San Jacinto Mountains through the cities of Palm Springs, Cathedral City, Rancho Mirage and Palm Desert. County-eligible Scenic Highways include Bob Hope Drive from the Palm Springs city limits to I-10, and the Upper Coachella Valley Scenic Area, which includes Indian Avenue, Pierson Boulevard, Palm Drive and Dillon Road. Interstate 10, another Eligible County Scenic Highway between SR62 and the Colorado River, affords users views of the contrasting desert and mountainous terrain. Whitewater Canyon Road, which parallels the Whitewater River north of I-10, is also a County-eligible Scenic Highway.

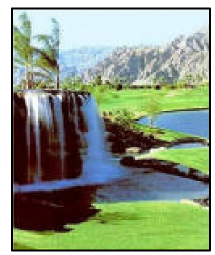


Western Riverside County

In the eastern portion of the Valley, State Route 111 from Bombay Beach on the Salton Sea to State Route 195 near Mecca is a State-eligible Scenic Highway, providing views of Salton Sea and the surrounding mountainous wilderness. This roadway passes between the Salton Sea on the west and the Chocolate and Orocopia Mountains and Mecca Hills on the east. Box Canyon Road from Mecca to I-10 is a County-eligible Scenic Highway that borders the southern boundary of the Mecca Hills Wilderness east of Mecca.



8. Coachella Valley Preserve

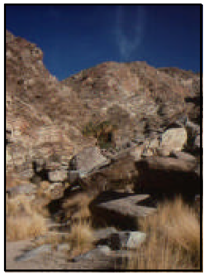


9. Palm Springs Golf Course

Figure 4.8.16

VISUAL RESOURCE
COACHELLA VALLEY

1. Joshua Tree



2. Typical Mountain Canyon

3. Desert Center

Eastern Riverside County

Eastern Riverside County includes the desert and mountainous areas east of the Coachella Valley. The most prominent of these areas is the Joshua Tree National Park. Located east of the Coachella Valley, Joshua Tree is characterized both by its desert landscape with distinctive flora like the Joshua Tree cacti and by its expansive mountainous terrain with large rock outcroppings. The roadway network serving the Joshua Tree National Park is part of the County-eligible Scenic Highway system.

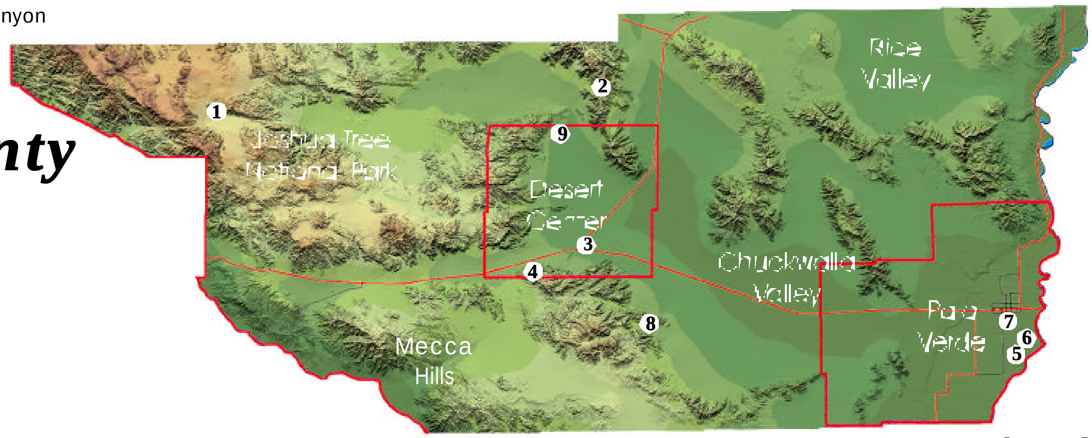
Just south of Joshua Tree National Park is the Chiriaco Summit set between the Cottonwood Mountains on the north and the Crocopia and Chuckwalla Mountains on the south. Between the Desert Center and Palo Verde Area Plans is the vast desert area of the Chuckwalla Valley. A series of steep peaks and small mountain ranges punctuates this valley. The Chocolate and Chuckwalla Mountains are situated south of Interstate 10 and the Coxcomb, Granite, Riverside and Little Maria and Big Maria Mountains lie to the north of Interstate 10. The Riverside Mountains Wilderness is located within the Riverside Mountains in the northeast corner of the County. An expansive series of sand dunes is located near the Riverside-San Bernardino County border, adjacent to the Rice Valley and Palen/McCoy Wilderness areas. Though most of those areas not contained within Area Plans are predominantly natural open space, there are scattered mining activities, residences and public facilities throughout this region.

Interstate 10 and State Highway 95 serve as the two County-Eligible Scenic Highways lying outside of Area Plan boundaries. The Scenic Designation for I-10 applies from the junction with State Route 62 near Whitewater east to the Arizona border. This roadway connects the San Gorgonio Pass with the Palo Verde Valley, transversing the Coachella and Chuckwalla Valleys and the City of Blythe as it crosses the Colorado River. State Highway 95 begins at the junction with I-10 and heads north into San Bernardino County, paralleling the Colorado River. This highway affords users views of the surrounding desert and mountainous terrain, the famous intaglios figures of the Giant Desert Figures Historic Landmark, and the riparian areas of the Colorado River.

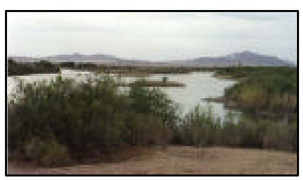
Desert Center

The Desert Center area is located in the Chuckwalla Valley between the Eagle and Chuckwalla Mountains. Straddling Interstate 10, Desert Center is located midway between the Coachella Valley and the City of Blythe, adjacent to the southeast corner of the Joshua Tree National Park. There are no incorporated cities in this area, but the small outlying communities of Desert Center and Eagle Mountain are set among the vast desert and steep hills of this area. Interstate 10, a County-eligible Scenic Highway, runs roughly through the middle of this region, affording users views of the contrasting desert and mountainous terrain.

The Desert Center region is surrounded by some of the most spectacular scenery in Riverside County. Mountainous areas such as the Chuckwalla Mountains, Orocopia Mountains, Palen Mountains, and the Eagle Mountains and Coxcomb Mountains in the Joshua Tree National Forest. The stark contrast between sparsely vegetated desert flatlands and rocky mountainous terrain is quite pronounced in the Desert Center area.



4. Typical Mountain Terrain



5. Palo Verde

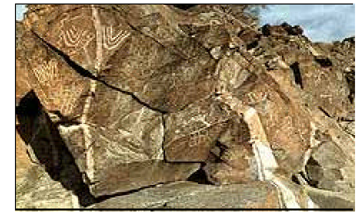
Palo Verde

The Palo Verde Valley area is located in southeastern Riverside County, adjacent to the Colorado River in the Palo Verde Valley. Palo Verde Valley, which includes the City of Blythe and the communities of East Blythe, Ripley and Nicholls Warm Springs, is bordered generally by the Palo Verde Mesa and the Colorado River. Blythe is a small city with a variety of residential, commercial and agricultural uses. Ripley and East Blythe, small rural communities, abut the southern and eastern boundary of Blythe, respectivelly.

Residents of this remote area enjoy views of the varied desert topography which includes such features as a variety of desert flora, the surrounding mountainous region, including the Big Maria Mountains, McCoy Mountains, Mule Mountains, and the foothills of the Palo Verde Mesa just west of Blythe. The Colorado River area provides a riparian and recreational corridor that serves as the eastern edge of the plan area.

Interstate 10 and State Highway 95 serve as the area's two County-eligible Scenic Highways. The Scenic Designation for I-10 applies from the junction with State Route 62 near Whitewater east to the Arizona border. This roadway connects the San Gorgonio Pass with the Palo Verde Valley, transversing the Coachella and Chuckwalla Valleys and the City of Blythe as it crosses the Colorado River. State Highway 95 begins at the junction with I-10 and heads north into San Bernardino County, paralleling the Colorado River. This highway affords users views of the surrounding desert and mountainous terrain, the famous intaglios figures of the Giant Desert Figures Historic Landmark, and the riparian areas of the Colorado River.

9. Eagle Mountain



8. Corn Spring Petroglyphs

7. Agriculture

6. McIntyre Park

Figure 4.8.17

VISUAL RESOURCE
EASTERN RIVERSIDE COUNTY

4.9 Open Space Land Inventory

California Government Code Section 65660(b) defines "open space land" as any parcel or area of land or water that is essentially unimproved and devoted to one of the following uses:

- ***Open space for the preservation of natural resources*** includes areas for the preservation of plant and animal life such as natural habitat areas; rivers, streams, lakes and their banks; and watershed lands.

- ***Open space used for the managed production of resources*** includes forest lands, range lands, agricultural lands, areas required for the recharge of groundwater basins, and areas containing major mineral deposits.

- ***Open space for outdoor recreation*** includes areas of outstanding historic and cultural value; areas devoted to or particularly suitable for park and recreation purposes; areas which serve as linkage between major recreation and open space reservations such as utility corridors, streams and rivers, trails, and scenic highways.

- ***Open space for public health and safety*** includes areas which require special management or regulation because of hazardous or special conditions such as fault zones, unstable soil areas, steep slopes, high fire hazard areas, areas required for the protection of water quality and water reservoirs, and flood plains.

Because of its unique blend of geography and climate, a wide variety of habitats and biological assets are present in Riverside County. The conservation of resources has become a predominant local, regional, and statewide issue. The term "conservation" often is equated with the protection and management of biological resources. In fact, conservation entails the protection, preservation, and management of a wide variety of natural and man-made resources such as air, minerals, soils, water, vegetation, scenic vistas, and cultural resources. The historic and contemporary impacts of humans in the County have dramatically altered the look, composition, and extent of local natural resources. In order to maintain viable natural assets within the County, a significant amount of land is under the administration of federal, state or local authorities and is maintained as natural open space.

In addition, within Riverside County, there are areas that are maintained as open space because they present significant hazards when used for urban purposes. Such lands include floodways, geologically unstable areas, high fire hazard areas, military artillery ranges, and noise impacted areas. Areas in the vicinity of hazardous or noxious land uses or activities may be preserved as open space to protect the health, safety, and welfare of the general public.

Agricultural lands provide valuable open space to local residents, while ensuring jobs and the continued productivity of Riverside County. Open space may also be established to provide areas for groundwater recharge.

The level and type of land use allowed in the various categories of open space within the County is determined by the areas' managing authority (i.e., National Park Service, Bureau of Land Management, County Park System), designation (i.e., wilderness area, agriculture preserve, county park), physical conditions (i.e., floodplain, undisturbed habitat, urban setting), and surrounding land use (i.e., airport, tribal lands, parkland). Continued development pressures are increasing in many areas of the County. Development of open space may result in the elimination of current recreational, aesthetic, and ecological resources.

4.9.1 Managed Open Space Lands

Public and private lands within the County are managed for a variety of reasons. How a specific parcel of land is managed is often determined by: (1) its inventory of flora, fauna or other natural resources, (2) its administering or managing authority, (3) the area's potential to provide recreational opportunities, and (4) adjacent land uses.

4.9.1.1 Managed Lands for Bio-Diversity

Some public lands are managed to protect biological resources. These are generally lands with significant, unique, rare or endangered species and/or habitat. Included in this category are Wilderness Areas, Areas of Critical Environmental Concern (ACEC), Research Natural Areas, Habitat Management Areas, and Wilderness Study Areas. Land use categories managed for bio-diversity include the following:

- National Park
- Forest Service Research Natural Areas
- Forest Service Wilderness Areas
- State Ecological Reserves and Wildlife Areas
- BLM Areas of Critical Environmental Concern
- Forest Service Wilderness Study Areas
- University of California Natural Reserve System
- Private Preserves or Land Trusts
- Riverside County Preserve System
- Riverside County Habitat Conservation Agency Stephen's Kangaroo Rat Core Reserve Areas.

4.9.1.2 Lands Managed for Multiple Use/Resource Protection

Most publicly held lands that are classified as open space or reserve system, fall under this category. The jurisdictions responsible for the management of these lands must balance a variety of uses along with the protection of sensitive species and/or habitats. Land use categories managed for multiple use as well as resource protection include the following:

- National Monuments
- BLM Managed Lands
- State Parks
- Water District Watershed Protection Areas
- Military Installations
- Agency Owned Reservoirs
- Indian Lands or reservations
- County Resource Oriented Regional Parks.

4.9.1.3 Lands Managed for Park and Recreation Use

Many areas are publicly owned and have recreation as their primary use. Though the managing agency may be required to protect sensitive species that may exist within the park, the primary focus is on providing active park facilities for the general public. City, county, and state parks whose primary purpose does not include species/habitat preservation are included in this category. These lands are described in Section 4.7, Parks and Recreation.

4.9.2 Publicly Owned Open Space

4.9.2.1 Federal

National Park Service /Joshua Tree National Park

As described in Section 4.7, Open Space, Joshua Tree National Park encompasses 794,000 acres, in north central Riverside County. Joshua Tree spans the transition between the Mojave and Colorado deserts of Southern California. A significant portion (approximately 630,000 acres) of this park is designated as the Joshua Tree Wilderness. The park has a rich human history and a pristine natural environment.

Bureau of Land Management

The mission of the Bureau of Land Management (BLM) is to sustain the health and diversity of public lands for the use and enjoyment of present and future generations. Within Riverside County, the BLM manages in excess of 747,000 acres (exclusive of Wilderness Areas within Joshua Tree National Park) for habitat preservation, through the establishment of Wilderness Areas and/or Areas of Critical Environmental Concern.

Wilderness areas generally prohibit select activities (e.g., motorized transport, use of motorized equipment, landing of aircraft) in order to protect the natural environment, solitude, and premiere recreational values of these areas. Lands within Riverside County that carry this designation include the Chuckawalla Mountains, Palen-McCoy, Mecca Hills, Big Maria Mountains, Riverside Mountains, Orocopia Mountains, and Rice Valley Wilderness Areas. Federal or state governments, or private landowners may own land within the boundaries of BLM designated Wilderness Areas. Area(s) of Critical Environmental Concern are managed in a manner to minimize unnecessary or undue degradation of natural environments. Management of these areas is very stringent, often with management guidelines as restrictive as those used for Wilderness areas. Lands with this designation in Riverside County include the Desert Lily Sanctuary, Chuckawalla Bench, Alligator Rock, and Big Morongo Canyon Preserve ACEC.

In addition to these areas, the BLM manages lands for a variety of uses, including recreation, grazing, and mining.

National Forest Service

Portions of Riverside County are within two national forests.

- ***San Bernardino National Forest*** includes lands under state (state parks), federal (BLM, Indian reservations), and private control. The San Bernardino National Forest is divided into two districts. A small portion of the San Bernardino District lies within western Riverside County. The San Jacinto District, located entirely within western Riverside County, encompasses 248,129 acres (185,307 acres of Forest Service lands with 62,822 acres under state, or private control) in the San Jacinto mountains.

- ***Cleveland National Forest*** lies within Riverside, Orange, and San Diego Counties. In its totality, the forest encompasses approximately 567,000 acres, divided amongst three (the Trabuco, Palomar, and Descanso) districts. Approximately 69,500 acres of the Trabuco District and 9,360 acres of the Palomar District lie within Western Riverside County.

The San Gorgonio, San Jacinto, and Santa Rosa Wilderness areas, located within the San Bernardino National Forest and the Agua Tibia and San Mateo Canyon Wilderness areas, in the Cleveland National Forest are managed for preservation of biodiversity.

Department of Defense (DoD)

The Chocolate Mountain Naval Aerial Gunnery Range, part of which is located in southeastern Riverside County is utilized by military aircraft for live bombing practice. This range is surrounded by a checkerboard of lands managed by the BLM. This facility is closed to the public.

Some undeveloped portions of March Air Reserve Base have been incorporated into one of seven reserves established by the Riverside County Habitat Conservation Agency (RCHCA).

4.9.2.2 Tribal Lands

Although the goals, objectives, and policies of the Riverside County General Plan do not apply to land under the jurisdiction of federally recognized tribal entities, tribal lands constitute a significant open space resource in the County. Two units of the Bureau of Indian Affairs (BIA), the Southern California Agency and the Colorado River Agency, administer BIA programs in Riverside County. Native American lands include the Agustine, Cabazon, Cahuilla, Morongo, Penchanga, Ramona, Santa Rosa, Soboba, Torres-Martinez and Twenty-Nine Palm Reservations (Southern California Agency), and the Colorado River Reservation (Colorado River Agency). Approximately 95,899 acres of land within Riverside County are under the jurisdiction of federally recognized Indian nations, approximately 89,673 acres within the Southern California Agency and 6,226 acres within the Colorado River Agency.

4.9.2.3 State Lands

State Parks/Recreation Areas

State parks and State recreation areas constitute a significant amount of land within Riverside County. These lands encompass a variety of climatic zones, habitats, and visitor facilities. The extent and purpose of these lands varies. State parks function as important necessary natural areas, providing crucial habitat for the preservation of biological resources. While a portion of these lands are managed for the preservation of natural resources, many allow multiple uses, including a variety of recreational opportunities. State recreation areas provide camping, hiking, riding, and boating opportunities at a number of parks, lakes, and campgrounds throughout the County. A more detailed discussion of State parks/recreation areas can be found in Section 4.7 (Parks and Recreation) of this document.

California Department of Fish and Game (CDFG)

The CDFG owns or manages 19 reserves, wildlife areas, and conservation easements throughout the County, encompassing over 122,800 acres. These lands are managed for biodiversity as well as to provide active and passive recreational opportunities. Lands owned or managed by the CDFG include the Hidden Valley, San Jacinto, and Santa Rosa Wildlife Areas; the Magnesia Springs and Lake Matthews Ecological Reserves; and the Lake Elsinore and Temecula Creek Conservation Easements.

University of California

The University of California maintains more than 30 natural reserves distributed throughout the state, encompassing a wide variety of habitats. The Natural Reserve System (NRS) preserves were established for use by researchers and students. These reserves vary in size, remoteness, degree of human impact, and ability to support use.

Use of the reserve system is by permission only. The NRS makes every effort to allow the general public to visit its reserves and learn of the work conducted there.

Through the Biology Department, the University of California at Riverside (UCR) administers six reserves in Riverside County. The nearly 28,000 acres in the UCR-managed reserves include a broad representation of Southern California's major ecosystems with their associated flora and fauna. These reserves include Emerson Oaks, James-San Jacinto Mountain, Box Springs, Motte-Rimcock, Boyd-Deep Canyon, and Steele Peak. These lands are invaluable outdoor laboratories, used by scientists throughout the world for research and teaching. In addition, many endangered or threatened species are protected from the urbanization occurring in Southern California on "habitat islands" within reserve boundaries.

The University also maintains and manages three agricultural preserves in Riverside (550 acres), Moreno Valley (740 acres), and Coachella Valley (540 acres). These agricultural preserves provide space for experimental crops and groves, research, and on a limited scale, instruction in agricultural sciences.

California State University

The Santa Margarita Ecological Reserve (SMER), comprised of 4,344 acres of chaparral, coastal sage scrub, and oak woodland, is located south of Temecula in southwestern Riverside County. The core property was acquired and reserve was established in 1962. Additional adjacent lands are leased from the BLM. This reserve is a field station of the California State Universities administered by San Diego State University (SDSU). Along with SDSU, the reserve is cooperatively administered by several other groups with varying on-site involvement including the BLM (leased lands), the CDFG (adjacent land owner), the MWD (aqueduct easement), and the Nature Conservancy (land acquisition and public outreach).

4.9.2.4 County Lands

Riverside County maintains 35 parks encompassing approximately 22,317 acres. More than half of these parks are located in the western portion of the county, with other facilities scattered in the desert, mountain, and Colorado River portions of the County. While providing recreational opportunities, several of these parks also function as invaluable open space or preserve lands which would otherwise be susceptible to encroaching development. County parks which serve this purpose include Box Springs Mountain Preserve, Norton Younglove Preserve, Prado Basin Park, Hartford Springs Preserve, Kabian County Park, Santa Ana River Regional Park, Santa Ana River Wildlife Area, and Bogart County Park.

4.9.2.5 Open Space Lands within City Boundaries

Supplementing the federal, state, and county open space assets identified above, municipal parks within Riverside County's 24 cities provide a variety of open space and recreational opportunities. The extent of a city's parkland is dependent on a variety of factors unique to each municipality. Although city park facilities may vary widely in size, facilities and permitted uses, they provide open space and recreational resources to residents of each city and Riverside County as a whole. Significant open space areas located within the jurisdictional boundaries of cities include Sycamore Canyon Wilderness Park (City of Riverside), Bighorn Sheep Preserve (City of Rancho Mirage), Magnesia Canyon Ecological Reserve (City of Rancho Mirage), Lake Cahuilla Recreation Area (City of La Quinta), and Quail Run Open Space (City of Riverside).

4.9.2.6 Riverside County Habitat Conservation Agency (RCHCA)

The RCHCA consists of the cities of Riverside, Moreno Valley, Hemet, Perris, Corona, Lake Elsinore, Murrieta, Temecula, and Riverside County and includes some lands discussed in this Open Space Land Inventory Section. The RCHCA has established a regional system of seven core reserves for conservation of Steven's kangaroo rat and the ecosystem upon which it depends. The core reserves encompass 41,221 acres. The individual core reserves range in size from 13,158 acres in Lake Skinner to 638 acres in the Motte Reserve. The vast majority of land included in these reserves is presently in public ownership; some privately held properties remain in the Lake Matthews-Estelle Mountain, Lake Skinner-Domenigoni Valley, San Jacinto-Lake Perris reserves. These reserves are managed by various public, quasi-public, and private entities, including the CDFG, the California Department of Parks and Recreation, MWD, the Nature Conservancy, the City of Riverside, the Riverside County Regional Park and Open Space District, the University of California-Riverside, and the BLM.

4.9.3 Private Lands Committed to Long-Term Open Space

4.9.3.1 The Nature Conservancy

Santa Rosa Plateau Ecological Reserve

This 8,640-acre preserve, located in southwestern Riverside County, includes rolling hills, random stands of rare Englemann oak, vernal pools on flat topped mesas, and perennial streams.

Coachella Valley Preserve

Southeast of Palm Springs, the 20,000-acre Coachella Valley Preserve provides habitat for a wide variety of plants and animals, including the federally listed endangered

Coachella Valley fringe-toed lizard and a large concentration of migratory birds. Sand dunes and palm oasis woodlands punctuate the preserve.

4.9.3.2 Utility Corridors

Because of an increased potential for adverse health and property damage, permitted uses proximate to high tension power lines, large fuel transmission pipelines, and water conveyance facilities, may be restricted. Utility providers, chiefly Southern California Edison (SCE), Southern California Gas (Gas Company), and MWD manage these areas in a manner which maximizes the health and safety benefits to the general public, ensures the economical and efficient upkeep of essential transmission facilities, and safeguards these valuable assets from unauthorized use or trespass. Open space provided in conjunction with utility corridors may be designated for agriculture or recreation uses. These corridors may also provide critical open space for wildlife or provide wildlife migration corridors for species increasingly isolated by encroaching development. A more detailed discussion of these utility corridors may be found in Sections 3.8 (Major Utility Corridors) and 9.4 (Public Services and Facilities - Water) of this document.

Metropolitan Water District (MWD): Roy E. Shipley Reserve

This 3,674-acre preserve, located between the Eastside Reservoir and Lake Skinner in southwestern Riverside County, is dedicated to the preservation and enhancement of multiple habitats and numerous endangered and sensitive animal and plant species. The MWD and RCHCA have completed a Southwestern Riverside County Multiple Species Habitat Conservation Plan (MSHCP). This plan covers numerous sensitive habitat types and species and will expand the Shipley Reserve into an area encompassing two reservoirs (Lake Skinner and Eastside Reservoir) and 13,504 acres of contiguous conserved wildlife habitat.

4.9.3.3 Williamson Act Lands

According to the State of California, Department of Conservation, Land Resource Protection Division, 63,725 acres of land within Riverside County are within Williamson Act Preserves. Of these, 57,734 acres are designated “prime,” while 5,991 are listed as “non-prime.” A detailed discussion of Williamson Act preserves is provided in Section 4.4 (Agriculture) of this document.

4.9.3.4 The Living Desert Nature Preserve

The Living Desert Nature Preserve is a 1,200-acre wildlife and botanical park dedicated to the preservation of desert species and public education of desert environments. This facility includes numerous exhibits, displays, and wilderness hiking trails.

4.9.4 Existing Open Space Land Not Committed to Long-Term Open Space

Private lands within Riverside County may be categorized as developed or undeveloped. The "undeveloped" category includes land upon which no improvements or modifications have been made. "Developed" land includes built-up, agricultural lands and/or land which has been modified in some manner.

Based on an analysis of land use within the County, approximately 2,731 square miles (1,747,692 acres) or 38 percent of the County total, are privately held.

4.9.5 Land Set Aside (Or Otherwise Restricted) for the Protection of the General Public

An important function of open space is its use as a buffer to separate people and property from intermittent or persistent hazards which could cause injury, property damage, or death. This category of open space includes areas which are set aside to distance persons and property from natural hazards (such as earthquakes, floods or unstable slopes) and lands designated as open space to buffer persons from noxious, hazardous, or incompatible human activities (e.g., landfills, airports, industrial operations).

4.9.5.1 Drainage Areas/Dam Inundation Areas

Riverside County has experienced severe flooding many times throughout its history, resulting in the loss of lives and millions of dollars in property damage. Recurrent sheet flow or local ponding is a problem in many low-lying areas of the County, while flash flooding can be a problem in desert areas and in/along alluvial fans and washes. Regulation of development in floodways and in 100-year floodplains is necessary to ensure the adequate mitigation of flood hazards. These areas are illustrated in the County Flood Hazard Maps (Figure 5.4.1). Rivers and floodways, lakes, and other water resources are generally limited to open space and limited recreational uses. Drainage areas, 100-year floodplains and dam inundation areas are discussed in further detail in Section 5.4 (Flooding Hazards) of this document.

The Prado Flood Control Basin, located in southwestern Riverside County, provides flood protection, along the Santa Ana River. The basin, located behind Prado Dam, accommodates Santa Ana River flows, allows for groundwater recharge, harbors natural areas, and provides open space for a variety of recreational pursuits. The dam's inundation area extends along the Santa Ana River and reaches portions of the Eastvale Community Plan area. Water level in the basin is seasonally variable. High precipitation storm events will substantially increase the amount of water within the basin. Plans to raise the height of Prado Dam would extend the inundation area further up and along the Santa Ana River.

Mystic Lake, located east of Lake Perris and Moreno Valley, and northwest of the City of San Jacinto, is an intermittent lake created by overflows of the San Jacinto River. During periods of above average precipitation, this lake form on agricultural lands. The underlying clay structure of the lakebed reduces percolation lake waters. Because of the intermittent nature of the lake, development of the area is generally restricted to agricultural operations and related activities which would be less affected by the variable nature of the lake.

4.9.5.2 Geologic Zones/Unstable Slope Area

Geologic zones and areas of unstable slope are often set aside as open space. Riverside County is traversed by several active and potentially active fault zones, and has experienced several earthquakes of moderate magnitude. The primary seismic hazards which result from such events include groundshaking and the potential for ground rupture along the surface trace of the fault. Secondary seismic hazards include liquefaction, settlement, landslides, and seiches. The continued urbanization of hillsides can lead to increased risk and damage from erosion and land/mud sides.

Areas of potential geologic hazards or prone to slope instability are identified in Figure 5.2.6 of this document. A more detailed analysis of these potential hazards is provided in Section 5.2 (Geotechical Hazards) of this document.

4.9.5.3 Fire Hazard Areas

Development within select areas of the County, especially those areas on or adjacent to hillsides, have an increased risk of wildfires. Development in areas prone to wildfires may be required to implement specific standards or meet stringent conditions prior to development approval. Development may be restricted in those areas where the construction of access roads, water lines or other standard firefighting facilities is physically restrictive or financially prohibitive. High fire hazard areas are discussed in Section 5.3 of this document.

4.9.5.4 Other Hazard Areas

In addition to areas set aside to protect against natural hazards, there are areas which have been designated as open space to prevent potential property loss and/or injury. These sites include buffer areas adjacent to airports, landfills, certain industrial operations, and military installations.

Section 5.0 - Public Health and Safety

Existing Setting Report

Revised March 2000

5.1 Introduction

This section is intended to provide an understanding not only of hazards and risks to existing residents and their property, but also to document the safety-related constraints to new development presented by Riverside County's natural and man-made environments. Included in this section is a discussion of seismic and geologic hazards, wildland fire hazards, flooding hazards, wind hazards, steep slopes, hazardous materials management, and emergency preparedness.

This portion of the Existing Setting Report deals with human safety. Residents, workers, and visitors to the County are exposed to a wide variety of hazards that result from natural phenomena, human intervention, and accidents. These hazards, which are similar in nature and extent to other areas of Southern California, can cause loss of life, bodily injury, and property damage. Since elimination of all potential risk associated with environmental hazards within the community is physically and economically impossible, Riverside County must set guidelines for what degree of risk is acceptable for various natural and man-made hazards.

Risk is a product of how often an event is likely to occur and how severe the consequences of its occurrence will be. The potential for significant safety impacts increases as each of these two parameters increases. Management of the level of risk can be managed in two ways: avoiding risks by locating development away from hazard areas, and regulating construction so as to mitigate risks to "acceptable" levels.

5.2 Geotechnical Hazards

While the County of Riverside is at risk from many natural and man-made hazards, the event with the greatest potential for loss of life or property and economic damage is an earthquake. This is true for most of Southern California, since damaging earthquakes are frequent, affect widespread areas, trigger many secondary effects, and can overwhelm the ability of local jurisdictions to respond. In Riverside County, earthquake-triggered geologic effects include ground shaking, fault rupture, landslides, liquefaction, subsidence, and seiches, all of which are discussed below. Earthquakes can also cause human-made hazards such as urban fires, dam failures, and toxic chemical releases.

Earthquakes are caused by movement of rock along a break called a fault. The movement releases pent-up strain energy in the form of waves, which travel outward in all directions. These seismic waves cause the earth to vibrate, and this shaking is what we feel in an earthquake.

Most earthquakes occur along plate boundaries. The outer portion of the Earth consists of enormous chunks of rock called plates, which slowly collide, separate, and grind past each other. Frictional forces resist plate movements and the plate edges lock together. Much strain energy builds up as plates keep trying to move. Eventually, frictional forces are exceeded, the locked edges move, and all the stored strain energy is released in seismic waves.

Earthquake risk is very high in the heavily populated, western portion of Riverside County, due to the presence of three of California's most active faults: the San Andreas, the San Jacinto, and the Elsinore. Risk is moderate in the eastern portion of the County that includes Blythe.

In California, recent earthquakes in or near urban environments have caused relatively few casualties. This is due more to luck than design. For example, when a portion of the Nimitz Freeway in Oakland collapsed at rush hour during the 1989, moment magnitude M_w 7.1 Loma Prieta earthquake, it was unusually empty because so many were watching the World Series. Nonetheless, California's urban earthquakes have resulted in significant economic losses. Riverside County is at risk from larger, more damaging earthquakes than the moderate-sized, M_w 6.7 Northridge earthquake, which in 1994 caused 54 deaths and $20 to $30 billion in damage.

5.2.1 Faults

Geologists visualize a fault as a plane of breakage between rocks, like a page between thick book covers, which meets the surface at some angle. Most of the major faults in Southern California are ***strike-slip***. When a strike-slip fault ruptures in an earthquake, the rocks on either side of the fault move horizontally, in opposite directions. In a ***right lateral strike-slip*** fault movement, rock on the opposite side of the fault moves to the right. Principal faults of the San Andreas system are right lateral strike-slip. There are also ***dip-slip*** faults**.** With dip-slip earthquakes, the two sides of the fault move up or down relative to each other. When the overhanging side of the fault moves down, by convention it is called a ***normal dip-slip*** fault. When the overhanging side moves up, it is a ***reverse dip-slip*** fault. Many faults combine vertical and horizontal motion. These are called ***oblique-slip*** faults.

On average, strike-slip faults are nearly vertical. That is, they meet the horizontal surface of the earth at a 90-degree angle. In contrast, dip-slip faults typically meet the surface at a non-vertical angle, and usually dip from the horizontal in the range of 45 to 60 degrees. ***Thrust*** faults are a particular type of low-angle, reverse fault, which dip 25 to 35 degrees from the horizontal. The San Fernando, Northridge, Whittier Narrows, and Sierra Madre earthquakes all occurred on thrust faults. Some faults do not extend all the way to the surface of the earth, and are referred to as "blind faults." These faults are difficult to detect before they cause an earthquake, although some do bend the surface into characteristic, small hills.

Most of the major fault zones in Southern California are roughly parallel with the plate boundary, and accommodate horizontal motion across right-lateral strike-slip faults. Reverse/thrust faults occur where regions of the crust are pushed together and are thus experiencing compression. In the Transverse Ranges north of Riverside County, there are reverse faults undergoing compression. Normal faults occur in areas where the Earth's crust is being pulled apart and extending. Some regions in Riverside County that are extending are Lake Elsinore, Temecula Valley, Beaumont Plain, and the Imperial Valley.

Current faulting in Southern California, associated with the boundary of tectonic plates, has been ongoing for the past few hundred million years. The San Andreas fault system has been active during about the past 20 million years (late Tertiary Period) and is obviously still active today. Some faults associated with earlier portions of the San Andreas Fault System have subsequently been abandoned and are no longer active (see Powell, 1993). There are yet older fault systems associated with tectonic plate interactions during the Paleozoic Era (570 to 245 million years ago), the Mesozoic Era (245 to 66 million years ago), and the early to mid Tertiary Period prior to the development of the San Andreas Fault System (66 to ~20 million years ago).

A fault is evaluated in terms of its location and lateral extent (zones), age (activity), total displacement, slip rate, and type (style of deformation, i.e., reverse, normal or strike-slip).

A ***fault zone*** represents a collection of relatively smaller scale fault ***segments*** and fault ***strands***, which typically have a similar strike, dip, and sense of movement. However, faults can exist within a particular fault zone, which displays motion contrary to the overall motion. Sometimes a number of strands is collectively referred to as a fault segment, if the faults are closely associated and are believed capable of all rupturing (moving) during a single earthquake. Individual fault strands and fault segments within a major fault zone are often designated with separate names. The individual strand refers to a single, fairly continuous mappable fault at a map scale of approximately 1:24,000. For example, the Wildomar fault strand is part of the Temecula segment, which is part of the Elsinore fault zone.

The estimated age ("activity") indicated for each fault is subdivided into categories based on the best estimate from the available data for the date of the last rupture on each fault. Listed below are the age designations utilized in the California fault map prepared by Jennings (1994). The categories include the following:

- **Historical** (ruptured in past 200 years)
- **Active** (ruptured during past 11,000 years; Holocene)
- **Potentially Active** (rupture age < ~700,000 years ago; late Pleistocene)
- **Inactive**:
  - **Quaternary** (last ruptured < 1.6 million yeas ago)
  - **Pre-Quaternary** (age unknown but available evidence suggests that it has not ruptured during the past 1.6 million years).
  - **Late Cenozoic** (ruptures between 1.6 and 11.2 million years ago).

Motion on faults is described by its ***total displacement*** (kilometers) and ***slip rate*** (provided in terms of millimeters per year-mm/yr). The total displacement is usually determined by evaluating geologic features that were around before the fault formed, and which have subsequently been split apart (offset) by the cumulative movement of many earthquakes on the fault over hundreds of thousands to millions of years. The slip rate is determined by a number of methods, all of which measure an amount of offset accrued during an estimated amount of time. The slip rate is then determined by dividing measured offset by the period of time required for the fault to accrue that much displacement. Slip rate data are utilized to estimate how fast a fault is storing up "energy" between earthquakes, and to estimate the recurrence time for large events.
The ***recurrence time***, sometimes referred to as "repeat time" or "return time," represents the average amount of time that elapses between major earthquakes on that fault. Repeat times for fault zones are estimated in a number of ways. The most specific involve fault trenching studies that investigate earthquakes that have occurred during the past thousands of years. Trenching studies have shown that faults with larger slip rates often have shorter recurrence times between major earthquakes. A large slip rate indicates rocks that are moving (due to current plate motions) at a relatively fast pace. But most of the time, the rocks are locked together by frictional forces at the fault. The more the rocks are trying to move, the faster strain energy will build up, and the more often will the forces of friction be exceeded. The fault will rupture and the rocks will move more often, releasing the strain energy in more frequent, large earthquakes.

5.2.1.1 Causes of Earthquake Damage

The ***three primary agents of earthquake damage***, ordered by their likelihood to occur extensively, are as follows:

1) Strong Ground Shaking: This causes the vast majority of earthquake damage. There are many ways that seismic waves can cause damaging ground shaking, but few of them will affect any particular location in a single earthquake. Characterization of shaking potential can require analyses of maximum ground movement (displacement), velocity and acceleration, the duration of potential strong shaking, and the lengths (periods) of waves that control each of these factors during a given earthquake. Horizontal ground acceleration is frequently responsible for widespread damage to structures. It is commonly measured as a percentage of g, the acceleration of gravity. In general, the degree of shaking can depend upon:

Source effects - These include earthquake size, location, and distance. The bigger and closer the earthquake is, the more likely damage will be. The exact way that rocks move along the fault can also influence shaking, as can the orientation of the fault in the ground. The 1995 Kobe, Japan earthquake was about the same size as the 1994 Northridge, California, earthquake, but caused much worse damage, because in Kobe, the fault directed seismic waves into the city. During the Northridge earthquake, the fault directed waves away from populated areas.

Path effects - Seismic waves change direction as they travel through the Earth's contrasting layers, just as light bounces (reflects) and bends (refracts) as it moves from air to water. Sometimes this can focus seismic energy at one location, and cause damage in unexpected areas.

Site effects - Seismic waves slow down in the loose sediments and weathered rock at the earth's surface. As they slow, their energy converts from speed to amplitude, which increases shaking. This is identical to the behavior of ocean waves. As the waves slow down near shore, their crests grow higher. Sometimes, too, seismic waves get trapped at the surface and resonate. Whether resonance will occur depends on the period (the length) of the incoming waves. Waves, soils, and buildings all have resonant periods. When these match, tremendous damage can occur.

2) Liquefaction/Ground Failure: Portions of the County of Riverside are susceptible to liquefaction and landslides or rockfall, very destructive secondary effects of strong seismic shaking.

Liquefaction - occurs primarily in saturated, loose, fine- to medium-grained soils in areas where the groundwater table is within 50 feet of the surface. Shaking suddenly increases pore water pressure, causing the soils to lose strength and behave as liquid. Excess water pressure vents upward through fissures and soil cracks and a water-soil slurry bubbles onto the ground surface. The resulting features are called “sand boils,” “sand blows,” or “sand volcanoes.” Liquefaction-related effects include loss of bearing strength, ground oscillations, lateral spreading, and flow failures or slumping. Site-specific geotechnical studies are the only practical and reliable way of determining the liquefaction potential of a site.

Landslides and Rockfall - There are predictable relationships between local geology and mass wasting processes like landslides and rockfall. Slope stability is dependent on many factors and their interrelationships. Rock type and pore water pressure are possibly the most important factors, followed by slope steepness due to natural or man-made undercutting. In addition, many existing landslides and soil slumps have been mapped within the County, and where slopes have failed before, they will fail again.

Field investigation enables identification of failure-prone slopes before an earthquake occurs.

3) Primary Ground Rupture/Faulting: Primary ground damage due to earthquake fault rupture typically results in a relatively small percentage of the total damage in an earthquake, but being too close to a rupturing fault can cause profound damage. It is difficult to reduce this hazard through structural design. The primary mitigative technique is to set back from, and avoid, active faults. The challenge comes in identifying all active faults. Faults throughout Southern California have formed over millions of years. Some of these faults are generally considered inactive under the present geologic conditions. Other faults are known to be active. Such faults have either generated earthquakes in historical times (the last 200 years), or show geologic and geomorphic indications of relatively recent movement. Faults that have moved in the relatively recent geological past are generally presumed to be the most likely candidates to generate damaging earthquakes in the lifetimes of residents, buildings or communities.

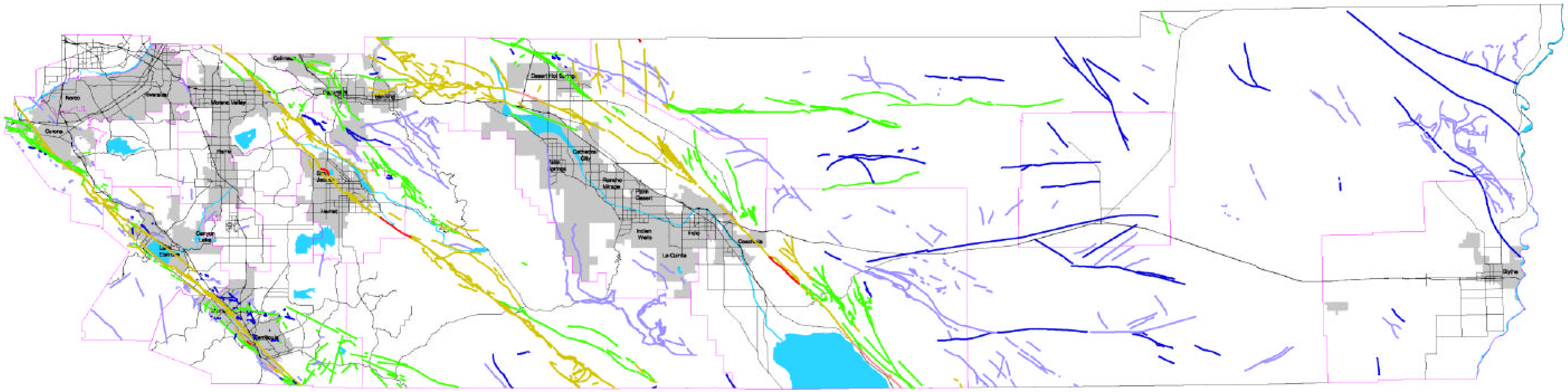
5.2.1.2 General Tectonic Setting

Earthquakes in Southern California occur as a result of movement between the Pacific and North American plates. Faults of the San Andreas system are used to mark the boundary between the plates, but the deformation, faulting and associated earthquakes occur in a broadly distributed zone that stretches from offshore to Nevada. Thus, the San Andreas is one of a system of plate-bounding faults. Most of the movement between the plates occurs along the San Andreas fault, which bisects Riverside County. The rest of the motion is distributed among northwest-trending, strike-slip faults of the San Andreas system (principally the San Jacinto, Elsinore, Newport-Inglewood and Palos Verdes faults); several east-trending thrust faults which bound the Transverse Ranges; and the Eastern Mojave Shear Zone (a series of faults east of the San Andreas, responsible for the 1992 Landers and the 1999 Hector Mine earthquakes).

There have been several notable earthquakes in Southern California over the last 15 years including the 1986 Palm Springs, 1987 Whittier Narrows, 1987 Imperial Valley, 1991 Sierra Madre, 1992 Landers, 1994 Northridge, and 1999 Hector Mine earthquakes. However, some researchers suggest that far too few earthquakes have occurred in Southern California in the last 200 years to account for the rate of movement between the Pacific and North American plates. The data suggest that Southern California is due for either numerous, moderate (M_w 6-7), Northridge-like earthquakes, or a few, larger (M_w 7.2 or greater) earthquakes.

Earthquakes could occur in any of the four major geologic provinces in the County of Riverside. These provinces are characterized by different active tectonic stress regimes and geomorphology (Figure 5.2.1). In each province, the stresses of plate motion create different styles of faults and surficial features.

Peninsular Ranges: The western portion of Riverside County and most of its population are in the Peninsular Range province. The Santa Ana and San Jacinto Mountains



Faults Activity

- Historic
- Historic (Creep)
- Holocene
- Late Quaternary
- Quaternary
- Pre-Quaternary

- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure5.2.1

Source: EarthConsultantsInternational.

MAPPED FAULTING IN RIVERSIDE COUNTY

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R:\SVC931-Graphics\ExistingSetting\faulting.cdr(7/5/02) are part of the Peninsular Ranges, and were built by movement along earthquake faults. This province is dominated by right-lateral strike-slip faulting associated with the San Jacinto and Elsinore faults. However, all types of faulting may be found in this block, such as in the Elsinore Trough. The communities of Temecula and Murrieta and many agricultural areas of southwestern Riverside County lie in this broad structural depression, formed by active faulting along faults of the Elsinore fault system.

Salton Trough: The desert communities and farmland of the Coachella Valley in central Riverside County are located within the Salton Trough province. Here, the plates are separating and spreading centers exist. The spreading centers continue to the south, into the Gulf of California. At present, the Salton Trough is cut off from the Gulf of California by an accumulation of sediment at the mouth of the Colorado River. The Trough is filled with sediment three miles thick, derived primarily from the Colorado River. Periodically during the last 10,000 years, the Trough has been inundated with water. The most recent inundation formed the Salton Sea in 1905.

Transverse Ranges: Throughout most of the western U.S. there is northwest-trending geologic features, a consequence of current plate motions. The trend of the Transverse Range province is a startling exception. These mountains run west to east from west of Santa Barbara to east of San Bernardino. The easternmost San Bernardino Mountains lie in north-central Riverside County. Many of Southern California's recent damaging earthquakes occurred on faults that have built the Transverse Ranges, including the 1971 Sylmar M_w 6.7, the 1991 Sierra Madre M_w 5.8, and the 1994 Northridge M_w 5-6.7. Although most of this province is located north and west of Riverside County, populated areas such as Riverside, Norco, and Corona are at risk from Transverse Range earthquakes occurring on the nearby Cucamonga or Sierra Madre fault systems, about 20 to 25 miles to the north.

Mojave Desert: The Mojave Desert province consists of the eastern half of the County, and includes the Blythe area. Compared to the rest of Riverside County, this province has a moderate to low rate of seismicity and very few mapped faults. However, just north of the County, there are numerous active right-lateral strike-slip faults in the Mojave Desert province. These have recently produced the 1992 Landers M_w 7.3 and the 1999 Hector Mine M_w 7.1 earthquakes.

5.2.1.3 Common Designations of Earthquake Hazard Potential

Earthquake Size and Impact: An earthquake is classified according to its ***moment*** (a measure of the energy released when a fault ruptures), its ***magnitude*** (a measure of maximum ground motion) or its ***intensity*** (a qualitative assessment of an earthquake's effects at a given location). A given earthquake will have one moment, and in principle, one magnitude (although there are several methods of calculating magnitude, which give slightly different results). However, earthquakes can produce several intensities, because effects generally decrease with distance from the earthquake. The most commonly used seismic intensity scale, called the Modified Mercalli Intensity (MMI) scale, has 12 levels of damage. The higher the number, the greater the damage (Table 5.2.A).

The strength of seismic ground shaking at any given site is a function of many factors. Of primary importance are the size of the earthquake, its distance, the paths the waves take as they travel through the earth, the rock or soils underlying the site, and topography (particularly whether a site sits in a valley, or atop a hill). The amount of damage also depends on the size, shape, age, and engineering characteristics of the affected structures.

Table 5.2.A - Abridged Modified Mercalli Intensity Scale And Relation to Other Parameters

	Intensity Value and Description	Average peak Velocity (centimeters per second)	Average peak acceleration (g is gravity = 9.80 meters per second squared)
I.	Not felt except by a very few under especially favorable circumstances (I Rossi-Forel)		
II.	Felt only by a few persons at rest, especially on upper floors of high-rise buildings. Delicately suspended objects may swing. (I to II Rossi-Forel scale)		
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibration like passing of truck. Duration estimated. (III Rossi-Forel scale)		
IV.	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like a heavy truck striking building. Standing automobiles rocked noticeably. (IV to V Rossi-Forel scale)	1-2	0.015g-0.02g
V.	Felt by nearly everyone, many awakened. Some dishes, windows, and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel scale)	2-5	0.03g-0.04g
VI.	Felt by all, many frightened and run outdoors. Some heavy furniture moved, a few instances of fallen plaster and damaged chimneys. Damage slight. (VI to VII Rossi-Forel scale)	5-8	0.06g-0.07g
VII.	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars. (VIII Rossi-Forel scale)	8-12	0.10g-0.15g
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed. (VIII+ to IX Rossi-Forel scale)	20-30	0.25g-0.30g
IX.	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel scale	45-55	0.50g-0.55g
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks (X Rossi-Forel scale)	More than 60	More than 0.60g
XI.	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.		
XII.	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into air.		

Primary Source: Bolt (1993)

The interaction of ground motion and human-made structures is complex. Governing factors include a structure's height, construction, and stiffness, a soil's strength and resonant period, and the period of high-amplitude seismic waves. Waves come in different lengths and thus repeat their motions with varying frequency. Long waves are called long period or low frequency. Short waves are called short period or high frequency. In general, long period seismic waves, which are characteristic of large earthquakes, are most likely to damage long period structures such as high-rise buildings and bridges. Shorter period seismic waves, which tend to die out quickly, will most often cause damage in nearby earthquakes, and they will damage shorter period structures such as one- and two-story buildings. Very short period waves are most likely to cause non-structural damage, such as to equipment. In different situations, ground displacement, velocity, and acceleration can cause damage.

Planning and Design Earthquakes: The largest earthquake expected in an area under the current tectonic environment is termed the ***maximum credible*** (MCE) or characteristic earthquake. A ***maximum probable earthquake*** (MPE) is the earthquake most likely to occur in a specified period of time, such as 30 to 500 years. Generally, the longer the time period (recurrence interval) between earthquakes, the larger the earthquake will be, because there has been time to store more strain energy. The recurrence interval of concern will depend on the planned use, lifetime, or importance of a facility. The more critical the structure, the longer the recurrence interval chosen and the larger the ***design earthquake.***

Geologists, seismologists, engineers, and urban planners typically use maximum credible and maximum probable earthquakes to evaluate the seismic hazard of a region. Buildings and other structures must meet seismic design parameter values. They must withstand a certain peak acceleration, a given duration of strong shaking, or a particular period of seismic waves. When these values are derived from maximum credible earthquakes (MCE), they help to establish safety margins.

Although earthquakes occur often in Southern California, hundreds or thousands of years can elapse between earthquakes on any particularly portion of a fault. Many Southern California faults have not caused earthquakes in historic times, and fewer yet have caused a MCE in historic times. Therefore, estimates of maximum credible and maximum probable earthquakes for a given fault are based on the length of the fault, style of faulting, and other characteristics. Earthquake size often depends on how many segments of a fault give way at one time. The more segments that rupture, the greater the energy release and the bigger the earthquake.

When a fault has not ruptured in historic times, data obtained from trenching excavations across the fault (paleoseismic studies) provide valuable insight into how often the fault ruptures, and how big its earthquakes get.

Fault Activity: The State of California, under the guidelines of the Alquist-Priolo Earthquake Fault Zoning Act (Hart and Bryant, 1997), classifies faults according to the following criteria:

<u>Active faults</u> show proven displacement of the ground surface within about the last 11,000 years (Holocene Epoch); and

<u>Potentially Active</u> faults show evidence of movement within the last 1.6 million years.

The State definition of an active fault is designed to gauge the surface rupture potential of a fault. The assumption is that if a fault has not moved in the last 11,000 years, it is unlikely to be the source of a damaging earthquake in the future. For residential subdivisions, a fault that has not moved in the last 11,000 years, as determined from direct geologic evidence, is presumed to be ***not active***. These are reasonable assumptions, but it can be difficult to ascertain when a fault has moved.

Although potentially active faults are considered less likely to generate earthquakes than active faults, in reality, most potentially active faults have been insufficiently studied to determine whether they are active or not.

Regardless of which fault causes an earthquake, there will always be ***aftershocks.*** By definition, these are smaller earthquakes that happen close to the ***mainshock*** (the biggest event of the sequence) in time and space. These smaller earthquakes occur as the earth adjusts to the regional stress changes created by the mainshock. The bigger the mainshock, the greater the number of aftershocks, and the larger they will be. Generally, it takes a magnitude of about 5.5 to damage buildings. Any major earthquake will produce aftershocks large enough to cause damage, especially to already-weakened structures.

On average, the largest aftershock is 1.2 magnitude units less than the mainshock, Thus, a magnitude 6.9 earthquake will tend to produce aftershocks up to magnitude 5.7 in size. This is an average, thus there are many cases where the largest aftershock is larger than the average would predict. Post-disaster response must take large, damaging aftershocks into account.

5.2.1.4 Laws to Mitigate Earthquake Hazard

The Alquist-Priolo Special Studies Zones Act was signed into law in 1972. In 1994 it was renamed the Alquist-Priolo Earthquake Fault Zoning Act (A-P Act). The primary purpose of the A-P Act is to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault (Hart and Bryant, 1997). This State law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. Surface rupture is the most easily avoided seismic hazard.

The A-P Act requires the State Geologist (Chief of the California Division of Mines and Geology (CDMG)) to delineate "Earthquake Fault Zones" along faults that are "sufficiently active" and "well-defined." Sufficiently active faults show evidence of Holocene surface displacement along one or more or their segments. Well-defined faults are clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The boundary of an "Earthquake Fault Zone" is generally about 500 feet from major active faults, and 200 to 300 feet from well-defined minor faults. The A-P Act dictates that cities and counties withhold development permits for sites within an Alquist-Priolo Earthquake Fault Zone, until geologic investigations demonstrate that the sites are not threatened by surface displacements from future faulting (Hart and Bryant, 1997).

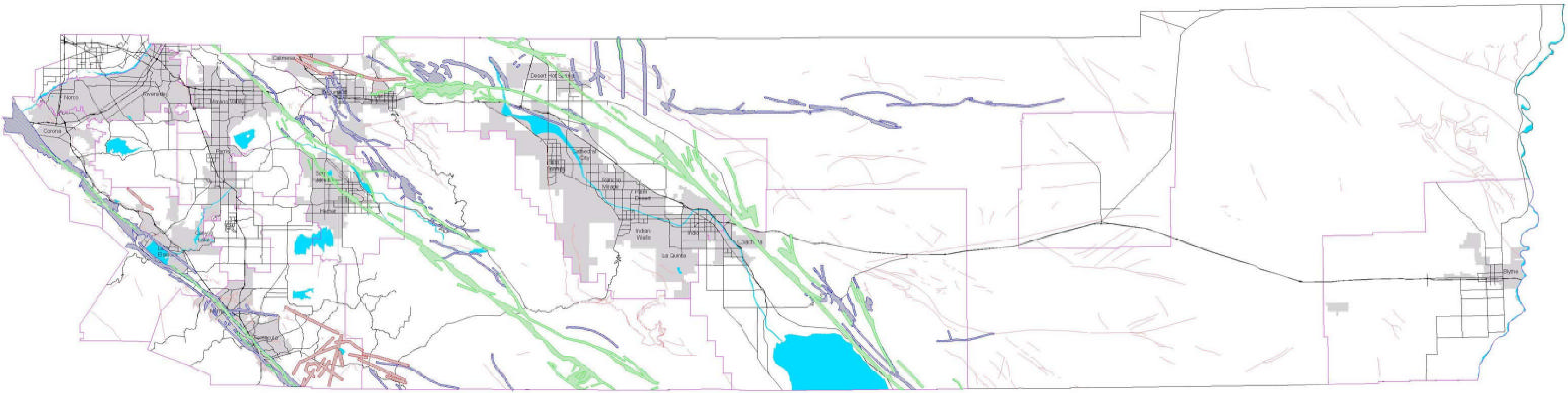
Alquist-Priolo Earthquake Fault Zone mapping has been completed by the State Geologist for the 45 quadrangles in Riverside County (Figure 5.2.2). The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. State law exempts single family wood-frame and steel-frame dwellings, which are less than three stories and are not part of a development of four units or more. However, local agencies can be more restrictive than state law requires.

Before a project can be permitted, cities and counties require a geologic investigation to demonstrate that proposed buildings will not be constructed across active faults. An evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

The A-P Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. ***The Seismic Hazards Mapping Act (SHMA)***, passed in 1990, addresses non-surface fault rupture earthquake hazards, including strong ground shaking, liquefaction, and seismically-induced landslides.

The CDMG is the principal State agency charged with implementing the 1990 SHMA. Pursuant to the SHMA, the CDMG is directed to provide local governments with seismic hazard zone maps that identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures. The goal is to minimize loss of life and property by identifying and mitigating seismic hazards. The seismic hazard zones delineated by the CDMG are referred to as "zones of required investigation." Site-specific geotechnical hazard investigations are required by SHMA when construction projects fall within these areas. The CDMG, pursuant to the 1990 SHMA, has not completed any mapping for Riverside County, nor is any planned for the foreseeable future (CDMG, 2000).

Real Estate Disclosure Requirements. Effective June 1, 1998, the Natural Hazards Disclosure Act requires that sellers of real property and their agents provide prospective buyers with a "Natural Hazard Disclosure Statement" when the property being sold lies within one or more state-mapped hazard areas. If a property is located in a Seismic Hazard Zone as shown on a map issued by the State Geologist, the seller or the seller's agent must disclose this fact to potential buyers.



Fault Zones

- Alquist-Priolo Zone
- Existing County Zone
- Recommended Zone
- Faults
- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure 5.2.2

Source Information: Earth Consultants International

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ALQUIST-PRIOLO EARTHQUAKE HAZARD ZONE MAP

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5.2.2 Major Earthquake Sources in Riverside County

Many faults have the potential to generate strong ground shaking, surface fault rupture and secondary damage in Riverside County. For the faults that pose the greatest threat to the County, summaries of current technical data and professional views are described in the next sections. The fault zone parameters for major faults within the County are summarized in Table 5.2.B.

5.2.2.1 San Andreas Fault Zone

Because of its relatively frequent (high recurrence rate), large earthquakes, the San Andreas fault is considered the "Master Fault," controlling the seismic hazard in Southern California. In the vicinity of Riverside County, the San Andreas fault zone is comprised of three segments: (1) the San Bernardino Mountains segment, (2) the Coachella Valley segment, and (3) the Mojave Desert segment. Between Cajon and San Gorgonio Passes, the County is bisected by the San Bernardino segment. The Coachella Valley segment of the San Andreas runs along the northeastern margin of the Coachella Valley.

The last major earthquake on the southern San Andreas fault was the 1857 M_w 8.0 Fort Tejon quake that ruptured the San Andreas from central California, near Parkfield, to Cajon Pass, about 15 miles north of the county. The "Southern Segment" is considered a simultaneous rupture of the San Bernardino and Coachella Valley segments. Paleoseismic evidence indicates that such simultaneous ruptures have occurred at least twice since 1450.

The San Bernardino Mountains segment extends in a westerly to northwesterly direction between the Cajon Pass area and the San Gorgonio Pass. This segment is structurally complex because the fault makes a left-step, and bends to trend in a more westerly direction. Associated compression is expressed as a zone of reverse, lateral and oblique-slip deformation that is accommodated by several subparallel fault strands. The most important of these are the Mission Creek, San Gorgonio Pass, and Banning faults.

Several estimates of slip rate obtained independently indicate that the San Bernardino Mountains segment has a slip rate of 24± 6 mm/yr, with an average recurrence interval of 146 years (WGCEP, 1995). Paleoseismic studies at Wrightwood indicate that there have been six surface-rupturing earthquakes on this segment since AD 1192, with the most recent five events occurring, on average, every 106 years. The most recent surface-rupturing earthquake on this segment is thought to have occurred in 1812 (Jacoby and others, 1988). Stein and others (1992) indicate that the Landers earthquake sequence may have caused stress changes that advanced the occurrence of the next great San Andreas earthquake on this segment by 8 to 22 years. The Working Group on California Earthquake Probabilities (1995) estimated that this segment has a 28 percent probability of rupturing in the time period between 1994 and 2024 (Figure 5.2.3). An earthquake of magnitude 7.3 on the San Bernardino Mountains segment could produce peak horizontal ground accelerations as high as 0.53 g in Riverside

Table 5.2.B: Fault Source Parameters for Riverside County

Fault Name and Geometry (1)	Distance from County (km)	Length		Slip Rate		Maximum Magnitude (2)	Maximum PGA (3)	Average Return Interval (yrs)	Comments
		(km)	+/-	(mm/yr)	+/-				
San Andreas-Coachella (rl-ss)	0	95	10	25	5	7.1	0.51	na	Slip rate based on Sieh and Williams (1990); Sieh (1986); Keller et al. (1982); Bronkowski (1981). Model assumes slip only in S. San Andreas events.
San Andreas-San Bernardino (rl-ss)	0	107	11	24	6	7.3	0.53	146	Slip rate reported by Weldon and Sieh (1985).
San Andreas (southern) (rl-ss)	0	203	20	24	6	7.4	0.48	220	Rupture of San Bernardino and Coachella segments. Slip rate based on Coachella segment.
San Andreas-Mojave (rl-ss)	>30	99	10	30	7	7.1	0.25	150	Slip rate based on Sieh (1984), Salyards et al. (1992), and WGCEP (1995).
San Jacinto-Coyote Creek (rl-ss)	0	40	4	4	2	6.8	0.48	175	Slip rate and fault length from WGCEP (1995).
San Jacinto-Anza (rl-ss)	0	90	9	12	6	7.2	0.52	250	Slip rate and fault length from WGCEP (1995).
San Jacinto-San Jacinto Valley (rl-ss)	0	42	4	12	6	6.9	0.49	83	Slip rate and fault length from WGCEP (1995).
San Jacinto-San Bernardino (rl-ss)	0	35	4	12	6	6.7	0.53	100	Slip rate and fault length from WGCEP (1995).
Elsinore-Temecula (rl-ss)	0	42	4	5	2	6.8	0.47	240	Slip rate and fault length from WGCEP (1995).
Elsinore-Glen Ivy (rl-ss)	0	38	4	5	2	6.8	0.48	340	Reported slip rates vary from 3.0-7.2 (Millman and Rockwell, 1986)
Whittier (rl-ss)	0	37	4	2	1	6.8	0.48	641	Slip rate based on Rockwell et al. (1990); Gath et al. (1992) description of offset drainage.
Chino-Central Ave. (rl-r-o)	0	28	3	1	1	6.7	0.47	882	Unconstrained slip rate based on assumptions of slip transfer between Elsinore and Whittier faults.

1. STYLE OF FAULT: (ss) strike slip, (r) reverse, (n) normal, (o) oblique SENSE OF SLIP: (rl) right lateral, (ll) left lateral
2. Maximum moment magnitude calculated from rupture area regressions (type "all") (from Wells and Coppersmith, 1994).
3. Maximum estimated horizontal peak ground acceleration as a percentage of gravity on bedrock, at closest Riverside County location (from CDMG).

County. If this fault segment breaks along with the Mojave or Coachella segments (e.g., Southern Segment), a much larger portion of the County would be subjected to strong ground motions.

The Coachella Valley segment extends from the San Gorgonio Pass to the Salton Sea. It has not produced large, surface-rupturing earthquakes in historic times (Sieh and Williams, 1990). Paleoseismic studies suggest that the last surface-rupturing earthquake on this segment occurred around A.D. 1680. Studies at Indio indicate that prior to 1680, earthquakes on this fault segment occurred at an average recurrence interval of 220 years. The data also suggest that the Coachella Valley and San Bernardino Mountain segments ruptured simultaneously in earthquakes that occurred around 1680 and 1450. The segment is creeping at a rate of about 2 to 4 mm/year, and has a long-term slip rate of about 25 ± 5 mm/yr (WGCEP, 1995). This segment has an estimated 22 percent probability of rupturing before the year 2024 and is estimated capable of producing a magnitude 7.1 earthquake (WGCEP, 1995).

The Mojave segment extends from the Cajon Pass area, the southern limit of the 1857 rupture, (about 30 kilometers (km) of Riverside County some 100 km north (WGCEP, 1995). The 1988 Working Group calculated the recurrence interval for this segment using the 1857 displacement. The 1995 Working Group retained the slip rate of 30 mm/yr, characteristic displacement of 4.5 ± 1.0 m and derived repeat time of 150 years, but increased the uncertainties to ±8 mm/yr and ±1.5 m, respectively. Rupturing alone, the Mojave segment is estimated capable of producing a magnitude 7.1 earthquake.

5.2.2.2 San Jacinto Fault Zone

The San Jacinto Fault Zone consists of a series of closely spaced faults that form the western margin of the San Jacinto Mountains. The fault zone extends from its junction with the San Andreas fault in San Bernardino, southeasterly toward the Brawley area, where it continues south of the international border as the Imperial transform fault. The San Jacinto fault zone has a high level of historical seismic activity, with at least ten damaging (M_w 6 - 7) earthquakes having occurred on this fault zone between 1890 and 1986. Earthquakes on the San Jacinto in 1899 and 1918 caused fatalities in the Riverside County area. Offset across this fault is predominantly right-lateral, similar to the San Andreas fault, although Brown (1990) has suggested that dip-slip motion contributes up to 10 percent of the net slip. The segments of the San Jacinto fault that are of most concern to Riverside County are the San Bernardino, San Jacinto Valley, and Anza segments.

Fault slip rates on the various segments of the San Jacinto Valley are less well constrained than for the San Andreas fault, but the available data suggest slip rates of 12 ± 6 mm/yr for the northern segments of the fault, and slip rates of 4 ± 2 mm/yr for the southern segments (WGCEP, 1995). For large ground-rupturing earthquakes on the San Jacinto fault, various investigators have suggested a recurrence interval of 150 to 300 years (Petersen and Wesnousky, 1994). The Working Group on California Earthquake Probabilities (1995) has estimated that the San Bernardino, San Jacinto Valley, and Anza segments have a 37, 43, and 17 percent probability, respectively, of rupturing in the period between 1994 and 2024.

A MCE of magnitudes 6.7, 6.9, and 7.2 are expected on the San Bernardino, San Jacinto Valley, and Anza segments, respectively, capable of generating peak horizontal ground accelerations of 0.48 to 0.53 g (Table 5.2.A) in the County of Riverside.

5.2.2.3 Elsinore Fault Zone

The Elsinore fault zone parallels the San Jacinto and is part of the same right-lateral crustal plate strain system as the San Andreas and the San Jacinto. Segments in Riverside County are the Whittier, Glen Ivy, Temecula, and Julian segments. The most apparent displacements on the Whittier-Elsinore have been vertical, as evidenced by the steep scarp (an earthquake-built cliff) along the Santa Ana Mountains. The Elsinore branches into the Whittier fault near Santa Ana Canyon, where it borders the Puente Hills to the southwest and the Chino fault to the northeast. A MCE of M_w 6.7 to 6.8 are assigned for the Chino, Whittier, Glen Ivy, and Temecula segments of the Elsinore fault. Major ground rupturing events on these fault segments would generate peak ground accelerations of 0.47 to 0.48 g for Riverside County (Table 5.2.A). WGCEP (1995) estimates probabilities of 5 to 16 percent for these events to occur in the 1994 to 2024 time period.

5.2.2.4 Cucamonga Fault Zone

The Cucamonga fault zone, a member of the Transverse Ranges family of thrust faults (Morton and Matti, 1987), is not in Riverside County but creates a hazard there. It is the eastward extension of the Sierra Madre fault, one of the most hazardous of Southern California's faults. The Cucamonga fault zone is the known Transverse Ranges fault that is closest to the County of Riverside. It is comprised of a series of east-west trending, north-dipping reverse faults that displace Holocene sediments (Ziony and Jones, 1989). This frontal fault zone extends from the southern margin of San Gabriel Mountains to the southern margin of the San Bernardino Mountains, disrupting modern alluvial fans and sediments associated with the upper Santa Ana River Valley. This provides evidence that the Cucamonga fault zone is active.

Measurements of the fault-plane dips and determination of surface offsets for thrust fault scarps suggest minimum slip rates between 4.5 and 5.5 mm/yr (Morton et al., 1987). Taking into account uncertainties in Carbon-14 age dating of offset materials, WGCEP (1988) assigned a slip rate of 5.0 ± 2.0 mm/yr and maximum magnitude of 7.0 to the Cucamonga fault.

5.2.3 Riverside County Seismicity

In Table 5.2.C are the epicenters and magnitudes of historical earthquakes that have caused significant ground shaking or secondary damage in Riverside County. These data are provided by the Southern California Earthquake Center-Data Center (SCEC-DC, 1999). Several of these earthquakes have resulted in MMI VII (severe) ground shaking in Riverside County. Fatalities were reported in Riverside County as a result of San Jacinto fault earthquakes in 1899 and 1918. Recently, MMI VI shaking occurred in the southern Coachella Valley region of Riverside County during the October 1999 M_w 7.1 Hector Mine earthquake.

Table 5.2.C - Historical Earthquakes Impacting Riverside County

Date	Magni-tude	Max MMI in Riverside County	Distance from Riverside County
Dec. 8, 1812; 7:00 a.m.	7.5	VIII	Wrightwood; 18 miles north
July 22, 1899; 12:32 pm,	5.7	VII	Cajon Pass; 18 miles north
Dec. 25, 1899; 4:25 am	6.5	VIII	San Jacinto Valley, 6 fatalities in County
May 15, 1910; 7:47 am	6.0	VII	near Lake Elsinore
April 21, 1918; 2:32 pm	6.8	VIII	San Jacinto Valley, 1 fatality in County
March 10, 1933; 5:54 pm	6.4	V	Long Beach; 19 miles west
Dec. 4, 1948; 3:43 pm	6.0	VII	Desert Hot Springs
Sept. 12, 1970; 7:30 am	5.2	V	Lytle Creek; 18 miles north
July 8, 1986; 2:21 am	6.0	VII	North Palm Springs
Oct. 1, 1987; 7:42 a.m.	5.9	IV	Whittier-Narrows; 21 miles west
June 26, 1988; 8:05 a.m.	4.7	IV	Upland; 11 miles west
Feb. 28, 1990; 3:43 p.m.	5.4	V	Upland; 12 miles west
June 28, 1991; 7:43 a.m.	5.8	IV	Sierra Madre; 18 miles northwest
April 22, 1992; 9:50 pm	6.1	VII	Joshua Tree
June 28, 1992; 4:57 am	7.3	VII	Landers; 8 miles north
June 28, 1992; 8:05 am	6.4	VI	Big Bear; 10 miles north
Jan. 17, 1994; 4:31 am	6.7	III	Northridge; 64 miles northwest
Oct. 16, 1999; 2:40 am	7.1	VI	Hector Mine; 20 miles north

5.2.3.1 Past Damaging Earthquakes

Below is a summary of historical earthquakes significant to Riverside County. Locations and sizes of earthquakes that occurred before good instrumental recordings became available (before ~1940) have been estimated.

1812 Wrightwood (formerly known as the "San Juan Capistrano Earthquake"): With a magnitude of approximately 7.5, this earthquake occurred on December 8, 1812 during the mid-morning hours. The epicenter is relatively uncertain, but, based upon tree ring and paleoseismology data (Jacoby and others, 1988; Sieh and others, 1989), appears to be on the San Andreas fault near Wrightwood, about 18 miles north of Riverside County. This earthquake is often referred to as the "San Juan Capistrano" earthquake, due to the death toll at the mission. It is thought that this quake ruptured the Mojave segment of the San Andreas, possibly resulting in as much as 106 miles of surface rupture -- roughly, the length of the San Andreas fault between Tejon Pass and Cajon Pass.

1899 Cajon Pass: This estimated magnitude 5.7 earthquake was felt over most of Southern California, with intensities reaching VIII in the epicentral area, somewhere near Lytle Creek and Cajon Pass, about 18 miles north of Riverside County. Triggered landslides blocked both the Lytle Creek Canyon Road and the road through Cajon Pass. The heaviest damage to buildings occurred in San Bernardino, Highland, and Patton. Damage was also reported in Redlands, Pomona, Riverside, Pasadena, and Los Angeles, though it was mostly minor. No deaths were reported, and the number of injuries is uncertain (Townley, 1939).

1899 San Jacinto: This devastating earthquake occurred in west-central Riverside County, near the town of San Jacinto, on December 25, 1899 at 4:25 a.m. PST, with an estimated magnitude of 6.5. This location is not far from the epicenter of the 1918 San Jacinto earthquake. Damage was greatest in the towns of San Jacinto and Hemet, where nearly all brick buildings were either badly damaged or destroyed. Also hit hard was the Soboba Indian Reservation, where six people were killed by falling adobe walls. Chimneys were thrown down and walls cracked in Riverside. Other outlying areas reported minor damage.

1910 Elsinore: The Elsinore earthquake struck on May 15, 1910 at 7:47 a.m. PST, with an epicenter estimated near Lake Elsinore in western Riverside County. The earthquake most likely occurred on the Elsinore fault, and was preceded by moderate foreshocks on April 10 and May 12. The Elsinore earthquake was not a particularly strong or damaging quake. What is notable about this quake is that best estimates place it on the Elsinore fault zone, along which there are no historical recordings of earthquakes of magnitude 6.0 or larger.

1918 San Jacinto: The approximately magnitude 6.8 earthquake occurred on April 21, 1918 at 2:32 p.m. PST on the San Jacinto fault in west-central Riverside County. According to intensity isoseismals that rely heavily on damage reports, most of the damage occurred in the business districts of the towns of San Jacinto and Hemet, where large masonry structures collapsed. Luckily, the earthquake struck on a Sunday afternoon, when the business districts were empty. Several people were injured and one death was reported. Two miners were trapped in a mine near Winchester, but were eventually rescued, uninjured.

1933 Long Beach: This magnitude 6.4 earthquake struck on March 10, 1933 at 5:54 p.m. PST, about 19 miles west of Riverside County. While referred to as the Long Beach earthquake due to the extensive damage in the Long Beach area, its epicenter was actually 3 miles south of Huntington Beach. This earthquake occurred on the Newport-Inglewood fault zone, a system of right-lateral strike-slip faults. There was no surface rupture associated with this earthquake, which resulted in 120 deaths and over $50 million in property damage. Most of the damaged buildings were of unreinforced masonry. Many school buildings were destroyed. Fortunately, however, the children were gone for the day. The Long Beach earthquake has the greatest death toll of any historical Southern California earthquake. Yet the toll would have been much more tragic if the collapsed school buildings had been occupied. The fact that the relatively recent urban earthquakes (1971 M_w 6.7 Sylmar; 1989 M_w 7.1 Loma Prieta; and 1994 M_w 6.7 Northridge) all had far fewer fatalities despite much larger populations may stand as testimony to improvement of the life-safety aspects of modern building codes. This is the earthquake that changed building codes and required masonry to be reinforced. The 1933 Long Beach earthquake also led to the passage of the Field Act, which gave the State Division of Architecture authority and responsibility for approving design and supervising construction of public schools.

1948 Desert Hot Springs: This magnitude 6.0 earthquake struck on December 4, 1948 at 3:43 p.m. PST. The fault involved is believed to be the Banning fault. Shaking was felt over a large area (central Arizona, parts of Mexico, Santa Catalina Island, and Bakersfield), and caused notable damage in regions far from the epicenter. In the Los Angeles area, a 5,800-gallon water tank split open, water pipes were broken at UCLA, and in Pasadena, plaster cracked and fell from many buildings. In San Diego, a water main broke. In Escondido and Corona, walls cracked. The administration building of Elsinore High School was permanently closed due to the damage it sustained, as was a building at the Emory School in Palm Springs. Closer to the epicenter, landslides and ground cracks were reported, and a road leading to the Morongo Indian Reservation was badly damaged (Louderback, 1949). In Palm Springs, the City hit hardest by the quake, thousands of dollars of merchandise was thrown from shelves and destroyed. Part of a furniture store collapsed. Two people were injured when the shaking induced a crowd to flee a movie theater in panic. Numerous other instances of minor structural damage were reported. Fortunately, despite much damage, no lives were lost.

1970 Lytle Creek: This magnitude 5.2 earthquake occurred on September 12 at 7:31 a.m. PST about 18 miles north of Riverside County. The Lytle Creek earthquake struck the area near Cajon Pass, knocking a San Bernardino radio station off the air, and causing landslides and rockfalls in the Transverse Ranges. Several roads were blocked or partially blocked. The quake caused some unusual damage in areas a fair distance from the epicenter. Power was disrupted in the Santa Monica Mountains northwest of Hollywood. A high-pressure water system in a Riverside aerospace plant was damaged, leading to a subsequent boiler explosion that injured four people. More typical minor damage also occurred, primarily in the Lytle Creek area (intensity VII on the MMI scale) and to a lesser degree in the nearby towns of Colton, Crestline, Cucamonga, Fontana, Glendora, Highland, Mt. Baldy, Rialto, Rubidoux, and Wrightwood (Lander, 1971).

1986 North Palm Springs: This magnitude 6.0 earthquake occurred on July 8, 1986 at 2:21 a.m. PST, along either the Banning fault or the Garnet Hill fault. The epicenter was about 6 miles northwest of Palm Springs in north-central Riverside County. The 1986 North Palm Springs earthquake was responsible for at least 29 injuries and the destruction or damage of 51 homes in the Palm Springs-Morongo Valley area. It also triggered landslides. Damage caused by this quake was estimated at over $4 million. Ground cracking was observed along the Banning, Mission Creek, and Garnet Hill faults, but these cracks were due to shaking, not surface rupture (Person, 1986).

1987 Whittier Narrows: This magnitude 5.9 earthquake occurred on October 1 at 7:42 a.m. PST, about 21 miles west of Riverside County. This earthquake occurred on a previously unknown, concealed thrust fault now known as the Puente Hills fault. It resulted in eight fatalities and $358 million in property damage (SCEC-DC, 1999). Severe damage was confined mainly to communities east of Los Angeles and near the epicenter, particularly the "Uptown" district of Whittier, the old downtown section of Alhambra and the "Old Town" section of Pasadena. These areas had high concentrations of unreinforced masonry buildings. Residences which sustained damage usually were constructed of masonry, were not fully anchored to foundations, or were houses built over garages with large door openings. Many chimneys collapsed and in some cases, fell through roofs. Wood frame residences sustained relatively little damage.

1988 Upland: This magnitude 4.7 event occurred on June 26, about 3 km (2 miles) northwest of Upland, about 11 miles west of Riverside County (Person, 1988). The event occurred on the San Jose fault. The 1988 Upland earthquake caused minor damage in the epicenter area, but would have been of relatively little note were it not for the possibility that it may have been triggered by the Whittier Narrows earthquake -- 9 months earlier, and 20 km away. Such causal connections are of great interest as they offer some hope of forecasting earthquake probabilities more accurately.

1990 Upland: This magnitude 5.4 earthquake occurred on February 28 (Person, 1990), about 12 miles west of Riverside County on the San Jose fault. The 1990 Upland earthquake was much more damaging than the quake of 1988. In the 1990 earthquake, 38 people sustained minor injuries, and damage was considerable near the epicenter. The quake was felt as far to the northeast as Las Vegas, Nevada, and as far south as Ensenada, Mexico.

1991 Sierra Madre: This magnitude 5.8 earthquake occurred on June 28 at 7:43 a.m. PST, about 12 miles northeast of Pasadena and 18 miles northwest of Riverside County. The earthquake occurred on the Clamshell-Sawpit Canyon fault, an offshoot of the Sierra Madre fault zone in the San Gabriel Mountains. Because of its depth and moderate size, it caused no surface rupture, though it triggered rockslides that blocked some mountain roads. Two deaths resulted from this earthquake - one person was killed in Arcadia, and one person in Glendale died from a heart attack. In all, at least 100 others were injured, though the injuries were mostly minor. Roughly $40 million in property damage occurred in the San Gabriel Valley (SCEC-DC, 1999).

1992 Joshua Tree: This magnitude 6.1 earthquake struck on April 22, 1992 at 9:50 p.m. PST, in north-central Riverside County. This event was preceded by a magnitude 4.6 foreshock. The Joshua Tree earthquake raised some alarms due to its proximity to the San Andreas fault. A San Andreas Hazard Level B alert was declared, meaning that the San Andreas fault had a 5 to 25 percent chance of generating an even larger earthquake within three days. Roughly two months and 6,000 aftershocks later, a larger earthquake did occur, but to the north, near Landers, away from the San Andreas. Aftershocks of the Joshua Tree quake suggest that the causative fault is a north-northwest-trending, right-lateral strike-slip fault at least 15 km long (Jones and others, 1995). The Eureka Peak fault is a likely candidate.

1992 Landers: On the morning of June 28, 1992, most people in Southern California were awakened at 4:57 a.m. PST by the largest earthquake to strike California in 40 years. Named "Landers" after a small desert community near its epicenter, the earthquake had a magnitude of 7.3 and occurred about 8 miles north of Riverside County. Centered in the Mojave Desert, approximately 120 miles from Los Angeles, the earthquake caused relatively little damage for its size (Brewer, 1992). It released about four times as much energy as the very destructive Loma Prieta earthquake of 1989, but fortunately, it did not claim as many lives (one child died when a chimney collapsed). The power of the earthquake was illustrated by the length of the ground rupture it left behind. More than 50 miles of surface rupture occurred. The average right-lateral strike-slip displacement was 10 to 15 feet, while a maximum of 18 feet was observed. The earthquake ruptured five separate faults: Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock faults (Rymer, 1992). Nearby faults also experienced triggered slip and minor surface rupture. The Landers earthquake triggered seismicity throughout the western United States. Before this occurred, the seismological community was convinced such triggering did not happen.

1992 Big Bear: This magnitude 6.4 earthquake struck about three hours after the Landers earthquake on June 28, 1992. The epicenter was about 10 miles north of Riverside County. This earthquake is technically considered an aftershock of the Landers earthquake (indeed, the largest aftershock), although the Big Bear earthquake occurred over 20 miles west of the Landers rupture, on a fault with a different orientation and sense of slip than those involved in the main shock. From Big Bear aftershocks, the causative fault appears to be a northeast-trending left-lateral fault. This orientation and slip are considered "conjugate" to the faults, which slipped in the Landers rupture. In addition, there is evidence that the Big Bear mainshock and aftershocks may have ruptured conjugate faults. The Big Bear earthquake did not break the ground surface, and, in fact, no surface trace of a fault with the proper orientation has been found in the area. The Big Bear earthquake caused a substantial amount of damage in the Big Bear area, but claimed no lives.

1994 Northridge: This magnitude 6.7, January 17, 1994 event was far enough from Riverside County to cause little or no direct damage. However, long-range economic impact of this $20-$30 billion earthquake affected all of Southern California, and in fact had global consequences.

1999 Hector Mine: Southern California's most recent large earthquake was a widely felt magnitude 7.1. It occurred on October 18, 1999, in a remote region of the Mojave Desert, 47 miles east-southeast of Barstow. Modified Mercalli Intensity VI (Table 5.2.A) shaking was reported in the southern Coachella Valley, but most County felt reports were in the MMI V range (SCEC-DC, 1999). The Hector Mine earthquake is not considered an aftershock of the M_w 7.3 Landers earthquake of 1992, although subsequent analysis will explore the relationship between these two events, which occurred on similar, north-northwest trending strike-slip faults within the Mojave Shear Zone. Hector Mine ruptured the Lavic Lake fault. Geologists documented a 40-km long surface rupture and a maximum right-lateral strike-slip offset of about 5 meters.

5.2.3.2 Seismicity of Riverside County

<u>History</u>

Our knowledge of seismicity improves as the quality of our recording methods improve. Before 1932, Southern California had no network of ***seismometers*** (instruments that record ground shaking), and records of earthquakes were public reports like newspapers. People are less sensitive than seismometers to ground shaking. Consequently, before 1932, we only have records of the largest earthquakes - generally magnitude 4.0 and greater. On the map, there are 44 earthquakes before 1932.

The Southern California Seismic Network (SCSN), started in 1932, was the first regional seismic network. The SCSN is a collaborative effort of the United States Geological Survey and the California Institute of Technology. Digital data from the SCSN is archived by the SCEC-DC.

From 1932 to 1981, as the SCSN grew, so did the catalog of smaller earthquakes. Since 1983, the SCSN has had a complete record of earthquakes to about the magnitude 1.8 level. This adds a huge number of earthquakes to the catalog, as the number of earthquakes increases approximately ten-fold with each decrease in magnitude point. So, for every magnitude 4.0 that occurs, there are 10 magnitude 3.0 earthquakes, 100 magnitude 2.0 earthquakes, and 1,000 magnitude 1.0 earthquakes.

Using a three-dimensional velocity inversion program, Hauksson (*in press*) accurately determined earthquake locations for all of the digitally catalogued SCSN data in southern California, that is, from 1981 to August, 1999.

Determinations of earthquake locations and sizes have also improved considerably since 1868, due to the creation and growth of the SCSN. Currently, the SCSN has seismometers at more than 250 sites around Southern California. This allows smaller earthquakes to be more accurately located, as well as simply detected. Before 1932, rough estimates of earthquake size and location were made by identifying regions where the most people felt the earthquake, or the most structures experienced damage. In 1935, Charles Richter developed the first quantitative method to calculate earthquake magnitude, called "the Richter scale" by the media, and "M_L, the local magnitude scale" by scientists. Richter's method was based on the amplitude of ground shaking on a Wood-Anderson seismometer situated 100 km from the earthquake. Local magnitude remains a fast and reliable method of determining earthquake size for smaller events, but underestimates the size of larger earthquakes. Magnitude based on energy release, ***M_w* moment magnitude**, is more accurate for larger earthquakes (see Aki, 1966; Brune, 1968; Hanks and Kanamori, 1979; Kanamori and Anderson, 1975). The larger earthquakes in Figure 5.2.3 have M_w magnitudes, the others are M_L.

Prior to the existence of modern seismograph networks like the SCSN, to estimate the approximate location and size of an earthquake, a shaking map was constructed based on some version of the MMI Scale (Table 5.2.A). Such maps defined intensity zones based on observations of damage and other effects associated with ground shaking. These maps typically displayed a bull's-eye pattern, with the highest intensities in the middle. The earthquake was assumed to be near the center of the bull's-eye. For earthquakes that pre-date quantitative magnitude determinations, magnitudes can be estimated by using the magnitudes of more recent earthquakes that generated similar intensity maps.

Seismicity Patterns

Earthquakes can be classified as "significant" (larger events), "foreshocks and after-shocks" (earthquakes that are smaller than significant events, but close in time and space, and that are physically, causally related with the significant event), and "back-ground" or "microseismicity" (small earthquakes, not associated with significant events). Earthquakes observed along the Elsinore fault zone, the San Gorgonio Pass fault zone, between major fault zones, and in the eastern portion of the County is "back-ground."

Significant earthquakes are too infrequent to identify fault locations, but the smaller epicenters of "background" and "aftershocks" define the map traces of many faults. Some portions of the San Andreas fault in southern Riverside County have been docu-mented to ***creep***, that is, the rocks along the fault slip readily, and this is thought to account for the abundant small earthquakes there (Jennings, 1994). The lack of small earthquakes on the rest of the southern San Andreas is one indication that this portion of the fault is locked in place by friction. After the next great earthquake(s) on the southern segments of the San Andreas, these locked segments will also be defined by epicenters of aftershocks.

It is also worth noting the paucity of earthquakes in the eastern half of the County. In part, this is an artifact of data coverage, as there are fewer seismometers in this por-tion of the network. However, the lack of earthquakes is also consistent with the lack of mapped active or potentially active faults in this region.

Depth of Seismicity

Most earthquakes occur in the upper 15 kilometers (about 9 miles) of the earth's crust, where rocks are cool and brittle enough to lock due to friction and store strain energy. Many major earthquakes begin 10 to 15 kilometers beneath the surface, near the bottom of the brittle portion of the crust (see dePalo and Slemmons, 1990). Then the

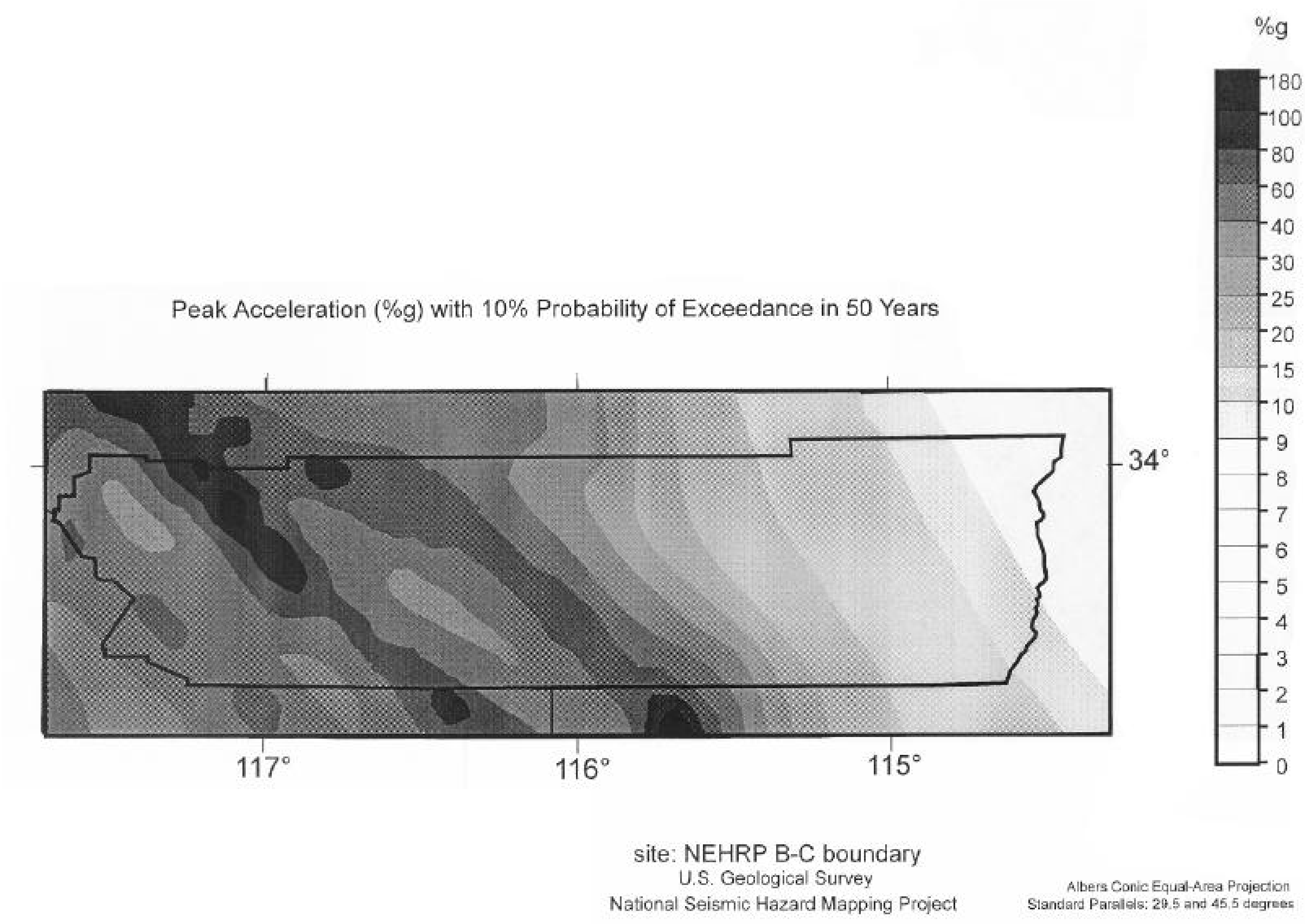


Figure 5.2.3

Source: EarthConsultantsInternational.

Scaleisapproximate
0 14 28Miles

PROBABILISTIC ACCELERATION CONTOUR MAPPING FOR RIVERSIDE COUNTY

fault rupture propagates up towards the surface. In the lower crust, deeper than 15 kilometers, the rocks are hotter and, when subjected to plate motion stresses, tend to be ductile and flow plastically.

The San Gorgonio Pass fault zone exhibits some of the deepest earthquakes in Southern California. Here, abundant seismicity occurs at depths of 15 to 25 kilometers (Nicholson et al, 1986; Seeber and Armbruster, 1995; Magistrale and Sanders, 1996). This is thought to be because upper crustal material has been pushed deeper due to motion within this complex fault system. This upper crustal material is still relatively cold and brittle and, therefore, continues to store strain energy.

5.2.4 Fault Rupture

Figure 5.2.2 illustrates fault traces mapped to date in Riverside County, regardless of geologic age. Not all of these traces are currently considered active based on guidelines of the A.P. Act (Hart and Bryant, 1997). The State law classifies faults according to criteria detailed in 5.2.1.2. Additional fault information is provided in Appendix E.

Alquist-Priolo Earthquake Fault Zones (A-P Zones) have been designated by the CDMG for the Elsinore, San Jacinto, and San Andreas fault zones in Riverside County (Figure 5.2.2 and Table 5.2.D). In addition, the County of Riverside (1991) applied special studies zone criteria for the Agua Caliente fault zone between the Elsinore and San Jacinto faults in southern Riverside County. All of these faults have high rates of displacement (> 5 mm/yr, which is about the rate that fingernails grow) and are rapidly accumulating strain energy to be released in earthquakes. Inevitably, the A-P Zones will expand with time. As faults are studied, more offshoot faults called splays are discovered.

Within these A-P Zones and special studies zones, State and Riverside County law requires that proposed tracts of four or more dwelling units investigate the potential for and setback from ground rupture hazards. This is typically accomplished by excavation of a trench across the site, determining the location of faulting and establishing building setbacks.

5.2.5 Expected Earthquake Analyses

To increase the earthquake resistance of structures, institutions, and communities, it is often useful to study the effects of a particular earthquake (a deterministic or design earthquake scenario). It is also important to consider the overall likelihood of damage from a plausible suite of earthquakes. This approach is called Probabilistic Seismic Hazard Analysis (PSHA), and takes into account the recurrence rates of likely, damaging earthquakes on each fault in the area, as well as the potential ground motion that may result from each of these earthquakes. As is true for most earthquake-prone regions, many potential earthquake sources pose a threat to the County of Riverside. Which earthquake to consider depends on the application of the analysis.

Table 5.2.D - Alquist-Priolo Earthquake Fault Zone Map Available for Riverside County

Map Name	Date	Map Name	Date	Map Name	Date
Alberhill	1980	Joshua Tree South	1993	SE Idyllwild	1974
Beaumont	1995	Lake Mathews	1980	SE Morongo Valley	1974
Bucksnort Mtn	1974	Lakeview	1988	SE San Gorgonio Mtn	1974
Cabazon	1995	Mecca	1974	Seven Palms Valley	1980
Cathedral City	1974	Mortmar	1974	Sunnymead	1974
Clark Lake NE	1974	Murrieta	1990	SW Idyllwild	1974
Collins Valley	1974	Myoma	1974	SW Lost Horse	1974
Corona South	1980	NE Hemet	1974	SW Morongo Valley	1974
Desert Hot Springs	1980	NE Thousand Palms	1974	SW Palm Desert	1974
Durmid	1974	NW Idyllwild	1974	SW San Gorgonio Mtn	1974
El Casco	1995	Orocopia	1974	Temecula	1990
Elsinore	1980	Pechanga	1990	Thermal Canyon	1974
Frink NW	1988	Redlands	1977	Whitewater	1995
Hemet	1980	Salton	1974	Wildomar	1980
Indio	1974	San Jacinto	1980	Yucca Valley South	1993

5.2.5.1 Design Earthquakes

A ***maximum probable earthquake*** (MPE) is the largest earthquake a fault is predicted capable of generating within a specified time period of concern, say 30 or 100 years. Maximum probable earthquakes are most likely to occur within the time span of most development and, therefore, are commonly used in assessing seismic risk. Nevertheless, the ***maximum credible earthquake*** (MCE), i.e., the largest earthquake a fault is believed capable of generating, is considered in a number of planning and engineering decisions. For example, MCEs are used in the design of critical facilities like dams, fire stations, and emergency operation centers. They are also used in urban and emergency planning to identify and mitigate the risk of worst-case scenarios.

For design purposes, a worst-case scenario earthquake (the MCE) for Riverside County is a magnitude 7.9 based on the rupture of the entire southern segment of the San Andreas fault from Cajon Pass to the Salton Sea. While other scenarios will expose portions of the County to intense ground shaking that is locally as severe as the MCE, the MCE exposes most of the County to very high intensity ground shaking.

Table 5.2.E presents estimates of several key ground shaking parameters near the fault rupture zone for the MCE, expressed as a percentage of gravity. Peak ground acceleration, the maximum acceleration achieved at a site, often turns out to be the earthquake effect that causes most damage to buildings. The periods, 0.3 and 1.0 second

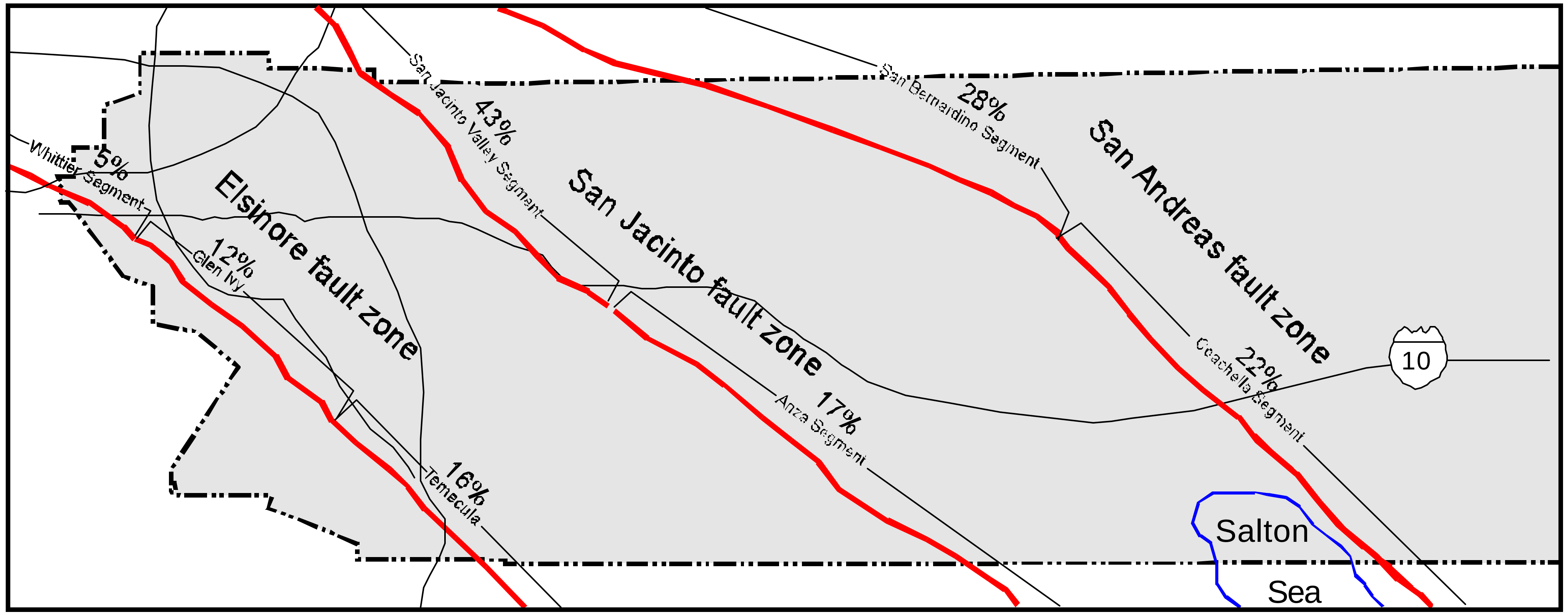
represent lengths of seismic waves that commonly damage structures. All of these values are well above the threshold for heavy damage (see Table 5.2.A).

Table 5.2.E - Probable Earthquake Scenarios for Riverside County

Event: Fault	Event: Segment	Maximum Magnitude (Mw)	Chance of Occurring in 30 Years	Comments
San Andreas	San Bernardino	7.3	28%	Very high intensity ground shaking throughout the San Bernardino Valley, including north central Riverside County.
San Andreas	Coachella	7.1	22%	Very high intensity ground shaking throughout the Coachella Valley, impacting desert resort communities and agriculture.
San Jacinto	San Jacinto Valley	6.9	43%	Highest probability of occurrence of any Southern California fault. Brought closer to failure as a result of stress field changes caused by the 1992 Landers earthquake.
San Jacinto	Anza Segment	7.2	17%	This event would be very destructive within the communities of Hemet and San Jacinto.
Elsinore	Temecula Segment	6.8	16%	Has not produced any significant earthquakes in historic time.
Elsinore	Glen Ivy Segment	6.8	16%	Would be very destructive in the communities of Lake Elsinore, Murrieta, and Temecula.
Whittier	Whittier	6.8	5%	Has not broken in over 1600 years (WGCEP, 1995). Would cause significant landsliding and lifeline damage in the Chino Hills - Corona area.

These design parameters for the MCE are utilized to estimate losses in an earthquake. With horizontal ground displacements as great as 25 feet along the fault and intense ground shaking that could last more than 60 seconds, damage and losses in the County as a result of the MCE or other major San Andreas fault earthquake would be extensive.

In addition, the County of Riverside must consider events on several faults. Earthquakes that are likely to occur during the design life of most buildings could be generated by segments of the Elsinore, San Jacinto or San Andreas faults. These have been evaluated by the Working Group on California Earthquake Probabilities (1995) and illustrated in Figure 5.2.4. Based on this segmentation, there are seven probable earthquakes that threaten Riverside County, as shown in Table 5.2.E. The event with the



Generalized Fault Zone

17% Anza Segment — Probability (in%) of an earthquake occurring on a fault segment in the next 30 years

Figure 5.2.4

Source: Earth Consultants International.

Scale is approximate
0 5 10 Miles

EARTHQUAKE PROBABILITY

R:\SVC931-Graphics\ExistingSetting\EQprobabilities.cdr(7/5/02) greatest probability of occurrence in 30 years (43 percent) is a M_w 6.9 rupture of the San Jacinto Valley segment of the San Jacinto fault. The San Jacinto event is considered the MPE for Riverside County.

5.2.5.2 Probabilistic Earthquake Hazard Assessment

This type of hazard assessment is utilized by the U.S. Geological Survey (USGS) in producing national seismic hazard maps that are modified and adopted into the Uniform Building Code (UBC). The most recent mapping produced for the 1997 UBC includes data from the CDMG (CDMG, 1996). Development of these maps requires three steps: (1) delineating earthquake sources; (2) defining the potential distribution of seismicity for each of these sources; and (3) calculating the potential ground motions from attenuation relations for all the model earthquakes. Attenuation relations estimate the amount that shaking will be modified (amplified or reduced) as waves travel from the fault plane to a locale.

USGS and CDMG scientists in the National Seismic Hazard Mapping Program have produced maps indicating the probabilistic ground shaking parameters for the County of Riverside (Figure 5.2.4). Table 5.2.F has been prepared to list the probabilistic ground shaking, in terms of peak horizontal ground acceleration on bedrock, associated with 24 of the County's incorporated cities. This table indicates that, with the exception of Blythe, the cities are exposed to very high and extremely high values that for the most part exceed 50 percent of the force of gravity with a 10 percent chance of occurring in 50 years. In addition, the communities along the San Jacinto fault (Moreno Valley, San Jacinto, and Hemet) have a greater risk of ground shaking than those along the San Andreas. This is a result of the higher probability of future San Jacinto earthquake versus San Andreas earthquake.

Values of peak horizontal ground acceleration are at bedrock and are expressed as a percent of the force of gravity. Generally, values greater than 25 to 30 percent of gravity are capable of substantial damage to structures (see Table 5.2.A). Liquefaction and landslides can occur at 10 percent of gravity. When values exceed 100 percent of gravity, the force of gravity is exceeded and objects become airborne.

These probabilistic ground motion values for the County of Riverside are among the highest in Southern California and are the result of the County's proximity to major fault systems with high earthquake recurrence rates.

The predicted ground accelerations in Table 5.2.A are lower than those values in Table 5.2.F. In part, near-fault ground motions may be underestimated by the methods of Table 5.2.A. In addition, the difference exists because Table 5.2.A values are based on deterministic analyses. Because Riverside County is close to so many active faults, the probabilistic assessment of risk is higher than that for any individual fault.

Table 5.2.F - Probabilistic Earthquake Accelerations for Riverside County

City	10% PE* in 50 yr	5% PE in 50 yr	2% PE in 50 yr
Moreno Valley	84.40	101.52	123.07
San Jacinto	82.30	99.44	120.14
Hemet	80.20	97.31	119.11
Desert Hot Springs	75.14	96.57	118.77
Beaumont	66.01	76.64	98.91
Calimesa	66.01	76.64	98.91
Coachella	61.90	78.13	103.10
Indio	61.90	78.13	103.10
Lake Elsinore	59.11	77.14	102.07
Corona	56.06	74.42	99.79
Murrieta	56.06	74.42	99.79
Temecula	56.06	74.42	99.79
Norco	56.06	74.42	99.79
Banning	55.86	69.91	79.83
Rancho Mirage	54.73	70.98	90.79
Perris	54.73	70.98	90.79
Canyon Lake	54.73	70.98	90.79
Riverside	53.64	65.41	76.20
La Quinta	48.45	61.17	76.00
Indian Wells	48.45	61.17	76.00
Palm Desert	48.45	61.17	76.00
Palm Springs	48.16	57.22	73.47
Cathedral City	48.16	57.22	73.47
Blythe	9.51	11.77	15.31

Note: PE is probability of exceedence, e.g., the given value has a 10% chance of being exceeded in 50 years.
Values are peak horizontal ground acceleration on bedrock and are expressed as a percent of the force of gravity.

5.2.5.3 Foreshocks on Strike-Slip Faults

A ***foreshock*** is an earthquake that is smaller than a mainshock, precedes it, and is causally related to it. Foreshocks are quite common. For California, Jones (1984) has determined that half of the magnitude 5.0 and greater, strike-slip earthquakes are preceded by immediate foreshocks (earthquakes within 72 hours and 10 kilometers of their mainshock). Almost all foreshocks occur less than 72 hours before the mainshock. If and when it becomes possible to distinguish foreshocks from background seismicity, foreshocks will become an effective short-term prediction tool. So far, scientists can only recognize foreshocks in hindsight, *after* the mainshock has occurred. Yet, the existence of foreshocks can still help prepare for destructive earthquakes on the San Andreas fault.

In 1991, a Working Group, chaired by Jones and Sieh, made the following observations from Agnew and Jones (1991) and Jones (1984, 1985):

- When an earthquake occurs, it is either a foreshock or a “background” event.

- Since it is possible that the earthquake may be a foreshock, it increases the probability that a larger earthquake will occur within 72 hours and 10 km.

- How much the probability increases will depend on how anomalous it is, that is, on the background seismicity patterns in the vicinity.

- Smaller earthquakes are more common than larger earthquakes. A magnitude 1.0 earthquake anywhere along the San Andreas fault will only marginally increase the chance of a larger earthquake occurring within 72 hours.

- On the other hand, if a magnitude 5.0 earthquake occurs within 10 km of the San Andreas fault, the probability of a major (magnitude at least 7.5) earthquake within 72 hours increases significantly.

- Around San Bernardino, where there is a fairly high level of background seismicity near the San Andreas fault, the occurrence of a magnitude 5.0 raises the short-term probability of a larger event by 1 to 5 percent.

- Around Mecca Hills, northeast of the Salton Sea, there is very little background seismicity. A magnitude 5.0 is quite anomalous, and raises the short-term probability at least 25 percent.

Table 5.2.G shows the Working Group calculations of the threshold magnitude required to raise the short-term probability by different specific amounts for different portions of the San Andreas fault. The areas are distinguished by their varying levels of background seismicity.

Table 5.2.G - Magnitude of Possible Foreshock Required to Reach a Specified Probability Level for Four Microseismic Regions of the Southern San Andreas Fault (Working Group, 1991)

Level (Probability of M_w 7.5 in 72 hr)	B 5-25%	C 1-5%	D 0.1-1%
San Bernardino	5.8	5.0	3.9
San Gorgonio	6.1	5.3	4.2
Palm Springs	5.2	4.5	3.4
Mecca Hills	4.9	4.2	3.1

From these observations and calculations, the Working Group developed a short-term hazard notification system for the southern San Andreas fault (Table 5.2.H). The system was designated when U.S. Geological Survey scientists would notify their supervisors and emergency response personnel, regarding increased short-term probabilities along the southern San Andreas. Note that there is no “A level” alert, because the Working Group felt that there was not yet a “meaningful way to estimate short-term probability above 25 percent.”

Table 5.2.H - Alert Levels and Response for Anomalous Earthquake Activity Along the Southern San Andreas Fault (from Working Group, 1991).

Level	Probability of M_w> 7.5 earthquake in next 72 hours	Expected time between occurrences of alerts at this level	USGS action
D	0.1% to 1%	6 months	Notify scientists involved in data collection and OES Ontario office
C	1% to 5%	5 years	As for Level D; also notify Comm. Officer, OES Sacramento, and USGS Menlo Park chief.
B	5% to 25%	28 years	As for Levels C and D, and also notify USGS Director, and CDMG State Geologist; start intensive monitoring

Notes: OES = Office of Emergency Services
CDMG = California Division of Mines and Geology.

5.2.6 Secondary Earthquake Hazards

Secondary earthquake hazards are those separate from, but induced by, the primary effects of strong ground shaking and fault rupture. Secondary geologic hazards include ground and slope failures and seiches, discussed below. (More broadly, secondary hazards also include non-geologic effects such as fires and toxic chemical spills.)

5.2.6.1 Liquefaction

Liquefaction is a process by which water-saturated materials (including soil, sediment, and certain types of volcanic deposits) lose strength and may fail during strong ground shaking. Liquefaction is defined as "the transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore-water pressure" (Youd, 1973). Liquefaction occurs worldwide, commonly during moderate to great earthquakes. In California, liquefaction-related ground failures occurred in 1857 (Fort Tejon earthquake), 1906 (San Francisco earthquake), 1933 (Long Beach earthquake), 1971 (San Fernando earthquake), 1973 (Point Mugu earthquake), 1979 and 1981 (Imperial Valley earthquakes), 1989 (Loma Prieta earthquake), and 1994 (Northridge earthquake), and others. Four kinds of ground failure commonly result from liquefaction: lateral spread, flow failure, ground oscillation, and loss of bearing strength.

Lateral Spread: Lateral displacement of surficial blocks of sediment as the result of liquefaction in a subsurface layer is called a lateral spread. Once liquefaction transforms the subsurface layer into a fluidized mass, gravity plus inertial forces caused by the earthquake may move the mass downslope towards a cut slope or free face (such as a river channel or a canal). Lateral spreads most commonly occur on gentle slopes that range between 0.3° and 3°, and commonly displace the surface by several meters to tens of meters. Such movement typically damages pipelines, utilities, bridges, and other structures having shallow foundations. During the 1906 San Francisco earthquake, lateral spreads causing displacement of only a few feet damaged every major pipeline. Thus, liquefaction compromised the ability to fight fires - and fires caused about 85 percent of the damage to San Francisco.

Flow Failure: The most catastrophic mode of ground failure caused by liquefaction, flow failure usually occurs on slopes greater than 3°. The flows are principally liquefied soil or blocks of intact material riding on a liquefied subsurface zone. Displacements are commonly tens of meters, but in favorable circumstances, material gets displaced for tens of miles, at velocities of tens of miles per hour. The extensive damage to Seward and Valdez, Alaska, during the 1964 Great Alaskan earthquake was caused by submarine flow failures.

Ground Oscillation: When liquefaction occurs at depth but the slope is too gentle to permit lateral displacement, the soil blocks that are not liquefied may separate from one another and oscillate on the liquefied zone. The resulting ground oscillation may be accompanied by the opening and closing of fissures (cracks) and sand boils (upward flowing sediment). These can potentially damage structures and underground utilities.

Loss of Bearing Strength: When a soil loses strength and liquefies, loss of bearing strength may occur beneath a structure, possibly causing the building to settle and tip. If the structure is buoyant, it may float upward. During the 1964 Niigata, Japan, earthquake, buried septic tanks rose as much as 3 feet and structures in the Kwangishicho apartment complex tilted as much as 60°.

Research into liquefaction in past earthquakes has linked liquefaction to certain hydrologic and geologic settings. Water-saturated, cohesionless, granular materials at depths of less than 50 feet are prone to liquefaction. To identify an area having significant potential for liquefaction, a liquefaction susceptibility map and a liquefaction opportunity map must be developed. The former depicts areas where the geology and hydrology are favorable for liquefaction. The latter summarizes information about the potential for strong earthquake shaking. When considered together, the two maps determine the liquefaction potential the relative likelihood that an earthquake will cause liquefaction in an area.

5.2.6.2 Guidelines for Delineating Liquefaction Hazard Zones

In 1997 and 1998, the CDMG (1997 and 1998) developed guidelines for delineating, evaluating, and mitigating seismic hazards in California. In 1999, a SCEC-DC sponsored group published "Recommended Procedures for Implementation of CDMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction in California." The SCEC-DC (1999) publication was a result of requests from city and county Building Officials for assistance in the development of procedures to implement the SHMA (see Section 5.2.1.5) for projects requiring their review. The guidelines in assessing liquefaction potential for this study are based on CDMG (1997 and 1998), as well as SCEC-DC (1999), and are summarized below:

Liquefaction Mapping Criteria: Liquefaction Hazard Zones are areas meeting one or more of the following criteria:

- Areas known to have experienced liquefaction during historic earthquakes. Field studies following past earthquakes indicate liquefaction tends to recur at many sites during successive earthquakes (Youd, 1984). There are many published accounts of liquefaction occurrences. Areas so delineated should be included in the Liquefaction Hazard Zones.

- All areas of uncompacted fills containing liquefaction-susceptible material that are saturated, nearly saturated, or may be expected to become saturated. In some areas, there has been a practice of creating useable land by dumping artificial fill on tidal flats or in large deep ravines. Standard geologic criteria are of little use in characterizing soils within these fills, which are less homogeneous than natural deposits. For example, there is no reason to assume lateral stratification in these fills and the validity of extrapolating subsurface data is questionable. Evidence for filling can be found by examining maps showing old shorelines, by comparing old and modern topographic maps, by studying logs of boreholes, and by obtaining reports or original plans of specific projects involving reclaimed land.

- Areas where sufficient existing geotechnical data and analyses indicate that the soils are potentially liquefiable. The vast majority of liquefaction hazard areas are underlain by recently deposited sand and/or silty sand. These deposits are not randomly distributed, but occur within a narrow range of sedimentary and hydrologic environments.

Liquefaction mapping criteria in areas where geotechnical data are insufficient: In areas of limited or no geotechnical data, susceptibility zones are identified by geologic criteria as follows:

- Areas containing soil deposits of late Holocene age (current river channels and their historic floodplains, marshes and estuaries), where the M7.5-weighted peak acceleration that has a 10 percent probability of being exceeded in 50 years is greater than or equal to 0.10 g and the water table is less than 40 feet below the ground surface; or

- Areas containing soil deposits of Holocene age (less than 11,000 years), where the M7.5-weighted peak acceleration that has a 10 percent probability of being exceeded in 50 years is greater than or equal to 0.20 g and the historic high water table is less than or equal to 30 feet below the ground surface; or

C Areas containing soil deposits of latest Pleistocene age (between 11,000 years and 15,000 years), where the M7.5-weighted peak acceleration that has a 10 percent probability of being exceeded in 50 years is greater than or equal to 0.30 g and the historic high water table is less than or equal to 20 feet below the ground surface.

Based on probabilistic mapping, only the easternmost portion of the County (Blythe region) has acceleration values below the criteria thresholds (Table 5.2.F).

Application of these criteria allows compilation of hazard maps that are useful for preliminary evaluations, general land-use planning and delineation of special studies zones where site-specific studies may be required before major development is approved (Youd, 1991).

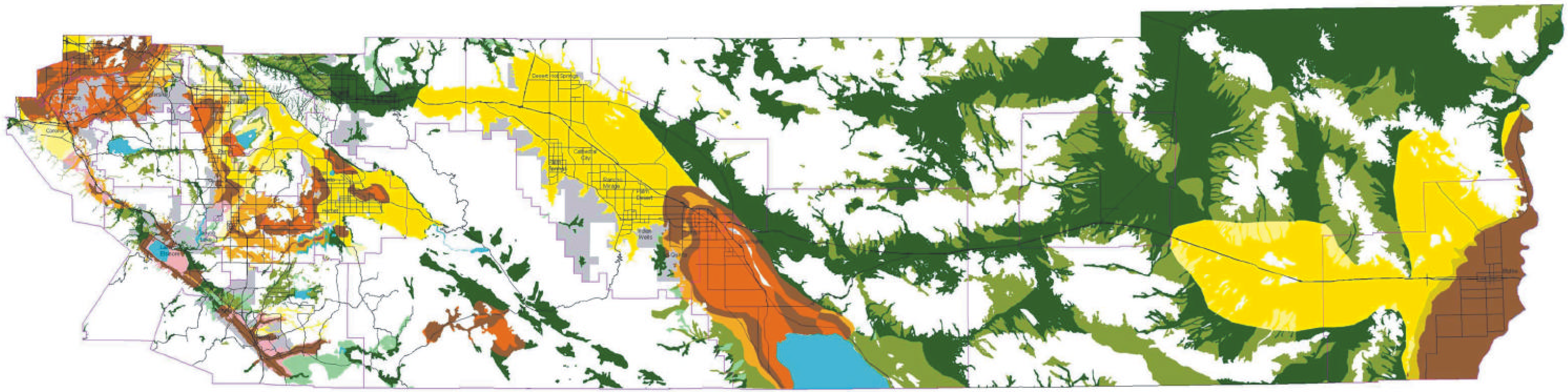
5.2.6.3 Liquefaction Hazard Zones in Riverside County

A detailed Liquefaction Susceptibility Map for Riverside County was produced. These data are summarized on the Generalized Liquefaction Susceptibility Map (Figure 5.2.5). Figure 5.2.5 includes the liquefaction potential zones described in Table 5.2.I.

Table 5.2.I - General Liquefaction Potential Zones for Riverside County

			Recommended Policies[1]	
Rank	**Ground Water Depth [2]**	**General [3] Sediment Type**	**General Construction**	**Critical Facilities**
High	< 30 feet	very susceptible	study required	study required
Moderate	< 30 feet	susceptible	study required	study required
	30-50 feet	very susceptible	study required	study required
Low	> 30 feet	susceptible	none	study required
Very Low	30-50 feet	susceptible	none	study required
	50-100	very susceptible	none	study required
Extremely Low	50-100 feet	susceptible	none	study required
None	> 100 feet	susceptible	none	none
	no data	bedrock	none	none

Notes: [1] Ground shaking potential in easternmost Riverside County is considered below the threshold for liquefaction, and site-specific investigations should not be required for general construction projects.
[2] Ground water depth is based on the historic high measurement.
[3] Very susceptible sediment type includes generally granular Holocene sediments; susceptible includes generally granular Pleistocene sediments.



Liquefaction Susceptibility

Shallow Groundwater
Susceptable Sediments

- Very High
- High
- Moderate
- Low
- Very Low

Deep Groundwater
Susceptable Sediments

- Moderate
- Low
- Very Low

No Groundwater Data
Susceptable Sediments

- Moderate
- Low
- Very Low

- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure 5.2.5

Source:EarthConsultantsInternational.

AREAS SUSCEPTIBLE TO LIQUEFACTION

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5.2.6.4 Seismically-Induced Settlement

In some situations, strong ground shaking can cause the densification of soils, resulting in local or regional settlement of the ground surface. Local differential settlements damage structures. Regional settlements can damage pipelines by, for example, changing the gravity gradient on water and sewer lines and canals.

Whether seismically-induced settlement will occur, depends on the intensity and duration of ground shaking, and the relative density (the ratio between the in-place density and the maximum density) of the subsurface soils. Sediments in the County's alluvial valleys were deposited fairly rapidly, which may lead to conditions of low density sediments that can settle in an earthquake. Therefore, many of the valley regions that contain relatively recent sediments may be susceptible to some degree of seismic settlement. The areal extent of relatively young sediments with moderate to locally high potential for settlement may be correlated with areas of valley fill represented on subsidence susceptibility mapping described in Section 5.5 Slope and Soil Instability.

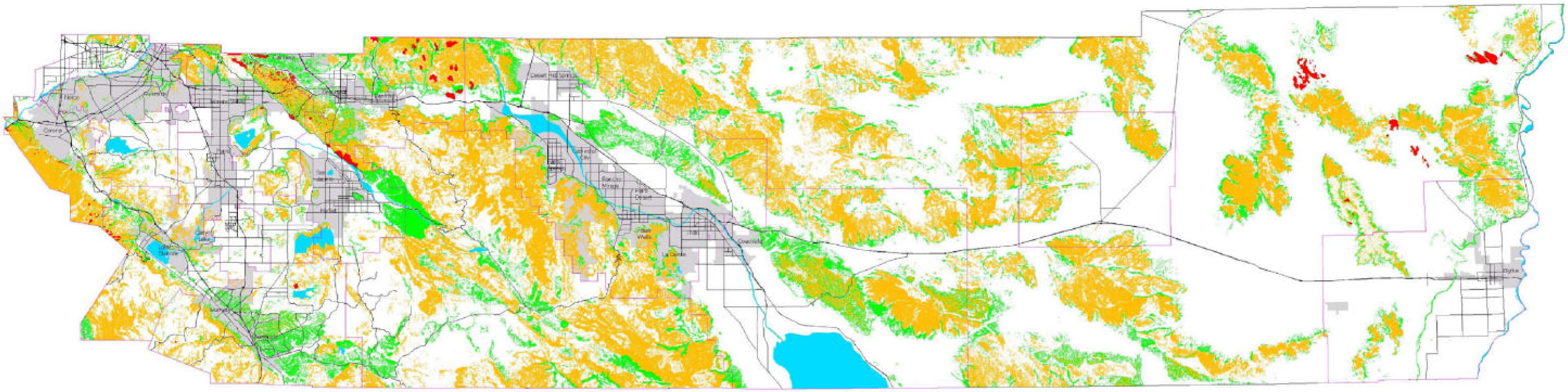
As demonstrated by past earthquakes, seismic settlement is primarily damaging in areas subject to differential settlement. These can include cut/fill transition lots built on hillsides, where a portion of the house is built over an area cut into the hillside while the remaining portion of the house projects over man-made fill. During an earthquake, even slight settlement of the fill can lead to a differentially settled structure and significant repair costs.

5.2.6.5 Seismically-Induced Slope Instability

Seismically induced landsliding and rock falls can be expected to occur throughout the County in a major earthquake. Section 5.5 - Slope and Soil Instability Hazards discusses slope stability and landsliding in the County in more detail. Figure 5.2.6 has been prepared to illustrate the regions of the County with existing landslides and slopes that are susceptible to instability during a significant earthquake.

Wilson and Keefer (1985) have reported that a ground acceleration of at least 0.10 g in steep terrain is necessary to induce earthquake-related rock falls, although exceeding this value does not guarantee that rock falls will occur. Since there are several faults capable of generating peak ground accelerations of over 0.10 g in Riverside County, there is a high potential for seismically induced rock falls and landslides to occur.

A separate SCEC-DC committee dealing with the issues of implementation of SP 117 (CDMG, 1997) for landslide hazards has been formed and is working on a companion to the liquefaction hazards document discussed earlier. Factors controlling the stability of slopes include: (1) the slope height and inclination, (2) the engineering characteristics of the earth materials comprising the slope, and (3) the intensity of ground shaking.



Existing Landslides

High susceptibility to seismically induced landslides and rockfalls.

Low to locally moderate susceptibility to seismically induced landslides and rockfalls.

Major Roads & Highways

Area Plan Boundaries

Cities

Figure5.2.6

Source:EarthConsultantsInternational.

Scaleisapproximate

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EARTHQUAKE-INDUCED SLOPE INSTABILITY MAP

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5.2.6.6 Seiches

The County's water tanks, reservoirs, lakes, and swimming pools are enclosed bodies of water that are subject to potentially damaging oscillations on the water surface, called ***seiches***. A seiche can result from a number of factors including wind-driven currents, tides, variation in atmospheric pressure and ground shaking associated with near or distant earthquakes. In Southern California, the greatest threat of seiches comes from earthquakes.

Whether an earthquake will create seiches depends upon a number of earthquake-specific parameters, including period or length of the seismic waves, earthquake location, and the style of fault rupture (e.g., dip-slip or strike-slip). Whether a seiche will cause damage can depend upon the size, shape and location of the body of water, storage tank strength, integrity of dam construction, underlying soil type, proximity of human-built structures, and local relief (variations in elevation).

Amplitudes of seiche waves associated with earthquake ground motion have typically been less than 0.5 meters high; however, some have exceeded 2 meters. A seiche in Hebgen Reservoir, caused by an earthquake in 1959 near Yellowstone National Park, repeatedly overtopped the dam, causing considerable damage to the dam and its spillway (Stermitz, 1964). The 1964 Alaska earthquake produced seiche waves 0.3 m high in the Grand Coulee Dam reservoir, and seiches of similar magnitude in 14 bodies of water in the state of Washington (McGarr and Vorhis, 1968). California earthquakes have generated (non-damaging) seiches in Florida swimming pools.

Lakes: Due to their relatively large size, proximity to major faults, and development near their shores, in Riverside County, Lake Elsinore and the Salton Sea create special hazard from seiches.

Dams: An important method to decrease seiche hazard behind dams is to increase the freeboard distance (top of dam to top of water). This can be accomplished by either building up the dam, or by reducing the allowable reservoir storage capacity. Other methods to decrease seiche hazards include the following:

- Replacing dams
- Adding buttresses and berms
- Flattening slopes
- Increasing drainages
- Grouting foundations.

It seems likely that the threat to dam stability is increased if a dam simultaneously experiences forces associated with strong seismic ground shaking and seiches. Thus, to increase dam safety, these two hazards need to be considered together.

Swimming Pools: Damage from swimming pool seiches is a common problem. During seismic ground shaking, seiches created in private and public pools can expel considerable water. This often damages homes downslope, and sliding glass doors near the pool.

Water Tanks: Seiches damaged storage tanks during the 1992 Landers-Big Bear earthquakes and the 1994 Northridge earthquake. As a result, the American Water Works Association (AWWA) Standards for Design of Steel Water Tanks (D-100) now provide new criteria for seismic design (Lund, 1994).

5.2.7 Vulnerability of the Built Environment to Earthquake Hazards

This section assesses the earthquake vulnerability of structures and facilities common in the County of Riverside, as well as the status of existing earthquake hazard mitigation programs, including code and ordinance adoption and enforcement. This analysis is based on past earthquake performance of similar types of buildings in the U.S. Utilizing a recent standardized methodology developed for the Federal Emergency Management Agency (FEMA), general estimates of projected losses in Riverside County are provided in Section 1.8 of this report.

Although it is not possible to prevent earthquakes from occurring, their destructive effects can be minimized. Comprehensive hazard mitigation programs that include the identification and mapping of hazards, prudent planning and enforcement of building codes, and expedient retrofitting and rehabilitation of weak structures can significantly reduce the scope of an earthquake disaster.

With these goals in mind, the State Legislature passed Senate Bill 547, addressing the identification and seismic upgrade of Unreinforced Masonry (URM) buildings. In addition, the law encourages identification and mitigation of seismic hazards associated with other types of potentially hazardous buildings, including pre-1971 concrete tilt-ups, soft-stories, mobile homes, and pre-1940 homes.

The County of Riverside's building stock is predominantly modern, and modern buildings do save lives. However, economic losses associated with structural and non-structural damage, loss of contents, and repairs can be tremendous. For example, the losses associated with the Northridge earthquake approached $30 billion.

As discussed earlier, various geologic phenomena can be triggered by earthquakes to cause loss of life and property damage. Earthquakes can also cause localized, equally destructive hazards such as urban fires, dam failures, and toxic chemical releases. During the 1994 Northridge earthquake, many mobile homes shifted or fell off their foundations, which ruptured gas lines and started fires. This type of hazard is intensified by the relatively high density of homes within mobile home parks.

5.2.7.1 Potentially Hazardous Buildings and Structures

Most of the loss of life and injuries due to an earthquake is related to the collapse of hazardous buildings and structures. FEMA (1985) defines a hazardous building as "any inadequately earthquake resistant building, located in a seismically active area, that presents a potential for life loss or serious injury when a damaging earthquake occurs." Building codes have generally been made more stringent following damaging earthquakes. However, pre-existing structures in the County of Riverside have generally not been upgraded to current building code standards, and may be hazardous during an earthquake. Structures built before the 1933 Long Beach earthquake are especially at risk.

Building damage is commonly classified as either structural or non-structural. ***Structural damage*** impairs the building's structural support. This includes any vertical and lateral force-resisting systems, such as frames, walls, and columns. ***Non-structural damage*** does not affect the integrity of the structural support system. Non-structural damage includes broken windows, collapsed or rotated chimneys, and fallen ceilings. During an earthquake, buildings get thrown from side to side, and up and down. Heavier buildings are subjected to higher forces than lightweight buildings, given the same acceleration. Damage occurs when structural members are overloaded, or differential movements between different parts of the structure strain the structural components. Larger earthquakes and longer shaking durations tend to damage structures more. The level of damage can be predicted only in general terms, since no two buildings undergo the exact same motions, even in the same earthquake. Past earthquakes have shown us, however, that some buildings are far more likely to fail than others.

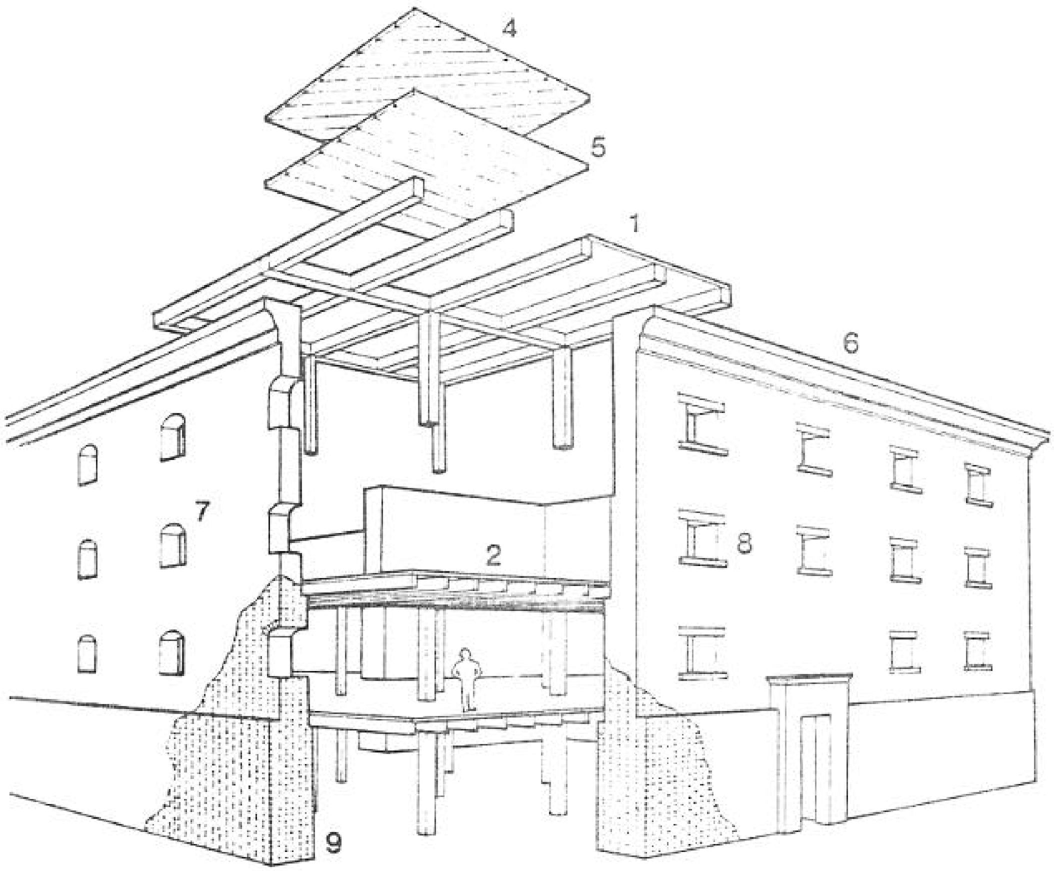
Unreinforced masonry buildings (URMs, Figure 5.2.7) are prone to failure due to inadequate anchorage of the masonry walls to the roof and floor diaphragms, due to the limited strength and ductility of the building materials, and sometimes due to poor construction workmanship. Using a statistical analysis, the number of URMs in Riverside County is estimated at about 4,000 (HAZUS™ '99 Inventory). However, Riverside County identified only five in the unincorporated areas during a 1990 study (Kack Fung, personal communication, 2000). There are surely URMs in older regions of incorporated cities within the County, but these have not been identified. The five known URM owners were notified by mail to comply with the State guidelines, but no unique URM ordinance has been passed by Riverside County. In addition, no other potentially vulnerable buildings have been inventoried.

Unless URMs have been appropriately reinforced and strengthened, an earthquake may cause irreparable damage, and even collapse. Thus, they pose a threat to life and property. There are many ways that damage may occur. Parapets and cornices that are not positively anchored to the roofs may fall out. Wall diaphragms are generally made of wood. These diaphragms are, therefore, very flexible, allowing large out-of-plane deflections at the wall transverse. This large drift can cause the masonry walls to collapse. Some tall URM buildings have thin walls that may buckle out-of-plane under severe lateral loads. If the wall is a non-load bearing wall, it may fail; collapse of a load-bearing wall will result in partial or total collapse of the structure. Deterioration of the mortar (often of lime and sand with little or no cement, having very little shear strength), and of the wood framing as a result of weather exposure may also contribute to the weakening and poor performance. Collapse of URMs generates much heavy debris.

Reinforced masonry buildings often perform well in moderate earthquakes if they are adequately reinforced and grouted, and if sufficient diaphragm anchorage exists.

Roof/floor span systems:
1. wood post and beam (heavy timber)
2. wood post, beam, and joist (mill construction)
3. wood truss-- pitch and curve

Roof/floor diaphragms:
4. diagonal sheathing
5. straight sheathing



Details:
6. typical unbraced parapet and cornice
7. flat arch window opennings
8. small window penetrations (if bldg is originally a warehouse)

Wall systems:
9. bearing wall-- four to eight wythes of brick

Figure 5.2.7

Source:EarthConsultantsInternational.

UNREINFORCED MASONRY BUILDING

Poor construction workmanship or materials may lead to failure during a large earthquake. Other common building types are also known to perform poorly during moderate to strong earthquakes, although they have not been targeted for upgrading and strengthening. Of particular concern are ***soft-story buildings*** (those with a story, generally the first floor, lacking adequate strength or toughness due to few shear walls). Apartments above glass-fronted stores and buildings perched atop parking garages are common examples of soft-story buildings. No estimates of the number of soft-story buildings in Riverside County are currently available. Collapse of a soft story and "pancaking" of the remaining stories killed 16 people at the Northridge Meadows apartments during the 1994 Northridge earthquake (EERI, 1994). There are many other cases of soft-story collapses.

Structural damage to ***wood frame structures*** often results from inadequate connection between the superstructure and the foundation. These buildings may slide off their foundations, with consequent damage to plumbing and electrical connections. Unreinforced masonry chimneys may also collapse. These types of damage are generally not life threatening, although they may be costly to repair. Wood frame buildings with stud walls generally perform well in an earthquake, unless they have no foundation or have a weak foundation constructed of unreinforced masonry or poorly reinforced concrete. In these, damage is generally limited to cracking of the stucco, which dissipates much of the earthquake's induced energy. The collapse of wood frame structures, if it happens, generally does not generate heavy debris; but rather, the wood and plaster debris can be cut or broken into smaller pieces by hand-held equipment and removed by hand in order to reach victims (FEMA, 1985).

Partial or total collapse of buildings where the floors, walls, and roofs fail as large intact units, such as large ***pre-cast concrete*** panels, cause the greatest loss of life and difficulty in victim rescue and extrication (FEMA, 1985). Thousands have died in collapses of these kinds of structures during earthquakes, such as in Mexico City (1985), Armenia (1988), Nicaragua (1972), El Salvador (1986), the Philippines (1990), and most recently Turkey (1999). Unfortunately, these lessons were not applied to California's parking structures. Many parking structures that failed spectacularly in Northridge (1994) consisted of pre-cast components (EERI, 1994). Many more such parking structures exist throughout the region. No estimates of the number in Riverside County are available.

Collapse of these types of structure leaves debris that requires heavy mechanical equipment to be removed. Location and extrication of victims trapped under the rubble are generally a slow and dangerous process. Extrication of trapped victims within the first 24 hours after the earthquake becomes critical for survival. In most instances, however, post-earthquake planning fails to quickly procure equipment needed to move heavy debris. The establishment of Heavy Urban Search and Rescue teams, as recommended by FEMA (1985), has improved victim extrication and survivability.

Tilt-up buildings have concrete wall panels, often cast on the ground, or fabricated off-site and trucked in, that are tilted upward into their final position. Connections and anchors have pulled out of walls during earthquakes, causing the floors or roofs to collapse. A high rate of failure was observed for this type of construction in the 1971 Sylmar, California earthquake. Tilt-up buildings may generate heavy debris.

Statistical estimates (HAZUS™ '99 Inventory) indicate about 1,500 ***pre-cast concrete frame*** buildings in Riverside County. Their seismic performance varies, and is dependent on adequate design and construction (Figure 5.2.8). Pre-cast frames are often weakened due to stresses incurred during transportation and accumulated stresses from shrinkage and creep. Corrosion of the metal connectors between prefabricated elements may also occur, weakening the structure. Multi-story concrete and reinforced masonry buildings with concrete floor slabs may collapse or "pancake" with the floor slabs falling, nearly intact, one on top of the other, becoming closely stacked. The floor slabs prevent access to, and extrication of, victims. These slabs weigh up to 250 tons and generally need to be cut into smaller pieces and removed by heavy cranes, a time-consuming process.

Reinforced concrete frame buildings, with or without reinforced infill walls, display low ductility. Earthquakes may cause shear failure (if there are large tie spacings in columns, or insufficient shear strength), column failure (due to inadequate rebar splices, inadequate reinforcing of beam-column joints, or insufficient tie anchorage), hinge deformation (due to lack of continuous beam reinforcement), and non-structural damage (due to the relatively low stiffness of the frame). A common type of failure observed following the M_w 6.7, 1994 Northridge earthquake was confined column collapse (EERI, 1994), where infilling between columns confined the length of the columns that could move laterally in the earthquake.

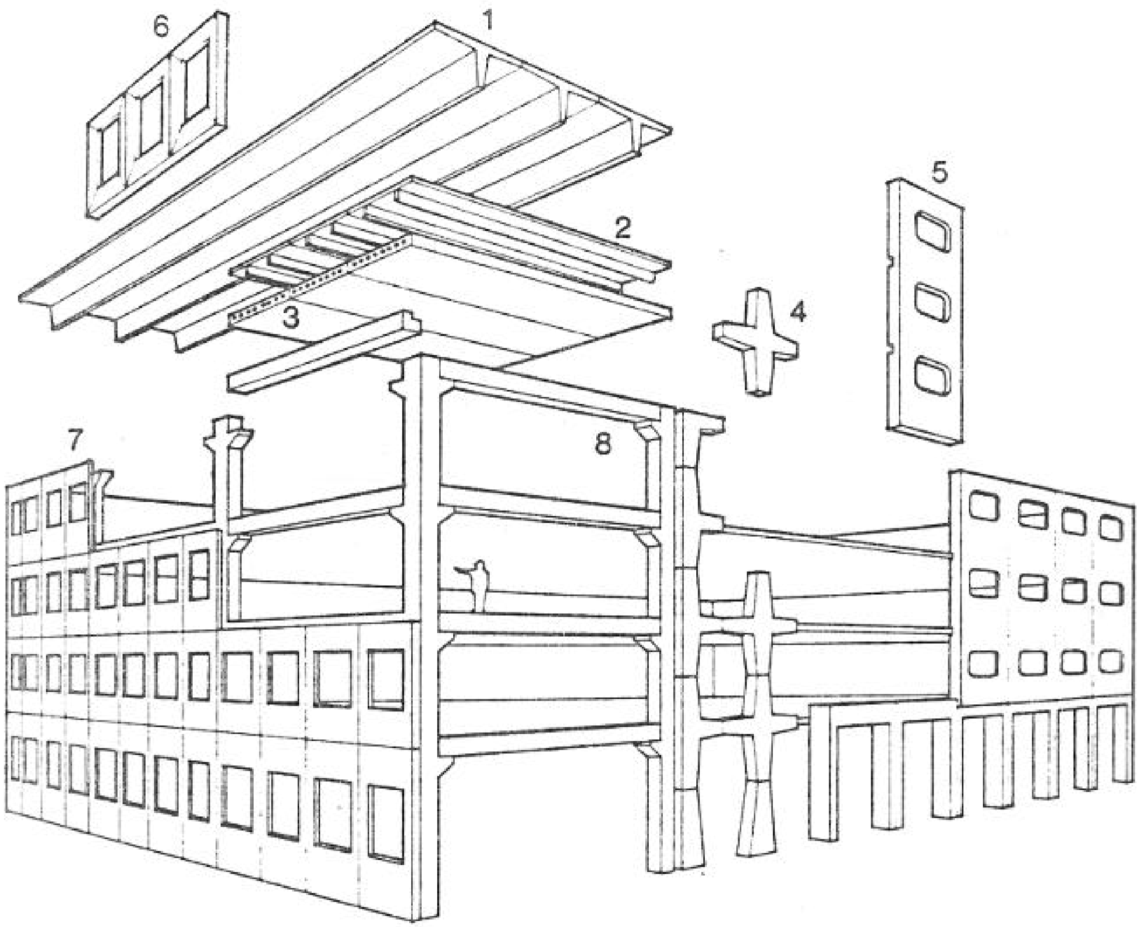
Multi-story steel buildings generally also have concrete floor slabs. However, these buildings are less likely to collapse than concrete structures. Common damage to these types of buildings is generally non-structural, including collapsed exterior curtain wall (cladding), and damage to interior partitions and equipment. Overall, modern steel buildings have been expected to perform well in earthquakes, but the 1994 Northridge earthquake broke many welds in these buildings, a previously unanticipated problem.

Older, pre-1945 steel frame structures may have unreinforced masonry such as bricks, clay tiles and terra cotta tiles as cladding or infilling. Cladding in newer buildings may be glass, infill panels or pre-cast panels that may fail and generate a band of debris around the building exterior (with considerable threat to pedestrians in the streets below). Structural damage may occur if the structural members are subject to plastic deformation, which can cause permanent displacements. If some walls fail while others remain intact, torsion or soft-story problems may result.

Buildings are often a combination of steel, concrete, reinforced masonry and wood, with different structural systems on different floors or different sections of the building. Combination types that are potentially hazardous (and that have not been discussed above) include: concrete frame buildings without special reinforcing, precast concrete and precast-composite buildings, steel frame or concrete frame buildings with unreinforced masonry walls, reinforced concrete wall buildings with no special detailing or reinforcement, large capacity buildings with long-span roof structures (such as theaters and auditoriums), large unengineered wood-frame buildings, buildings with

Roof/floor span systems:
1. structural concrete "T" sections
2. structural double "T" sections
3. hollow core concrete slab

Wall systems:
4. load-bearing frame components (cross)
5. multi-story load-bearing panels



Curtain wall system:
6. precast concrete panels
7. metal, glass, or stone panels

Structural system:
8. precast column and beams

Figure 5.2.8

Source:EarthConsultantsInternational.

PRECAST CONCRETE-FRAME CONSTRUCTION

R:\SVC931-Graphics\ExistingSetting\precastconc.cdr(7/5/02) inadequately anchored exterior cladding and glazing, and buildings with poorly anchored parapets and appendages (FEMA, 1985). Additional types of potentially hazardous buildings may be recognized after future earthquakes.

A building's vertical and/or horizontal shape can also be important. Simple, regular and ***symmetric buildings*** generally perform better than non-symmetric buildings. During an earthquake, ***non-symmetric buildings*** tend to twist as well as shake. Wings on a building tend to act independently during an earthquake, resulting in differential movements and cracking. The geometry of the lateral load-resisting systems also matters. For example, buildings with one or two walls made mostly of glass, while the remaining walls are made of concrete or brick, are at risk. Also, asymmetry in the placement of bracing systems that provide a building with earthquake resistance can result in twisting or differential motions.

Site-related seismic hazards may include the potential for neighboring buildings to "pound," or for one building to collapse onto a neighbor. ***Pounding*** occurs when there is little clearance between adjacent buildings, and the buildings "pound" against each other as they deflect during an earthquake. The effects of pounding can be especially damaging if the floors of the buildings are at different elevations, so that, for example, the floor of one building hits a supporting column of the other. Damage to a supporting column can result in partial or total building collapse.

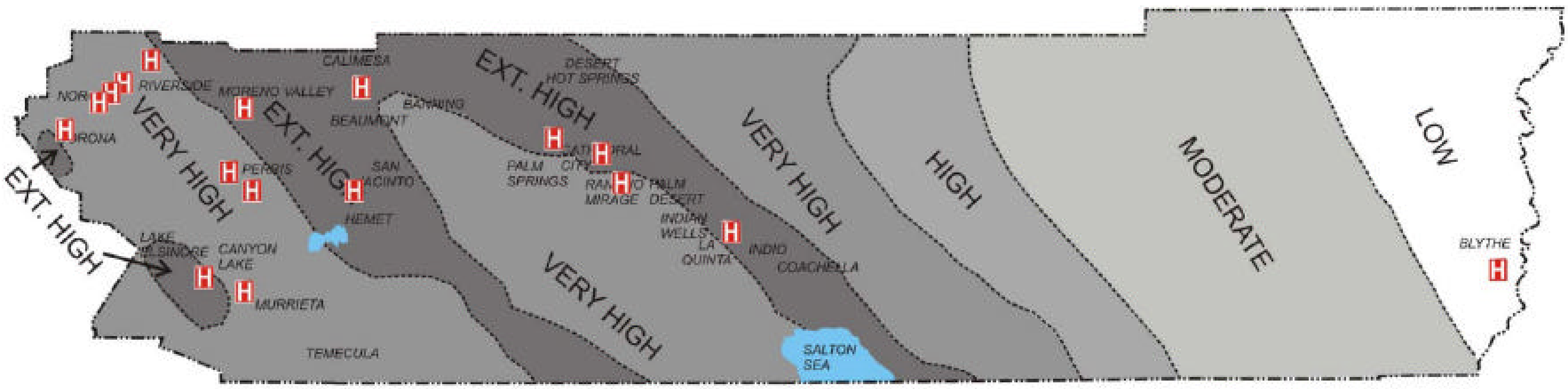
By inventory estimates, more than 70,000 ***mobile homes*** are located in the County of Riverside (HAZUS™ '99 Inventory). Mobile homes are prefabricated housing units that are placed on isolated piers, jackstands, or masonry block foundations (usually without any positive anchorage). Floors and roofs of mobile homes are usually plywood; outside surfaces are covered with sheet metal. Mobile homes typically do not perform well in earthquakes. Severe damage occurs when they fall off their supports, severing utility lines and piercing the floor with steep jackstands.

5.2.7.2 Essential Facilities

Critical facilities are those parts of a community's infrastructure that must remain operational after an earthquake, or facilities that pose unacceptable risks to public safety if severely damaged. Critical facilities include schools, hospitals, fire and police stations, emergency operation centers (EOC's) and communication centers. Figures 5.2.9a through 5.2.9d illustrate the locations of the County's hospitals, emergency response facilities (EOC's, fire and police stations), schools, and communication facilities in relation to ground shaking potential.

It is essential that critical facilities have no structural weaknesses that can lead to collapse. The FEMA, (1985) has suggested the following seismic performance goals for health care facilities:

C The damage to the facilities should be limited to what might be reasonably expected after a destructive earthquake and should be repairable and not life-threatening.



Hospital Location

General Ground Shaking Risk

Low = <10% g
Moderate = 10-20% g
High = 20-30% g
Very High = 30-40% g
Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure5.2.9a

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF HOSPITAL LOCATIONS

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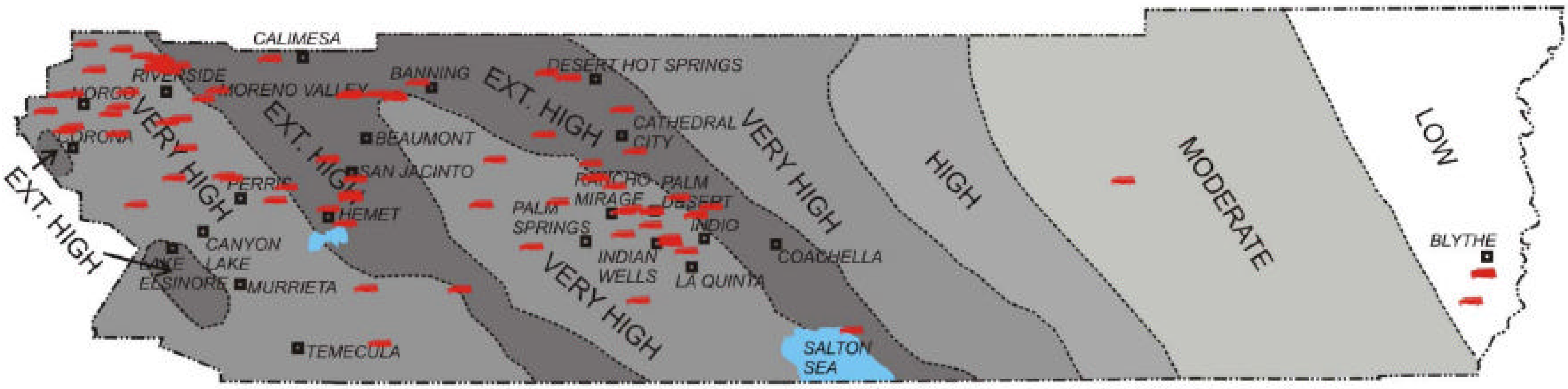

Location of Emergency Response Facility
Fire, Police, or Emergency Operations Center
(based on HAZUS '99 inventory.)

General Ground Shaking Risk

Low = <10% g
Moderate = 10-20% g
High = 20-30% g
Very High = 30-40% g
Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure 5.2.9b

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF EMERGENCY RESPONSE FACILITIES

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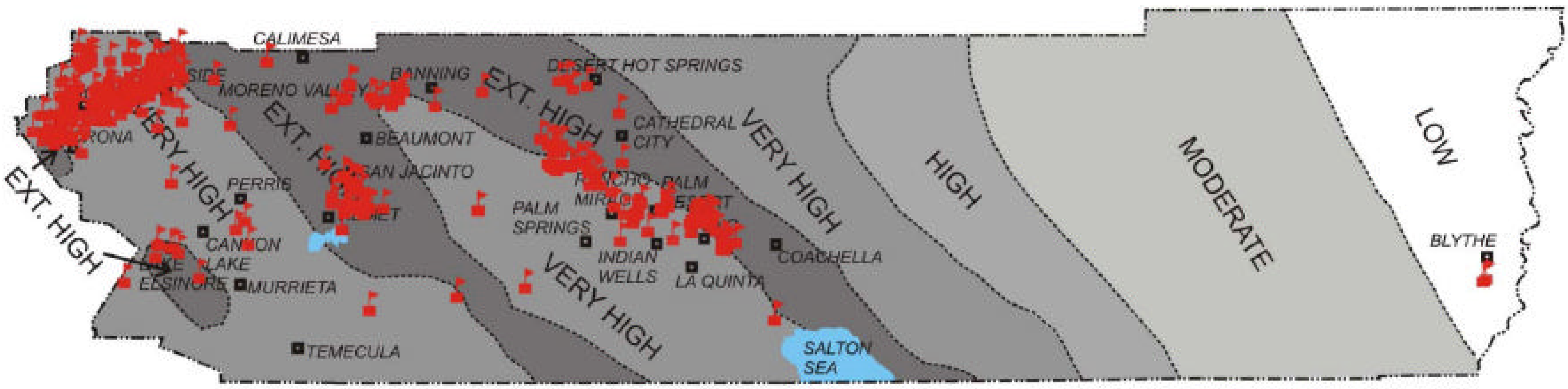

Location of Schools
(based on HAZUS '99 inventory.)

General Ground Shaking Risk

Low = <10% g
Moderate = 10-20% g
High = 20-30% g
Very High = 30-40% g
Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure5.2.9c

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF SCHOOL LOCATIONS

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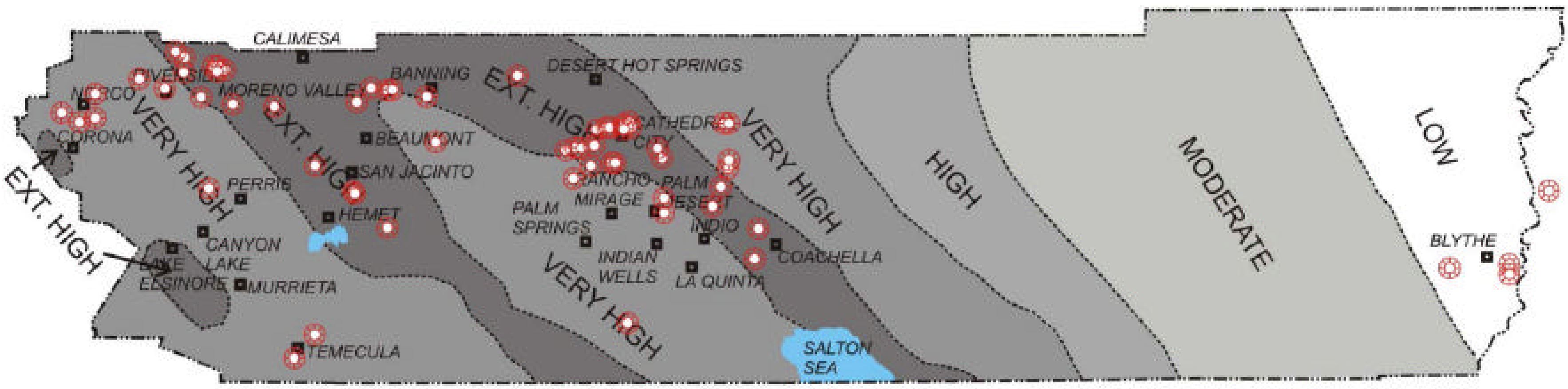


Location of Communication Facility: Television and Radio Stations and Businesses with a Commercial Licence (based on HAZUS '99 inventory.)

General Ground Shaking Risk

- Low = <10% g
- Moderate = 10-20% g
- High = 20-30% g
- Very High = 30-40% g
- Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure 5.2.9d

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF COMMUNICATION FACILITIES

R:\SVC931-Graphics\ExistingSetting\communication.cdr(7/5/02)

C Patients, visitors, and medical, nursing, technical and support staff within and immediately outside the facility should be protected during an earthquake.

C Emergency utility systems in the facility should remain operational after an earthquake.

C Occupants should be able to evacuate the facility safely after an earthquake.

C Rescue and emergency workers should be able to enter the facility immediately after an earthquake and should encounter only minimum interference and danger.

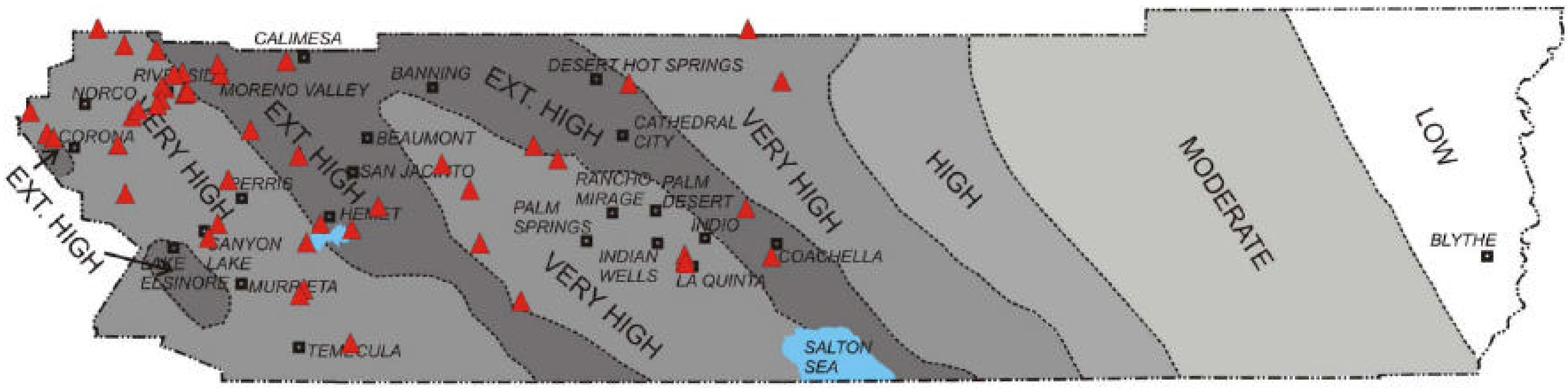
C The facility should be available for its planned disaster response role after an earthquake.

High-loss facilities, if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include nuclear power plants, dams and flood control structures, freeway interchanges, bridges, and industrial plants that use or store explosives, toxic materials or petroleum products. Figures 5.2.9e through 5.2.9g illustrate the locations of the County's dams, highway bridges, and hazardous materials sites in relation to ground shaking potential.

Dam Safety: Statutes governing dam safety are defined in Division 3 of the California State Water Code (California Department of Water Resources, 1986), which empowers the California Division of Dam Safety to monitor the structural safety of dams that are greater than 25 feet in dam height or 50 acre-feet in storage capacity.

Dams under this State jurisdiction are required to have inundation maps that show the potential flood limits in the remote possibility a dam is catastrophically breached. Dam inundation maps are prepared by dam owners primarily for contingency planning; it is stressed that they in no way reflect the structural integrity or safety of the dam in question. Dam owners are also required to prepare and submit emergency response plans to the State Office of Emergency Services, the lead State agency for the State dam inundation mapping program. Detailed dam inundation mapping and a discussion of dam vulnerability are presented in Section 5.4 Flood Hazards. The County of Riverside is required by State law to have in place emergency procedures for the evacuation and control of populated areas within the limits of inundation below the dams. In addition, real estate disclosure upon sale or transfer of property in the inundation area is required under recent legislation (AB 1195 Chapter 65, June 9, 1998. Natural Hazard Disclosure Statement).

Most of the legislation regarding dam safety has developed as a result of dam failures, particularly the sudden, disastrous failure of the St. Francis Dam in 1928 (Babbitt, 1993), and damage to dams during earthquakes. During the 1971 San Fernando earthquake, for example, the Lower San Fernando Dam came within 5 feet of being breached, when the upstream slope slid into the reservoir and the crest settled 30 feet. This confirmed concerns that hydraulic fill dams could be severely damaged by earthquake-induced vibrations (Babbitt and Verigin, 1996).



Location of Dams
(based on HAZUS '99 inventory.)

General Ground Shaking Risk

Low = <10% g
Moderate = 10-20% g
High = 20-30% g
Very High = 30-40% g
Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure 5.2.9e

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF DAM LOCATIONS

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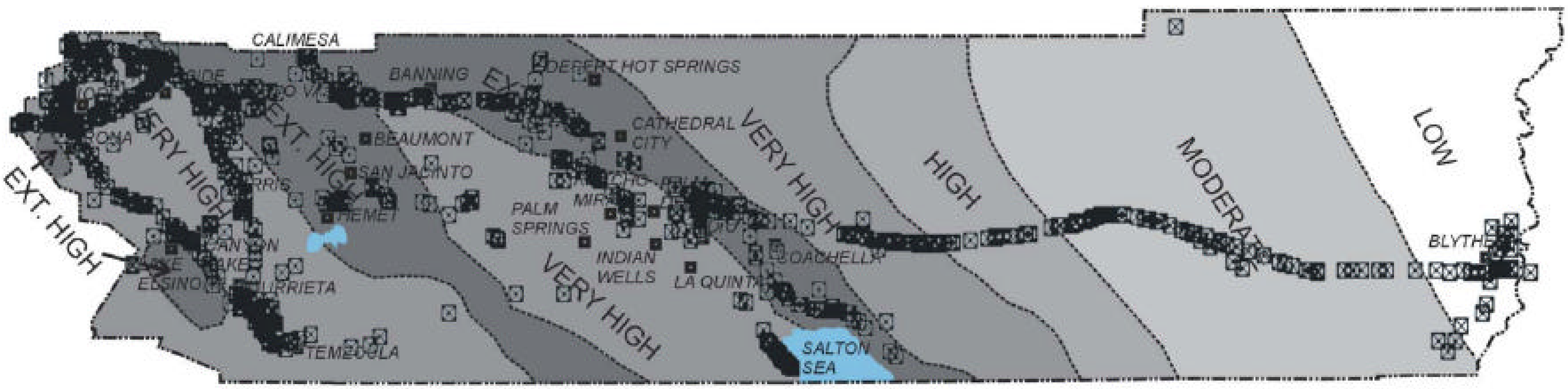


☒ Location of Highway Bridges
(based on HAZUS '99 inventory.)

General Ground Shaking Risk

- Low = <10% g
- Moderate = 10-20% g
- High = 20-30% g
- Very High = 30-40% g
- Ext. High = >40% g

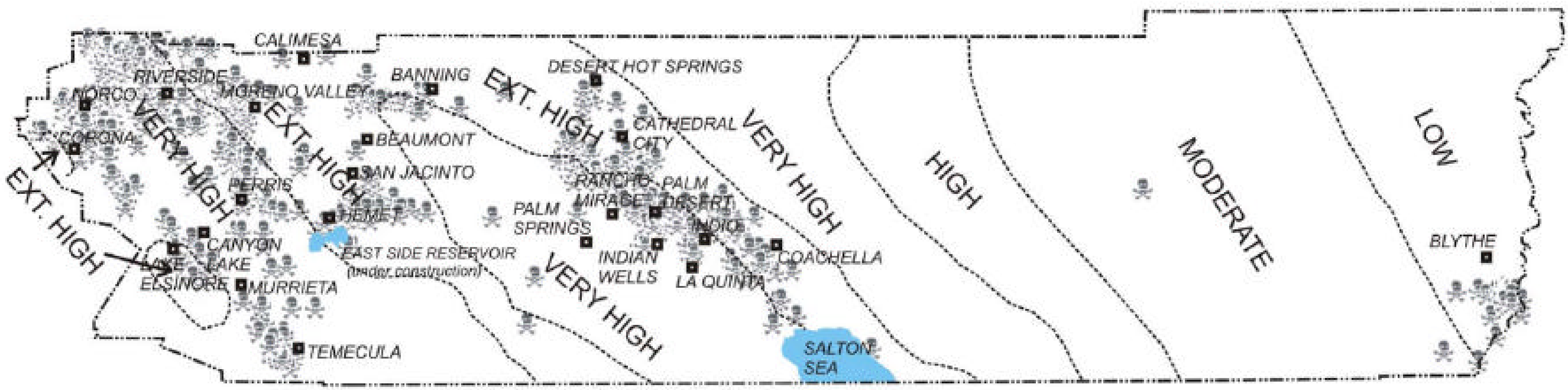
Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure 5.2.9f

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF HIGHWAY BRIDGES



Location of Hazardous Materials (based on HAZUS '99 inventory.)

General Ground Shaking Risk

Low = <10% g
Moderate = 10-20% g
High = 20-30% g
Very High = 30-40% g
Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure 5.2.9g

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF HAZARDOUS MATERIALS

RIVERSIDE COUNTY RCIP INTEGRATED PROJECT

High-occupancy facilities can potentially cause a large number of casualties or crowd-control problems. This category includes high-rise buildings, large assembly facilities, and large multi-family residential complexes.

Dependent-care facilities house populations with special evacuation considerations, such as preschools and schools, rehabilitation centers, prisons, group care homes, and nursing and convalescent homes.

Economic facilities are those that should remain operational to avoid severe economic impacts, such as banks, archiving and vital record keeping facilities, airports and ports, and large industrial and commercial centers.

5.2.7.3 Lifelines

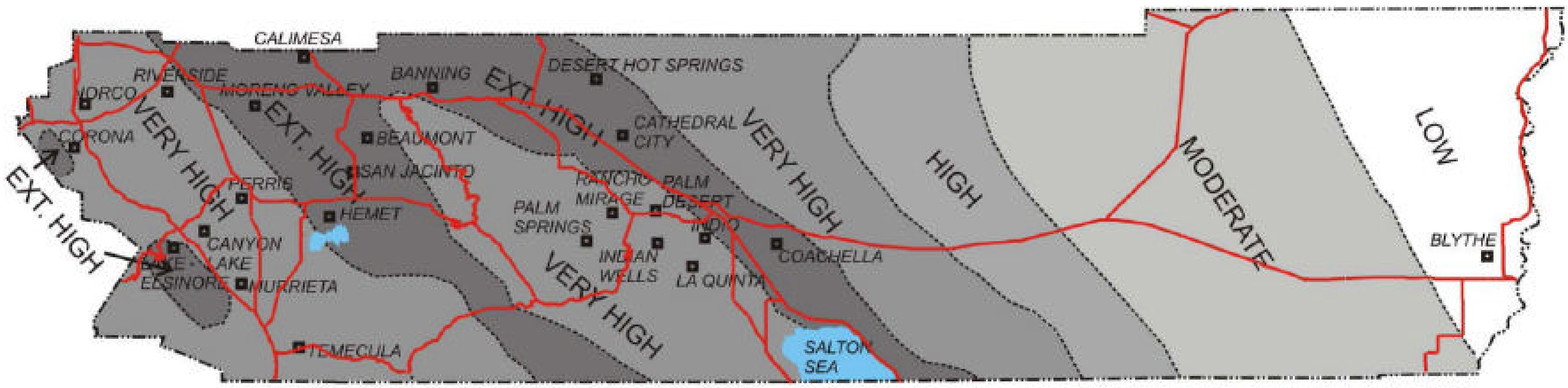
Critical facilities, designed to remain functional during and immediately after an earthquake, may provide only limited services if lifelines are disrupted. The issue of seismic hazard mitigation for lifelines is very complex, given the diversity of lifeline facilities. The effects of strong ground motion to buildings apply to structures involved in lifeline service, such as the control tower in an airport, or the buildings that house the computers and telephone circuits that are central to communication lifelines. When properly designed, manufactured and laid out, buried pipelines are generally not damaged by strong ground motions, but can be severely disrupted in areas of surface rupture, liquefaction, or landslides. Freeway interchanges and bridges have been damaged by strong ground motions; certain bridge designs have been prioritized in retrofitting programs because of their poor past performance in regions of seismic activity.

A hazard analysis focuses on four lifeline categories: (1) water and sewer facilities, (2) transportation facilities, (3) electric power facilities, and (4) gas and liquid fuel lines. Retrofit and upgrading programs for lifelines generally require careful planning to ensure that the public is not inconvenienced by irregular or discontinued service.

Figures 5.2.9h through 5.2.9i illustrate the County's inventory of airports, highways, and rail facilities, as well as available data on water, oil and natural gas pipelines, in relation to the general ground shaking risk.

5.2.8 HAZUS™ Earthquake Scenario Loss Estimations for Riverside County

HAZUS™ is a standardized methodology for earthquake loss estimation based on a Geographic Information Systems (GIS). A project of the National Institute of Building Sciences, funded by the FEMA, it is a powerful advance in mitigation strategies. The HAZUS™ project developed guidelines and procedures to make standardized earthquake loss estimates at a regional scale. With standardization, estimates can be compared from region to region. HAZUS™ is designed for use by state, regional, and local governments in planning for earthquake loss mitigation, emergency preparedness, response, and recovery. HAZUS™ addresses nearly all aspects of the built environment, and many different types of losses. The methodology has been tested against the experience of several past earthquakes, and against the judgment of experts.



Major Highway Locations

General Ground Shaking Risk

Low = <10% g
Moderate = 10-20% g
High = 20-30% g
Very High = 30-40% g
Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure 5.2.9h

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

INVENTORY OF MAJOR HIGHWAY LOCATIONS

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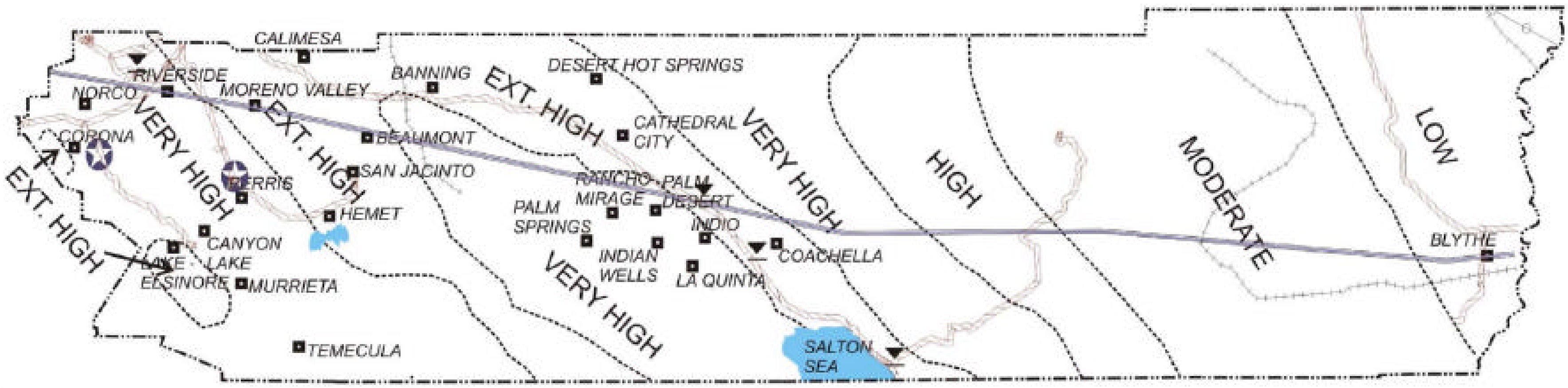


Potable water pipeline

Oil pipeline

Natural gas pipeline

Railroad track

Rail station

Railroad bridge

General Ground Shaking Risk
Low = <10% g
Moderate = 10-20% g
High = 20-30% g
Very High = 30-40% g
Ext. High = >40% g

Mapping is based on U.S. Geological Survey, National Seismic Hazard Mapping peak horizontal accelerations at bedrock expressed as a percentage of gravity with a 10% probability of being exceeded in 50 years.

Figure5.2.9i

Source:EarthConsultantsInternational.

Scaleisapproximate
0 10 20Miles

RAIL FACILITIES, AVAILABLE WATER, OIL AND NATURAL GAS PIPELINE INVENTORY DATA

Subject to several limitations noted below, HAZUS™ can produce results that are valid for the intended purposes.

Loss estimation is an invaluable tool, but must be used with discretion. A loss estimation analyzes casualties, damage, and economic loss in great detail. It produces numbers that can be easily misinterpreted. A loss estimation's results, for example, may cite 4,054 left homeless by a scenario earthquake. There are many variables used to calculate this loss estimation, so it is best to interpret the estimates in terms of its magnitude rather than as an exact number. For example, a loss estimation that predicts 7,000 homeless will probably be considered equivalent to the 4,054 result.

The more community-specific the data that is input to HAZUS™, the more reliable the loss estimation. HAZUS™ provides defaults for all required information. These are based on best-available scientific, engineering, census, and economic knowledge. The loss estimations in this report have been tailored to Riverside County by using the maps of soil type, liquefaction, and landslide susceptibility done as part of this study. Loss estimations can be further refined with new census data, and an inventory of the buildings, lifelines, and infrastructure specific to Riverside County.

Uncertainties are inherent in any loss estimation methodology. They arise in part from incomplete scientific knowledge concerning earthquakes and their effect upon buildings and facilities, and in part from the approximations and simplifications necessary for comprehensive analyses.

5.2.8.1 HAZUS™ Scenario Earthquakes

Eight specific earthquakes, called scenario events, were chosen for HAZUS™ loss estimation (Table 5.2.J). These include the MPE and the MCE for Riverside County, as defined in Section 5.2.5.1. The earthquake chosen to represent MPE ground shaking is a magnitude 6.9 earthquake on the San Jacinto Valley segment of the San Jacinto fault. The MCE is a M_w 7.9 earthquake rupturing the entire southern San Andreas fault.

Table 5.2.J - HAZUS™ Scenario Earthquakes for Riverside County

Event		Maximum Magnitude (Mw)	Chance of Occurring in 30 Years	Comments
Fault	Segment			
San Andreas	Southern	7.9	22%	Worst-case scenario event for Riverside County. Involves rupture of the entire San Andreas from Cajon Pass to the Salton Sea. This event is considered the MCE for Riverside County.
San Andreas	San Bernardino	7.3	28%	Very high intensity ground shaking throughout the San Bernardino Valley, including north central Riverside County.
San Andreas	Coachella	7.1	22%	Very high intensity ground shaking throughout the Coachella Valley, impacting desert resort communities and agriculture.

Event: Fault	Event: Segment	Maximum Magnitude (Mw)	Chance of Occurring in 30 Years	Comments
San Jacinto	San Jacinto Valley	6.9	43%	Highest probability of occurrence of any Southern California fault. Brought closer to failure as a result of stress field changes caused by the 1992 Landers earthquake. This event is considered the MPE for Riverside County.
San Jacinto	Anza Segment	7.2	17%	Very destructive within the communities of Hemet and San Jacinto.
Elsinore	Temecula Segment	6.8	16%	Has not produced any significant earthquakes in historic time.
Elsinore	Glen Ivy Segment	6.8	16%	Would be very destructive in the communities of Lake Elsinore, Murrieta, and Temecula.
Whittier	Whittier	6.8	5%	Has not broken in over 1600 years (WGCEP, 1995). Would cause significant landsliding and lifeline damage in the Chino Hills - Corona area.

5.2.8.2 Estimated Losses Associated with Scenario Earthquakes

HAZUS™ loss estimations for Riverside County were run for the eight scenario earthquakes listed in Table 5.2.J. The following sections describe projected losses associated with two events (MCE and MPE) in detail.

Summaries of building damage, casualties, shelter requirements, and economic losses in Riverside County associated with the eight scenario earthquakes are provided in Tables 5.2.K through 5.2.N, below.

Table 5.2.K - Number of Buildings Damaged

Scenario Event	Building Damage: Slight	Moderate	Extensive	Complete	Total
San Andreas-Southern Segment M_W 7.9 ***(MCE)***	112,100	92,700	50,900	37,000	292,700
San Andreas-San Bernardino Segment M_W 7.3	109,400	69,200	26,600	9,600	214,900
San Andreas-Coachella Segment M_W 7.1	52,700	35,200	13,100	4,600	105,600
San Jacinto-San Jacinto Valley Segment M_W 6.9 ***(MPE)***	92,800	57,300	26,600	10,500	187,100
San Jacinto-Anza Segment M_W 7.2	97,100	57,400	22,800	7,400	184,800
Elsinore-Temecula Segment M_W 6.8	69,300	36,100	10,600	2,200	118,200
Elsinore-Glen Ivy Segment M_W 6.8	82,000	46,600	14,300	3,300	146,200
Elsinore-Whittier M_W 6.8	65,100	33,100	8,400	1,700	108,400

Table 5.2.L - Estimated Casualties

Scenario Event	Casualty Severity* 1	2	3	4	Total
San Andreas-Southern Segment M_W 7.9 ***(MCE)***	8,159	1,499	302	127	10,524
San Andreas-San Bernardino Segment M_W 7.3	2,455	410	83	31	2,979
San Andreas-Coachella Segment M_W 7.1	1,216	207	42	16	1,481
San Jacinto-San Jacinto Valley Segment M_W 6.9 ***(MPE)***	2,916	503	71	39	3,952
San Jacinto-Anza Segment M_W 7.2	1,974	325	37	21	2,357
Elsinore-Temecula Segment M_W 6.8	911	139	17	9	1,076
Elsinore-Glen Ivy Segment M_W 6.8	1,453	231	25	17	1,726
Elsinore-Whittier M_W 6.8	974	153	20	13	1,160

Notes: *Severity Definitions
Severity 1: Medical treatment without hospitalization.
Severity 2: Hospitalization but not life threatening.
Severity 3: Hospitalization and life threatening.
Severity 4: Fatalities.

Table 5.2.M - Estimated Shelter Requirements

Scenario Event	Estimates* Displaced House-holds (no. of households)	Short Term Shelter (no. of people)
San Andreas-Southern Segment M_W 7.9 ***(MCE)***	8,159	1,499
San Andreas-San Bernardino Segment M_W 7.3	2,455	410
San Andreas-Coachella Segment M_W 7.1	1,216	207
San Jacinto-S.J. Valley Segment M_W 6.9 ***(MPE)***	2,916	503
San Jacinto-Anza Segment M_W 7.2	1,974	325
Elsinore-Temecula Segment M_W 6.8	911	139
Elsinore-Glen Ivy Segment M_W 6.8	1,453	231
Elsinore-Whittier M_W 6.8	974	153

Notes: *HAZUS™ estimates 2.4 persons displaced per household, but typically not all require shelter (most apparently leave the area or stay with others). HAZUS™ uses past earthquake experiences and demographics (income) to estimate the number of persons requiring short-term shelter.

Table 5.2.N - Estimated Economic Losses

Scenario Event	Economic Losses (millions) Property Damage	Business Interruption	Total
San Andreas-Southern Segment M_W 7.9 ***(MCE)***	$10,150	$3,020	$13,170
San Andreas-San Bernardino Segment M_W 7.3	$4,180	$1,440	$6,240
San Andreas-Coachella Segment M_W 7.1	$2,340	$720	$3,070
San Jacinto-S.J. Valley Segment M_W 6.9 ***(MPE)***	$4,280	$1,220	$5,500
San Jacinto-Anza Segment M_W 7.2	$3,280	$870	$4,150
Elsinore-Temecula Segment M_W 6.8	$1,800	$450	$2,240
Elsinore-Glen Ivy Segment M_W 6.8	$2,820	$730	$3,540
Elsinore-Whittier M_W 6.8	$2,060	$550	$2,600

5.2.8.3 Estimated Losses Associated with a M_W 6.9 San Jacinto Fault Earthquake (MPE)

This event was chosen as the MPE because it has the greatest probability of occurrence (43 percent, Table 5.2.J) within the lifetimes of structures in the County of Riverside (30 years). The event would involve a rupture of the San Jacinto Valley segment of the San Jacinto fault. The relatively high probability is related to the San Jacinto's high slip rate (±12 mm/year), as well as the increase in stress along the fault caused by the 1992 Landers earthquake. HAZUS™ estimates as many as 39 fatalities, about 3,500 injuries and total economic loss of $5.5 billion (equivalent to 9 percent of the total replacement value of the region's buildings).

Building Damage

HAZUS™ estimates that over 94,000 buildings will be at least moderately damaged. This is about 23 percent of the total number of buildings in the region. An estimated 10,485 buildings will be completely destroyed. The definition of 'damage states' are described above. Table 5.2.O below summarizes the expected damage by general occupancy for Riverside County buildings, while Table 5.2.P summarizes the expected damage by general building type.

Table 5.2.O - Expected Building Damage by Occupancy
M_w 6.9 San Jacinto Fault Earthquake

Occupancy Type	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Residential	210,420	97.90	91,537	98.67	56,074	97.92	26,124	98.20	10,295	98.2
Commercial	2,980	1.39	833	0.90	799	1.40	325	1.22	137	1.31
Industrial	823	0.38	241	0.26	268	0.47	108	0.41	36	0.34
Agriculture	264	0.38	62	0.00	45	0.08	20	0.08	10	0.10
Religion	222	0.10	67	0.00	52	0.09	18	0.07	3	0.03
Government	73	0.03	4	0.00	5	0.01	2	0.01	0	0.00
Education	162	0.08	29	0.03	21	0.04	7	0.03	4	0.04
Total	**214,944**		**92,773**		**57,264**		**26,604**		**10,485**	

Table 5.2.P - Expected Building Damage by Building Type (all design levels)
M_w 6.9 San Jacinto Fault Earthquake

Occupancy Type	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	988	0.5	313	0.3	267	0.5	146	0.4	47	0.5
Mobile Homes	18,481	8.6	13,256	14.3	21,418	37.4	15,279	59.3	6,218	57.4
Precast Concrete	889	0.4	204	0.2	246	0.4	132	0.6	61	0.5
Reinforced Masonry	15,030	7.0	3,842	4.1	4,295	7.5	2,778	10.7	1,125	10.4
Steel	10,409	4.8	4,586	4.9	6,500	11.4	3,976	15.2	1,595	14.9
URM	1,008	0.5	589	0.6	794	1.4	661	6.8	708	2.5
Wood	168,139	78.2	69,983	75.4	23,744	41.5	3,632	7.0	731	13.7

Essential Facility Damage

Before the earthquake, there are 18 hospitals with 2,682 hospital beds available for use. HAZUS™ estimates that 51 percent of these beds are available on the day of the earthquake, as well as by patients already in the hospital. After one week, 64 percent of the beds will be back in service. By 30 days, 81 percent will be operational (Table 5.2.Q).

Table 5.2.Q - Expected Damage to Essential Facilities as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault

Classification	Total	Number of Facilities With: At Least Moderate Damage	Complete Damage	Functionality > 50% at day 1
Hospitals	18	17	0	10
Schools	380	378	0	146
EOCs	12	11	0	6
Police Stations	45	43	0	30
Fire Stations	52	52	0	16

Transportation and Utility Lifeline Damage

Table 5.2.R, below, provides damage estimates based on available inventory.

Table 5.2.R - Expected Damage to the Transportation Systems as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault

		Number of Locations				
					With Functionality > 50 %	
System	Component	Locations/ Segments	With at Least Mod. Damage	With Complete Damage	After Day 1	After Day 7
Highway	**Bridges**	1,306	89	18	1,254	1,299
Railways	**Bridges**	4	0	0	4	4
	Facilities	2	0	0	2	2
Bus	**Facilities**	6	1	0	6	6
Airport	**Facilities**	39	7	0	39	39
	Runways	34	1	0	34	34

HAZUS™ performs a simplified system performance analysis for electric power (Table 5.2.S).

Table 5.2.S - Expected Electric Power System Performance as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault

		Number of Households without Service				
System	Total # of Households	At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Electric Power	402,426	93,996	17,668	825	0	0

Fire Following Earthquake

HAZUS™ uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this MPE scenario, 124 ignitions will burn about 0.03 percent of the region's total area, displace about 360 people and burn about $19.0 million of building value.

Debris Generation

HAZUS™ estimates that 4.5 million tons of debris will be generated. Brick/wood comprises 36 percent of the total, with the remainder reinforced concrete/steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 180,984 truckloads (at 25 tons/truck) to remove the debris generated by the MPE.

Shelter Requirement

HAZUS™ estimates 9,345 households will be displaced due to the earthquake. Of these, 6,964 people will seek temporary shelter in public shelters.

Casualties

Table 5.2.T provides a summary of the casualties estimated for this MPE.

Table 5.2.T - Casualty Estimates as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault

			Level 1	Level 2	Level 3	Level 4
2 AM (maximum residential occupancy)	**Residential**		2,898	498	38	38
	Non-Residential		16	3	0	0
	Commute		2	3	4	1
		Total	2,916	503	42	39
2 PM (maximum educational, industrial and commercial)	**Residential**		1,119	193	14	14
	Non-Residential		866	157	20	20
	Commute		8	13	20	4
		Total	1,993	363	54	38
5 PM (peak commute time)	**Residential**		1,328	229	17	17
	Non-Residential		264	48	6	6
	Commute		20	33	48	10
		Total	1,613	309	71	32

Building-Related Economic Losses

Total building-related losses were $5.5 billion dollars, and 22 percent of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, making up over 68 percent of the total loss. Table 5.2.U summarizes the losses associated with building damage.

Table 5.2.U - Building-Related Economic Loss Estimates (millions of dollars) as a Result of a M_w 6.9 Earthquake on the San Jacinto Fault

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss	**Structural**	615.3	158.3	48.1	31.0	**852.7**
	Non-Structural	2,061.2	368.2	107.2	81.1	**2,617.7**
	Content	519.1	167.0	73.8	35.1	**794.9**
	Inventory	N/A	3.6	11.7	0.9	**16.2**
	Subtotal	3,195.6	697.1	240.8	148.1	**4,281.6**
Business Interruption Loss	**Wage**	16.6	190.3	10.4	8.8	**226.0**
	Income	7.1	208.6	6.2	2.4	**224.4**
	Rental	160.2	67.2	4.9	4.6	**236.9**
	Relocation	378.7	105.1	12.8	39.3	**535.9**
	Subtotal	562.7	571.2	34.4	55.1	**1,223.3**
	Total	3,758.3	1,268.3	275.1	203.2	**5,504.9**

5.2.8.4 Estimated Losses Associated with a M_w 7.9 Southern San Andreas Earthquake

This event represents the MCE for Riverside County. The earthquake would rupture the San Andreas fault from Cajon Pass, north of the County, to the Salton Sea. It is an event that likely occurs only once every several hundred years, but should it occur tomorrow, HAZUS™ estimates that Riverside County would suffer about 120 deaths, nearly 9,800 injuries, and economic losses of $13.6 billion, about 22 percent of the total replacement value of the region's buildings.

Building Damage

HAZUS™ estimates that over 181,000 buildings will be at least moderately damaged. This is over 45 percent of the buildings in the County. An estimated 37,013 buildings will be destroyed. Table 5.2.V summarizes the expected damage by building occupancy, while Table 5.2.W summarizes expected damage by building type.

Table 5.2.V - Expected Building Damage by Occupancy M_w 7.9 San Andreas Fault Earthquake

Occupancy Type	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Residential	107,383	98.18	110,856	98.89	90,754	97.89	49,686	97.66	35,937	97.1
Commercial	1,259	1.15	817	0.73	1,331	1.44	856	1.68	799	2.16
Industrial	399	0.36	233	0.21	375	0.40	224	0.44	179	0.48
Agriculture	128	0.12	80	0.00	94	0.10	43	0.08	41	0.11
Religion	104	0.10	73	0.00	97	0.10	41	0.08	36	0.10
Government	25	0.02	4	0.00	11	0.01	5	0.01	3	0.01
Education	78	0.07	32	0.03	49	0.05	20	0.04	18	0.05
Total	**109,376**		**112,095**		**92,711**		**50,875**		**37,013**	

Table 5.2.W - Expected Building Damage by Building Type (all design levels)
M_W 7.9 San Andreas Fault Earthquake

	None		Slight		Moderate		Extensive		Complete	
Occupancy Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	420	0.4	321	0.3	430	0.5	309	0.8	281	0.6
Mobile Hms.	2,123	1.9	6,125	5.5	18,971	20.5	25,484	59.3	21,949	50.1
Precast Concrete	415	0.4	204	0.2	370	0.4	276	0.7	267	0.5
Reinforced Masonry	7,546	6.9	4,360	3.9	6,240	6.7	4,932	10.8	3,992	9.7
Steel	3,387	3.1	3,485	3.1	7,807	8.4	7,310	13.7	5,077	14.4
URM	140	0.1	233	0.2	568	0.6	834	5.4	1,985	1.6
Wood	95,345	87.2	97,367	86.9	58,325	62.9	11,730	9.4	3,462	23.1

Essential Facility Damage

Before the earthquake, the region had 2,682 hospital beds available for use. HAZUS™ estimates that only 20 percent of these beds are available on the day of the earthquake, as well as by patients already in the hospital (Table 5.2.X). After one week, 34 percent of the beds will be back in service. Even after 30 days, only 57 percent will be operational.

Table 5.2.X - Expected Damage to Essential Facilities
as a Result of a M_W 7.9 Earthquake on the San Andreas Fault

		Number of Facilities With		
Classification	**Total**	**At Least Moderate Damage**	**Complete Damage**	**Functionality > 50% at day 1**
Hospitals	18	18	0	2
Schools	380	380	0	3
EOCs	12	12	0	1
Police Stations	45	45	0	8
Fire Stations	52	52	0	4

Transportation and Utility Lifeline Damage

Table 5.2.Y, below, provides damage estimates based on available inventory.

Table 5.2.Y - Expected Damage to the Transportation Systems as a Result of a M_w 7.9 Earthquake on the San Andreas Fault

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	**Bridges**	1,306	392	124	936	1,096
Railways	**Bridges**	4	1	0	4	4
	Facilities	2	0	0	2	2
Bus	**Facilities**	6	3	0	5	6
Airport	**Facilities**	39	14	1	36	39
	Runways	34	1	1	34	34

HAZUS™ performs a simplified system performance analysis for electric power (Table 5.2.Z).

Table 5.2.Z - Expected Electric Power System Performance as a Result of a M_w 7.9 Earthquake on the San Andreas Fault

System	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Electric Power	402,426	210,867	121,080	50,577	4,470	0

Fire Following Earthquake

HAZUS™ uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this MCE scenario, HAZUS™ estimates 124 ignitions that will burn about 0.06 percent of the region's total area, displace about 830 people, and burn about $51.0 million dollars of building value.

Debris Generation

HAZUS™ estimates 11.9 million tons of debris will be generated. Brick/wood comprises 36 percent, with the remainder being reinforced concrete/steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 474,338 truckloads (at 25 tons/truck) to remove the debris generated by the MCE for Riverside County.

Shelter Requirement

HAZUS™ estimates 27,027 households will be displaced. Of these, 20,079 people will seek temporary shelter in public shelters.

Casualties

Table 5.2.AA provides a summary of the casualties estimated for this earthquake.

Building-Related Economic Losses

Total building-related losses were $13.2 billion dollars, and 25 percent of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up over 67 percent of the total loss. Table 5.2.BB, below, provides a summary of the losses associated with building damage.

Table 5.2.AA - Casualty Estimates as a Result of a M_w 7.9 Earthquake on the San Andreas Fault

			Level 1	Level 2	Level 3	Level 4
2 AM (maximum residential occupancy)	**Residential**		8,102	1,479	122	122
	Non-Residential		51	10	1	1
	Commute		7	11	17	3
		Total	8,159	1,499	141	127
2 PM (maximum educational, industrial and commercial)	**Residential**		2,960	540	43	43
	Non-Residential		2,676	508	67	67
	Commute		36	56	85	17
		Total	5,672	1,104	195	127
5 PM (peak commute time)	**Residential**		3,515	642	52	52
	Non-Residential		841	160	21	21
	Commute		98	149	229	46
		Total	4,454	950	302	118

Table 5.2.AB - Building-Related Economic Loss Estimates (millions of dollars) as a Result of a Mw 7.9 Earthquake on the San Andreas Fault

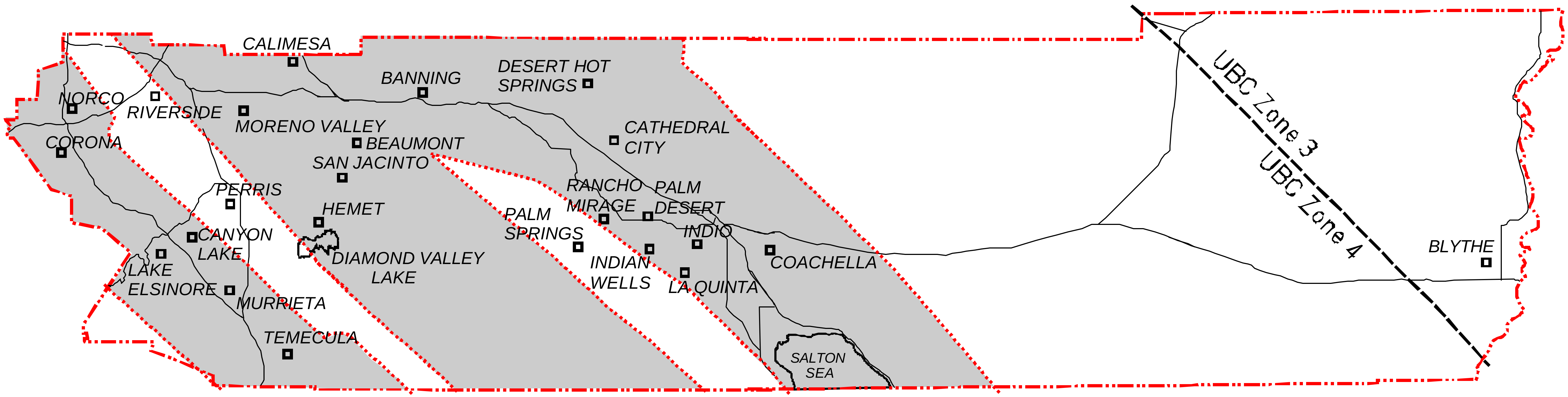
Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss	Structural	1,532.3	433.1	104.0	71.3	2,140.7
	Non-Structural	5,085.1	975.7	195.6	180.6	6,436.9
	Content	1,032.4	335.8	116.0	60.6	1,544.7
	Inventory	N/A	6.9	18.3	1.7	26.9
	Subtotal	7,649.8	1,751.5	433.9	314.2	10,149.3
Business Interruption Loss	Wage	69.6	566.5	21.4	18.5	676.0
	Income	29.5	742.3	12.8	5.6	790.3
	Rental	459.9	171.5	9.5	10.3	651.1
	Relocation	934.1	253.2	23.3	86.7	1,297.4
	Subtotal	1,493.1	1,733.5	67	121.1	3,021
	Total	**9,142.9**	**3,485.0**	**500.9**	**435.3**	**13,170**

5.2.9 Reducing Earthquake Hazards in Riverside County

Recent California earthquakes, with their relatively low loss of life, have demonstrated that the best mitigation technique is our ongoing improvement of building codes as we incorporate lessons from damaging earthquakes worldwide. Building codes are designed to protect lives, not structures. Under recent building code improvements, buildings will still be damaged, but are far less likely to fail catastrophically. Our most recent building codes (1997, adopted by the County of Riverside Department of Building and Safety in July 1999), are a prime example. However, while hazards are reduced by new building codes, they are simultaneously increased by population growth, increased development in vulnerable areas, and aging of the existing building stock.

5.2.9.1 1997 Uniform Building Code Impacts on the County of Riverside

Changes in the 1997 UBC represent the most significant increases in ground shaking criteria in the last 30 years. Two changes have special significance for the County of Riverside. The first change is a revision in soil types and amplification factors. The second change incorporates the proximity of earthquake sources in UBC seismic zone 4. Zone 4 is the highest hazard zone and includes most of the County of Riverside. The eastern portion of the County (Blythe Region; Figure 5.2.10) is Zone 3, so the 1997 near-source seismic provisions of the UBC do not apply. The Riverside County Department of Building and Safety defines the UBC seismic zones in the County as follows:



AreasofRiverside Countywherenewnear-source design parametersare r equiredunderthe 1997UniformBuildingCode

Figure5.2.10

Source:EarthConsultantsInternational.

NEAR SOURCE ZONE REGIONS IMPACTING RIVERSIDE COUNTY AND UBC ZONE BOUNDARY

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"The townships T2SR16E, T3SR17E, T4SR18E, T5SR19E, T6SR20E, T7SR21E, T8SR22E are inclusive to the UBC SEISMIC ZONE-4 and the townships lying East of listed above may be considered in the SEISMIC ZONE-3."

Buildings of short predominant period of ground shaking (low-rises) must now also consider soil effects. In the past, only long-period structures (high-rises) were influenced by UBC requirements. The new ground shaking basis for code design is more complicated, because of the wide range of soil types and the close proximity of seismic sources. The new soil effects are based on observations made as a result of the Mexico City and Loma Prieta earthquakes, and affect all new buildings in western and central Riverside County. Most of the western and central portions of the County are affected by the new, near-source design factors. An Atlas, "Maps of Known Near-Source Zones in California and Adjacent Portions of Nevada" was prepared by the CDMG and published by the International Conference of Building Officials (ICBO) for use with the 1997 UBC (ICBO, 1998). The 1997 UBC, contains detailed descriptions of the incorporation of the new near-source and soil parameters; only a summary is provided below:

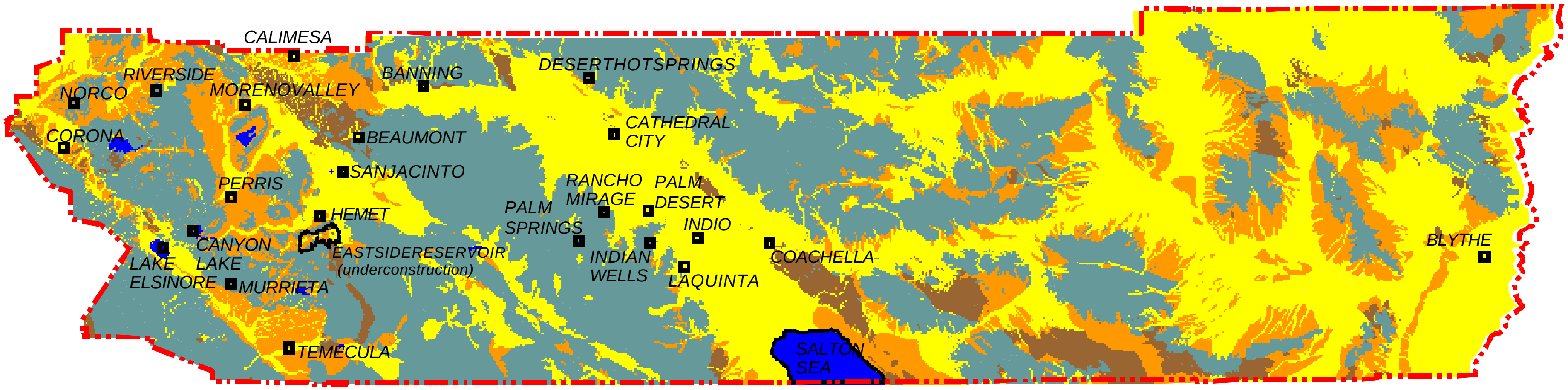
Soil Types and Soil Amplification Factors: The seismic design response spectra are defined in terms of two seismic coefficients Ca and Cv. These coefficients are functions of the following parameters:

- Seismic Zone (e.g. UBC Zone 0, 1, 2, 3, or 4)
- Soil Type, and
- Near-Source Factors (UBC Zone 4 only).

The UBC outlines six soils types, using the average soil properties in the top 100 feet of soil, sediment and rock. Figure 5.2.11 illustrates the areal distribution of the UBC soil types. The engineering parameters associated with the UBC soil types are outlined, below in Table 5.2.CC.

Table 5.2.AC - 1997 Uniform Building Code Soil Profile Types

		Average Soil Properties for the Upper 100 Feet		
Soil Profile Type	**Soil Profile Name/Generic Description**	**Shear Wave Velocity (feet/second)**	**Standard Penetration Test (blows/foot)**	**Undrained Shear Strength (psf)**
S_A	Hard Rock	>5,000		
S_B	Rock	2,500 to 5,000		
S_C	Very dense soil and soft rock	1,200 to 2,500	>50	>2,000
S_D	Stiff soil profile	600 to 1,200	15 to 50	1,000 to 2,000
S_E	Soft soil profile	<600	<15	<1,000
S_F	Soil requiring site-specific evaluation.			



Soil Profile Type	Soil Profile Name/Generic Description	Average Soil Properties for the Upper 100 Feet		
		Shear Wave Velocity (feet/second)	Standard Penetration Test (blows/foot)	Undrained Shear Strength (psf)
S_A	Hard Rock	>5,000		
S_B	Rock	2,500 to 5,000		
S_C	Very dense soil and soft rock	1,200 to 2,500	>50	>2,000
S_D	Stiff soil profile	600 to 1,200	15 to 50	1,000 to 2,000
S_E[1]	Soft soil profile	<600	<15	<1,000
S_F	Soil requiring site-specific evaluation.			

Figure 5.2.11

Source:EarthConsultantsInternational.

GENERAL UNIFORM BUILDING CODE SOIL TYPES

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The detailed GIS engineering geology coverage for Riverside County was converted to the basic UBC soil profiles illustrated on Figure 5.2.11 based on the following assumptions:

- S_A: Does not generally exist in California.
- S_B: Includes all igneous and metamorphic bedrock types.
- S_C: Includes all pre-Quaternary rock types, as well as Pleistocene soils described as "indurated."
- S_D: Generally Pleistocene soils, or soils described as "moderately consolidated."
- S_E: Generally Holocene soils, or soils described as "unconsolidated" or "weakly consolidated."

Near-Source Factors: Most of the western and central portions of the County of Riverside (see Figure 5.2.10) are subject to near-source design factors based on the proximity of three major fault systems (Elsinore, San Jacinto, and San Andreas), as well as some smaller fault systems (Chino-Central Avenue, Burnt Mountain, and Eureka Peak). These parameters, new to the 1997 UBC, address the proximity of potential earthquake sources (faults). In earlier versions of the UBC, these factors were present for the design of seismically isolated (base-isolation) structures, but were not applied to other structures until now. Ground shaking that was far more intense than expected occurred near the fault ruptures at Northridge in 1994 and at Kobe, Japan in 1995. The 1997 UBC also includes a near-source factor that accounts for directivity of fault rupture. The direction of fault rupture played a significant role in distribution of ground shaking at Northridge and Kobe. For Northridge, much of the earthquake energy was released into the sparsely populated mountains north of the San Fernando Valley, while at Kobe, the rupture directed energy into the city and contributed to extensive damage. Since the rupture direction of a given source cannot be predicted, the UBC requires about a 20 percent general increase in estimated ground shaking to account for directivity.

Seismic Source Type: Near-source factors include a classification of seismic sources based on slip rate and maximum magnitude potential. These parameters are used to classify three seismic source types (A, B and C), in Table 5.2.DD.

Table 5.2.AD - 1997 Uniform Building Code Seismic Source Types

Seismic Source Type	Seismic Source Description	Seismic Source Definition	
		Maximum Moment Magnitude, M	Slip Rate, SR (mm/yr)
A	Faults that are capable of producing large-magnitude events and which have a high rate of seismicity.	$M_w \geq 7.0$ and	$SR \geq 5$
B	All faults other than Types A and C.		
C	Faults which are not capable of producing large-magnitude earthquakes and which have a relatively low rate of seismic activity.	$M_w < 6.5$	$SR \leq 2$

Type A faults are active and capable of producing large-magnitude events. Most segments of the San Andreas and associated faults are classified as Type A, including those in the County of Riverside. The Type A slip rate (>5 mm/yr) and magnitude (Mw 7.0 or greater) are common only to faults near boundaries of tectonic plates (Pacific and North American). Type C seismic sources are considered to be sufficiently inactive and not capable of producing large-magnitude events such that potential ground shaking effects can be ignored. Type B sources include all faults that are neither Type A nor C, thus Type B includes most of the active faults in California. The San Andreas fault and most of the San Jacinto fault in Riverside County are Type A faults. The 1997 UBC requires that the locations and characteristics of these faults be established based on reputable sources such as the CDMG and the USGS. The fault parameters used by the CDMG (ICBO, 1998) in classifying seismic source zones in the County of Riverside, and the UBC "Type" assigned to the fault segments as a result, are summarized in Table 5.2.EE.

The UBC source zone classification of the San Jacinto Valley segment of the San Jacinto fault as a type B fault is based on its maximum magnitude of 6.9. The UBC has a minimum M_w 7.0 for Type A. However, of any Southern California fault, this fault segment has the highest probability of generating a large earthquake in the next 30 years (43 percent; WGCEP, 1995). It also has a high slip rate (±12 mm/year).

Table 5.2.AE - 1997 Uniform Building Code Near-Source Zones and Classifications of Faults in Riverside County

Source	Maximum Magnitude (M_w)	Slip Rate (mm/year)	Type
San Andreas - San Bernardino Segment	7.3	24	A
San Andreas - Southern Segment	7.4	24	A
San Jacinto - San Jacinto Valley Segment	***6.9***	***12***	***B***
San Jacinto - Anza Segment	7.2	12	A
Elsinore - Temecula Segment	6.8	5	B
Elsinore - Glen Ivy Segment	6.8	5	B
Elsinore - Whittier Segment	6.8	2.5	B
Chino - Central Avenue Fault	6.7	1	B
Burnt Mountain Fault	6.4	0.6	B
Eureka Peak Fault	6.5	0.6	B

To establish near-source factors for any proposed project in the County of Riverside, the first step is to identify and locate known active faults in the region. The ICBO has provided an Atlas of the location of known faults for California to accompany the 1997 UBC.

The rules for measuring distance from a fault are provided by the 1997 UBC. The criteria for determining distance to vertical faults, such as the San Andreas, are relatively straightforward. The distance to thrust faults (which meet the surface at a low angle) and a blind thrust fault (which are shallow dipping but buried) is assumed as 0 for anywhere above the dipping fault plane to a depth of 10 kilometers.

5.2.9.2 Retrofit and Strengthening of Existing Structures

The new building codes mitigate hazards in new construction. The retrofit and strengthening of existing structures require the adoption of ordinances. The County of Riverside is required by State law to adopt an ordinance aimed at retrofitting URMs. Although retrofit buildings may still incur severe damage during an earthquake, the retrofitting results in a substantial reduction of casualties by preventing collapse.

Past earthquakes have shown that many other types of structures other than URMs are potentially hazardous. Structures built before the code incorporated lessons from the 1971 Sylmar earthquake are particularly susceptible to damage. These include pre-cast tilt-up concrete buildings, soft-story structures, unreinforced concrete buildings, as well as pre-1940 single-family structures. Other potentially hazardous buildings include irregular-shaped structures and mobile homes.

The societal and economic implications of rehabilitating existing buildings are discussed in many publications, including "Establishing Programs and Priorities for the Seismic Rehabilitation of Buildings - A Handbook and Supporting Report," "Typical Costs for Seismic Rehabilitation of Existing Buildings: Summary and Supporting Documentation," (FEMA Publications 174 and 173, and 156 and 157, respectively). Another appropriate source is the publication prepared by Building Technology, Inc. entitled “Financial Incentives for Seismic Rehabilitation of Hazardous Buildings - An Agenda for Action (Report and Appendices)”.

5.3 Wildland Fire Hazards

Major wildland and earthquake-induced fires can overwhelm local emergency response resources. Riverside County has experienced six fire disasters since 1970. Much of the County is considered potential wildland fire area, by the State of California Department of Forestry and Fire Prevention (CDF). In these areas, special State statutes govern development.

Wildland fire, also called chaparral or brush fire, is typically associated with the indigenous vegetation in the mountain and foothill areas of Southern California. This vegetation has a very high oil content that creates severe fire danger. Wildland fires can also occur in suburban and rural areas of the County, which juxtapose developed lands with uncultivated lands, undeveloped lands, timber, range, watershed, brush, or grasslands.

Wildland fire is a serious and growing hazard. At present, more than 8 million people have homes and businesses in California's wildland areas. In Riverside County, as elsewhere, more people than ever are living and playing in wildland intermix areas. Wildland-urban interfaces create extremely dangerous and complex fire conditions, posing a threat to public and firefighter safety. As wildland fires meet structural developments, vegetation ceases to burn but catastrophic fire can continue, sustained by structures igniting.

Wildland fire is a natural process. In the past, the presumption has been that all wildland fires should be extinguished promptly. This has caused fire-starved vegetation to grow more dense, weakening vegetation in a struggle for living space and increasing destruction by pests and disease. Dead and dying plants add fuel for fire. In addition, the absence of fire can alter or disrupt the cycle of natural plant succession and the associated habitats. Recognizing this, land management agencies are now committed to finding ways, such as prescribed burning, to reintroduce fire into natural ecosystems.

Fires in fire-starved areas burn more intensely. They are more costly to control and create greater risk of losses to the people, resources, and improvements in wildland areas. In addition, many other factors are contributing to make wildfires hotter and more destructive. California has extended droughts, which increase dead and dying vegetation, volumes of dry fuel per acre, and the number of days of low humidity. Federal policy that sets aside federal lands, without an aggressive pre-fire management program, further limits fuel management and adds ignition sources. In many portions of Riverside County, fire danger can be worsened by steep, rugged topography, which allows wildland fire to spread quickly and makes it more difficult to fight.

Santa Ana winds greatly increase fire danger. Named by the early settlers at Santa Ana, these hot, dry winds typically develop when a strong, but stalled, high-pressure system near Idaho and Salt Lake (the Great Basin High) meets a weak, low-pressure system just offshore in Southern California (Chen, 2000). In these conditions, the easterlies (winds from the east) are turned north and south, where they are channeled and thus strengthened by the many canyons in the Great Basin. The result is hot, powerful, and very dry winds that blow across Southern California, especially through the mountain passes.

The greatest demands on fire suppression resources occur when there are multiple ignitions. Thus, widespread fires following an earthquake, coupled with Santa Ana winds, constitute a worst-case fire suppression scenario. Because of dry vegetation and recurring Santa Ana winds, the fire danger for Riverside County is considered extremely high during 25 percent of each year, throughout the months of August, September and October. Because of many large, active faults in Riverside County, the probability of a major earthquake is high, year-round. Therefore, there is a statistically significant chance that this worst-case fire suppression scenario could occur.

The Oakland Hills fire of October, 1991 (the "Tunnel" fire, Table 5.3.A), demonstrates the seriousness of multiple ignitions. The Oakland Hills fire was a firestorm. When fires grow into firestorms, catastrophes occur. Insurance companies define a catastrophe as an event that triggers at least $25 million in claims or more than 1,000 individual claims.

During the Oakland Hills fire, numerous single- and multiple-family residential structures were ignited simultaneously by embers fanned by winds. In this mode of fire spread, termed "branding," wind can transport embers a mile or more. Roofs are the most vulnerable portion of a building or structure to branding. Wood-shingle roofs are particularly fire-prone, thus current code prohibits the use of untreated wood shingles or shakes for new or replacement roofing. Wood-shingle roofs are prevalent in residential areas of Riverside County.

5.3.1 Previous Fire Disasters

Unfortunately, damaging fires are commonplace throughout California. In 1994 alone, more than 525,000 acres were destroyed in California wildland fires. In 1995, the CDF battled 6,621 blazes that damaged or destroyed 121 structures. To date, the most destructive fire in California history was the fast-moving 1991 Oakland Hills fire, called the "Tunnel" fire (Table 5.3.A).

Table 5.3.A lists the 20 largest California wildland fires, their locations, causes, and extent of devastation. They are ranked according to number of structures lost.

In Riverside County, the most severe fire disaster to date occurred in October 1993. Powerlines knocked down by Santa Ana winds started a fire that destroyed 107 homes and burned 25,100 acres in Riverside County (Table 5.3.A and 5.3.B). Gubernatorial Proclamations of a State of Emergency and Presidential Major Disaster Declarations (Office of Emergency Services, 2000) affecting Riverside County were declared on that and five other occasions in the last 30 years (Table 5.3.B).

Table 5.3.A - Twenty Largest California Wildland Fires (Ranked By Structures Lost)

Rank	Name *(Cause)*	Date	County	Acres	Structures Lost	Deaths
1	Tunnel *(Rekindle)*	Oct. 1991	Alameda	1,600	2,900	25
2	Paint *(Arson)*	Sept. 1990	Santa Barbara	4,900	641	1
3	Fountain *(Arson)*	Aug. 1992	Shasta	63,960	636	0
4	Berkeley *(Powerlines)*	Sept. 1923	Alameda	130	584	0
5	Bel Air *(Undetermined)*	Nov. 1961	Los Angeles	6,090	484	0
6	Laguna *(Powerlines)*	Sept. 1970	San Diego	175,425	382	5
7	Laguna *(Arson)*	Oct. 1993	Orange	14,437	441	0
8	Panorama *(Arson)*	Nov. 1980	San Bernardino	23,600	325	4
9	Topanga *(Arson)*	Nov. 1993	Los Angeles	18,000	323	3
10	49ER *(Burning Debris)*	Sept. 1988	Nevada	33,700	312	0
11	Sycamore *(Kite)*	July 1977	Santa Barbara	805	234	0
12	Kannan *(Arson)*	Oct. 1978	Los Angeles	25,385	224	0
13	Old Gulch *(Equipment Use)*	Aug. 1992	Calaveras	17,386	170	0
14	Kinneloa *(Campfire)*	Oct. 1993	Los Angeles	5,485	196	1
15	Mt. Tamalpais *(Smoking)*	July 1929	Marin	2,500	117	0
16	**California *(Powerlines)***	**Oct. 1993**	**Riverside**	**25,100**	**107**	**0**
17	Harlow *(Arson)*	July 1961	Mariposa	41,200	106	2
18	Wright *(Burning Debris)*	Sept. 1970	Los Angeles	27,952	103	0
19	Hanly *(Smoking)*	Sept. 1964	Napa	52,770	102	0
20	Coyote *(Burning Debris)*	Sept. 1964	Santa Barbara	67,000	94	1

Source: California Department of Forestry and Fire Prevention (CDF)

Table 5.3.B - Disaster Declarations Impacting Riverside County

Date	Affected Counties	Damage Summary
Fall 1970	Declared: City of Oakland (Alameda County 9/24/70), Los Angeles, Ventura, San Diego (9/28/70), Kern (10/1/70), San Bernardino (10/2/70), Monterey, ***Riverside (10/20/70)***, San Bernardino (11/14/70)	Damage: public-$52,862,000; watershed-$24,826,000; private-$145,923,000 TOTAL-$223,611,000; 576,508 acres, 19 deaths, 722 buildings.
December 1970	Declared: ***Riverside (12/22/70)***	Damage $3.2 million
November 1980	Declared: San Bernardino (11/25/80), Los Angeles, Orange, ***Riverside (11/18/80)***	Damage: public-$13,982,700; private-$50,812,500; TOTAL-$64,795,200. San Bernardino—65 buildings, 5482 acres destroyed, Additionally, 355 buildings, 41,472 acres destroyed.
August 1987	Declared: Colusa, Del Norte (9/10/87), Butte, Fresno, Humboldt, Inyo, Kern, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Placer, Plumas, ***Riverside***, San Bernardino, Shasta, Sierra, Siskiyou, Trinity, Tulare, Tuolumne (9/3/87)	Damage: $18 million (estimated); 1,070 fires. 534,661 acres burned, 835 sq. miles, 3 deaths (firefighters), 76 injuries (firefighters) 38 homes destroyed
June 1990	Declared: Los Angeles, Santa Barbara (6/28/90), ***Riverside***, San Bernardino (6/29/90)	Damage: $300 million+; 3 deaths (1 civilian, 2 firefighters), 89 injuries (46 civilians, 43 firefighters) 22,500 blackened acres, 492 homes destroyed, 28 apartments destroyed, 15 businesses and 10 public buildings destroyed, plus 30 additional structures.
October 1993	Declared: Los Angeles, Ventura (10/27/93), San Diego, Orange (10/27/93), ***Riverside (10/27/93)***, San Bernardino (10/28/93)	Damage: total property estimate-$1 billion; 4 deaths, 162 injuries, 1078 destroyed structures, 193,814 acres destroyed. Fires: arson (12), power lines (6), campfires (2)

Source: California Governor’s Office of Emergency Services

5.3.2 Fire Safety Regulations

Public Resources Code (PRC) Section 4290 requires minimum statewide fire safety standards pertaining to:

- Road standards for fire equipment access;
- Standards for signs identifying streets, roads, and buildings;
- Minimum private water supply reserves for emergency fire use; and
- Fuel breaks and greenbelts.

With certain exceptions, all new construction after July 1, 1991, in potential wildland fire areas has been required to meet the statewide standards. The State requirements, however, do not supersede more restrictive local regulations.

As defined by the CDF, wildland areas may contain substantial forest fire risks and hazards. These areas are also called State Responsibility Areas (SRAs). They consist of lands exclusive of cities, and federal lands regardless of ownership. The primary financial responsibility for preventing and suppressing fires belongs to the State. However, it is not the State's responsibility to provide fire protection services to any building or structure located within the wildlands unless the CDF has entered into a cooperative agreement with a local agency for those purposes pursuant to PRC, Section 4142. Wildland areas require disclosure for real estate transactions, and owners of properties in wildland areas are subject to the maintenance requirements of PRC, Section 4291.

Every fifth year beginning July 1, 1991, the CDF must provide maps identifying the boundaries of lands classified as SRAs to the Riverside County assessor. The CDF is also required to notify Riverside County of any changes to SRAs within the County resulting from periodic boundary modifications approved by the CDF.

Government Code Section 51178 specifies that the Director of the CDF, in cooperation with local fire authorities, shall identify areas that are Very High Fire Hazard Severity Zones (VHFHSZ) in Local Responsibility Areas (LRAs), based on consistent statewide criteria and the expected severity of fire hazard. This requirement is based on the Bates Bill (Assembly Bill 337, adopted September 29, 1992) that was initiated following the 1991 Oakland Hills "Tunnel" fire (Table 5.3.A). VHFHSZ consider fuel loading, slope, fire weather, and other relevant factors. Under Assembly Bill 3819, passed in 1994 (AB 3819 – Willie Brown), "Class A" roofing, minimum clearances of 30 feet around structures, and other fire defense improvements are required for these zones.

Per Government Code Section 51178, a local agency may, at its discretion, exclude from the requirements of Section 51182 an area within its jurisdiction that has been identified as a VHFHSZ, if it provides substantial evidence in the record that the requirements of Section 51182 are not necessary for effective fire protection within the area. Alternatively, local agencies like Riverside County may include areas not identified as VHFHSZ by the CDF, following a finding supported by substantial evidence in the record that the requirements of Section 51182 are necessary for effective fire protection within the new area. According to Section 51182, such changes made by a local agency shall be final and shall not be rebuttable by the CDF.

During adoption of the 1997 Uniform Fire Code (UFC), the County of Riverside Board of Supervisors (1999) found that additional requirements and standards of fire hazard reduction were needed to properly protect the health, safety, and welfare of the existing and future residents and workers of Riverside County. They based these finding on:

- ***Climate:*** Generally, Riverside County is arid. Annual rainfall varies from three inches in Blythe to over thirty inches in Pine Cove. Hot, dry Santa Ana winds are common and necessitate increased fire protection. Added protection includes, but is not limited to, on-site protection such as sprinklers. On-site protection supplements normal Fire Department response, and provides immediate fire protection for life and safety of multiple-occupancy structures.

- ***Geography and Topography:*** Riverside County includes deserts, mountains, brush-covered wildlands, and agricultural lands. Elevations range from three hundred feet below sea level (Salton Sea) to ten thousand feet above it. In areas of habitable land, slopes range from flat to 25 percent (Slope measures variation from the horizontal. A flat terrain is 0 percent and a vertical cliff is a 100 percent slope). Traffic and congestion in urban areas, and great travel distances in rural and wildland areas, often hinder Fire Department response time. Thus, enhanced on-site protection for property occupants is necessary.

- ***Geology and Societal Realities:*** Several major earthquake faults bisect the County, including the San Andreas, the San Jacinto, and the Elsinore. Numerous minor active faults add to the hazard. There are many areas within Riverside County at risk from landslides, wind erosion, blowing sand, flooding, and wildfires. Most of these disasters can also be triggered by earthquakes. Placement of multiple-occupancy buildings, location of arterial roads, and State revenue limits all complicate fire department efforts. Locations of fire stations and numbers of staff may be insufficient to control fires in multiple locations simultaneously. Thus, enhanced on-site, built-in protection is necessary.

5.3.2.1 Real Estate Disclosure and Maintenance Requirements

Assembly Bill 6 (AB6) requires disclosure in real estate transactions for two types of fire hazard areas.

- Wildland Areas that may contain substantial forest fire risks and hazards (Wildland Areas)

- Very High Fire Hazard Severity Zones (VHFHSZ)

Thus, AB6 fire maps are prepared by the CDF.

Civil Code Section 1103(c)(6) requires real estate sellers to inform prospective buyers whether or not a property is located within a Wildland Fire Area that could contain substantial fire risks and hazards. The latest update to these requirements occurred in 1999 with the passage of Assembly Bill 248 (Torlakson). This disclosure has actually been required for Wildland Fire Areas since 1990, pursuant to PRC, Section 4136. The State Board of Forestry identifies those lands where the CDF has the primary duty for wildland fire prevention and suppression. Many people know these lands as SRA lands. The CDF sends maps to the affected counties, and county officials must post notices at the offices of the county recorder, the county assessor, and the county planning agency that explain where the CDF maps are available.

Current Real Estate disclosure requirements ask two “yes” or “no” questions concerning fire hazards, which are formatted as follows:

THIS REAL PROPERTY LIES WITHIN THE FOLLOWING HAZARDOUS AREA(S):

- A VERY HIGH FIRE HAZARD SEVERITY ZONE.
- A WILDLAND AREA THAT MAY CONTAIN SUBSTANTIAL FOREST FIRE RISKS AND HAZARDS.

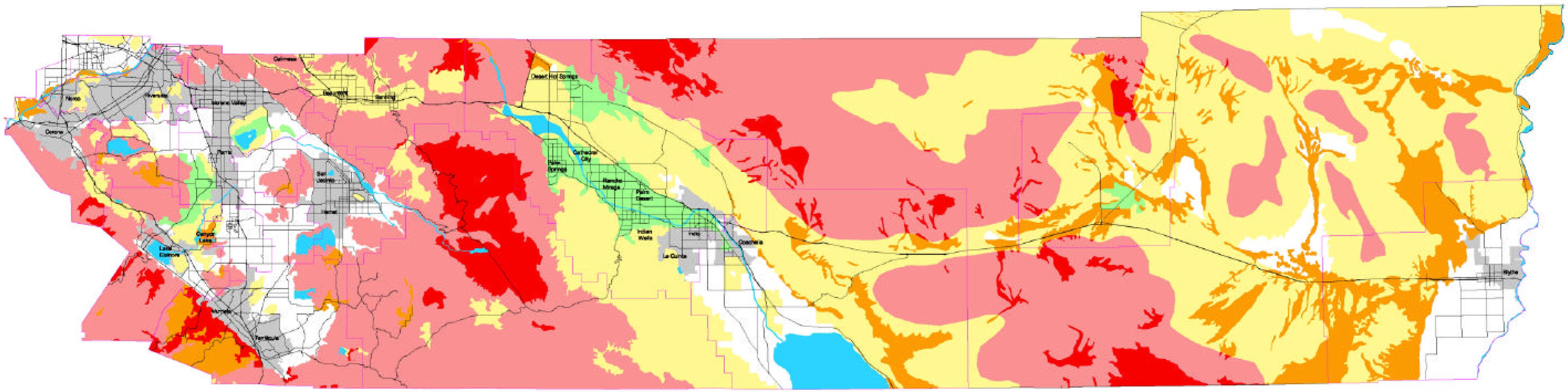
The wildfires susceptibility map (Figure 5.3.1) shows natural hazards in Riverside County. The hillside terrain of the County of Riverside is predominantly mapped as having a substantial fire risk. Therefore, much of the County of Riverside is subject to PRC, Section 4291-4299, which requires property owners in these areas to conduct maintenance to reduce the fire danger. PRC, Section 4291-4299 affects any person who owns, leases, controls, operates, or maintains any building or structure in, upon, or adjoining any mountainous area or forest-covered lands, brush-covered lands, or grass-covered lands, or any land covered with flammable material. That person shall at all times do all of the following:

- Maintain around and adjacent to such building or structure a firebreak made by removing and clearing away, for a distance of not less than 30 feet on each side thereof or to the property line, whichever is nearer, all flammable vegetation or other combustible growth. This subdivision does not apply to single specimens of trees, ornamental shrubbery, or similar plants, which are used as ground cover, if they do not form a means of rapidly transmitting fire from the native growth to any building or structure.

- Maintain around and adjacent to any such building or structure additional fire protection or firebreak made by removing all brush, flammable vegetation, or combustible growth which is located from 30 feet to 100 feet from such building or structure or to the property line, whichever is nearer. Grass and other vegetation located more than 30 feet from such building or structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion.

- Remove that portion of any tree, which extends within 10 feet of the outlet of any chimney or stovepipe.

- Maintain any tree adjacent to or overhanging any building free of dead or dying wood.



Wildfire Zones

- Very High
- High
- Moderate
- Low
- Very Low
- None

- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure5.3.1

Source:EarthConsultantsInternational.

WILDFIRE SUSCEPTIBILITY

Scaleisapproximate

0 6 12Miles

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- Maintain the roof of any structure free of leaves, needles, or other dead vegetative growth.

- Provide and maintain at all times a screen over the outlet of every chimney or stovepipe that is attached to any fireplace, stove, or other device that burns any solid or liquid fuel. The screen shall be constructed of nonflammable material with openings of not more than one-half inch in size.

- A person is not required under this section to maintain any clearing on any land if that person does not have the legal right to maintain the clearing, nor is any person required to enter upon or to damage property that is owned by any other person without the consent of the owner of the property.

5.3.3 HUD Study System

As a result of concerns about fire hazards in California, in April of 1973, the CDF published a study funded by the Department of Housing and Urban Development (HUD) under agreement with the Governor's Office of Planning and Research. It was developed in response to the September and October 1970 wildfires, which burned more than 580,000 acres in 773 fires. The HUD study uses fuel loading, fire weather, and slope as rating factors.

Fuel loading includes three classes of vegetation based on U.S. Geological Survey (USGS) life forms. These types can easily be determined from USGS maps, and thus a fairly accurate determination of fuels can be made without undertaking a major vegetation mapping project. The vegetative types are considered accurate to the nearest acre.

Light fuels include flammable grass and annual herbs. *Medium* fuels include brush and other perennial shrubs less than 6 feet tall and with a crown density of 20 percent or more. *Heavy* fuels include the heavier brush species, woodland types, and timber types over six feet tall with a crown density of 20 percent or more. HUD weights fuel loading in these vegetative types as follows:

- *Light* (grass): average of 2.22 tons/acre; *Fuel Severity Factor* = 1
- *Medium* (scrub): average of 17.33 tons/acre; *Fuel Severity Factor* = 8
- *Heavy* (woods, brushwood): average of 36.96 tons/acre; *Fuel Severity Factor* =16.

Fire Weather Severity is based on the California Wildland Fire Danger Rating System (CWFDRS). There are three classes of severity distinguished by the annual average frequency of critical fire weather days. To determine this, from June through December, fire weather ratings were analyzed in the State's three Fire Danger Rating Areas over a 10-year period. In the *Low* class (Class I) are Fire Danger Rating Areas that experience fire weather in the "very high" or "extreme" ranges an annual average of less than one day. In the *High* class (Class II) is an annual average of 1 to 9.5 days, and the *Extreme* class (Class III) has an annual average of more than 9.5 days. The fire weather severity weights are defined as follows:

- *Low*, Class I (<1 day per year); *Fire Weather Severity Factor* = 1
- *High*, Class II (1-9.5 days per year); *Fire Weather Severity Factor* = 2
- *Extreme*, Class III (>9.5 days per year); *Fire Weather Severity Factor* = 8.

To test the predictive powers of these ratings, analyses were made at 354 stations throughout California, in all 151 Fire Danger Rating Areas for the time period 1959-1969. During this time, there were 678 fires of 300 acres or more, and 75 percent of these occurred in Class III areas. For the 109 fires that burned at least 5,000 acres, 79 percent occurred in the same areas. HUD listed Fire Weather Severity for each of the USGS Quadrangle maps for California.

Slope: Like Fire Weather Severity, slope classes are taken from the CWFDRS. Each class covers a range of slopes: 0-40 percent, 41-60 percent, and over 60 percent. Because an increase in slope produces an increase in the rate of fire spread, slope often determines how a wildland fire is fought. The slope class weights are assigned as follows:

- *Class I* (>40%); *Slope Severity Factor* = 1.0
- *Class II* (41-60%); *Slope Severity Factor* = 1.6
- *Class III* (>60%); *Slope Severity Factor* = 2.0.

Once the severity factors are assigned to the fuel loading, fire weather, and slope classes the values are multiplied together to determine a numerical rating, the Fire Hazard Severity Scale. The fire severity hazard defined by the HUD Study System is as follows:

- Moderate Hazard, 1 - 12.8 Points
- High Hazard, 16 - 32 Points
- Extreme Hazard 51 - 256 Points.

Numerical gaps between categories exist because multiplying the factors does not produce all numbers. The slope can be either mechanically calculated or automatically calculated with a software program containing the USGS Quadrangle data (e.g. TopoScout©).

5.3.3.1 Bates Bill Process

The Bates Bill Process determines Very High Fire Hazard Severity Zones (VHFHSZs) in Local Responsibility Areas (LRAs). Assembly Bill 337 (the Bates Bill) was a direct result of the great loss of lives and homes in the Oakland Hills Tunnel Fire of 1991. It gave the CDF the responsibility to map VHFHSZs. The CDF formed a working group, comprised of State and local representatives. They devised a weighting system that considered fuel, slope, weather, and dwelling density. The raters were usually one local representative and one CDF or County representative. They could reduce the score by one point for certain mitigation measures, and increase the score one point for certain factors known to contribute to fire spread. Scores can range from 1-16 points. To qualify as a VHFHSZ, an area had to score 10 or more points. The recommended system was given extensive field tests by different members of the working group before implementation.

5.3.3.1.1 Classification Points for Basic Factors

A. Fuel: A Fuel Hazard Rating is assigned based on the predominant fuel type.

- Small, light fuels (Grass, Weeds, Shrubs) +1
- Medium fuels (Brush, Large Shrubs, Small Trees) +2
- Heavy fuels (Timber, Woodland, Large Brush, Heavy Planting of Ornamentals) +3

***B. Topography—Slope*:** A Slope Hazard Rating is chosen to best represent the predominant slope range.

- Flat to Mild Slope (0-9.9%) +1
- Mild to Medium Slope (10-19.9%) +2
- Medium to Moderate Slope (20-39.9%) +3
- Moderate to Extreme Slope (40% +) +4

C. Dwelling Density: Local ordinances regarding dwelling density must be checked before setting this factor.

- Low (less than one structure per 10 acres) +1
- Medium (one structure per 5 to 10 acres) +2
- High (one structure per 0 to 5 acres) +3

D. Weather: This information is obtained for each county by using the Burning Index (BI). Weather is a major part of the BI system, BI data come from weather stations throughout the state.

- Moderate +1
- High +2
- Very High +3

For these basic factors, points can range from 4 to 13 points. Ten or more points are required to designate a VHFHSZ.

5.3.3.1.2 Additional Weighting Factors

***Downgrading Hazard*:** A local agency may use the mitigation measures outlined below to reduce a zone's rating:

- Infrastructure—meets or exceeds minimums of ISO 8, NFPA 1231, PUC 103, or PRC, Section 4290 -1.
- Ordinances in place regarding housing, roofing (Class A, B, or better roof), sprinklers, firesafe construction, or fuel modification -1.
- PRC, Section 4291 ordinance or better (Natural Resource Protection) -1.

Upgrading Hazard:

- Rough topography with steep canyons or draws that would impede responding personnel and equipment +1.
- Area with a history of relatively high fire occurrence, because of heavy lightning, railroad fires, debris burning, arson, etc +1.
- Area subject to severe fire weather (such as strong winds and lightning) or recurring seasonal weather patterns that can increase fire activity (such as the Santa Ana winds) +1.
- Heavy concentration of flammable ornamentals or vegetation introduced by humans +1.

5.3.4 Prefire Management

Over time, all California's wildlands *will* burn. There are conditions and behaviors that will increase the likelihood that fires will occur that will make them larger, more intense and more damaging, and thus more costly to fight and will take a higher toll. Not all of these factors can be controlled, but most can be anticipated.

Riverside County's complex patterns of land use and ownership require complex techniques to effectively manage the fire environment. Some options fall under the jurisdiction of State, federal and local governments. Others fall to private citizens or businesses. Most are joint responsibilities. Custom strategies can be created through combinations of prefire management, suppression, and postfire management, and many lessen the costly impacts of future wildfires.

The County has many firefighting allies. Numerous federal agencies have roles in fire hazard mitigation, response and recovery, including:

- Fish and Wildlife Service
- National Park Service
- U.S. Forest Service
- Bureau of Land Management
- Bureau of Indian Affairs
- Office of Aviation Services
- National Weather Service
- National Association of State Foresters.

5.3.4.1 Fire Prevention

Comprehensive programs to reduce fire risk and hazard consist of engineering, education, and law enforcement contributions. Of key importance is a planning process focused on ignition management and loss reduction. Tactics include biomass harvesting, fire-resistant landscaping, mechanical and chemical fuels treatments, building construction standards, infrastructure, and land use planning.

The single most important mitigation strategy for structures is fire-safe landscape, which creates a defensible space around structures.

5.3.4.2 Vegetation Management

Before extensive settlement began, vegetation in California's Mediterranean climate was dominated by a complex succession ecology of more, smaller and fewer wildfires. The active suppression of fire since then has produced these results:

- Increased losses to life, property, resources and ecology.
- Difficulty of fire suppression, increased safety problems for firefighters and reduced productivity by fire crews on perimeter lines.
- Longer periods between recurring fires in many vegetation types by a factor of 5 or more.
- Increased volumes of fuel per acre.
- Increased fire intensities.
- Increased taxpayer costs and asset losses.

Recognition of these problems has led to vegetation management programs.

Since 1981, prescribed fire has been the primary means of fuel management. Approximately 500,000 acres — an average of 30,000 acres a year — have been treated with prescribed fire under the vegetation management program throughout the State. However, a recent program review by the CDF has identified needed changes, with focus on citizen and firefighter safety, and the creation of wildfire safety and protection zones.

In the past, the typical vegetation management project targeted large wildland areas without assessing all of the values protected. Now, increasing population and development often preclude the use of large prescribed fires. The CDF proposes:

- A shift in emphasis to smaller projects closer to new developments, and to alternatives to fire, such as mechanical fuel treatment. In some instances, programs may be limited to providing wildland safety and protection zones around high value assets.

- Emphasis on quality over quantity of acres treated. Projects will be chosen to provide the most cost-effective means of protecting assets at risk from disastrous wildfires.

- The Board of Forestry and the State Air Resources Control Board will develop a joint policy on the use of prescribed fire. The policy will recognize the value of prescribed fire in reducing air emissions of wildfire during the high-impact summer period.

5.3.4.3 Greenness Mapping

Since the early 1990s, the EROS Data Center (EDC) in Sioux Falls, South Dakota, has produced weekly and biweekly maps for the 48 contiguous states and Alaska. These maps display plant growth and vigor, vegetation cover, and biomass production, using multispectral data from satellites of the National Oceanic and Atmospheric Administration (NOAA). EDC also produces maps that relate vegetation conditions for the current two-week period to average (normal) two-week conditions during the past seven years. EDC maps provide comprehensive growing season profiles for forests, rangelands and grasslands, and agricultural areas. With these maps, fire and land managers can assess the condition of all vegetation throughout the growing season, which improves planning for fire suppression, scheduling of prescribed burns, and study of long-term vegetation changes resulting from human or natural factors.

5.3.4.4 Fire Potential Index

The Fire Potential Index (FPI) is a valuable fire management tool that has been developed collaboratively by the U.S. Geological Survey and U.S. Forest Service. The FPI characterizes relative fire potential for forests, rangelands, and grasslands, regionally and locally. It combines multispectral satellite data from NOAA with GIS technology to generate 1-km resolution fire potential maps. Input data include the total amount of burnable plant material (fuel load) derived from vegetation maps, the water content of the dead vegetation, and the fraction of the total fuel load that is live vegetation. The proportion of living plants are derived from the greenness maps described above. Water content of dead vegetation is calculated from temperature, relative humidity, cloud cover, and precipitation. The FPI is updated daily to reflect changing weather conditions.

Fire management staffs in California use the FPI daily to supplement traditional information sources. They use these data to establish regional prevention priorities that will reduce the risk of wildland fire ignition and spread; and to improve the allocation of suppression forces, which can lead to quicker control of fires in areas of high concern.

5.3.4.5 Riverside Fire Laboratory

An excellent local resource is the Riverside Fire Laboratory (RFL) of the U.S. Forest Service. Located in the City of Riverside, the laboratory researches:

- Air Pollution and Climate Impacts on Western Forest Ecosystems
- Meteorology for Fire Severity Forecasting

- Wildland Recreation and Urban Cultures
- Prescribed Fire and Fire Effects
- Fire Management in the Wildland/Urban Interface

Good fire management planning requires fire weather predictions on time scales ranging from hours to months. Fire weather forecasts that extend beyond a few days are generally unavailable. However, research at the RFL aims to provide forecast tools for the medium-range (10-15 days), extended-range (30 days), and seasons (90 days). Because the accuracy of weather forecasts varies with season, location, and other factors, the RFL is exploring the addition of forecast reliability maps.

Monthly fire weather forecasts provide fire managers with a quick and easy planning tool. Although scientifically based, these long-range forecasts are inherently less accurate. Thus, the user must consider the impact of variable forecast accuracy. Also, average weather conditions may vary rapidly over short distances, as happens in complex terrain. The scale of these forecasts may be too coarse to capture such variations accurately.

The RFL is developing a computer model to help minimize risk to structures from wildland fires. Houses in areas of flammable wildland fuel are often not located, constructed, or maintained to minimize the risk posed by wildfires in surrounding vegetation. The model assesses the potential for structures to ignite from wildland fire. The model is based on site-specific characteristics, surrounding fuels, and the planned or existing structure. Information from this assessment will help guide developers and home owners in the construction, maintenance and protection of homes in wildlands.

The RFL is investigating methods to forecast management impacts. Fire and resource managers must make decisions based on the complex interaction of resource, environmental, social, political, economic, and fire behavior parameters. Technology, such as geographic information systems, expert systems, risk analysis, and modeling methods, makes it possible to improve the availability and test the usefulness of complex data. The RFL is investigating how population growth and changes in land use patterns will affect fire management. The objective is to improve future zoning, residential development, fuels management, and planning.

5.3.4.6 Prescribed Fire

Fire ecologists now recognize that fire is as vital to the health of a forest as water. They have suggested crown fires – the spectacular tree-consuming infernos that make headlines – should be intentionally set in wilderness areas to help restore a healthier patchwork of trees of different ages. Yet many find the notion of “prescribed fire” difficult to accept. For the last 100 years, humans have suppressed and battled fires. Unless fire is reintroduced to the landscape in measured doses with carefully crafted goals, more acres will someday burn in uncontrollable blazes, or die of disease.

A prescribed fire is deliberately set under controlled and monitored conditions. The purpose is to remove brush and other undergrowth that can fuel uncontrolled fires. Prescribed fire is used to alter, maintain or restore vegetative communities, achieve desired resource conditions, and to protect life, property, and values that would be degraded by wildland fire.

Prescribed fire carries its own risk. The Bureau of Land Management (2000) recommends the following guidelines for prescribed burn projects:

- The safety of firefighters and the public is the number one priority when planning and implementing a prescribed fire project.

- All prescribed fire projects should have an approved prescribed fire plan prior to ignition.

- All prescribed fire plans should contain measurable objectives, a predetermined prescription, and an escaped fire contingency plan to be implemented in the event of an escape.
- All prescribed fire projects should be conducted in compliance with federal and State regulations.

5.3.4.7 Hazardous Fire Area Designation

Based on drought and other conditions, it may become necessary to close an area to the public due to extreme fire hazard potential. Riverside County (1999) outlines the procedures for "Hazardous Fire Area Designation" as follows:

> The chief is given the authority to officially determine and publicly announce the closure of any hazardous fire area or portion thereof. However, any closure by the chief for a period of more than 15 days must be approved by the Board of Supervisors within 15 days of the chief's original order of closure. No person is permitted in any hazardous fire area, except on public roadways and inhabited areas, during such time as the area is closed to entry. This shall not prohibit residents or owners of private property within any closed area, or their invitees, from going in or being upon their lands. This does not apply to any entry, in the course of duty by a peace officer or any other duly authorized public officer, members of any fire department, or member of the CDF, nor does it apply to National Forest Land in any respect. During periods of closure, the chief shall erect and maintain at all entrances to the closed areas sufficient signs giving adequate notice of closure.

5.3.4.8 Hazard Abatement Notices

Each spring, the CDF and Riverside County Fire Department (RCoFD) distribute hazard abatement notices. These notices, which currently go to about 30,000 County residents, request that property owners reduce the fuels around their property. Requirements for hazard reduction around improved parcels (those with structures) are set forth in Riverside County Ordinance No. 787, and PRC, Section 4291. A minimum 30-foot clearance is required around all structures, which can be extended to 100 feet in areas where severe fire hazards exist. On unimproved parcels as set forth in Riverside County Ordinance No. 695, the property owner is required to disc or mow 100 feet along the perimeter of the property.

5.3.4.9 Fire Flow

Riverside County uses the UFC, Division III, Appendix III-A for establishing fire flow, duration and pressure requirements for fire flow. The requirements are a function of building size, type, material, purpose, location, proximity to other structures, and the type of fire suppression systems installed. The various water districts in the County are required to test fire protection capability for the various land uses per the flow requirements of the UFC (Table 5.3.C).

Table 5.3.C - Uniform Fire Code Minimum Fire Protection Flows

Land Use	Flow (gallons per minute)	Duration (hours)	Fire Suppression Storage (million gallons)	Residual Pressure (psi)
Residential Single-Family	2,000	4	0.48	20
Residential-Estate, Single Family Frontier	2,500	4	0.60	30
Residential Multiple-Family	3,000	4	0.72	20
Commercial/Industrial	4,000	4	0.96	20
Schools	3,500	4	0.84	20

Emergency Storage is required in the event of an interruption of the Metropolitan Water District (MWD) primary supply. MWD recommends a seven-day emergency storage supply.

5.3.4.10 Model Fire Hazard Reduction Ordinance

To assist local jurisdictions in adopting ordinances to reduce fire hazards, the State Fire Marshal, Fire Engineering Division has developed a model ordinance checklist. This development was required by Assembly Bill 3819, on September 27, 1994. The model ordinance checklist addresses the following standards:

- Road Standards for Fire Equipment Access (Table 5.3.D)
- Structural Standards (Table 5.3.E)
- Fuel Modification Standards (Table 5.3.F).

Table 5.3.D - Road Standards for Fire Equipment Access

Width	Two 9' lanes
Surface	40,000 lb. Load
Grades	Not to exceed 16%
Horizontal Inside Radius	No less than 50'
Vertical Curves	100'
Turnarounds	Required, 40' from center
Hammerhead/"T"	Top of "T" 60' long
Turnouts	10' x 30' 25' taper each end
Roadway Structures (Bridges)	Load and clearance per Vehicle Code Sections 35550, 35750, 35250
Bridge Signage	Load, clearance, one-way, single lane
One-way Roads	One 10' lane Must connect to 2 lanes at each end Serve no more than 10 dwellings Not to exceed 2640' Turnout at midpoint
Dead-end Roads	Not to exceed:
<1 acre parcels	800'
1-4.99 acre parcels	1320'
5-19.99 acre parcels	2640' with turnaround at 1320' interval
20+ acre parcels	5280' with turnaround at 1320' intervals
Driveways	10' wide, 15' vertical clearance
If >150' but <800'	Turnout at midpoint
If >800'	Every 400'
If >300'	Turnaround w/in 50' of all building sites
Gate Entrances	2' wider than lane 30' from roadway

Developed by the Office of the State Fire Marshal, Fire Engineering Division

Table 5.3.E - Structural Standards

Eaves	1 hour fire rated Fascias required, must be backed by 1 hour or 2" lumber
Roofs	Class B or better
Underfloor Areas	Enclosed to ground

Exception	If exposed materials are 1 hour rated
Unenclosed Accessory Structures	Non-combustible or 1 hour rated
Exception (If 100' defensible space)	patio roofs > 2"x4" or open lattice > 2"x2" is OK
Underfloor Areas (Attached Structure)	If over a descending slope, enclose within 6" of ground
Windows	Tempered or multi-layered glass
Doors	Non-combustible or solid core > 1-3/4"
Attic Openings	Not to exceed 144 square inches
	Noncombustible corrosion-resistant mesh < 1/4" holes
	Not to be in soffits, eave overhangs, etc.
	Gable/dormer vents 10' from property line
Walls	Any habitable space must be 1 hour rated
Underfloor Areas (Detached Structure)	If over a descending slope, enclose within 6" of ground

Table 5.3.F - Model Ordinance Checklist, Fuel Modification Standards

Clearance (Structure)	30' on each side or to property line
Additional Clearance	30'-100' when needed
Trees	10' from chimney
Dead or Dying Wood	Remove if overhangs structure
Accumulated Vegetation	Clear roof
Chimney and Stovepipe	Screen <½" holes
Setback If >1 acre	30'
If <1 acre	Same practical effect
Disposal	Prior to acceptance
Greenbelts	Locate strategically - must be approved

Developed by the Office of the State Fire Marshal, Fire Engineering Division

5.3.5 Earthquake-Induced Fires

Fires following earthquakes can cause severe losses. These losses can sometimes outweigh the total losses from direct damage (such as collapse of buildings).

Many factors affect the severity of fires following an earthquake, including ignition sources, types and density of fuel, weather conditions, functionality of water systems, and the ability of firefighters to suppress the fires. Casualties, debris and poor access can all limit firefighting effectiveness. Water availability in Riverside County following a major earthquake would likely be curtailed due to breaks in waterlines across faults, in liquefiable regions, and in areas susceptible to landslides. In addition, above-ground reservoirs are vulnerable and damage to them would also affect fire flow.

Earthquake-induced fires make extraordinary demands on fire suppression resources because of multiple ignitions. The principal causes of earthquake-related fires are open flames, electrical malfunctions, gas leaks, and chemical spills. Downed power lines may ignite fires in the unlikely event the lines do not automatically de-energize. Unanchored gas heaters and water heaters are common problems, as these readily tip over during strong ground shaking. State law now requires new and replaced gas-fired water heaters to be immobilized.

The California Division of Mines and Geology Newport-Inglewood Earthquake Scenario (Toppozada and others, 1988) indicates that fire units should prepare for thousands of damaged and leaking mains, valves, and service connections, including broken pipelines. These will occur along, and adjacent to, fault ruptures. The Southern California Gas Company has prepared by replacing distribution supply pipelines with resistant (flexible) plastic polyethylene pipe, and has an overall ability to isolate and shut off sections of supply lines when breaks are serious.

5.3.5.1 Natural Gas Fires -- Northridge Earthquake

The moderately-sized, M_W 6.7 Northridge earthquake of 1994 caused 15,021 natural gas leaks. In the aftermath of the earthquake, 122,886 meters were closed by customers or emergency personnel. The majority of the leaks were small and could be repaired at the time of service restoration. The Southern California Gas Company (1994) reported 35 breaks in its natural gas transmission lines and 717 breaks in distribution lines. About 74 percent of its 752 leaks were corrosion-related.

Natural gas leaks in the Southern California Gas Company service area resulted in three street fires, 51 structure fires (23 of these caused total ruin), and the destruction by fire of 172 mobile homes. In one incident, the earthquake severed a 22-inch transmission line and a motorist ignited the gas while attempting to restart his stalled vehicle. Response to this fire was impeded by the earthquake's rupture of a water main. Five nearby homes were destroyed. Elsewhere, one mobile home fire started when a ruptured transmission line was ignited by a downed power line. In many of the destroyed mobile homes, fires erupted when inadequate bracing let them fall from foundations, severing gas lines and igniting fires. There was a much greater incidence of mobile home fires (49.1 per thousand) than other structure fires (1.1 per thousand). Earthquake-induced fires greatly threaten Riverside County, in part due to the County's large number of mobile homes.

5.3.5.2 Earthquake-Induced Fire Scenarios for the Riverside County Area using HAZUS™

HAZUS™, a standardized methodology for earthquake loss estimation based on a geographic information system (GIS), is a project of the National Institute of Building

Sciences, funded by the Federal Emergency Management Agency (FEMA). HAZUS™, and the earthquake threat to Riverside County, are discussed at length in Section 5.1 – Geotechnical Hazards. This section reports on earthquake-induced fire loss estimation made with HAZUS™.

Loss estimation is an invaluable tool, but must be used with discretion. Loss estimation results are best taken as broad indications of a disaster's severity. For example, a fire station with 60 percent functionality has clearly fared better than one at 30 percent functionality, but that 30 percent is probably equivalent to one at 20 percent.

Loss estimation is a new methodology. Current data, and thus understanding of fires following earthquakes, are limited. Furthermore, a fully accurate, fire-following-earthquake evaluation requires extensive knowledge of the level of readiness of local fire departments, as well as the types and availability (functionality) of water systems. For all these reasons, there will undoubtedly be future improvements in forecasting ability.

Based upon current data and best judgment, it is estimated that about 70 percent of all earthquake-induced fire ignitions occur immediately, as the fire is discovered within a few minutes of the earthquake. The remaining ignitions occur about an hour to a day after the earthquake. A typical cause of later ignitions is the restoration of electric power. When power is restored, short circuits caused by the earthquake become energized and can start fires. Also, items which have overturned, fallen onto stove tops, etc., can ignite. If no one is present at the time electric power is restored, ignitions can grow to fires requiring fire department response.

HAZUS™ loss estimations were made using two scenario earthquakes, listed in Table 5.3.G and described in Section 5.3. Two wind velocities were used for each scenario earthquake. A velocity of 30 miles per hour (mph) was assigned to evaluate fire spread as a result of Santa Ana winds. A value of 10 mph was used to model normal wind conditions.

Table 5.3.G - Scenario Earthquakes for Riverside County

Event	Location	Size	Description
Maximum Credible Earthquake (MCE)	San Andreas fault	M_W 7.9	Based on a rupture of the entire segment between Cajon Pass and the Salton Sea (probably the worst-case scenario for Riverside County, see Section 5.2)
Maximum Probable Earthquake (MPE)	San Jacinto fault, San Jacinto Valley segment	M_W 6.9	Rated most likely fault segment in Southern California to produce a large earthquake (44 percent probability in 30 years, see Section 5.2)

An estimate of Countywide fire station functionality is included in Table 5.3.H. Estimates for the functionality at each station in the HAZUS™ database are presented in Table 5.3.I. Here, functionality is based entirely on building damage due to estimated peak ground accelerations at each station. Note that the HAZUS™ loss estimation does not consider effects of reduced water pressure due to breaks in the water distribution system. These are expected to be widespread where ground failure occurs, such as due to fault rupture or liquefaction, and could further reduce functionality at some stations.

While the fire station database requires updating, the functionality estimates provide credible guidelines for response planning and exercises.

5.3.6 Postfire Effects

Wildfires leave problems behind. An intense wildfire may destroy all vegetation; also, the organic material in the soil may be burned away or decompose into water-repellent substances that prevent water from percolating into the soil. As a result, even normal rainfall can cause exceptional erosion or flooding from a burned area. Heavy rain can produce destructive debris flows.

Table 5.3.H - Earthquake Induced Fire Losses in Riverside County
HAZUS™ Scenario Earthquakes

Event	No. of Ignitions	Population Exposed *(Wind Velocity of 10 mph)*	Population Exposed *(Wind Velocity of 30 mph, Santa*	Value Exposed *(Wind Velocity 10 mph)*	Value Exposed *(Wind Velocity 30 mph, Santa Ana Conditions)*	Fire Station Functionality*
Mw 7.9 San Andreas Earthquake	74	832	3,663	$50,713,000	$209,658,000	25%
Mw 6.9 San Jacinto Earthquake	43	358	2,225	$18,640,000	$116,238,000	44%

*estimate of Countywide fire station functionality at 24 hours after earthquake

Table 5.3.I - Estimated Functionality (in percent) of County Fire Response Facilities Based on Scenario Earthquakes at One Day After Event

NAME/LOCATION	San Jacinto M_w 6.9	San Andreas M_w 7.9
Anza Volunteer Fire & Rescue, 56520 Hwy 371	36	30
Banning Fire Dept Alternate, 172 N Murray Street	30	7
Banning Fire Dept Business, 3900 W Wilson Street	27	8
Beaumont Fire Dept Business Office, 628 Maple Avenue	20	9
Blythe Fire Dept, 201 N Commercial Street	100	72
Blythe Fire Dept Business Call, 201 Commercial Street	100	70
California Office of Emergency, 2524 Mulberry Street	18	15
Corona Fire Dept Business	63	39
Desert Hot Springs Fire Dept B, 65958 Pierson Boulevard	77	6
Fire Dept, Blythe	100	70
Fire Sprinkler Service Co, Riverside	19	15
Hemet Fire Dept, 220 N Carmalita Street	10	22
Hemet Fire Dept, 220 N Juanita Street	10	22
Highgrove Volunteer Fire Dept, 910 W Center	19	15
Home Gardens Fire Station, 1148 E 6th Street, Corona	58	36
Idyllwild Fire Dept, 54160 Maranatha Drive	87	68
Indian Wells Fire Dept Bus Cal, 44950 El Dorado Drive	84	7
Indio Fire Dept Fire Station N, 43715 Jackson Street	91	6
Indio Fire Dept Fire Station N, 46621 Madison Avenue	90	6
La Quinta Fire Dept Business C, Avenue 52	87	9
La Quinta Fire Dept Business C, Pga West	88	9
Lake Tamarisk , 43880 Lake Tam. Drive, Desert Center	99	26
Morongo Fire Dept, 11581 Potrero Road, Banning	40	6
Norco Fire Dept Business And I, 3367 Corydon Avenue	57	34
Palm Desert Fire Dept, 44400 Town Center Way	80	8
Pine Cove Fire Dept, 24419 Hwy 243, Idyllwild	31	14
Riverside Fire Dept Emergency, Perris	45	33
Riverside Fire, 20320 Temescal Canyon Road, Corona	62	43
Riverside Fire, Cajalco Fi, 17650 Cajalco Road, Perris	33	26
Riverside Fire, Edgemont, 22055 Cottonwood Avenue, Moreno Valley	18	17
Riverside Fire, 4080 Lemon Street, Riverside	21	17

NAME/LOCATION	San Jacinto M_w 6.9	San Andreas M_w 7.9
Riverside Fire Dept Emergency, 3601-9th, Riverside	21	16
Riverside Fire, 132 S San Jacinto Avenue, San Jacinto	8	18
Riverside Fire, 24220 Juniper Flats Road, Homeland	19	25
Riverside Fire Dept, 24919 Marion Ridge Drive, Idyllwild	31	14
Riverside Fire Dept, 25175 Fairview Avenue, Hemet	15	27
Riverside Fire, 25730 Sultanas Road, Homeland	25	29
Riverside Fire Dept Fire Stations, 25954 Stanford, Hemet	15	27
Riverside Fire, 36850 Stetson Avenue, Hemet	15	26
Riverside Fire Dept Fire Stations, 37381 Sage Road, Hemet	27	38
Riverside Fire, 44422 Sage Road, Aguanga	47	50
Riverside Fire Dept Fire Stations, 56560 Hwy 371, Anza	36	30
Riverside Fire Dept Fire Stations, 59200 Morris Ranch Road, Mountain Center	51	17
Riverside Fire Dept Glen Avon, 10400 San Sevaine Way, Mira Loma	43	24
Riverside Fire Dept Lake Hills, 17452 Lake Pointe Drive	47	30
Riverside Fire, 9270 Limonite Avenue, Mira Loma	41	25
Riverside Fire Dept Perris Headquarters, 210 W San Jacinto	31	28
Riverside Fire, Rubidoux F, 3590 Rubidoux Boulevard	24	17
Riverside Fire, 23770 Sunnymead, Moreno Valley	14	15
Riverside Fire West River, 7545 Mission Boulevard	29	19
Riverside Fire Woodcrest, 17800 Van Buren Boulevard	31	23
San Jacinto Fire Dept Business, 160 W 6th Street	8	19

In 1997, wildfires charred many areas of Southern California, leaving them bare before the next winter's heavy El Niño rainfall. Of the 25 large Southern California wildfires, 10 produced debris flows after the first major winter storm, and flooding plagued 8 other areas. Only four burn areas showed little erosion or runoff. This study has compiled digital databases to depict the relative importance of topography, vegetation conditions, and geologic engineering properties. These can be used to help mitigate postfire debris flow hazards.

Fires can also hurt watersheds of Riverside County. The loss of ground-surface cover and the chemical transformation of burned soils make watersheds more susceptible to erosion from rainstorms. Erosion, in turn, impairs water quality.

5.3.7 Fire Response Resources

Any discussion of fire hazard reduction hinges on the County's efforts to prevent fires and to suppress them once they have started. Firefighting readiness can be partially gauged by the following:

- ***Minimum Safety Standards for Peak Load Water Supply, Road Width, and Turning Radius:*** These function as safeguards to ensure public safety and prevent unsafe development. Peak load water supply standards ensure sufficient water flow is available to fight fires. Peak water flow requirements are based on building type, design, and use.

- ***Planning:*** The National Board of Fire Underwriters recommends a three-day emergency supply of water, while the Metropolitan Water District of Southern California recommends a seven-day emergency water supply.

- ***Fire and Building Code Enforcement:*** The County of Riverside presently administers the 1997 UFC and Uniform Building Code (UBC); updated versions are adopted every three years. Some relevant fire safety code standards and programs include:
  - Section 8109.2 requires that buildings or structures more than three stories or 30 feet in height, or more than 15,000 square feet, shall be provided with an approved fully automatic sprinkler system. In addition, buildings or structures of more than 5,000 square feet to be used primarily for public assembly shall be provided with a fully automatic sprinkler system. Installation of sprinkler systems is also required in existing buildings where emergency access for fire apparatus or equipment is restricted. These requirements apply to existing as well as future developments.

  - New construction restrictions for Class B roofing materials. As defined in the UBC, Class B roofs are pressure-treated, wood-shake shingles. They are not as resistant to fire as Class A roofs, which include generally non-flammable products.

5.3.7.1 California Department of Forestry

The State agency with the greatest number of resources for firefighting capabilities is the CDF. CDF is primarily a wildland fire protection agency with the legal responsibility for protection of approximately 33 million acres of private and State lands in California. The Riverside Ranger Unit of CDF (with headquarters in Perris) provides direct protection for 1,070,000 acres of "wildland." These vegetation-covered, watershed lands are designated by the State Board of Forestry as SRAs. This is generally private land, outside of the cities and federal land where protection is at maximum strength during the declared "fire season."

The CDF has extensive ground forces, including volunteer firefighters from the prisoner population, and an air force that includes: 15 Grumman S-2A 800-gallon airtankers, four S-2T 1200-gallon airtankers, two 2,000-gallon contract airtankers, 11 Super Huey Bell UH-1H helicopters, six O-2A air attack aircraft, 11 OV-10A air attack aircraft, and one C-26B fire mapping airplane. From 13 air attack and nine helitack bases located statewide, aircraft can reach any California fire within 20 minutes. The air attack planes fly overhead directing the airtankers and helicopters to critical areas of the fire for retardant and water drops. The retardant used to suppress fires is Di-Ammonium Phosphate + Iron Oxide, which acts as a fertilizer as well as suppressant.

5.3.7.2 Riverside County Fire Department

The County of Riverside contracts with the State of California for fire protection. PRC, Section 4142 affords legal authority for the CDF to enter into agreements with local government entities to provide fire protection services with the approval of the Department of General Services. By virtue of this authority, CDF administers the RCoFD.

The RCoFD provides fire suppression, emergency medical, rescue, and fire prevention services. It is one of the largest regional fire service organizations in California. The Department responded to 73,999 incidents during the 1998 calendar year. It is staffed with 696 career and 1,225 volunteer personnel, and currently serves approximately 800,000 residents in an area of 7,004 square miles. This service area consists of the unincorporated county areas and 15 contract cities (Banning, Beaumont, Calimesa, Canyon Lake, Coachella, Desert Hot Springs, Lake Elsinore, Indian Wells, Indio, La Quinta, Moreno Valley, Palm Desert, Perris, Rancho Mirage, San Jacinto, and Temecula). The assessed value of real property in the area served exceeds $40.8 billion.

The RCoFD operates out of fire department headquarters in the city of Perris. It is organized into two operational areas and six divisions, which currently contain 16 battalions and 85 fire stations. The equipment used by the department has the versatility to respond to both urban and wildland emergency conditions. The RCoFD inventory includes structural engines, brush engines, telesquirts, trucks, paramedic units, a helicopter, hazardous materials unit, incident command units, water tenders, fire crew vehicles, mobile communications centers, breathing support units, lighting units, power supply units, fire dozers, mobile training vans, and mobile emergency feeding units.

The RCoFD is the Operational Area Coordinator for the California Fire and Rescue Mutual Aid System for all fire service jurisdictions in the County of Riverside. It also has several mutual and automatic aid agreements with other city jurisdictions as well as the adjacent National Forests. The Operational Area is responsible for controlling and suppressing all unwanted fires in the department's jurisdiction. RCoFD/CDF personnel frequently respond to large-scale emergencies. Recent examples include the Landers, Loma Prieta, and Northridge earthquakes; the Dunsmuir hazardous materials spill/train derailment at Lake Shasta; the 1997 and 1998 California Floods; and the Oakland Hills, Yellowstone, and Yosemite fires. Response to large-scale emergencies or disasters is managed by 12 Major Incident Management Teams located throughout the state.

Riverside County Fire Department Responsibilities*:*

Fire Control: Due to increasing population, the RCoFD is faced with a growing structural fire problem. Riverside County is one of the most active wildland fire counties in the state.

Air Attack Program: The CDF and the United States Forest Service (USFS) operate a joint air tanker base at the Hemet/Ryan Airport. Ryan Air Attack Base is statistically the most active in the nation, deploying one CDF and two USFS air tankers. Two air coordination aircraft and one CDF helicopter are stationed at Ryan Air Attack Base.

Fire Protection Planning and Engineering: Fire protection specialists review plans for all new developments, commercial, and industrial buildings located within the contract cities and unincorporated areas of Riverside County. Requirements are established to provide a high degree of life safety and property protection. Common requirements include the installation of fire hydrants, sprinkler systems, early warning fire detection systems, and fire safety zones in remote areas.

Emergency Services: Disaster and recovery planning are the key elements. The Emergency Services Division maintains two underground Emergency Operation Centers with communications, for government use during major events.

5.4 Flood Hazards

During the 20th century, floods were the leading natural disaster in the United States in terms of number of lives lost and property damage. Since 1965, 11 Gubernatorial and Presidential flood disaster declarations have been made for Riverside County.

5.4.1 Types of Flood Hazards

There are four principal types of flood hazard:

Stream Flooding: The County of Riverside is vulnerable to flooding associated with several major drainages, including but not limited to the Santa Ana River, San Jacinto River, and Whitewater River, as well as smaller scale and flash flood events on many of the alluvial fans that flank the County's hillsides.

Bridge Scour: Bridge foundations are vulnerable to scouring during a flood. Major bridge crossings that are vital to the County of Riverside should be designed and built to withstand scouring.

Dam Inundation: More than 20 dam failure inundation paths have the potential to affect the County of Riverside. In addition, canals and levees may be vulnerable to the earthquake-induced effects of liquefaction, lateral spreading, and primary fault rupture.

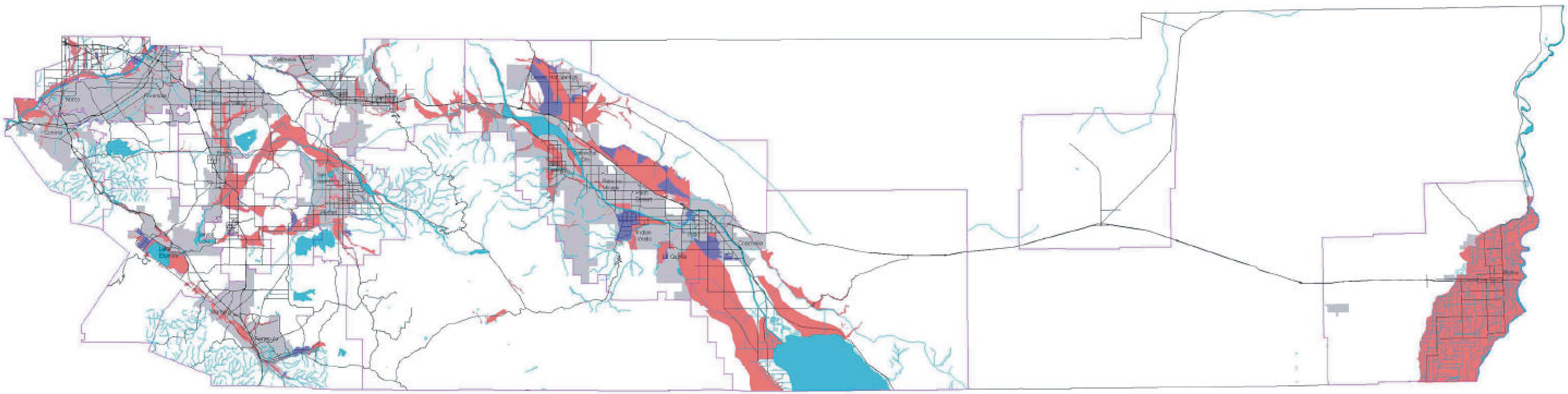
Earthquake-Induced Flooding (Tsunamis and Seiches): In Riverside County, the susceptibility to tsunami (seismic sea wave) inundation is non-existent. However, an earthquake may cause local flooding by creating seiches (reverberating waves) in enclosed bodies of water, or by damaging water storage facilities.

Floods that affect Riverside County can be attributed to three types of storm events. The first is a general winter storm that combines high-intensity rainfall and rapid melting of the mountain snow pack. The second is a tropical storm out of the southern Pacific Ocean, and the third is summer thunderstorms, particularly in the desert area.

The County of Riverside participates in the National Flood Insurance Program. Consequently, Flood Insurance Rate Maps (FIRMs) prepared by the Federal Emergency Management Agency (FEMA) to show potential flood zones are available for areas within County limits. These maps were used to provide the general boundaries of the 100 year and 500 year flood inundation areas shown on Figure 5.4.1.

5.4.2 Previous Flood Disasters Affecting Riverside County

The U.S. Geological Survey has operated several stream gages along Riverside County's drainages. The type of data available include peak discharge and graphs of daily mean discharge in cubic feet per second, as well as stage in feet above gage datum. The historical stream flow data indicate that peak flows typically occur in January, February, and March.



Flood Prone Areas

- 100 Year Flood Zone
- 500 Year Flood Zone
- Stream, River, Canal
- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure5.4.1

Source:EarthConsultantsInternationaland FederalEmergencyManagementAgency,2000.

100- AND 500-YEAR FLOOD HAZARD ZONES

Scaleisapproximate
0 6 12Miles

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To provide a general indication of the relative severity of historical floods throughout Riverside County, FEMA (1996) compiled flood gage data (Table 5.4.A) that have been updated with information from The U.S. Geological Survey (2000). In addition to gage data, historic levels of Lake Elsinore (Table 5.4.B) provide an indication of the flood history of Riverside County. Reports of flooding accounts since 1969 in Riverside County have been summarized by FEMA (1996), Chin and others (1991), and Kupferman (1994):

- ***February 1969:*** Two distinct periods of heavy rain struck Riverside County during January and February of 1969, producing the most runoff since March of 1938. Four persons lost their lives and $40 million in damage to public and private property was reported.

- ***October 1974:*** An extremely high-intensity thunderstorm in October of 1974 resulted in widespread flooding and property damage in western Riverside County. The sudden flooding associated with this storm included unpredictable braiding and fanning of flood flows on alluvial fans.

- ***September 1976:*** On September 10 and 11, 1976, the southwestern side of the Coachella Valley was subjected to intense rainfall associated with Tropical Storm Kathleen. This storm resulted in $14.6 million in damages to Cathedral City, Rancho Mirage, Palm Desert, La Quinta, and Oasis. Isolated thunderstorms struck many of the same areas again on September 23 and 24, causing an additional $4.4 million in damage.

- ***August 1977:*** During its passage over the Coachella Valley in August 1977, Tropical Storm Doreen caused flooding in Indio, Palm Desert, Thousand Palms, and Desert Hot Springs.

- ***March 1978:*** During February and March of 1978, several successive periods of heavy rain resulted in $9 million in flood damage within Riverside County. The regions suffering the greatest damage included the Palm Springs area adjacent to the Whitewater River, the Corona area, Murrieta Creek, and portions of the Santa Margarita and Santa Ana basins.

- ***July 1979:*** Intense local thunderstorms on July 20, 1979, in the hills above Rancho Mirage and Cathedral City, resulted in the flooding of 130 homes and $6.4 million in damage. One person was killed by flash flooding.

- ***February 1980:*** The 1980 floods were the most costly on record for Riverside County. Ten deaths and more than $70 million in property damage were recorded. Another $10 million was spent to fight floods and rehabilitate flood control structures. (See Section 5.4.2.3, for more detail on the 1980 flooding).

- ***September 1981:*** A local thunderstorm on September 7, 1981, in the Lakeview Mountains caused flooding of Lakeview Wash, about six miles southeast of March Air Force Base. Sixteen residences had interior damage.

Table 5.4.A - Historical Stream Gage Data for Riverside County

Location	Drainage Area (square miles)	Period of Record	Date	Peak Discharge (cfs)
San Jacinto River near San Jacinto	141	1920 to present	February 16, 1927	45,000
			February 21, 1980	17,300
			March 2, 1938	14,300
			February 6, 1937	14,000
			January 25, 1969	7,410
			November 22, 1965	6,300
Bautista Creek near Hemet	39.4	1947-1969	April 3, 1958	1,440
			July 19, 1955	1,170
			February 25, 1969	650
Bautista Creek at Valle Vista	47.2	1969 to present	February 21, 1980	11,400
			March 28, 1980	1,390
			August 17, 1977	1,050
Murrieta Creek at Temecula	222	1924 to present	January 4, 1916	23,300
			February 21, 1980	21,800
			January 23, 1943	17,500
			March 2, 1938	16,800
			March 1, 1978	14,800
			February 25, 1969	10,400
Temecula Creek near Aguanga	131	1957 to present	April 3, 1958	3,540
			February 21, 1980	3,420
			January 29, 1980	2,640
			January 25, 1969	2,550
			February 25, 1969	2,550
Whitewater River at White-water	57.5	1948 to present	March 2, 1938	42,000
			November 22, 1965	24,000
			January 25, 1969	16,200
			February 25, 1969	13,500
			December 6, 1966	5,500
			March 4, 1978	5,000
			February 21, 1980	3,200

Table 5.4.B - Peak Elevation Levels of Lake Elsinore

Date	Elevation of Lake Elsinore (feet)
April 1980	1265.7
April 1916	1265.6
April 1917	1260.7
May 1922	1259.7
May 1927	1259.0
May 1938	1258.9
April 1918	1258.7
June 1941	1258.6

- ***1992-93 Winter Storms:*** Storm damage in Riverside County as a result of the 1992-93 winter storms included flooding, slope failure, erosion, rising groundwater, and unanticipated seepage and contamination. Flood damage was reported along Temecula and Murrieta creeks.

5.4.2.1 Winter Floods of 1980

A series of six Pacific cyclones struck Southern California during February 13-21, 1980 (Chin et al, 1991). Resultant flooding caused 18 deaths and about $500 million in damages. For Riverside County, the floods of 1980 are the worst on record, responsible for ten deaths and more than $70 million in damages. Extensive flooding along banks of reservoirs and streams, including failure of the San Jacinto River levees, led to a Presidential Disaster Declaration.

The San Jacinto River and Lake Elsinore, where much of the flood disaster was centered, are a part of the Santa Ana River Basin. The flood of January 22, 1862, the largest recorded in the history of the Santa Ana River Basin, destroyed the settlement of Agua Mansa in the northern portion of Riverside County with an estimated peak flow of 320,000 cfs based on old flood marks. Discharges in the vicinity were about 100,000 cfs on March 2, 1938, and 19,500 cfs on February 18, 1980. The reduction in peak discharges over time is a direct result of upstream reservoirs, and with the recent completion of Seven Oaks Dam, even more flood mitigation is in place.

On February 21, 1980, the levee upstream of the City of San Jacinto failed, and flood water reverted to its original channel. The levee break along the San Jacinto River had the largest consequence of any event associated with the 1980 flooding in Southern California. The levee breaks left many homeless, and resulted in damages of $29 million to urban areas and $1.9 million to agricultural areas. Another major disaster associated with the 1980 flooding occurred at Lake Elsinore at the terminus of the San Jacinto River. Since it had been so long since outflow had occurred from Lake Elsinore, gravel had built up at the Temescal Creek outlet. Inflow to Lake Elsinore from San Jacinto River reached a peak of 8,000 cfs on February 22, and the lake surface reached its maximum elevation of 1, 266 feet on March 20. In the low-lying areas around the lake, 874 dwelling and buildings were damaged, and 2,000 residents were displaced.

5.4.3 Flood Problem Areas

The most widely distributed flood map product is the Flood Insurance Rate Map (FIRM). The Federal Emergency Management Agency (FEMA) is mandated by the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to evaluate flood hazards and provide FIRMs for local and regional planners to further promote sound land use and floodplain development. Flood risk data presented on FIRMs are based on historic, meteorologic, hydrologic, and hydraulic data, as well as open-space conditions, flood control works and development. To prepare a FIRM that illustrates the extent of flood hazards in a flood-prone community, the Federal Emergency Management Agency (FEMA) conducts an engineering study referred to as Flood Insurance Study (FIS). Using information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on FIRMs. SFHAs are those areas subject to inundation by a flood that has a one percent or greater chance of being equaled or exceeded during any given year.

According to the FIS for the County of Riverside (FEMA, 1996), most of the major floods in the County have occurred as a result of general winter storms. However, serious flooding, including potentially lethal flash flooding, has also occurred as a result of summer thunderstorms. Riverside County's average precipitation varies from more that 30 inches per year in the San Jacinto Mountains to less than 5 inches per year in the Blythe region.

The major rivers in the western portion of the County are dry most of the year and pose flood threats to developments within the flood plain during general storms of long duration (FEMA, 1996). These rivers are the Santa Ana, San Jacinto, San Gorgonio and Santa Margarita Rivers, as well as Temescal and Murrieta Creeks. When a major storm moves into the area, water collects rapidly as surface runoff. Resultant flood flows have predominantly short durations and sharp peaks. Major floods along the San Jacinto River resulting from intense rainfall have been shown typically to peak in approximately 1.5 days with a total duration of flooding of 4 days.

Tributaries to the major rivers present additional flood hazards. Flooding in these streams is caused mostly by local thunderstorms. The desert areas extending to the east from the Palm Springs area are susceptible to sheet flow flooding, with flow depths generally less than 2.0 feet. These type of flows leave the mouths of canyons and often follow unpredictable paths. During major floods, flood water carries heavy debris loads and causes considerable damage from deposition. For example, the Santa Ana River carried a total sediment load of more than 11 million tons of sediment during the storm of 1969.

Findings of the FEMA FIS, as well as additional information from the County water districts, the U.S. Geological Survey and the Army Corp of Engineers, are summarized below. Except as noted, the data cover the last 100 years:

San Gorgonio River: Flooding on the San Gorgonio River caused damage during 1938, 1965, 1966, and 1969. During the floods of 1969, the San Gorgonio River attained an estimated peak discharge of 17,000 cubic feet per second (cfs), which resulted in loss of life and extensive damage in the Cabazon area.

San Jacinto River: The San Jacinto River flooded during 1916, 1927, 1931, 1937, 1938, 1966, 1969, 1980, and 1993. Its largest flood of record occurred on February 16, 1927, with a peak discharge of 45,000 cfs near the City of San Jacinto. Agricultural, railway, and highway properties were extensively damaged. In addition, failure of its levee system in 1980 resulted in extensive damage.

Murrieta Creek: Nine major floods have been reported for Murrieta Creek, during 1862, 1884, 1916, 1938, 1943, 1969, 1978, 1980, and 1993.

Santa Ana River: Flooding of the Santa Ana River is known to have resulted in many damaging floods in 1862 (estimated >300,000 cfs), 1867, 1884, 1891, 1916, 1938, 1969, 1980, and 1993. Prior to extensive dam and reservoir controls, the Santa Ana River had a large flood event about every five years.

Perris Valley: Due to increased urbanization (Guay, 1996), the Perris Valley region has a growing risk of flood hazards. The Perris Valley Storm Drain and the San Jacinto River are the major sources of flooding for the area, and previously inundated primarily agricultural land east and southeast of the City of Perris. The valley is extremely flat, causing flood waters to move slowly and spread over a large area. In addition, sudden constriction of flood flows at the entrance to the upper end of Railroad Canyon, south of the City of Perris, causes ponding and backs up the flood plain for seven miles upstream (FEMA, 1996). The Perris Valley Storm Drain that drains March Air Force Base to the north, generates similar flooding.

Urbanization increases flood potential by increasing the percentage of impervious surfaces. Urban areas in Perris Valley have more than tripled in the last 20 years.

Desert Hot Springs: The City of Desert Hot Springs sits on deposits from past floods from Big Morongo Wash and canyons of the Little San Bernardino Mountains.

Coachella Valley: Although mean annual precipitation on the floor of the Coachella Valley is low (4 inches), high and intense precipitation in steep, high surrounding mountains poses hazards. Floods that affect the Coachella Valley are typically of short duration, high peak volumes, and carry large amounts of debris.

Whitewater River Basin: In the Whitewater River basin, a major flood occurs on average every ten years. The greatest storm on record was in March 1938, with peak discharge estimated at 42,000 cubic feet per second - almost twice the peak of the second largest storm (November 22, 1965, 24,000 cfs).

5.4.3.1 Earthquake Hazard to Local Water Tanks/Reservoirs

Earthquakes generate floods by causing the failure of water retention structures such as reservoirs. Seismically-induced inundation can occur if strong groung shaking causes structural damage to above-ground water tanks. Damage is also generated by seiches. A seiche is an earthquake-induced wave that reverberates on the surface of the water in an enclosed or semi-enclosed basin, such as a reservoir, lake, bay, or harbor. Also, if a tank is not adequately braced and baffled, sloshing water can lift it off its foundation, splitting the shell, damaging the roof, and bulging out the bottom of the tank. Movement can also sheer off the pipes leading to the tank, allowing water to escape through the broken pipes. New tank design includes flexible joints that can accommodate movement in any direction.

5.4.3.2 Bridge Scour

Nationwide, several catastrophic collapses of highway and railroad bridges have occurred due to scouring and a subsequent loss of support of foundations. Scour at highway bridges involves sediment-transport and erosion processes that remove streambed material from the bridge vicinity. California's seismic retrofit program of bridges includes underpinning of foundations, which may help reduce the vulnerability of foundations to be undermined by scour.

5.4.3.3 Essential Facility Inventory Exposed to Flood Hazards in Riverside County

Table 5.4.C presents an inventory of essential facilities and hazardous materials sites available, from national data sets (FEMA, 1999), which are within the 100 and 500 year flood hazard zones.

Table 5.4.C - Facilities in Riverside County Exposed to Flood Hazards

Facility Type	Total No. in County*	No. in Flood Hazard Zones
Airports	39	14
Hospitals	18	4
Police Stations, Fire Stations and Emergency Operation Centers	109	47
Schools	380	92
Highway Bridges	1,306	446
Hazardous Materials Sites	1,978	695

*Based on HAZUS™ 1999 various national-level inventories.

5.4.4 County Flood Control and Reservoir Projects

5.4.4.1 Seven Oaks Dam

The Seven Oaks Dam was completed in 1999 by the U.S. Army Corps of Engineers, Los Angeles District, as part of the Santa Ana River Mainstem Project. It is an important flood control structure for the Santa Ana River channel through northwestern Riverside County. The Seven Oaks Dam operates in tandem with Prado Dam, about 40 miles downstream. Historical flood flows on the Santa Ana have exceeded 300,000 cfs.

The Seven Oaks Dam project consists of a zoned, earth-filled embankment, spillway, outlet tunnel, air shaft, gate chamber, and intake structure tower. Seven Oaks is the 12th highest dam in the country and provides flood protection to the growing urban communities of Orange, Riverside, and San Bernardino Counties. It operates in tandem with Prado Dam, about 40 miles downstream. During the early part of each flood season, runoff is stored behind the dam in order to build a debris pool to protect the outlet works (U.S. Army Corp of Engineers, 2000). Small releases are made on a continual basis to maintain the downstream water supply. During a flood, Seven Oaks Dam will store water destined for Prado Dam for as long as the reservoir pool at Prado Dam is rising. When the flood threat at Prado Dam has passed, Seven Oaks will begin to release its stored flood water at a rate not exceeding the downstream channel capacity. At the end of each flood season, the reservoir at Seven Oaks gradually drains and the Santa Ana River flows through unhindered.

5.4.4.2 Prado Dam

Prado Dam is a flood control and water conservation project located at the upper end of the Lower Santa Ana River Canyon, a natural constriction controlling 2,255 square miles of the 2,450-square mile Santa Ana River watershed. The dam embankment is approximately two miles west of the City of Corona. Portions of the reservoir are in both Riverside and San Bernardino Counties (California Division of Safety of Dams, 2000). Historically, releases larger than 5,000 cfs have been damaging to downstream improvements. However, when current downstream channel improvements are completed, the downstream channel capacity will increase to over 30,000 cfs. Its purpose is to collect runoff from uncontrolled upstream drainage areas along with releases from other storage facilities.

5.4.4.3 Lake Elsinore

Throughout its history, Lake Elsinore has been subject to flooding and drying, depending on runoff amounts. The lake loses an average of 15,000 acre-feet (one acre-foot is approximately 325,900 gallons) a year to evaporation, dropping the surface level more than 4.5 feet. In wet years, runoff from the 782-square mile San Jacinto watershed pours into Lake Elsinore, which is the lowest point in the watershed. Currently, natural runoff is the only source of water for the lake. In the past, when runoff caused upstream reservoirs to spill, Lake Elsinore often filled, but rarely discharged. In the past, as the lake began to evaporate, salt concentrations would rise, affecting water quality. The Project enables more frequent discharges from the lake during heavy runoff.

5.4.4.4 Diamond Valley Lake

The Diamond Valley Lake project is situated in the Domenigoni/Diamond valleys, four miles southwest of the City of Hemet. The project is Southern California's largest reservoir, with a capacity of 800,000 acre-feet (261 billion gallons), almost doubles Southern California's surface storage capacity, and secures a six-month emergency water supply. The reservoir will also provide additional water for drought protection and peak summer need by 2001(Metropolitan Water District, 2000). Water will be delivered from the Colorado River Aqueduct through the San Diego Canal and from the California State Water Project through the new 12-foot diameter, 45-mile Inland Feeder Project.

5.4.4.5 Inland Feeder Project

The Inland Feeder Project more than doubles the water delivery capacity of the east branch of the State Water Project and helps replenish local groundwater basins. The project begins in the Devil Canyon area north of the City of San Bernardino and ties into Metropolitan Water District's Colorado River Aqueduct south of Lake Perris, near the City of San Jacinto. The approximately 44-mile feeder passes through or near the communities of Riverside, Perris, Moreno Valley, and San Jacinto Valley. It will be an important source of water for the Diamond Valley Lake Project, delivering about 1,000 cfs, or about 646 million gallons a day. The estimated cost of the project is $1.2 billion, with a completion date of 2004 (Metropolitan Water District, 2000).

5.4.4.6 Murrieta Creek-Flood Control Master Plan

The Master Plan is to channelize Murrieta Creek and its major tributaries using several concrete-lined open channels and a small network of underground storm drains. The proposed system will carry storm runoff through the rapidly developing Murrieta Creek valley to the valley's south end, where Murrieta Creek and Temecula Creek converge to form the Santa Margarita River.

5.4.4.7 Lake Mathews

Lake Mathews is the terminal reservoir for the Colorado River Aqueduct. It is owned and operated by the Metropolitan Water District and provides drinking water for approximately 15 million people. The County of Riverside Flood Control and Water Conservation District has obtained funding for a $20 million Drainage Water Quality Management Plan for the Lake Mathews Watershed Project. The Project objective is to address non-point source pollution in Lake Mathews and Cajalco Creek, which drains into Lake Mathews. This will be primarily accomplished by construction of a series of wetlands.

5.4.4.8 Whitewater River

The Whitewater River is the principal drainage course through the Coachella Valley. It is typically dry, but when it carries water, it flows southeasterly. From the City of La Quinta southward, the Whitewater River is contained by the man-made Coachella Valley Stormwater Channel, which flows northeast, around the City of Indio, and eventually into the Salton Sea. The Whitewater drains areas as far away as the summit of San Gorgonio Pass, and the steep southern and eastern slopes of Mount San Gorgonio, with a total drainage area of approximately 850 square miles. The Coachella Valley Water District maintains the channel, including straightening and grading as necessary.

5.4.4.9 Salton Sea

The Salton Sea was formed accidentally in 1905 when floods eroded a cut in a bank of the Colorado River made during construction of the All American Canal and diverted the Colorado River into the Salton Trough. Presently, the western six miles of Salton Sea lies within Riverside County and the remainder is in Imperial County. With the Sea’s relatively flat shoreline, a slight increase in elevation can cause flooding in the recreational facilities located at the water’s edge. In the late 1970s and 1980s, major flash flooding in Imperial and Coachella Valleys and flood control releases from Colorado River dams negated local conservation efforts to control the rising sea. Improved irrigation practices and a cut back in California’s use of Colorado River water after completion of the Central Arizona Project are expected to contribute to a gradual decrease in the sea's elevation during the next two decades (Coachella Valley Water District, 2000).

5.4.4.10 Riverside County Flood Control and Water Conservation District Projects

A list and summary of proposed Riverside County Flood Control and Water Conservation District projects for fiscal year 2000 is summarized in Table 5.4.D.

Table 5.4.D - Flood Control Project Request FY 2000
Riverside County Flood Control District

Area	Description	Amount
Santa Ana River at Norco Bluffs	Construction-General	$2,200,000
Santa Margarita and Murrieta Creek Sub-Basin	Feasibility Study - Flood Control	$232,000
	Preconstruction Engineering & Design	$100,000
San Jacinto River	Reconnaissance Study - Flood Control & other purposes	$100,000
Santa Ana River – Mainstream	Construction-General	$23,000,000
Prado Dam	Construction-General	$5,000,000

Santa Ana River at Norco Bluffs: The Santa Ana River passes along the northerly border of the City of Norco. The southerly bank of the river is a bluff, varying from 46 to 96 feet above the streambed. Atop the bluff is a residential neighborhood. In the floods of January and February 1969, flow impingement on the riverbank undermined the toe of the slope, causing severe bank sloughing. The bluff retreated 50 to 60 feet to the south. No improvements were lost, but the threat became apparent. The floods of 1978 and 1980 caused another 30 to 40 feet of bluff retreat, and the loss of a single family residence.

Santa Margarita, Murrieta Creek Sub-Basin: Murrieta Creek passes through the cities of Murrieta and Temecula in southwest Riverside County, then confluences with Temecula Creek to form the Santa Margarita River. The Santa Margarita River flows into San Diego County, through the Camp Pendleton Marine Base, and into the Pacific Ocean. Murrieta and Temecula experienced severe flood damage in January 1993, estimated in excess of $10 million dollars, from Murrieta Creek overflow. Camp Pendleton also suffered extensive flood damage, estimated at $88 million, to facilities and aircraft due to Santa Margarita River overflow. A U.S. Army Corps of Engineers

Feasibility Study addressing flood control, environmental enhancement, and recreation for Murrieta Creek was initiated in April 1998.

San Jacinto River: The 730-square mile San Jacinto River watershed drains into Lake Elsinore in western Riverside County. The San Jacinto River originates in the San Jacinto Mountains and passes through the cities of San Jacinto, Perris, Canyon Lake and Lake Elsinore. The river is an important regional resource that provides water supply, wildlife habitat, drainage, and recreation values to the region. The only major flood control structures on the river are levees in the City of San Jacinto built by the Corps of Engineers in the early 1960s. In the 30-mile reach of the river between Lake Elsinore and the City of San Jacinto, only minor channelization exists. The river is characterized by expansive overflow areas, including the Mystic Lake area (Riverside County Flood Control and Water Conservation District, 1999). The San Jacinto River has caused major flooding damage to agricultural areas and rendered Interstate 215 and several local arterial transportation routes impassable.

Santa Ana River Mainstem Project: The Water Resources Development Act of 1986 (Public Law 99-662) authorized the Santa Ana River Mainstem project, which includes improvements and various mitigation features, set forth in the Chief's Report to the Secretary of the Army. The Boards of Supervisors of Orange, Riverside, and San Bernardino Counties continue to support this critical project as stated in past resolutions to Congress. Significant construction has been completed on the lower Santa Ana River Channel and on the San Timoteo Creek Channel. Construction activities on Oak Street Drain, Mill Creek Levee and Seven Oaks Dam have been completed.

Prado Dam: The Prado Dam portion of the Santa Ana River Mainstem project continues to advance to an eventual construction start (Riverside County Flood Control and Water Conservation District, 1999). Engineering design for the dam embankment and outlet works is almost complete. Design work has been initiated on the various interior dikes included in the project, and additional design contracts are ready to be let for the balance of engineering work necessary prior to construction.

5.4.5 Dam Failure

5.4.5.1 Dam Inventory Data for Riverside County

Data for Riverside County dams were obtained from the National Inventory of Dams (2000), based on 1998-99 data submitted by local agencies. A summary of the dam inventory data available through NATDAM is presented in Table 5.4.E. NATDAM hazard classification is based entirely on the downstream hazard potential, as follows:

- ***LOW HAZARD POTENTIAL*****:** Dams where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

Table 5.4.E - National Inventory of Dam (NATDAM) Data for Riverside County

Dam Name	River	Nearest City	Height (feet)	Storage (acre-feet)	Year Built	Drainage Area (square miles)	Hazard Type*
Vail	Temecula Creek	Temecula	152	62,000	1949	306	H
Quail Valley	San Jacinto River	Lake Elsinore	37	178	1959	1.6	S
El Casco	San Timoteo Creek	Redlands	19	188	1879	0.09	S
Railroad Canyon	San Jacinto River	Lake Elsinore	94	19,367	1928	664	H
Lake Hemet	San Jacinto River	Valle Vista	135.00	19,112	1895	67	H
Foster	Lily Creek	Idyllwild	38.00	56	1945	0.85	L
Fairmont Park	Santa Ana River	Riverside	12.00	330	1923	22	S
Mockingbird Canyon	Mockingbird Canyon	Riverside	74.00	2,905	1914	13.13	H
Harrison Street	Harrison Creek	Riverside	50.00	350	1954	2.03	H
Wide Canyon	West Wide Canyon	Fun Valley	84.00	1,490	1968	33.5	S
Box Springs	Box Springs Canyon	Riverside	49.00	630	1960	4	H
Pigeon Pass	Pigeon Pass	Sunnymead	36.00	1,400	1958	8.71	H
Sycamore	Sycamore Canyon	Riverside	63.00	1,510	1956	10.7	H
Alessandro	Alessandro Creek	Riverside	66.00	530	1956	4.63	H
Woodcrest	Woodcrest Creek	Riverside	44.00	420	1954	5.32	H
Jurupa Basin	Jurupa Wash	Ennis	22.00	291	1983	1.69	S
Mary Street	Alessandro Wash	Casa Blanca	40.00	570	1981	6.7	H
Declez Detention	San Sevaine Creek	Glen Avon Heights	30.00	480	1984	10.7	H
Tahquitz Reek Debris	Tahquitz Creek	Agua Caliente	32	-9.9	1991	18	H

Dam Name	River	Nearest City	Height (feet)	Storage (acre-feet)	Year Built	Drainage Area (square miles)	Hazard Type*
Sunnymead Ranch	Reche Canyon	Sunnymead	41	540	1985	2	H
Prenda	Prenda Creek	Riverside	44	291	1954	1.93	H
Lee Lake	Temescal Creek	Corona	47	2,800	1919	53	S
Metz Road Debris	San Jacinto River	Perris	12	154	1981	1	S
Tachevah Creek	Tachevah Creek	Palm Springs	42	1,720	1964	3.2	H
Oak Street	Oak Street Creek	Corona	36	400	1979	6.02	H
Mabey Can-yon	Mabey Creek	Corona	46	111	1974	1.5	H
Henry J. Mills Creek	Offstream	Riverside	23	103	1979	0	L
Skinner Clearwell	Offstream	Temecula	44	410	1991	0	S
Dunn Ranch	Hamiliton Creek	Anza	44	126	1987	0.2	S
Robert A. Skinner	Tocalota Creek	Temecula	109	62,800	1973	51	H
Matthews	Cajalco Creek	Corona	264	222,400	1918	40	H
Perris	Bernasconi Pass	Pesrris	130	154,852	1973	10	H
Lakeview	San Jacinto River	N/A	37	990	1994	NA	H
Eastside	Domenigoni Valley Creek	N/A	284	NA	2001	13	H
Goodhart Canyon De-tention Basin	Goodhart Can-yon	Winchester	15	1,038	NA	3.8	H
Henry J. Mills #2	Offstream	N/A	34	92	NA	0.1	S
Henry J. Mills	Offstream	N/A	48	98	NA	0.03	S
Prado Dam	Santa Ana River	Orange	106	295,581	1941	2,233	H

Dam Name	River	Nearest City	Height (feet)	Storage (acre-feet)	Year Built	Drainage Area (square miles)	Hazard Type*
Eastside Detention Dike No. 1	Whitewater River	Thermal	42	21,000	1949	NA	L
Eastside Detention Dike No. 2	Whitewater River	Thermal	48	18,000	1949	NA	L
Westside Detention Dike No. 2	Whitewater River	N/A	37	630	1968	NA	L
Westside Detention Dike No. 3	Whitewater River	N/A	22	1,300	1970	NA	L
Westside Detention Dike No. 4	Whitewater River	N/A	48	4,900	1968	NA	L

*NID hazard types are defined in text.

- ***SIGNIFICANT HAZARD POTENTIAL*:** Dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or affect other concerns. These dams are often located in predominantly rural or agricultural areas, but could be located in areas with population and significant infrastructure.

- ***HIGH HAZARD POTENTIAL*:** Dams where failure or misoperation will probably cause loss of human life.

5.4.5.2 Dam Inundation Potential Along the Colorado River

The portions of the County along the Colorado River corridor could suffer from catastrophic failure of dams well outside of the County. South to north, the dams along the Colorado River upstream of the County of Riverside are summarized below:

- ***Palo Verde Diversion Dam***: Located 9 miles north of Blythe, the dam is a mix of concrete and earth embankment with a structural height of 43 feet and a hydraulic height of 10 feet.

- ***Headgate Rock Dam***: Located near Parker, Arizona, the dam has a structural height of 70 feet and hydraulic height of 52 feet.

- ***Parker Dam***: Located 12 miles north of Parker, Arizona, this concrete arch dam was completed in 1938. The dam has a structural height of 320 feet and a hydraulic height of 75 feet. Lake Havasu is the reservoir created by the dam and it has a storage capacity of 648,000 acre-feet.

- ***Davis Dam***: Located near Laughlin, Nevada, Davis Dam is a zoned, earth-fill dam completed in 1950. It has a structural height of 200 feet, and creates the Lake Mojave reservoir with a total capacity of 1.8 million acre-feet.

- ***Hoover Dam***: Located about 36 miles south of Las Vegas in the Black Canyon of the Colorado River, Hoover Dam is the highest and third largest concrete dam in the United States. Construction of the dam began in 1931 during the Great Depression and the dam was completed in 1936. The dam has a structural height of 726 feet. The reservoir (Lake Mead) has a storage capacity of 28.5 million acre-feet.

The U.S. Bureau of Reclamation (1993) evaluated inundation potential along the Colorado River by modeling failure of combinations of Hoover, Davis and Parker dams. The mapping prepared by the U.S. Bureau of Reclamation (1993) is digitized and presented in Figure 5.4.2. The results are summarized for the Blythe area in Table 5.4.F. Blythe has a listed population of about 8,000, which triples during the winter months; and sits about 207 feet above sea-level, well under the modeled water surface elevations for catastrophic failure of any combination of Colorado River dams. Fortunately, in the unlikely case there is a catastrophic failure, a minimum of 23 hours is estimated before the flood waters reach the Blythe region.

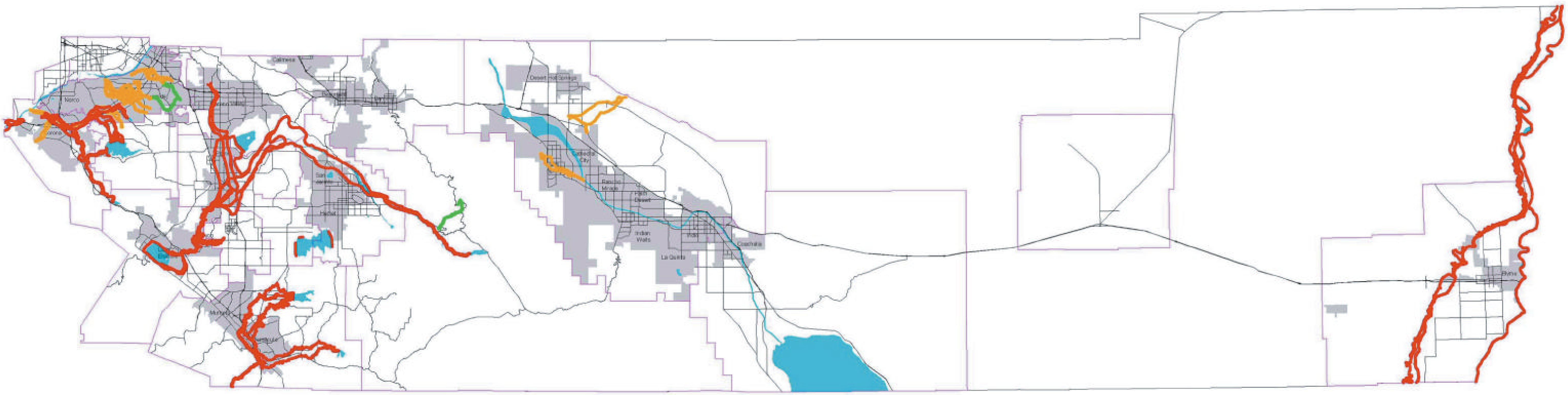
Table 5.4.F: Inundation Modeling of Colorado River Dams

Conditions at Blythe (elevation = ±207 feet)

Scenario	Peak Flow (cfs)	Max. Water Surface Elevation (feet)	Travel Time
Failure of Hoover, Davis and Parker	6.1 million	331	33 hours
Failure of Davis and Parker	500,000	283	43 hours
Failure of Parker	360,000	280	23 hours
Major storm release from Hoover	313,000	279	

5.4.5.3 Dam Inundation Zones for Riverside County

Figure 5.4.2 shows the location of zones that could be inundated with water from dam failure in the County.



Dam Hazard Zones

- High
- Moderate
- Low

- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure 5.4.2

Source:EarthConsultantsInternationaland NationalInventoryofDams,2000.

DAM FAILURE INUNDATION ZONES

Scaleisapproximate
0 6 12Miles

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5.4.5.4 Performance of Dams in Earthquakes

Several California dams have been tested by earthquakes. Experience has shown that dams must be made safe before earthquakes occur. After an earthquake strikes, there are many obstacles that hinder the quick detection and treatment of earthquake damaged dams, or implementation of evacuation plans. After recent earthquakes, key response personnel were not available, communications were blocked, equipment and operators were in short supply, helicopters were not available for inspections, and access to repair materials and dams was difficult.

In 1971, the San Fernando earthquake damaged the Lower San Fernando Dam. The reservoir had to supply a large portion of the water for Los Angeles for two weeks while severe damage to the supply aqueducts was repaired. This scenario could be repeated in Riverside County following a major earthquake, as many of the County's aqueduct systems cross major faults at numerous locations.

A wide variety of creative solutions have been used to improve the seismic stability of dams in California. Although there have been major advances in analysis techniques, rehabilitations have not changed radically. Multiple arch dams are still being stiffened and embankment dams buttressed. Reservoir storage restrictions are effective ways to rapidly increase dam safety, but can prove troublesome in the long term.

5.4.5.5 Seismic Retrofit Projects

No single agency tracks the status of dam improvement projects for California. However, the National Inventory of Dams (U.S. Army Corp of Engineers, 2000) plans to include retrofit information in future inventories.

Pigeon Pass Dam: In December 1978, cracks were discovered in the embankment. The causes of the cracks were determined to be a combination of embankment shrinkage and differential foundation settlement due to hydrocompaction and possible seismic shaking. Because the San Jacinto fault is within four miles of the dam, seismic retrofitting was undertaken. Mitigation measures included a chimney drain placed in a trench in the downstream slope to act as a crack stopper.

Railroad Canyon Dam: The Railroad Canyon Dam received a $6 million facelift in 1997 to withstand greater seismic and flood forces, in accordance with Federal weather criteria and the State Division of Safety of Dams (Elsinore Valley Municipal Water District, 2000).

Lake Mathews: A major seismic hazard reduction project is underway at Lake Mathews reservoir about five miles south of the City of Riverside. The purpose is to reduce the seismic vulnerability of Lake Mathews outlet facilities, and to ensure a reliable supply of water following a major earthquake.

5.4.5.6 Mitigation Alternatives-Storage Restrictions

Temporary storage restrictions have been used to improve the safety of 21 dams in California. These operating restrictions are placed soon after analyses identify stability problems. They allow time to design and finance repairs, and find alternate water supplies. Reducing the allowable reservoir storage directly reduces the damage potential should an earthquake rupture the dam. Permanent storage restrictions are being used on only 12 California dams. These restrictions can be difficult to maintain, as there is pressure to lift restrictions during periods of drought and other crises. Lowered or notched spillways are a more foolproof way to implement storage restrictions.

5.4.6 Flood Hazard Reduction in Riverside County

State law makes local governmental agencies responsible for flood control in California. Paragraph C0 of Section 8401 of the Water Code states: "The primary responsibility for planning, adoption, and enforcement of land use regulations to accomplish flood plain management, the land use element of the plan must identify areas that are subject to flooding."

Table 5.4.G summarizes agencies with local flood control responsibilities in Riverside County. Local governments are authorized to appropriately zone river basin lands within their jurisdictions. However, State and Federal agencies (Department of Water Resources, the U.S. Army Corps of Engineers and Federal Emergency Management Agency) often provide assistance to local planning and zoning commissions by determining the probability of flooding and the potential flood damage, and by assisting with ordinances that minimize development in floodplains.

Table 5.4.G - Local Agencies with Flood Control Responsibilities in Riverside County*

Name of Agency	Contact Person, Title	Phone Number	Geographic Area of Service
Riverside County Flood Control & Water Conservation District	David Zappe, General Manager	909-275-1250	Western half of Riverside County.
Coachella Valley Water District	Tom Levy, General Manager	760-398-2651	Majority of Coachella Valley.
Palo Verde Irrigation District [1]	Gerald Davisson, District Manager	760-922-3144	Palo Verde Valley in extreme eastern Riverside County and a portion of Imperial County.
Imperial Irrigation District [1]		619-339-9416	Imperial Valley - Imperial County and southeastern Riverside County.

Name of Agency	Contact Person, Title	Phone Number	Geographic Area of Service
County Service Areas 103 & 121 [2]	Mel Bohlken, Administrator	909-275-1110	CSA 103 serves Wildomar in southwest Riverside County and CSA 121 serves Thousand Palms in the Coachella Valley.
Desert Water Agency	Jack Oberle, General Manager	619-323-4971	Certain territory in Riverside County but excludes waters of the Whitewater River system.
San Gorgonio Pass Water Agency [3]	Steve Stockton, General Manager	909-845-2577	Certain territory in Riverside County.

*Source: California Department of Finance (1997)

1 This district performs agricultural/local drainage rather than regional flood control.

2 The two County Service Areas maintain local retention basins.

3 While the agency has authority to acquire and control storm water, its actions in this regard have been limited to taking "runoff" water from local rivers and streams to replenish the groundwater on lands within the agency's jurisdiction.

5.4.6.1 National Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods. The NFIP makes federally backed flood insurance available in communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. National Flood Insurance is available in the County of Riverside.

The NFIP is managed by the Federal Emergency Management Agency's Federal Insurance Administration and Mitigation Directorate. The Federal Insurance Administration manages the insurance component of the NFIP, and works closely with FEMA's Mitigation Directorate, which oversees the floodplain management aspect of the program.

Owners of all structures within the projected inundation area of the 100-year flood (Special Flood Hazards Area, SFHA) are required to purchase and maintain flood insurance as a condition of receiving a federally related mortgage or home equity loan on that structure. However, nationwide estimates indicate that 75 percent of households in SFHAs do not have a National Flood Insurance Policy (NFIP). Structures located in SFHAs have a 26 percent chance of being flooded over the course of a 30-year mortgage. The likelihood that a building will catch fire over the same 30-year period is about 4 percent.

5.4.6.2 Riverside County Flood Control District

The Riverside County Flood Control District is the largest agency in Riverside County that is responsible for flood control, including most of the western County. During the District's 50-year history, it has developed an extensive flood control system in western Riverside County including 35 dams, debris basins and detention basins, 48 miles of levees, 188 miles of open channel, and 182 miles of underground storm drains (Zappe, 1997). Proper operation and maintenance of the flood control system is critical to protect the lives and properties of the residents of western Riverside County, and is essential to ensure that economic activity and transportation corridors are not disrupted during times of flooding.

5.4.6.3 Changing Flood Control Concepts

Flood control programs and methods are currently undergoing dramatic change. Where structures are absolutely necessary, they incorporate softer, more environmentally-friendly materials and designs, where feasible.

In order to participate in the National Flood Insurance Program, the Federal Emergency Management Agency (FEMA) requires that Riverside County and its incorporated cities maintain the carrying capacity of all flood control facilities, and floodways. Communities that fail to meet their maintenance responsibility are subject to expulsion from the National Flood Insurance Program, loss of other Federal aid, and even exposure to suits by FEMA for recovery of flood insurance and disaster payments.

Under the Federal Clean Water Act, three separate permits are required to operate and maintain flood control systems (Zappe, 1997):

- A National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit is required to discharge stormwaters to "waters of the United States."

- A Section 404 Dredge and Fill Permit must be obtained from the Corps for any project that discharges fill to waters of the United States. Under Section 7 of the ESA, the Corps is required to consult with the Service where a permitted activity may jeopardize an endangered or threatened species or critical habitat. The EPA retains veto power over any permit issued by the Corps.
- A Section 401 Water Quality Certification or Waiver must be obtained before any given 404 Permit becomes valid. This process has been delegated by EPA to the State Water Resources Control Board.

5.5 Wind Erosion

Wind erosion damages land and natural vegetation by removing soil from one place and depositing it in another. It mostly affects dry, sandy soils in flat, bare areas, but wind erosion may occur wherever soil is loose, dry, and finely granulated. It causes soil loss, dryness, deterioration of soil structure, nutrient and productivity losses, air pollution, and sediment transport and deposition. The presence of dust particles in the air is a source of several major health problems. Atmospheric dust causes respiratory discomfort, may carry pathogens that cause eye infections and skin disorders, and reduces highway and air traffic visibility. Buildings, fences, roads, crops, trees and shrubs can all be damaged by blowing soil, which acts as an abrasive.

Suspension, saltation, and surface creep are the three types of soil movement which occur during wind erosion (Figure 5.5.1). While soil can be blown to virtually any height, over 93 percent of soil movement takes place within one meter of the ground.

Wind and windblown sand are an environmentally limiting factor throughout much of Riverside County. Approximately 20 percent of the land area of Riverside County is vulnerable to "high" and "very high" wind erosion susceptibility (Figure 5.5.2). The Coachella Valley, the Santa Ana River Channel in northwestern Riverside County, and the community of Hemet are zones of high wind erosion susceptibility.

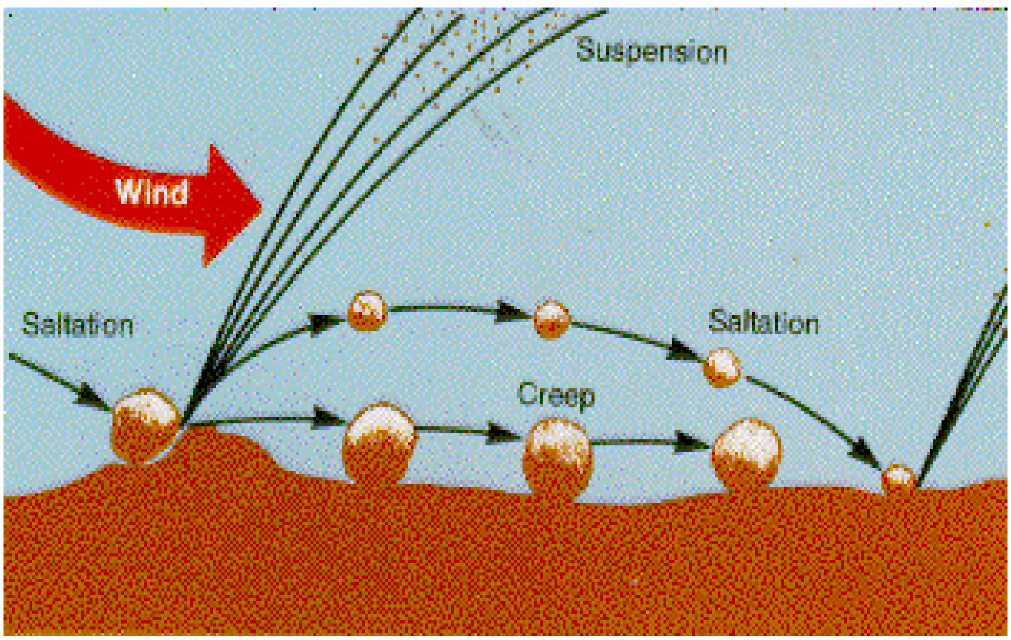

Figure 5.5.1: Types of Soil Movement

(Wind-induced soil movement is a result of wind forces exerted against the surface of the ground and includes suspension, saltation, and surface creep. Soil can be blown high into the atmosphere, however, most soil movement takes place at or below 1 meter.)

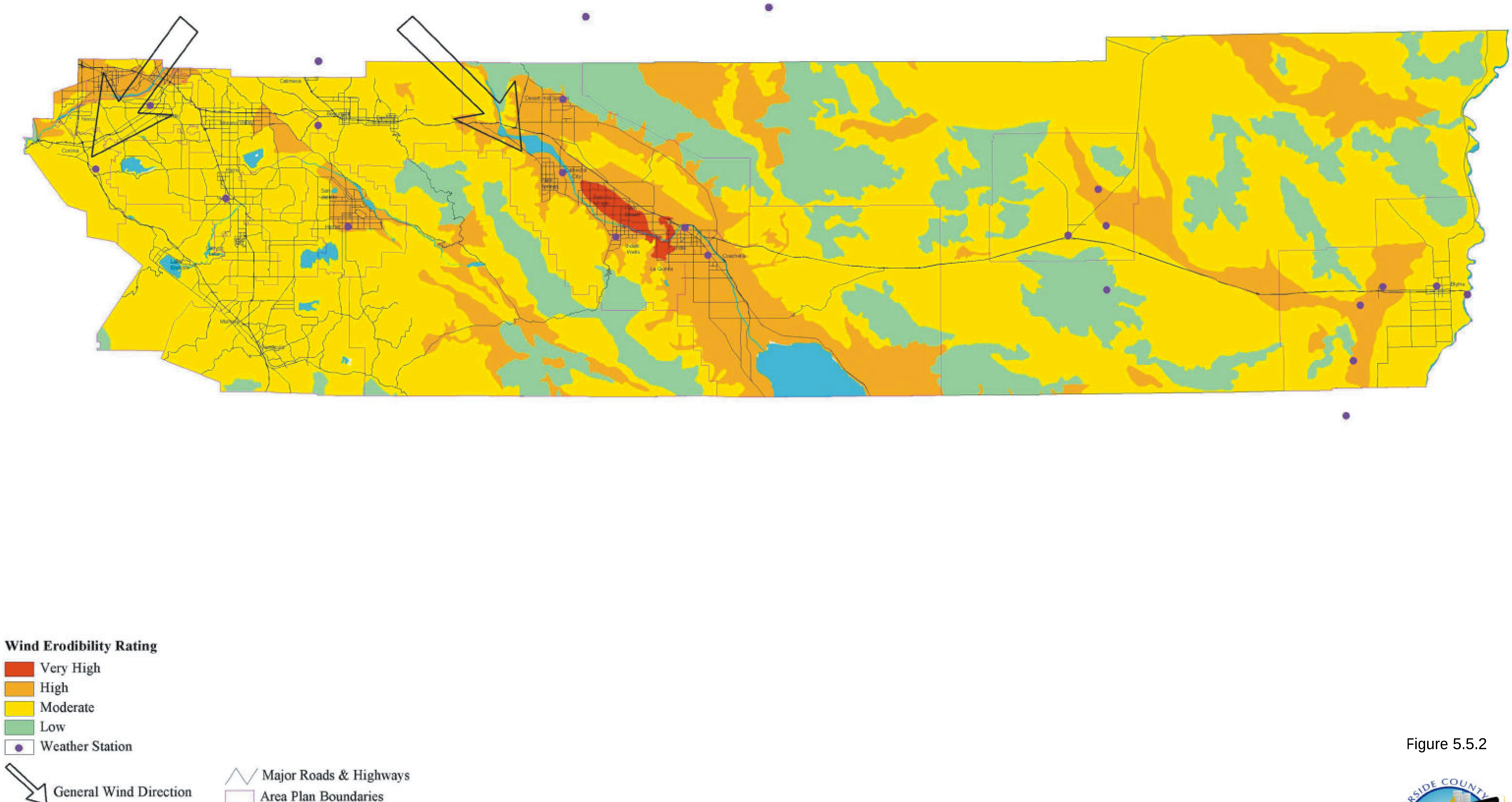

Figure 5.5.2

Source: EarthConsultantsInternational.

WIND HAZARD AREAS

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5.5.1 Coachella Valley

Windblown sand is a well-recognized hazard for developments in the Coachella Valley, with greatest activity in the central region from Palm Springs to the northern portion of La Quinta. Windblown sand has forced abandonment of dwellings and subdivided tracts in the central Coachella Valley (Sharp, 1980).

High winds often blow down the axis of the Coachella Valley. Shelter from these winds controlled the location of initial development in the upper Coachella Valley. Most of the early development of the winter recreational resort communities began in the lee of the protecting mountains. The Coachella Valley area, is undergoing rapid development and changes in land use that increase windblown sand problems. Development has now moved into the central axis of the valley, the high-wind areas. These growing communities need additional mitigation measures.

According to El-Aghel (1984), five physical factors determine the distribution and intensity of the windblown sand hazard in the Coachella Valley:

- ***Orientation of hill and mountain masses:*** Mountains bordering the valley have their long axes aligned northwest-southeast and thus offer little resistance to the free flow of air down the long axis of the Coachella Valley. The narrow San Gorgonio Pass accelerates the wind, which improves its ability to pick-up and transport sand.

- ***Nature of the bedrock:*** Granitic and metamorphic rocks that comprise the local mountains readily weather to grain sizes that are easily transported by wind.

- ***Location of the Whitewater River Floodplains:*** The Whitewater River is the main stream feeding the upper Coachella Valley. It drains much of the adjacent parts of the San Bernardino Mountains. During floods, large quantities of sand and gravel are deposited on the Whitewater floodplains, at the eastern end of San Gorgonio Pass, where wind velocities are the greatest.

- ***Slope of the valley floor:*** From the summit of the San Gorgonio Pass (elevation about 1,200 feet) to the Salton Sea (below sea level), the valley floor slopes without interruption, thereby allowing air to move unhindered.

- ***Climate:*** The Coachella Valley is a desert. Its sparse vegetation exposes surficial materials to wind. Precipitation in the adjacent mountains is often short and intense, leading to torrential runoff and considerable deposition on the valley floor.

Primary source of sand in the Coachella Valley is the Whitewater River. Increases in the amount of windblown sand are related to episodic flooding of the Whitewater River (Sharp, 1964, 1980). A 15-fold increase in wind erosion rates was noted following heavy floods (Sharp, 1980). These floods changed the character of the Whitewater River drainage from stony to sandy. Typically, within a few months, the drainage bottom returned to a predominantly stony appearance.

Figure 5.5.7: Wind-induced soil movement is a result of wind forces exerted

Development has exacerbated the wind erosion conditions by removing native vegetation, building roads and other infrastructure across the valley floor. Recreational land uses, especially use of off-road vehicles, accelerates erosion in the area.

5.6 Steep Slopes

Hillside areas typically offer a variety of amenities such as reduced densities, rural character, significant views of valleys and hills, proximity to large natural open space areas, and privacy that are not commonly available in flat land developments, and are thus popular in the marketplace. However, if development is improperly planned and designed, the very amenities that people seek as the benefits of hillside living can be destroyed. In addition, the cumulative effects of improper hillside development can be significant destruction of an area's natural beauty, erosion, degradation of water quality, increased runoff and flooding problems, slope failures, fire hazards, high utility costs, lack of safe access for emergency vehicles, loss of sensitive biological habitats, and high costs for maintenance of public improvements.

5.6.1 Hillside Design Parameters

5.6.1.1 Measuring Slope Steepness

In establishing hillside management programs, many communities rely on slope steepness as the primary or sole determinant of "developability." While slope analysis is a useful tool in understanding and managing hillside development and conservation, it is but one of several determinants of the development potential of a site. "Slope" is defined as the vertical change in elevation over a given horizontal distance. It can be measured as a percentage, a ratio, or as an angle, as illustrated in Figure 5.6.1. A 10 percent slope is one that rises 10 feet over a horizontal distance of 100 feet. That same slope would have a 10:1 ratio (10 feet horizontal distance for each 1 foot in vertical rise). A 2:1 slope (the steepest slope that is generally permitted for cut slopes in a grading operation) would have a 50-foot vertical rise over a 100-foot horizontal distance (50 percent), and a 26E angle to the slope (Figure 5.6.1).

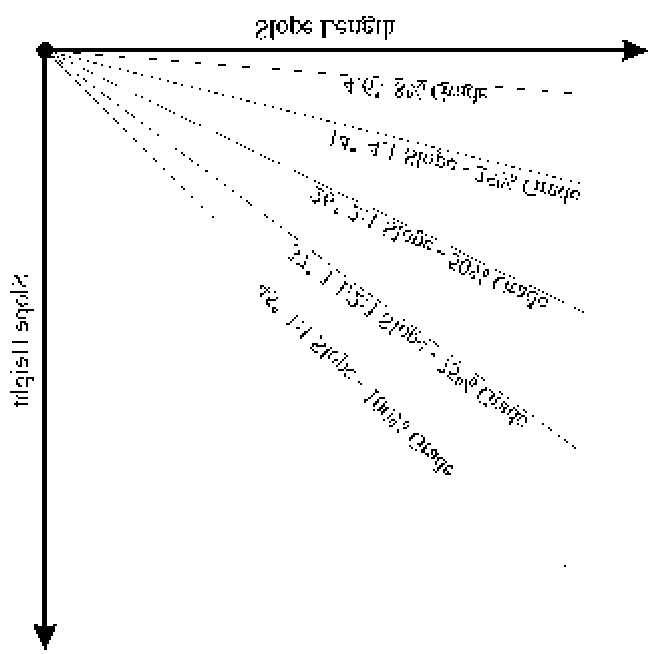


Figure 5.6.1 - Slope Illustration

Several methods exist for calculating slope steepness. The appropriate method, as well as the slope categories that are used, scale and accuracy of mapping, are all dependent on the intended use of the information. It is also important to understand that different techniques of slope steepness calculation might give different results. The three most common methods of calculating slope are identified below (Table 5.6.A).

Table 5.6.A - Types of Slope Measurement

Type of Measurement	Description
Site Specific Slope Map	This consists measuring the horizontal distance between each set of parallel contours on a topographic map, and mapping the results in various slope categories need to be used (e.g., 0 to 15 percent, 15 to 25 percent, etc.). The resulting map is a "mosaic," identifying the slope steepness at any point within a given geographic area. The precision of the slope map is dependent upon the scale and contour interval of the topographic map being used. For example, a slope map prepared from a topographic map with a scale of 1"=100' with contour intervals of 5 feet will be far more accurate than using a topographic map with a scale of 1"=2,000' and a contour interval of 20 feet.
Cross-Sectional Slope Map	A (typically) 100- to 200-foot cross section line is drawn on a site plan map through the middle of a building site at right angles to the contour lines, and the overall slope of the cross section is measured. Often, the steepness of several cross sections is measured to define an average slope. While significant changes in grade are taken into account, this method tends to minimize the steepness of rolling lands.
Average Slope	"Average slope" defines the average steepness of a given geographical area, and is expressed by the following formula: $S = \frac{2.29x10^{-3}IL}{A}$ S = Average slope percent A = Total acreage of the area being measured L = Length of each of the contours, in feet (with appropriate scale), within the area being measured I = Contour intervals, in feet While average slope is a useful concept to describe generalized steepness of a given geographical area, it can mask actual conditions in that area. For example, moderately rolling hills may have the same average slope as a flat plain that is cut by a deep canyon. Thus, even though the flat plain is readily accessible and easy to develop, the use of average slope to define developability might understate the potential of that property.

5.6.1.2 How Steep is Too Steep?

The basic premise behind using slope steepness to define "developability" is that, as slopes become steeper, grading and provision of infrastructure become more difficult and expensive, and the extent of landform modification, loss of the aesthetic appeal of natural hillsides, and environmental degradation increase. Based on a review of several hillside ordinances and regulations from communities in the western United States,[1] slopes are generally treated in the manner described in Table 5.6.B.

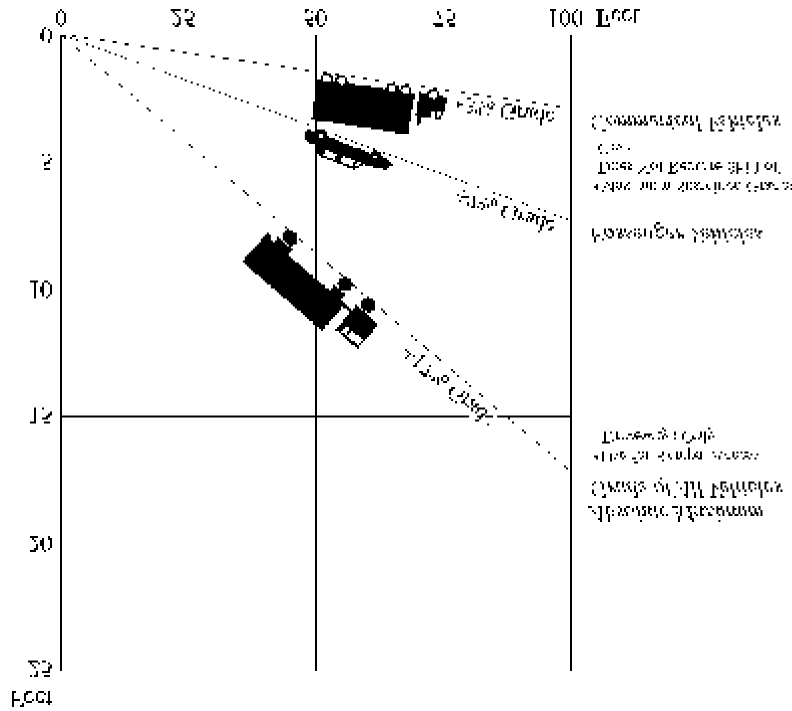
Table 5.6.B - Generalized Slope Categories

Slope Steepness	Slope Problems and General Management
Less than 15 percent	These lands are not generally considered to be "hillside" for management purposes due to the absence of problems related to slope; although rolling land with slopes greater than 5 percent are commonly considered to be hills. Permitted, land uses, and density/intensity of development are generally determined by underlying zoning.
15 to 25 percent	At about 15 percent, slopes begin to create problems for development. Above 12 to 15 percent, roads must run diagonal rather than perpendicular to slopes, as 12 to 15 percent roads are the steepest that are comfortable and safe to drive on, except for very short distances. Grading becomes difficult at this steepness, as roads and buildings require extensive cut and fill. The more restrictive hillside ordinances prohibit development on slopes in excess of 20 percent, or limit the maximum allowable density to 1 du/10 ac, while other ordinances limit density to approximately 1 du/ac or 50 to 75 percent of comparable flat land densities within the underlying zone.
25 to 35 percent	Slope becomes a critical factor in development at this steepness. Large parcels are required because of the extensive cut and fill needed to create roadways and level building pads. Access between roadways and building pads is difficult, and the design of individual lots and buildings to fit site-specific terrain condition is important. Moderately restrictive ordinances begin prohibiting development or limit density to 1 du/10 or 20 ac. Where development is permitted, uses are generally limited to single family residential. Other ordinances limit density to approximately 1 du/2 or 3 ac or 25 to 50 percent of comparable flat land densities within the underlying zone.
Over 35 percent	Slope is extremely critical. Allowable steepness of cut and fill slopes (50 percent) approaches or exceeds natural slopes, resulting in very large cuts and fills or the need for retaining walls for creating even small flat areas. By and large, roads should not penetrate terrain of this steepness. Because of grading problems, individual sites and homes need to be custom designed. Grading in slopes exceeding 50 percent can result in extreme disturbances, and are generally considered to be undevelopable. Only natural building sites within large areas in this steepness category can be developed without extreme disturbance and high costs. Development is prohibited or highly restricted (1 du/40 ac), and uses are limited to single family residential and open space. Where development is permitted, density generally is restricted to 1 du/5 ac or 25 percent of comparable flat land density.

[1] Hillside ordinances, regulations, and policies were reviewed from Breckenridge, CO; Carlsbad, CA; El Paso, TX; Flagstaff, AZ; Glendora, CA; La Verne, CA; Morgan Hill, CA; Phoenix, AZ; San Diego (City), CA; San Diego (County), CA; San Rafael, CA; Santa Fe, NM; Santee, CA; and Scottsdale, AZ.

5.6.1.3 Accessibility

The steepest grades on existing paved highways are 9 to 12 percent for highways, and 30 to 32 percent for urban streets, such as those in San Francisco which run straight up steep slopes (Figure 5.6.2). However, commercial vehicles (e.g., truck, delivery vehicle, fire engine) can ascend a continuous 17 percent grade only in low gear, and sustained grades above 7 to 10 percent require shifting. Thus, for safety purposes, maximum road grades are generally set by communities at 12 or 15 percent, sometimes permitting short stretches of steeper roads where such road grades cannot be feasibly avoided.



Source: Urban Planning and Design Criteria, Joseph Dechiara/ Lee Koppelman 3rd edition, 1982.

Figure 5.6.2 - Maximum Grades

In addition, for safety purposes, two or more points of access to new development are typically required. This ensures continuous access to an area if one access point becomes unavailable, and also permits the staging of emergency vehicles, such as fire engines, along one access point while local residents leave an area via other point(s) of access. Where there is limited development, one of the access points may be permitted to be used for emergency purposes only. In steeply sloped areas, provision of two access points can be difficult.

5.6.1.4 Slope Stability

Hillsides, generally speaking, can be unstable platforms for development. Unless a landslide is already occurring, a steep slope can generally be thought of as existing in a state of equilibrium. When this equilibrium is disturbed by development in hillside areas, the likelihood of slope failure, soil erosion, silting of lower slopes, and downstream flooding increases. Slope stability issues in Riverside County are discussed in further detail in Section 5.0, Public Health and Safety.

5.6.1.5 Aesthetic Resources

Natural slopes are one of Riverside County's primary aesthetic resources. Foothill and mountain areas, which are visible throughout the County, create a dramatic backdrop for local communities, and provide substantial visual open space. Development, particularly if it is dense, will result in a significant loss of the aesthetic value of the study area to the community. In addition, in steeper areas, even development of individual single family dwellings on large lots can, along with needed access roads, result in substantial degradation of the area's aesthetic value.

5.6.1.6 Biological Resources

Communities throughout California have devoted much effort to defining hillside development guidelines that protect the natural *character* of hillside areas, emphasizing visual attributes, and allowing for their development. These techniques, commonly known as landform grading and landform planting, focus on grading and landscaping aimed at recreating a "natural look" within hillside development areas. While landform grading and planting represent a substantial aesthetic improvement on the traditional "cookie cutter" approach to hillside development, they do not address the loss of biological resources that accompany development of natural hillsides and are, therefore, applicable only to the grading that is permitted to occur *after* significant environmental resources are protected. It is also important to recognize that, while aesthetically pleasing development designs may also be destructive of biological resources, preservation of the most biologically productive portions of a development site might not preserve the most aesthetically pleasing portions of a site.

5.6.1.7 Cost of Development and Public Services

In addition to hazards and risks, public and private costs of hillside development can be substantial. Hillside development usually calls for high initial expenditures for improvements such as roads and utilities, and can commit local agencies to maintenance costs far in excess of those common to flat land developments. The construction of roads on steep slopes often calls for substantial grading, extra-wide rights-of-way to accommodate road slopes, retaining walls, and steeply sloping embankments, which can also result in increased long-term maintenance.

Because of the typically low densities present in hillside developments, the per unit cost of utilities is generally higher than for flat land subdivisions. In addition, as development moves up a hillside to higher elevations, it becomes increasingly more difficult and expensive to provide water storage facilities that are at an appropriate elevation to maintain adequate service pressures.[1] In addition, simple activities, such as trash pickup, are often more expensive in hillside areas due to low densities and the increased time it takes for trash trucks to move along steep roadways.

In general, it is not cost effective to provide sewer lines and provide municipal sewage treatment for lots greater than .05 to 1 acre in size. This is because of the high per unit cost of constructing sewage lines, along with the increased potential of providing on-site private waste disposal via septic tanks. However, the feasibility of using septic tanks is reduced on slopes in excess of 15 percent since lines in the septic tank leach field need to run relatively flat. In addition, soil depth within hillside areas is often limited, requiring a greater number of leach lines and a larger leach field than might otherwise be necessary on flatter ground.

5.6.1.8 Slope Maintenance

When large manufactured slopes are created as part of a new development, ensuring their ongoing maintenance is critical. Without appropriate maintenance, manufactured slopes can erode and become unstable over time. As is common in many hillside subdivisions, when slopes are individually owned and maintained, the majority, but not all, of the slopes will be well maintained. In some cases, homeowners' associations are formed to assume the responsibility of maintaining the primary manufactured slopes in the subdivision. While homeowners' associations generally provide better overall maintenance of slope areas, developers are often reluctant to form an association for the sole purpose of slope management, since homeowners' associations can be seen as a negative in the marketplace.

If open space is retained as part of a hillside development, ownership and maintenance of that open space is an important consideration. Developers will often want to dedicate the open space, which often consists of slope areas that are too steep to develop, to a public agency, eliminating the need to form a homeowners' association. However, there is often little benefit to accepting dedication of such lands, and there is no mechanism to fund their maintenance. In other cases, open space areas are divided up into the private lots within the hillside development. While this avoids the need to set up a homeowners' association, it also introduces the possibility of individual owners stripping natural vegetation on hillsides and replacing it with ornamentals. These ornamentals could have negative consequences for the adjacent habitat areas.

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[1] Typically, a grade differential of 100 feet is required between water storage facilities and the highest building being served in order to provide adequate service pressure. In hillside situations, pumping to maintain service pressures, as might be accomplished in a large valley area, is generally not cost effective.

5.6.2 Hillside Management Programs in Other Agencies

The primary methods of hillside management include density controls, runoff controls, hillside grading design regulations or guidelines, or general policy statements. While there are a limited number of techniques available, communities tend to use these techniques in very different ways. A summary of various hillside management programs in the Western United States is presented in Table 5.6.C.

Table 5.6.C - Hillside Ordinance Summary

Agency	Type of Regulation	Requirements for Development on Steep Slopes	Slope Density Formula?	Maximum Density on Steep Slopes
Breckenridge, CO	Zone district for steeply sloped (>15 percent) and other environmentally sensitive lands	District #1 land use guidelines set a maximum land use intensity of 1 du/10 acres.	No.	1 du/10 acres
Carlsbad, CA	Hillside Development Regulations, supplemented by detailed guidelines.	Maximum allowable densities under zoning are modified by slope considerations. Grading is to be minimized in areas with slopes between 25 percent and 40 percent, and is generally prohibited in areas steeper than 40 percent. The length of structures is to be oriented parallel to the contour of the hillside. Manufactured slopes are limited to 30' in height. Grading volumes are limited to 8,000 cubic yards per acre, unless specific findings are made.	Yes. Based on amount of land that can be used to calculate density under base zone.	Areas with slopes over 40 percent are considered to be undevelopable; however, "limited" development may be permitted if this prohibition would "constitute an unconstitutional deprivation of property." No more than 50 percent of the area with slopes between 25 percent and 40 percent may be used for calculating allowable residential density.
Claremont, CA	Zoned District for Hillside Areas	All new developments shall be required to be reviewed and approved by the Architectural Commission and Planning Commission per hillside development criteria found in the ordinance for design, grading, fire protection, and landscaping.	Yes. Based on average slope.	The overall maximum density in a cluster area shall be 0.5 acre per dwelling unit (du). Hillside classifications are combined with slope density standards noted as SD-1, SD-2, or SD-3 establishing different densities based on accessibility and location within City, and property development standards.
El Paso, TX	Planned Mountain Development Zone	The zone provides three options for residential development. In a clustered project (single family or multiple family), a slope density formula applies. For a single family subdivision with no common open space, a schedule of lot size and dimensions, as well as maximum buildable area per lot applies, with steeper slopes requiring larger lots. For a single family tract with a minimum of 20 percent open space, clustering may apply, permitting a development to use the next flatter slope category for calculation of density, thereby reducing minimum lot sizes and open space requirements.	Yes. Based on average slope.	Option 1: In a clustered project, the maximum allowable development intensity is 1 du/4 ac for development on an average slope in excess of 40 percent. A minimum of 65 percent of the site must be retained in open space. Option 2: For single family dwellings with no open space, the minimum required lot size is 2 acres on average slopes over 40 percent. A maximum of 30 percent of the lot is considered to be "buildable." Option 3: For single family dwellings within a site having an average slope greater than 40 percent, the minimum required lot size may be reduced to 1

Agency	Type of Regulation	Requirements for Development on Steep Slopes	Slope Density Formula?	Maximum Density on Steep Slopes
				acre if 20 percent of the site is retained in open space. A maximum of 40 percent of the lot is considered to be "buildable."
Flagstaff, AZ	Resource protection requirements.	Eighty (80) percent of the area within a development having a slope greater than 25 percent is considered to be "Protection Land," and is to be retained in open space.	Yes. Based on amount of land that can be used to calculate density under base zone.	Protection land is subtracted from the net acreage of the site in determining the net buildable site area, and is not counted in the determination of density in the base zoning district.
Glendora, CA	Hillside Development standards and Rural Hillside Residential Zone	General guidelines are applied to hillside areas with an average slope over 10 percent. Maximum lot coverage requirements are set based on the average slope of a parcel. Grading is prohibited on existing natural slopes in excess of 35 percent.	Yes. Formula defines net land area per dwelling unit.	Where the average slope of a site is 30 percent, the lot area per dwelling unit is 1.8 acres; at 40 percent average slope, the lot area per dwelling unit is 2.65 acres; and at a 50 percent average slope, the lot area per dwelling unit is 5 acres.
La Verne, CA	Hillside Overlay District	Special design guidelines are established to govern the manner in which development within the overlay district is designed. Guidelines address access, water supply, fire response times, perimeter fire protection, fire-resistant design and materials, siting of structures, grading, circulation, drainage, retaining walls, architecture and urban design, landscaping, and community amenities. The overlay district also includes requirements for master planning, continuity of infrastructure, and review of development plans by adjacent property owners.	Yes. Based on amount of land that can be used to calculate density under base zone.	Development within the hillside overlay district is based on *net* rather than *gross* acreage as it is on flat lands. Significant topographic, geographic, geologic, and hydrologic features (e.g., ridgelines, knolls, saddles, watercourses); significant environmental features (e.g., riparian habitats, "slopes visible from the valley floor," fuel modification zones, areas over 25 percent slope, and subsurface utility easements) are defined as constraints, and are subtracted from gross site acreage to achieve "net" acreage when determining development density.
Morgan Hill, CA	Hillside Overlay District	Development or modification of any portion of a site having a slope in excess of 20 percent is prohibited, except in limited circumstances for public safety purposes. Where the average slope is greater than 30 percent, a minimum of 85 percent of the site is to remain in open space.	Yes. Based on average site slope.	At a 40 percent average slope, the maximum allowable density is 1 du/2.5 ac. At 47 percent average slope, the maximum allowable density is 1 du/3.85 ac.
Phoenix, AZ	Hillside Development Regulations in zoning ordinance	A slope density formula specifies the maximum number of units per acre. The maximum number of units on a given site is determined by adding the allowable density in each of the City's six slope categories.	Yes. Based on varying densities for various slope categories within site.	For slopes 35 percent and over, the maximum development intensity is 0.20 du/ac (1 du/5 ac).

Agency	Type of Regulation	Requirements for Development on Steep Slopes	Slope Density Formula?	Maximum Density on Steep Slopes
San Diego (City), CA	Hillside Review Overlay	Coastal Zone Requirements: no development is permitted in areas having slopes over 25 percent if the site contains officially mapped sensitive resources. Development may encroach up to 20 percent of the area having slopes over 25 percent if more than 95 percent of the site is that steep. Non-Coastal Zone Requirements: Development may occur on slopes over 25 percent that are not mapped as having sensitive resources provided that certain standards are met.	No.	Not permitted in areas of sensitive resources.
San Diego (County), CA	General policy statement.	General guidelines are aimed at minimizing the "permanent impact upon site resources," including natural terrain, vegetation, visually significant geologic features, and areas which have public or multi-use value.	No.	Not applicable.
San Dimas, CA	General Plan policies, Single Family Hillside (SF-H) Zone, and Subdivision Requirements	General policy statements are provided in the General Plan, which sets maximum density at 1 du/5ac (with 1.5 to 3.0 acre minimum lot sizes in the Puddingstone Hills, and 1.0 acre minimum lot sizes on Way Hill). More definitive standards are established in the SF-H zone, including a slope density formula, and in the subdivision ordinance.	Yes. Defines residential yield per gross acre.	Where the average slope of a site is 30 percent, the average yield is one dwelling unit per 1.67 acres, at 40 percent average slope, the average yield is 3.33 acres per dwelling unit, and over 48 percent average slope, the yield is one dwelling unit per 20 acres. At slopes over 48 percent, the ordinance states that most lots will likely be larger than 20 acres.
San Rafael, CA	Standards for Hillside Subdivisions supplemented by detailed development guidelines	Lot design standards are provided to evaluate the configuration of hillside subdivisions. The ordinance states that lower densities than the maximums may be required where potentially hazardous conditions exist and where site is particularly visible to the community.	Yes. Based on average site slope.	Hillside Resource Residential: 0.2 du/ac Hillside Residential: 0.5 du/ac Low Density (Infill): 2.0 du/ac
Santa Fe, NM	Terrain Management (Development) Regulations	Each lot is required to have an area suitable for building of at least 2,000 square feet At least half of this area must have a natural slope of 20 percent or less. No structure may be placed on a slope of 30 percent. Where a structure is placed on a slope of 20-30 percent, the finished floor elevation may not exceed 5' above the natural grade below that point. Maximum allowable road slope height: 15'; onsite cut slopes may not exceed 10' unless a structural alternative is approved. Onsite cuts may never exceed the height of the building. Onsite fill slopes or retaining walls may not exceed 15'.	No.	Development not permitted on slopes exceeding 30 percent.
Santee, CA	Overlay district regulated by average natural slope of the site.	On slopes over 25 percent, the zoning ordinance states only that limited grading will be permitted, and in certain cases, may be prohibited. "Development should not normally be approved within areas having a slope greater than 25 percent." Policy guidance is provided for public safety, drainage, biological resources, and development design.	Yes. Based on average site slope.	25 percent of the base zoning district's maximum density.

Agency	Type of Regulation	Requirements for Development on Steep Slopes	Slope Density Formula?	Maximum Density on Steep Slopes
Scottsdale, AZ	Environmentally Sensitive Lands Ordinance (Overlay District)	Detailed regulations are provided for development of hillside and desert areas. Incentives are provided for the transfer of density to flatter portions of a development site.	Yes.	On slopes of 25 to 35 percent, the maximum allowable density is 1 du/20 ac; however, a density of up to 1 du/5 ac may be approved by the City Council if the site is not visually prominent. On slopes over 35 percent, the maximum allowable density is 1 du/40 ac. If a site encompasses two or more slope categories, the intensity limit is determined by the slope category of the land on which the building pad or construction envelope is located.

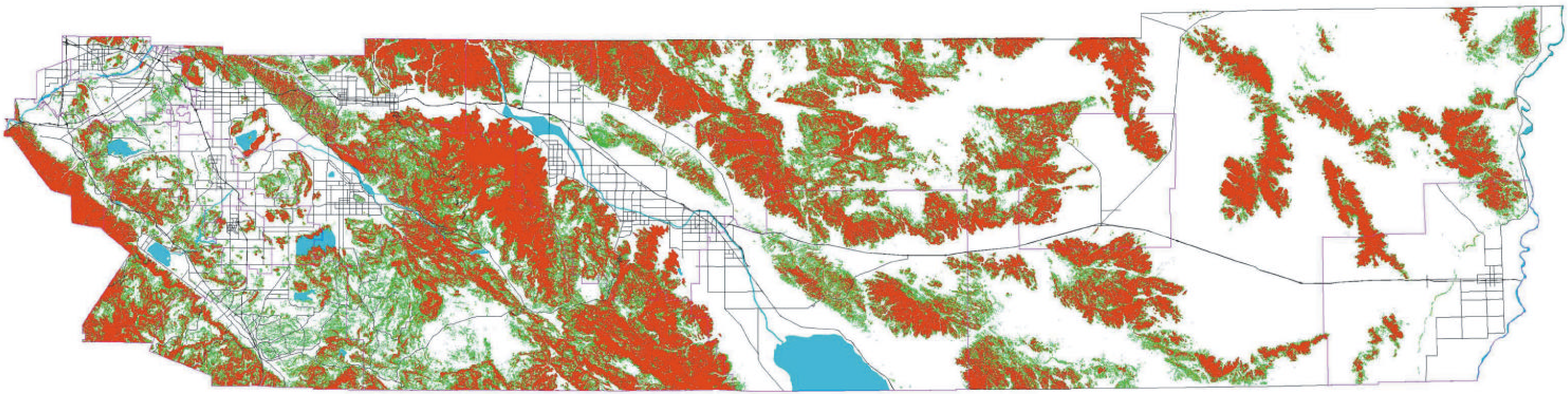
5.6.3 Areas of Steep Slopes in Riverside County

Unlike many areas of California, within Riverside County, steep hillsides tend to rise abruptly from flat valley floors and high plateaus, and areas of gently rolling hills are relatively limited. This pattern is the result of geologic structures dominated by a series of northwest-southeast trending fault systems. Figure 5.6.3 identifies areas of steep slopes in the County. Specific mountain and hillside areas are also illustrated in Figure 4.8.1, Visual Resources in Riverside County.

The western margin of Riverside County is dominated by the Santa Ana Mountains, which form a rugged boundary, separating RiversideCounty from Orange County. The Santa Ana River Valley provides the only flat connection between Riverside and Orange Counties. The steep slopes of the Jurupa Hills also limit the potential for roadway connections north into San Bernardino County.

Hillside areas south of Lake Mathews, east of Temescal Canyon and the Temecula Valley, and southeast of Lake Perris form the Moreno, Perris, and Hemet-San Jacinto Valleys, and provide limited opportunities for roadway connections between them. The Badlands, San Bernardino Mountains, and San Jacinto Mountains frame the San Gorgonio Pass area. South of the San Jacinto Mountains are a series of rolling hills and plateaus where rural residential communities such as Aguanga are located. Steep northwest-southeast trending mountain ranges and hillside areas frame the relative flat Coachella Valley.

East of the Coachella Valley are a number of mountain ranges separating the Coachella Valley from the Chuckwalla Valley. Additional mountain ranges in the eastern portion of the County form the Rice Valley and Palo Verde Mesa.



Slope Angle

- Less than 15%
- 15 - 25%
- 25 - 30%
- 30% and Greater

- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure 5.6.3

Source:EarthConsultantsInternational.

AREAS OF STEEP SLOPES

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5.6.4 Physiographic and Geologic Setting

The County of Riverside covers approximately 7,000 square miles of the geologically complex Southern California region, from the Colorado River at the Arizona border to within ten miles of the Pacific Ocean. Riverside County spans portions of several major geologic provinces:

- ***Peninsular Ranges:*** The western portion of Riverside County and most of its population are in the Peninsular Range province, which is dominated by right-lateral strike-slip faulting associated with the San Jacinto and Elsinore faults. However, all types of faulting may be found in this block. Temecula, Murrieta and many agricultural areas of southwestern Riverside County lie in the broad structural depression called the Elsinore Trough, formed and bounded by active faults of the Elsinore fault system. The Santa Ana and San Jacinto Mountains are part of the Peninsular Ranges, and were built by movement along earthquake faults.

- ***Salton Trough:*** The desert communities and farmland of the Coachella Valley in central Riverside County are located within the Salton Trough province. Here, the plates are separating and spreading centers exist. The spreading centers continue to the south, into the Gulf of California. At present, the Salton Trough is cut off from the Gulf of California by an accumulation of sediment at the mouth of the Colorado River. The Trough is filled with sediment three miles thick, derived primarily from the Colorado River. Periodically during the last 10,000 years, the Trough has been inundated with water. The most recent inundation formed the Salton Sea in 1905.

- ***Transverse Ranges:*** Throughout most of the western U.S. are northwest-trending geologic features, a consequence of current plate motions. The trend of the Transverse Range province is a startling exception. These mountains run west to east from west of Santa Barbara to east of San Bernardino. The easternmost San Bernardino Mountains lie in north-central Riverside County. Although most of this province is located north and west of Riverside County, populated areas such as Riverside, Norco and Corona are at risk from Transverse Range earthquakes occurring on the nearby Cucamonga or Sierra Madre fault systems, about 20 to 25 miles to the north.

- ***Mojave Desert:*** The Mojave Desert province consists of the eastern half of the County, and includes the Blythe area. Compared to the rest of Riverside County, this province has a moderate to low rate of seismicity and very few mapped faults. However, just north of the County, there are numerous active right-lateral strike-slip faults in the Mojave Desert province. These have recently produced the 1992 Landers M_w 7.3 and the 1999 Hector Mine M_w 7.1 earthquakes.

The hazards of subsidence and hydroconsolidation (soil collapse) are concentrated in valley regions filled with sediment, while mass wasting (such as landslides and rockfall) is associated with the mountainous regions primarily underlain by igneous and metamorphic rock.

The bedrock exposures of Riverside County consist predominantly of igneous and metamorphic rock with some sedimentary units. They vary from hard rock underlying steep slopes of the San Jacinto Mountains to the weathered granitic rocks of Joshua Tree National Park and hillsides near the City of Riverside.

Alluvial (river) valleys between these mountain ranges contain sediments with significant variation in thickness. Some valleys are filled with a few hundred feet of Pleistocene and Holocene sediments, whereas others, such as the Coachella, San Jacinto and Elsinore Valleys, contain several thousand feet to several miles of sediment. The thickest sediments have been deposited in basins that are being pulled apart by the movement of tectonic plates.

5.6.5 Geology and Engineering Geology Coverages

Figure 5.6.3 shows a detailed digital Engineering Geologic Materials map prepared for Riverside County.

5.6.5.1 Mass Wasting - Slope Instability Hazards

Mass wasting is the downslope movement of rock and regolith (rock products such as soil, sediment, weathered rock and windblown deposits) due to the pull of gravity. Mass wasting includes landslides, mudflows, rock falls, and creep, and is an important part of the erosional process. Mass wasting occurs continuously on all slopes; some mass wasting processes act very slowly, others occur very suddenly, often with disastrous results. In a typical year in the United States, mass wasting causes 25 to 50 deaths and over $1.5 billion in damages.

Slope stability is dependent on rock type, pore water pressure, and slope steepness due to natural or man-made undercutting. The igneous and metamorphic basement rock forming much of the County's hillside terrain is generally stable in its natural condition, however, steepness of the slopes can result in rocks that could fall as a result of earthquake ground shaking or intense rainfall. Existing landslides and soil slumps have been mapped within the County, and where slopes have failed before, they will fail again.

Every slope has an angle of repose. Slopes less than this angle can resist the pull of gravity and will be at rest. Slopes steeper than this angle will eventually fail. On average, the angle of repose is 35 degrees from horizontal, but varies widely. The looseness or consolidation of the material, planes of weakness and vegetation all affect angles of repose. The most effective way to protect lives and property from mass wasting is to prohibit development on or near slopes that exceed about 30 degrees in steepness.

Types of Mass-Wasting Processes: In common usage, any downslope movement of material is called a landslide. In actuality, landslides are only one of many types of mass wasting, distinguished by style and velocity of movement. The processes are separately identified, but are part of a continuum, and distinctions between them are not always sharp. Classification is thus sometimes difficult or arbitrary, but includes these broad categories:

- Slope Failure - a sudden downhill transport of material by sliding, rolling, falling, or slumping.

- Sediment Flow - Downhill transport of rock and plant material mixed with water or air.

Slumps: Blocks of rock or regolith rotate as units along a concave-upward curved surface (see Figure 5.6.4a). The upper surface of each slump block remains relatively undisturbed. Slumps leave concave scars or depressions on a hill slope. They can be isolated or may occur in large complexes covering thousands of square meters. Slumps often form as a result of human activities, and thus are common along roads where slopes have been steepened during construction. Heavy rains and earthquakes can also trigger slumps.

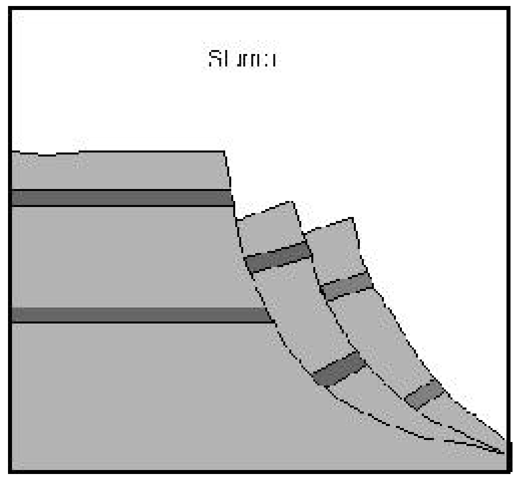


Figure 5.6.4a: Slumps

Falls: Rock falls occur when a piece of rock becomes dislodged (see Figure 5.6.4b). Debris falls are similar, but involve a mixture of soil, regolith, vegetation, and rocks. At the base of most cliffs is an accumulation of fallen material termed talus.

Slides: Rock can have planar features that allow other rocks and debris to slide downhill that include bedding planes, foliation surfaces, and joint surfaces (see Figure 5.6.4c). Piles of talus (fallen material) are common at the base of a rock slide or debris slide. Unlike slumps, slides see no rotation of the sliding mass; nor does the mass of material maintain its original shape.

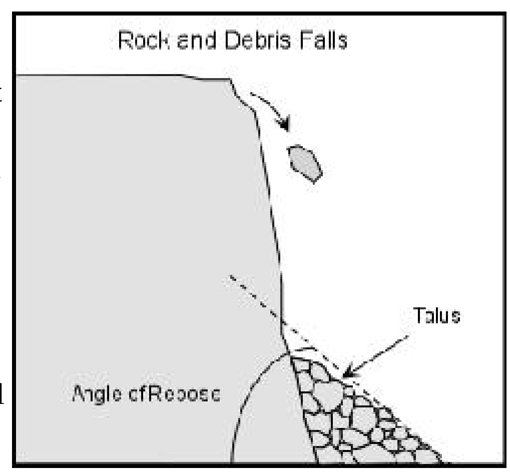


Figure 5.6.4b: Falls

5.6.5.2 Rock Fall

Areas most at risk from rock fall lie below steep outcrops of relatively well-cemented rock. Such rock underlies much of the County's mountain ranges. Rock fall hazard in the County is high for hillside development, and for development located adjacent to steep slopes.

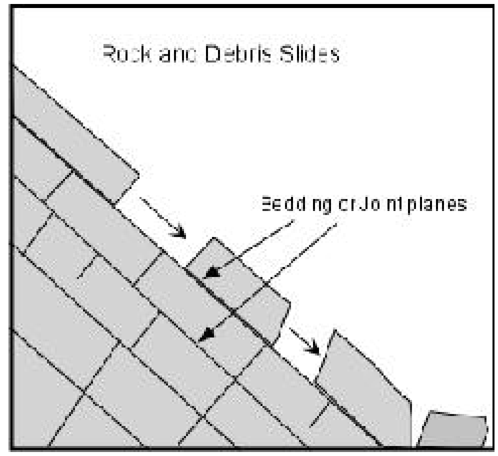


Figure 5.6.4c: Slides

5.6.5.3 Debris Flows

A debris flow is a mixture of rock and/or regolith with water or air. Whether debris will flow downhill depends on numerous factors, including: soil depth and composition, the kind of vegetation, the size and variety of tree roots, subtle variations in slope shape, existence of road cuts or drainage pipes, incongruities in underlying bedrock, and even the presence of animal burrows.

Fine-grained sedimentary rocks are most susceptible to debris flows, especially during exceptionally high rainfall periods. Typically, debris flows occur when a long saturation period is followed by intense bursts of rain, concentrated in just a few hours or days. Water, often traveling beneath the surface from miles away, fills the pores (spaces) in surficial material but not in bedrock or clay, which have far fewer pores and are less permeable (they lack connections between pores). This creates a saturated zone in the surficial material. As the water fills the pores between solid particles, it increases pore pressure and decreases the friction that holds material to a slope. At some point, gravity causes the mass to break loose and slide along the less permeable surface below.

Debris flows, like rockfalls, occur rapidly and without warning. The areas most at risk from debris flows include:

- Canyon bottoms, stream channels, and areas near the outlets of canyons or channels. Multiple debris flows that start high in canyons commonly funnel into channels. There, they merge, gain volume, and travel long distances from their sources.

- Downslope from swales (depressions). Debris flows commonly begin in swales on steep slopes.

- Roadcuts and other altered or excavated areas of slopes. Debris flows and other mass wasting events onto roadways are common during rainstorms, and often occur during milder rainfall conditions than those needed for debris flows on natural slopes.

- Places where surface runoff of water is channeled, such as along roadways and below culverts.

Where one debris flow has occurred, others will inevitably follow. Much of the County of Riverside is underlain by alluvial fans, deposits that have been shed from streams exiting mountain ranges. These fans and stream washes are evidence of many debris flows in the recent geologic record. In the smallest, most common events, the impact to the County is from boulders transported onto roadways and improvements.

Numerous man-made controls have been constructed to reduce the impact of these events on the County. The County operates more than 40 dams, and several hundred miles of levees and storm drains (Riverside County Flood Control and Water Conservation District, 2000).

Without the presence of extensive flood control devices, including large debris catchment basins, the areas downgradient or downstream from unstable slope areas may be subject to catastrophic debris flow inundation.

5.6.6 Expansive Soils

Expansive soils have a significant amount of clay particles, which can give up water (shrink) or take on water (swell). The change in volume exerts stress on buildings and other loads placed on these soils. These soils are often associated with geologic units having marginal stability. The distribution of expansive soils can be widely dispersed, and they can occur in hillside areas as well as low-lying alluvial basins.

Expansion testing and mitigation are required by the current grading and building codes. Active enforcement, peer review and homeowners' involvement are required to maintain these standards.

Although expansive soils are now routinely alleviated through the County Building Code, problems related to past, inadequate codes constantly appear. Expansive soils are not the only cause of structural distress in existing structures. Poor compaction and construction practices, settlement and landslides can cause similar damage, but require different mediation efforts. Once expansion has been verified as the source of the problem, mitigation can be achieved through reinforcement of the existing foundation, or through the excavation and removal of the expansive soils in the affected area.

5.6.7 Collapsible Soils

Hydroconsolidation, or soil collapse, typically occurs in recently deposited, Holocene (less than 10,000 years old) soils that were deposited in an arid or semi-arid environment. Soils prone to collapse are commonly associated with man-made fill, wind-laid sands and silts, and alluvial fan and mudflow sediments deposited during flash floods.

The soils typically contain minute pores and voids. The soil particles may be partially supported by clay or silt, or chemically cemented with carbonates. When saturated, collapsible soils undergo a rearrangement of their grains and the water removes the cohesive (or cementing) material. Rapid, substantial settlement results. An increase in surface water infiltration, such as from irrigation, or a rise in the groundwater table, combined with the weight of a building or structure, can initiate settlement and cause foundations and walls to crack.

In the County of Riverside, collapsible soils occur predominantly at the base of the mountains, where Holocene-age alluvial fan and wash sediments have been deposited during rapid runoff events. In addition, some windblown sands may be vulnerable to collapse and hydroconsolidation. Typically, differential settlement of structures occurs when lawns or plantings are heavily irrigated in close proximity to the structure's foundation. Forensic indications of collapsible soils include the following:

- Tilting floors
- Cracking or separation in the structure.
- Sagging floors.
- Non-functional windows/doors.

5.6.8 Ground Subsidence

Ground subsidence is typically a gradual settling or sinking of the ground surface with little or no horizontal movement, although fissures (cracks and separations) are common. Subsidence can range from small or local collapses to broad regional lowering of the earth's surface. While subsidence typically occurs throughout a susceptible valley, additional displacement and fissures occur at or near the valley margin. Susceptible valleys are predominantly filled with unconsolidated sand, and silty sand that includes thin layers of silt and clayey silt. Fine-grained alluvium and organic matter often underlie the fissure areas (Kupferman, 1995). Two types of fissures associated with subsidence. The first are generally straight and correspond to the traces of faults, while the second are more curvilinear on the surface and appear to correspond to the alluvium-bedrock contact at valley margins.

The causes of subsidence are as diverse as the forms of failure, and include dewatering of peat or organic soils, dissolution in limestone aquifers, first-time wetting of moisture-deficient low-density soils (hydrocompaction), natural compaction, liquefaction, crustal deformation, subterranean mining, and withdrawal of fluids (groundwater, petroleum, geothermal). Most of the damaging levels of subsidence are induced by the extraction of oil, gas or groundwater from below the ground surface, or the organic decomposition of peat deposits, with a resultant loss in volume. Ground subsidence can also occur as a response to natural forces such as earthquake movements, and the evolution of a sedimentary basin as it folds and subsides. Earthquakes can cause abrupt elevation changes of several feet.

Ground subsidence can disrupt surface drainage, reduce aquifer system storage, form earth fissures (cracks and separations), and damage wells, buildings, roads and utility infrastructure. Regional subsidence generally damages structures that are sensitive to slight changes in elevations, such as canals, sewers, and drainages. In the County of Riverside, risk due to regional subsidence is greatest at valley margins.

In Riverside County, subsidence and fissuring have been caused by falling groundwater tables and by hydrocollapse when groundwater tables rise (Shlemon and Hakakian, 1992). In addition, many fissures have occurred along active faults that bound the San Jacinto Valley and Elsinore Trough.

Figure 5.6.5 shows regions of documented subsidence and regions that may be susceptible to subsidence. The latter include all alluvial valley regions. Subsidence has only been documented in three areas:

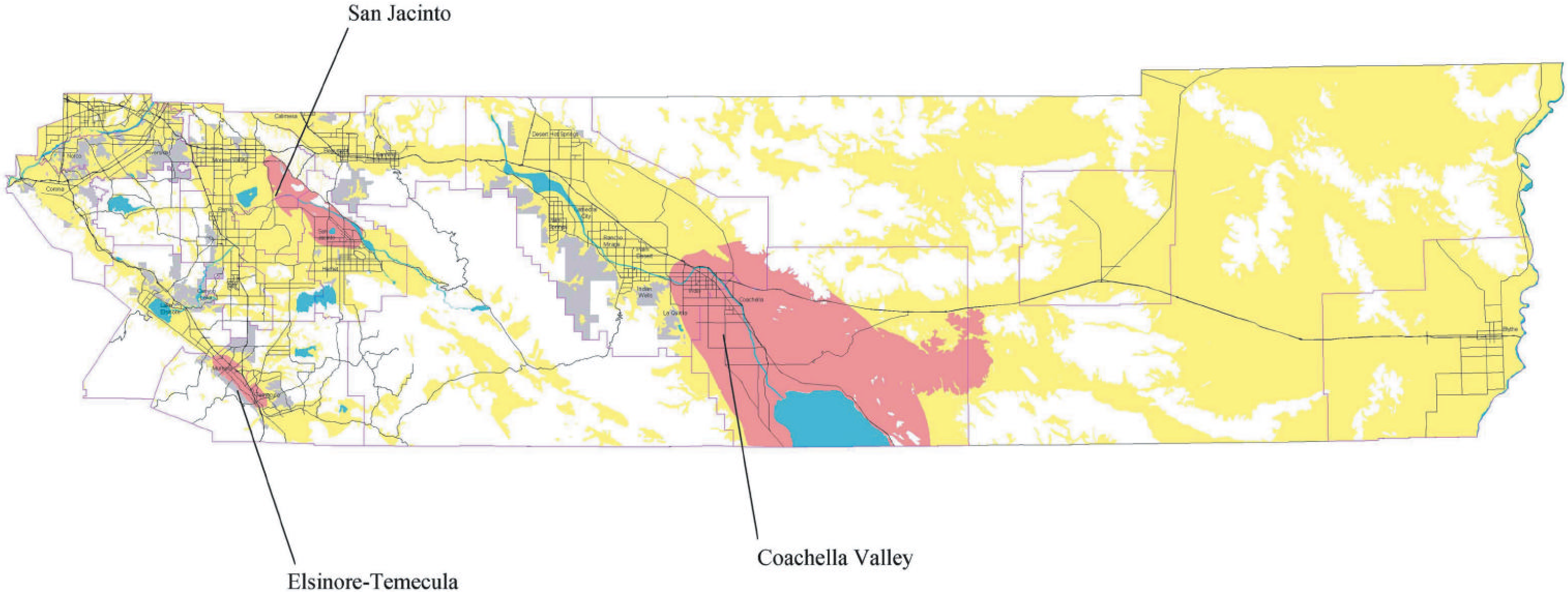
- Elsinore Trough, including Temecula and Murrieta.
- San Jacinto Valley from Hemet to Moreno Valley.
- Southern Coachella Valley.

These areas are all potentially sensitive to the withdrawal of groundwater. Depending on the depth and mechanical properties of the aquifer and the overlying sediments, they can subside if groundwater resources are not managed properly. Mitigation of ground subsidence usually requires a regional approach to groundwater conservation and recharge. Such mitigation measures are difficult to implement if the geology of the aquifer and overlying sediment are not well understood. Furthermore, conservation efforts can be quickly offset by rapid growth and attendant heavy water requirements (golf courses, for example, consume about 8 acre-feet of water per acre per year). Further, it is not uncommon for several jurisdictions to utilize a continuous groundwater aquifer, and then mitigation requires regional cooperation among all agencies.

5.6.8.1 Elsinore Trough

Two separate areas of active subsidence are known in the Elsinore Trough (Shlemon and others, 1995), a broad structural depression called a graben, which has been formed by active faulting in the Elsinore fault system. Subsidence in the two areas, near the communities of Temecula and Murrieta, was caused by different mechanisms.

Temecula: The Temecula fissures first appeared in 1987. Short, parallel ground fissures advanced across 7 miles from Wolf Valley in the south to the Temecula-Murrieta valleys in the north. By 1991, alleged damages to residential and commercial structures exceeded $50 million (Corwin and others, 1981). The Temecula-area fissures occur in northwest-trending valleys informally designated as the Murrieta, Temecula, and Wolf Valley grabens (low areas bounded by faults). In this case, the grabens are approximately one mile wide and bounded by faults of the Elsinore fault system. Studies of the Temecula fissures led to the discovery of two previously



Subsidence Zones

- Areas with Documented Subsidence
- Susceptible Areas
- Stream, River, Canal or Ditch
- Major Roads & Highways
- Area Plan Boundaries
- Cities

Figure 5.6.5

Source: EarthConsultantsInternational.

Scaleisapproximate
0 6 12Miles

AREAS OF DOCUMENTED OR SUSCEPTIBLE TO SUBSIDENCE

R:\SVC931-Graphics\ExistingSetting\subsidence.cdr(7/5/02) unrecognized active faults, the Wolf Valley and the Murrieta Creek. These two faults primarily control the distribution of the Temecula fissures (Shlemon and Hakakian, 1992). Many hypotheses have been proposed to explain the generation of the Temecula fissures. The two most often preferred are:

1. Accelerated pumping of groundwater caused deep compaction. Tensile stresses (which pull ground apart) concentrated along nearby, graben-bounding faults.

2. A seismic creep (fault movement that does not produce earthquakes) occurred along the Wolf Valley and Murrieta Creek faults.

Groundwater pumping is now the favored hypothesis (Shlemon and Davis, 1992), due to the observation that, in the days and weeks prior to subsidence, several new wells began pumping. Since the cessation of pumping, the fissures have not increased in number or size.

Murrieta: The Murrieta fissures first occurred in 1990, primarily in the "California Oaks" subdivision. About 50 discrete fissure areas have formed in and around the 10,000-home development. In litigation, damages associated with the Murrieta fissures were alleged to exceed $100 million by 1992 (Shlemon and Hakakian, 1992). These fissures are similar in appearance to the Temecula fissures, however, they occur within stream-filled channels. They occur primarily at the transition between bedrock and alluvium (stream deposits). In places, the alluvium thickness locally exceeds 75 feet, and as much as 60 feet of alluvium was left in-place after site grading. These stream sediments were then surcharged with about 10 feet of compacted fill, and residential structures were built over the fill. Subsequent geotechnical studies (Shlemon and Hakakian, 1992) indicate that groundwater levels have risen as much as 50 feet. The rise is attributed to irrigation of a golf course and residential lots.

5.6.8.2 San Jacinto Valley

In the San Jacinto Valley, the groundwater table has declined more than 120 feet (Lofgren, 1976), and has resulted in about three feet of maximum surface subsidence between 1939 and 1959 (Proctor, 1962). It is estimated that most of the subsidence (70 to 80 percent) resulted from groundwater withdrawal, with the remainder from subsidence of the sedimentary basin due to local tectonic forces associated with movement of the San Jacinto fault system (Holzer, 1984).

5.6.8.3 Coachella Valley

The Coachella Valley is filled with more than 10,000 feet of sediments, of which the upper 2,000 feet are water-bearing deposits. The most important source of groundwater recharge to the lower Coachella Valley is the Colorado River (Tyley, 1974). Minor sources of recharge include groundwater inflow from adjacent areas, infiltration of precipitation that falls on the valley floor, and local runoff from the mountains that border the area.

The groundwater basin in the Coachella Valley is currently in a state of overdraft. Groundwater levels are declining at an increasing rate as a result of valleywide mining for groundwater. Water levels declined up to 50 feet from the early 1920s to the late 1940s. In 1949, water from the Colorado River was imported through the Coachella Canal and pumping of groundwater decreased. Groundwater levels recovered throughout most of the valley from the 1950s to the 1970s, with some basin recharge attributed to leakage from unlined water canals. Since the late 1970s, the demand for water has exceeded the deliveries of imported surface water, and groundwater levels have been declining again as a result of increased pumping. By 1996, in many areas, groundwater levels fell beneath the historical low.

Recent studies by the U.S. Geological Survey (USGS) have determined that long-term declines in water levels of sufficient magnitude to induce land subsidence have occurred in portions of the Coachella Valley. In 1996, the USGS (Ikehara and others, 1997) established a precise geodetic network to monitor elevation changes and thus land subsidence in the lower Coachella Valley. It currently monitors 17 locations. Of the 15 measurement locations with historical elevation data, 14 indicate cumulative subsidence from -0.2 to -0.5 of a foot since the 1930s. However, the magnitude of these subsidence determinations is within the range of uncertainty (±0.2 feet), so these measurements do not unequivocally indicate that subsidence has occurred.

Where data were available, the USGS plotted historical subsidence over time and compared this to water level changes in nearby wells. Subsidence occurred during periods of water level decline, and rebound occurred during intervening periods of water level recovery. This correspondence suggests that land subsidence is occurring, and a significant part of the measured subsidence likely has occurred since 1991, about the time when water levels began declining below their previously recorded low levels (Steve Robbins, personal communication, 1999).

The U.S. Geological Survey (Ikehara and others, 1997) plans to precisely measure elevation every 2 to 3 years to determine the magnitude and extent of subsidence. In addition, monitoring of well water levels is required to assess the relationship between groundwater overdraft and regional subsidence.

As is true elsewhere, mitigation of subsidence in the Coachella Valley will require a regional approach to groundwater conservation and recharge. Because overdraft of the Coachella Valley groundwater basin is caused by all water users in the area, and it is not feasible to predict exactly where ground fissures will appear, one potential mitigation measure is to fund structural repairs or replacement with costs passed on to water users through the Coachella Valley Water District.

Currently, groundwater recharge in the Coachella Valley area is minimal. The Coachella Valley Water District operates a pilot recharge facility south of Lake

Cahuilla near Avenue 62 and Madison Street, in the city of La Quinta. The facility has been in operation since 1996 and has shown that recharge is feasible there (Steve Robbins, personal communication, 1999). Design of a full-scale facility at this location will likely begin within the next several years.

5.7 Hazardous Materials

Over the past several decades, innovations and technological advances in agriculture and industry have improved the quality of life and well being of modern society. Some of these innovations and advances have required the utilization of greater amounts of trace metals and chemical compounds. In the United States, tens of thousands of different chemical compounds are currently in use, with annual introduction of many new and/or modified chemical substances. Large quantities of these materials are refined, manufactured, transported, stored and disposed of in Southern California and Riverside County. Many of these compounds are also potential contaminants which, if improperly handled, transported, stored, utilized or disposed of, can exert harmful effects to humans and the environment. Potential contaminants can enter the environment through a variety of pathways such as improper use of application, improper storage or disposal, and accidental discharge.

Hazardous materials are commonly used by all segments of society including manufacturing and service industries, commercial enterprises, agriculture, military installations, hospitals, schools, and households. Anticipated residential, commercial and industrial growth within Riverside County in the coming years will make the identification of potential problems associated with the handling, transport, storage and disposal of hazardous materials an increasingly important consideration.

Major federal and state laws regulating hazardous waste management fall into two categories. Hazardous waste site cleanup is governed by the Comprehensive Environmental Compensation and Liability Act (CERCLA) of 1980, and the Superfund Amendments and Reauthorization Act (SARA) of 1986. Regulation of businesses that generate, transport, treat, and dispose of hazardous wastes is governed by the Resource Conservation and Recovery Act (RCRA) and the California Hazardous Waste Control Law (HWCL).

5.7.1 Definitions

5.7.1.1 Hazardous Materials

Title 22, Division 4 (Environmental Health) of the California Administrative Code Health and Safety Code defines a hazardous material as a substance or combination of substances, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics may either:

- Cause, or significantly contribute to an increase in mortality, or in serious irreversible or incapacitating reversible illness; or
- Pose a substantial present or potential hazard to humans or the environment when improperly treated, stored, transported, disposed, or otherwise managed.

Hazardous materials include a wide range of potentially injurious substances including pesticides, herbicides, toxic metals and chemicals, gases and liquified gases, explosives and volatile chemicals, biological compounds and organisms, and radioactive substances. The Code of Federal Regulations (CFR Title 40, Part 261) defines hazardous materials on the basis of ignitability, reactivity, corrosiveness, toxicity, and/or other properties.

5.7.1.2 Types of Hazards

Hazardous materials and wastes can be divided into several categories depending on the compounds' physical and chemical properties. Most substances present multiple hazards, including the following.

- ***Combustibility*** is the ability of a material that act as a fuel and sustain a fire. Combustion is a chemical reaction that requires heat. Heat is either supplied by the ignition source and maintained by combustion, or it is supplied by an external source. The concentration of fuel and oxygen must be high enough to allow ignition and maintain the burning process. When a material itself generates enough heat to self-ignite and combust, spontaneous combustion occurs in the form of a fire or explosion.

- ***Flammable*** refers to materials that can be ignited easily and burn quickly. For a liquid or gas, flammability is the ability to generate a sufficient concentration of combustible vapors to be ignited and produce a flame. Most flammable solids are metals that burn rapidly. The physical state of a metal is a major determinant of its potential to ignite. Metals in a powder form will ignite more readily than those cast in a solid brick. Many flammable solids are water-reactive.

- ***Corrosiveness*** is the ability of a compound to break down or cause degradation of tissue or other materials on contact. Common corrosives are the halogens (such as chlorine and flourine), acids (sulfuric and acetic acids), and bases (lye and calcium hydroxide). Acids and bases may be organic or inorganic.

- A ***chemical reaction*** is the interaction of two or more substances that results in chemical changes. A reactive material is one that can undergo a chemical reaction under certain specified conditions. A reactive hazard refers to a substance that burns, explodes, or displays some other hazardous behavior in the presence of water or under normal atmospheric conditions.

- ***Explosives*** are substances that undergo very rapid chemical transformation, releasing large amounts of various gases and heat. Explosions produce gases such as nitrogen, oxygen, carbon monoxide, and water vapor, expanding rapidly at velocities exceeding the speed of sound, creating a noise and a shock wave or high-pressure wave front. Explosive hazards are categorized as high or low (referring to the rate of chemical transformation). Explosions may occur as a result of reaction between may chemicals not ordinarily considered to be explosives (such as ammonium nitrate).

- ***Oxidizing agents*** are compounds or elements (including oxygen itself) that yield oxygen readily, thereby increasing the combustion rate of organic materials. Oxidizing materials can burn in the absence of air, due to their ability to provide their own oxygen for the combustion process. With the exception of water, reactive substances, strong oxidizers have more potential incompatibilities than any other chemical group.

- ***Reducing agents*** react with other materials in a manner opposite to that of oxidizing agents. Reducing agents present many of the same problems as oxidizers. By definition, reducing agents are highly oxidizable and can react with air or moisture in the air. Reducing agents react with a broad spectrum of chemical classes and the reactions can be exothermic (generates heat) and violent.

- ***Compressed gas*** is a gas in a closed container that is under sufficient pressure to cause injury or damage if it is released suddenly, even though the gas itself may pose no inherent hazard (e.g., compressed air is a hazardous material). Generally, to be considered a compressed gas, the in-container pressure of the material must exceed 40 pounds per square inch absolute (psia) at 70 degrees (Fahrenheit). Many compressed gases, because of the pressure within the containing vessel, are actually in a liquid state. If these materials are heated above their critical temperature, the risk of extreme rupture increases.

- ***Toxic materials*** cause organisms to suffer local or systemic detrimental effects. Toxic hazards can be categorized by the physiological effect they have on organisms. A given material can induce more than one physiological response.

The use, storage, and transport of hazardous materials is facilitated by the use of standardized "diamond placards," which identify the type of hazard associated with any particular compound.

5.7.1.3 Hazardous Waste

Hazardous waste is often generated as a byproduct of industrial, manufacturing, agricultural, and other uses. The Federal Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as any solid, liquid, or contained gaseous material that is either disposed, incinerated or recycled. A hazardous material may become hazardous waste upon its accidental or inadvertent release into the environment. Although hazardous wastes may be considered hazardous materials, hazardous materials are not may not always be classified as hazardous waste. For example: liquid chlorine transported in a tanker truck would be classified as a hazardous material. This same substance, upon accidental release into the environment, would be considered hazardous waste. Both hazardous materials and hazardous waste pose potential risks to the health, safety, and welfare of the County, if handled inappropriately. All hazardous waste must be discharged at a Class I facility.

5.7.1.4 Designated Waste

Designated waste is hazardous waste that has been granted a variance from hazardous waste management requirements. Designated wastes can be discharged only at Class I landfills, or at Class II facilities approved for containment of the particular type of waste to be discharged. In addition, nonhazardous waste consisting of, or containing pollutants that could be released at concentrations in excess of applicable water quality objectives, or that could cause pollution of surface or subsurface waters may be classified as “designated waste.”

5.7.1.5 Hazardous Waste Generators

Small-scale generators are businesses that generate less than 2,205 pounds (1,000 kilograms) of hazardous waste per month (13.23 tons per year). A majority of the hazardous waste generators under the County’s purview are classified as small quantity generators. Collectively, small businesses generate a very large portion of the hazardous waste produced in the County.

5.7.2 Generators/Users of Hazardous Materials

5.7.2.1 Commercial/Industrial Uses

The U.S. Environmental Protection Agency (EPA) compiles information provided by individual facilities into a “Toxic Release Inventory” (TRI). The Toxic Release Inventory documents the release and transfer of hazardous materials resulting from manufacturing processes. This database describes the type of hazardous material generated and the method of disposal (either through on-site release, off-site disposal, or off-site recycling). According to the database, the five largest generators of production-related hazardous materials in Riverside County produce over 15 million pounds of these materials, including lead compounds; ammonia; hydrochloric, sulfuric and phosphoric acids; and xylene. These hazardous waste generators include food and beverage processors as well as battery, semi-conductor, and metal container manufacturers. Although hazardous waste generators are scattered throughout the County, most of the large producers of these materials are located in the western portion. Of the five largest generators described above, two were located in Corona. The other three were located in Riverside, Temecula, and Mira Loma.

Underground storage tanks (USTs) associated with automotive service stations, airports and truck stops represent a risk for the accidental release of hazardous materials into the environment. The effect of such a release may be compounded by the presence of a high groundwater table in the area surrounding the tank. USTs may leak gasoline, diesel and/or waste oil. Recent and increasingly stringent government regulation and inspection of USTs (such as double-walled construction, leak detection systems, and protective coatings) should result in fewer UST leaks in the future.

Hazardous materials are also typically encountered in a number of common businesses. Automotive repair shops and auto parts stores generally have halogenated cleaning solvents, antifreezes (ethylene glycol), freon, and various oils and greases. Auto body shops commonly use a variety of paints, paint solvents, and thinners in their operations.

Photo processing facilities are a probable source of potentially hazardous materials. A number of chemicals are used in the development process, including silver solutions. Although changes in dry-cleaning processes have reduced the number of hazardous materials incidents within this industry, the potential for misuse of hazardous materials, including chlorinated solvents, remains.

Many types of retail businesses within Riverside County commonly store and sell hazardous materials. These materials may be subject to uncontrolled release during an earthquake, fire, or other upset. Typical hazardous materials sold at retail outlets includes paints, solvents, cleaning fluids, and garden pesticides and fertilizers. The adverse effects produced by the accidental release of hazardous materials may be compounded by the release and co-mingling of several different hazardous materials during such an event. In addition, retail establishments that provide propane or other compressed fuels to the public represent a potentially significant explosive hazard.

Many "high-tech" industries are moving to Riverside County, with more plants predicted to open in the future. To support these industries, the County will realize a large increase in the transportation of highly toxic and corrosive materials into and out of the County. Along with these hazardous materials comes the problem of hazardous waste management and disposal. The closing of hazardous waste disposal sites will necessitate the transportation of these materials over greater distances.

5.7.2.2 Agricultural Uses

There is a long history of agricultural production in Riverside County. Agricultural activities typically include the storage and periodic application of pesticides, herbicides, and fertilizers, as well as the storage and use of toxic fuels and solvents. Pesticides and herbicides vary in toxicity and persistence in the soil. Pesticides that degrade slowly over time may leave undesirable residues on crops or in the soil, resulting in higher levels of pesticides in the food chain. The infiltration of these substances may leach into local groundwater supplies, presenting an elevated risk of groundwater contamination.

The over-application of chemical substances such as fertilizers, herbicides, and pesticides in agricultural production has resulted in the localized contamination of top soils and groundwater. The increased salinity and nitrate levels are problems throughout Riverside County where dairy farming, crop raising, and citrus groves are prevalent.

In addition to chemical substances applied to agricultural crops, large scale dairies, feed lots or poultry farms pose a potential environmental hazard. Animal waste from these uses could, if not properly disposed of (or otherwise managed), affect the quality of local and regional groundwater resulting in increases nitrate levels in local drinking water supplies. An examination of groundwater quality has determined that agriculture-induced groundwater contamination occurs primarily in the dairy preserve of Norco, the San Jacinto Valley, and the Colorado River Basin.

5.7.2.3 Household Uses

Nearly all Riverside County residents have some type of hazardous material in their homes. Examples include motor oil, paints, cleaners, aerosols, and pesticides. Household hazardous materials pose serious health issues for people who improperly use or dispose of these materials. Adverse environmental impacts can occur when household hazardous materials are disposed of in unlined sanitary landfills, where these materials may leach through the soil and contaminate groundwater.

Rural home sites, removed from community natural gas distribution networks often rely upon propane or other compressed fuels for heating and cooking purposes. Fuels of this type are often stored in on-site aboveground tanks, which are periodically replenished by mobile propane (or other compressed gas) providers. These tanks pose potentially significant explosive and fire hazards if improperly maintained.

5.7.2.4 Community and Individual Wastewater Treatment

Wastewater treatment facilities within Riverside County process millions of gallons of effluent daily. Although they are subject to stringent regulations, the improper design, installation, maintenance, or operation of waste treatment facilities could allow the release of untreated or partially treated sewage with high pathogen concentrations and/or toxic compounds, posing a threat to public health or natural resources. Monitoring of wastewater treatment facilities is the responsibility of California Regional Water Quality Control Boards.

Within rural communities, wastewater treatment is accommodated by individual septic systems. Riverside County maintains regulations for the design of septic systems and leach fields to ensure their proper operation. However, if not property maintained, septic systems could potentially contaminate groundwater with nitrates, ammonia, salts, metals, organic solvents, grease and oil, and other substances, impairing the beneficial uses of local water supplies.

5.7.2.5 Landfills

Landfill Designations

Landfills are classified based on a disposal site's ability to contain waste. The ability of a particular site to contain waste is based on an analysis of various criteria, including the site's underlying geology, hydrology, topography, and climatology, with the principal goal being the protection of surface and subsurface water quality.

Class I landfills are qualified to accept and manage hazardous waste. The primary objective at a Class I landfill is the protection of surface and subsurface water quality.

A Class I landfill is required to be located where natural geographic features provide optimum conditions for the isolation of wastes from surface and subsurface waters.

Waste facilities under the Class II designation are required to be located where site characteristics and containment structures isolate waste from surface and subsurface waters. Select types of hazardous materials may be deposited at Class II facilities, provided a special variance from standard hazardous waste management procedures is granted.

Class III landfills are required to be located where adequate separation can be provided between nonhazardous solid waste and surface and subsurface waters. Class III landfills are not permitted to accept hazardous waste.

Existing Landfills in Riverside County

Twelve landfills are currently permitted to operate within the County, all of which are located in unincorporated areas. Of these 12 permitted landfills, 11 are operated by the Riverside County Waste Management Department, while one (El Sobrante) is privately owned and operated. The El Sobrante and Blythe landfills are the only facilities which currently accept waste from outside of the County.

All of the landfills currently located in Riverside County are classified as Class III landfills, which accept only nonhazardous solid wastes. Hazardous waste generated within Riverside County and disposed of off-site is transported to Kern County or Santa Barbara County, which contain active Class I landfills. Some waste is also transported out of the state.

Historically, no Class I landfill has operated within the County. Despite this, the dumping of household hazardous wastes and unreported industrial wastes in landfills is not uncommon. This illegal disposal may contribute to the degradation of soil and groundwater quality, thereby increasing the potential for adverse effect on humans and the environment.

Illegal dumping of hazardous wastes is a widespread problem that occurs in a variety of forms, including disposal of hazardous substances on unimproved land.

5.7.2.6 Power Generation/Transmission

San Onofre Nuclear Generating Station

Parts of southwestern Riverside County are included in the Emergency Planning Zone (EPZ) of the San Onofre Nuclear Generating Station, located near Camp Pendleton in San Diego County, approximately 25 miles west of the City of Temecula. The U.S. Nuclear Regulatory Commission has identified the area surrounding every nuclear generating station as an Emergency Planning Zone (EPZ). The Federal government also establishes the area within a 50-mile radius around every nuclear generating station as an Ingestion Pathway Zone (IPZ), which extends into southwest Riverside County. The State of California has identified the area outside and adjacent to the EPZ as a Public Education Zone (PEZ). Parts of southwestern Riverside County are included in the PEZ.

Radioactive byproducts from operations at the San Onofre Nuclear Generating Station are contained within the plant, with the exception of small quantities of radioactive gas that are released into the air and liquids that are released into the Pacific Ocean. The releases are part of normal operations, and are monitored by Station personnel. According to officials of the Station, radiation exposure due to material releases is less than the typical exposure from natural background radiation. The two most likely sources of radiation contamination are transportation accidents involving transport of radioactive materials and uncontrolled releases at the plant site.

Electrical Substations

Electrical substations located near urban areas provide a potential for hazardous materials to come in contact with the public. Hazardous materials common at power plants or substations are fuels (e.g., gasoline or diesel) used to operate the facility. Other hazardous materials found at power plants and substations are polychlorinated biphenyls (PCBs). These persistent chlorinated organics are often found in transformer oil at the base of power transformers. PCBs can enter the soil or groundwater and do not easily deteriorate in the environment. Studies have linked PCBs to cause cancer in laboratory animals. There are 20 electrical substations located throughout the western Riverside County and 3 in the eastern portion.

5.7.2.7 Military Installations

March Reserve Air Base (MRAB)

At the time of its realignment (April 1996), MRAB (the former March Air Force Base) contained 31 active and 3 inactive underground storage tanks. The majority of these were located in the northeastern portion of the base. In addition, there were numerous aboveground storage tanks. A bulk fuel storage area in the northern portion of the base and two hydrant fueling systems utilize the largest of these tanks. The bulk storage consists of three aboveground tanks with a total capacity of 5.88 million gallons of JP-8 (jet fuel). This fuel is delivered via an 8-inch pipeline from Colton in southwestern San Bernardino County. Maintenance and monitoring of this system is conducted by the Air Force Reserves (ARFES) in compliance with the Aboveground Petroleum Storage (APS) Act.

An Environmental Baseline Survey (EBS), Base Realignment and Closure (BRAC), and Cleanup Plan (BCP) have been prepared for MRAB. These Air Force documents outline the status, management and response strategy, and action items related to the cleanup of on-base contaminated and hazardous sites. These programs support the cleanup of hazardous materials contamination and restoration of the base, as well as selected areas surrounding the base, which is necessary for property disposal and reuse activities.

Chocolate Mountains Naval Aerial Gunnery Range

The Chocolate Mountains are located in the desert portion of Riverside County, east of the Salton Sea. Within this area, over which public access is restricted, the U.S. Navy maintains and aerial gunnery range, which extends over both Riverside and Imperial Counties. The most significant hazardous material found in these mountains is unexploded ordnance (weapons).

5.7.2.8 Medical Facilities

Medical facilities, including clinics, hospitals, professional offices, blood and plasma centers, and medical research facilities generate a wide variety of hazardous substances. These substances may include contaminated medical equipment or supplies, infectious biological matter, prescription medicines, and radioactive materials used in medical procedures.

Major medical facilities in the County include Riverside County Regional Medical Center (Moreno Valley), Riverside Community Hospital (Riverside), and Eisenhower Medical Center (Rancho Mirage). Nearly two dozen other hospitals or major care centers are located throughout the County.

The disposal of medical waste is achieved by on-site autoclaving of red bagged waste (any medical waste that could possibly transmit a pathogen) and subsequently transported to a Class III landfill. The County Department of Environmental Health Services (DEHS) has regulatory control over the disposal of medical and biological waste.

Needles, syringes, and other sharp objects containing blood, body fluids, human or animal body parts, and clothing stained with blood and/or body fluids that are generated from non-regulated sources such as crime scenes, traffic accidents, and private residences are not classified as regulated waste under the California Medical Waste Management Act, Chapter 6.1. However, as these materials may be potentially infected with pathogens, care should be utilized in the handling and disposal of such materials.

The County Hazardous Waste Management Plan does not address the management of radioactive waste because the handling, treatment, storage, and disposal of these wastes involve complex issues that are distinct from those involving the general body of hazardous wastes. The use and disposal of radioactive materials used, produced or otherwise associated with medical procedures is regulated by the County Department of Environmental Health Services. Disposal of these substances takes place outside of the County.

5.7.3 Hazardous Materials Transport

Riverside County's location, along with its rail and highway transportation routes, and varied industries, results in an increasing potential for hazardous materials incidents. The accidental release of a hazardous material into the environment could have serious consequences on the environment, property and human health, depending upon the size, location, and quantity of the release. Although incidents can happen almost anywhere, certain areas of the County are at higher risk for inadvertent release of hazardous materials. Locations near roadways that are frequently used for transporting hazardous materials (e.g., SR-60, I-10, I-15, and I-215) and locations near industrial facilities that use, store, or dispose of these materials all have an increased potential for a release incident, as do locations along the County's freight railways.

Releases of explosive and highly flammable materials have the potential to cause fatalities and injuries, necessitate large-scale evacuations and destroy both public and personal property. Toxic gases could cause injury and fatalities among emergency response personnel and passers-by. Serious health and environmental effects may result from the release of toxic materials into either surface or groundwater supplies. Releases of hazardous materials may be particularly serious if they occur in highly populated areas and/or along heavily traveled transportation routes.

The United States Department of Transportation (DOT) has developed a system of numerical designations (the International Classification System) that may be displayed on placards, labels and/or shipping papers. The shipper of any hazardous material must classify the material according to its hazardous properties. This system classifies hazardous materials with class and division numbers as follows:

- Class 1 - Explosives: This class is further divided into six divisions, which categorize the volatility and potential explosive force of these materials.
- Class 2 - Gases: Four divisions within this class identify whether the compound is flammable, toxic and/or corrosive.
- Class 3 - Flammable Liquids: Materials in this class are separated into three groups based on a compound's "flashpoint."
- Class 4 - Flammable Solids: Includes flammable solids and materials which are spontaneously combustible, and/or are dangerous when wet.
- Class 5 - Oxidizers and organic peroxides.
- Class 6 - Poisonous and infectious material.
- Class 7 - Radioactive material.
- Class 8 - Corrosives: Materials are further divided according to a compound's ability to cause visible damage to tissue and/or other materials.

- Class 9 - Miscellaneous hazardous material.

- Other Regulated Materials: This category is reserved for materials that require care in transport, but do not meet the definition of any of the above-referenced hazard classes.

In addition to the numerical classification system for hazardous materials, the DOT has established a placarding system for transporting of hazardous wastes, which has been adopted by the EPA who regulates these shipments. These placards are large in size and similar in shape, are required to be displayed on all sides on any truck or railcar that transports hazardous materials. When a truck or railcar is transporting more than one hazardous material or more than 5,000 pounds of a material, the placard "DANGEROUS" must also be displayed. Some placards also have a four-digit code indicating the type of material being transported. This four-digit identification number is required on any tank truck or rail tank car, and allows more precise identification in an emergency.

5.7.3.1 Highways

The amount of hazardous materials transported over County roadways on a daily basis is unknown, but is estimated to be steadily increasing due to the growth of overall traffic and industry in the County. In addition to the accidental release of gasoline, diesel, oil, and other automotive products during vehicle collisions, the transport of hazardous materials on highways within Riverside County presents a risk of upset and/or release of these substances. Besides the immediate effect of a truck-related hazardous material incident, there are also ancillary effects such as the impact on water and drainage systems, the evacuation of schools, business districts, and residential areas, and the impact of traffic in the area.

The transportation of hazardous waste by truck (or rail) is regulated by the DOT through National Safety Standards. These federal safety standards are also included in the California Administrative Code, Environmental Health Division. The California Health Services Department regulates hazardous waste haulers only. The California Highway Patrol (CHP) has jurisdiction over transportation-related hazardous waste incidents on public roads. The County Fire Department also responds to these incidents for control and clean-up purposes.

Several major highways traverse Riverside County, including I-10, I-15, I-215, SR-60, and SR-91. These highways provide regional access, as well as access to industrial operations throughout the County, thereby allowing for the transport of a wide variety of hazardous materials. The most vulnerable areas along these routes are generally considered to be the on/off ramps and interchanges.

Of major concern in the trucking industry is the safe operation of the trucks. With the regulation of the trucking industry, spot checks of trucks in many states, including California, have shown that at least 25 percent of trucks currently in service are not considered safe enough to operate on public highways. The CHP is responsible for the general enforcement of motor carriers hauling hazardous materials. Truck scales are located on I-10 in Banning, I-15 in the Cajon Pass, and on SR-91 in Orange County. Scale masters at these locations issue "compliance ratings," which monitor maintenance, vehicle code, safety, and cargo compliance with federal, state, and local laws. In addition to inspections at these scales, the CHP Motor Carrier Safety Units conduct inspections at areas or yards where trucks are parked and/or parked between trips. "Mobile Road Enforcement" entails the patrol and inspection of vehicles on city and county roadways, as well as state highways.

The growth of high-tech industry in the County requires the transport of increasing quantities of toxic and corrosive materials into and out of the County. Along with these hazardous materials comes the problem of hazardous waste management and disposal. The transportation of chlorine is a concern in the County. The MWD operates one of the largest fleets of chlorine transport trucks in the state, with trucks in daily operation throughout the County.

5.7.3.2 Rail Transport

The rail lines running through Riverside County carry some hazardous cargoes. Hazardous material transport on railroads is not as prevalent as on truck routes; however, the substantially greater volumes involved in rail transport poses a greater hazard when an accident does occur. Major rail lines, which cross Riverside County are listed in the Circulation and Transportation Section (Section 3.2) of this report.

The most common hazardous materials incidences involving rail transport are due to train wrecks and derailments, nine of which occurred in Riverside County between 1990 and 1999. The other most common incident associated with rail transport are diesel spills, four of which occurred in the County between 1990 and 1999. These types of incidences allow quantities of hazardous materials to enter the soil and groundwater.

The location of rail corridors in the vicinity of natural gas and/or petroleum pipelines presents a potential risk of catastrophic release of these fuels in the event of a rail derailment or similar incident.

5.7.3.3 Pipelines

Illegal discharge and disposal are the most common incidences that occur along pipelines in Riverside County, with four occurring between 1991 and 1999.

Riverside County has extensive pipeline distribution systems. For example, three high pressure natural gas transmission pipelines maintained by The Gas Company are routed through the San Gorgonio Pass, and supply a major portion of the non-transportation energy supply for Southern California. This pipeline system delivers natural gas from the southwestern states into Southern California. A more detailed discussion of natural gas pipelines may be found in Section 3.8 of this document.

The Gas Company transports high-pressure natural gas through two types of lines: distribution and transmission lines. These lines are joined at regulation stations where changes of pressure (from high to low and vice versa) takes place. Natural gas for domestic and commercial uses is delivered via underground in-street pipelines. The rupture of these facilities, either during a natural disaster or by an accidental breach caused by human activity, could potentially result in explosive consequences.

Petroleum products are also stored and distributed at many major points throughout the County. Of particular interest are the aviation fuel tanks and pipelines located at March Air Reserve Base (MARB). A JP-8 (jet fuel) pipeline runs from Colton in southwestern San Bernardino County, to the fuel storage facilities at MARB.

5.7.3.4 Airports

Both municipal airports and military airports are situated within Riverside County. Section 3.7 of this document includes a discussion of airport facilities throughout the County. For the most part, these facilities are small, serving the needs of local residents.

The transport of hazardous materials onboard aircraft is regulated by the DOT. These regulations prohibit the transport of certain categories of hazardous materials, restrict the amount of material transported per flight, and establishes appropriate safeguards for the transport of hazardous materials. Even with stringent regulations hazardous materials, accidents still occur. Several types of incidences are commonly found at airports throughout Riverside County including illegal disposal of hazardous materials, fuel spills, and leaking USTs. There have been 13 of these incidences in Riverside County reported between 1989 and 1997.

5.7.4 Areas of Known Hazardous Materials Contamination

Two Riverside County sites are on the EPA Region 9 Superfund National Priorities List (NPL): March Reserve Air Base and the Stringfellow Acid Pits.

5.7.4.1 March Reserve Air Base

March Air Reserve Base (MARB) is located adjacent to the cities of Moreno Valley and Perris, approximately 9 miles from downtown Riverside. Contaminated sites exist on the base as a result of the storage, use, and disposal of household refuse, construction debris, hazardous substances, and petroleum products and their derivatives over the course of the installation's history. A total of 43 "Installation Restoration Program" (IRP) sites have been identified. Of these, 16 are located on lands proposed for release for non-military uses; 3 additional sites are located on Air Force Village West property, and 2 are located on National Cemetery lands.

The Air Force is required to remediate past environmental contamination that occurred within the former March Air Force Base. Remediation is coordinated by the Department of Defense (DOD) with the EPA and appropriate state agencies. An Environmental Baseline Survey (EBS) and BRAC Cleanup Plan (BCP) was prepared for MAFB. These Air Force documents outline the status, management and response strategy, and action items related to the cleanup of on-base contaminated and hazardous sites. These programs support the cleanup and restoration of the base, which is necessary for property disposal and reuse activities.

The IRP process for MRAB commenced September 1993, with the majority of the cleanup sites completed or near completion at time of base realignment in April 1996. There remain some areas where jet fuel byproducts have contaminated groundwater off site. These plumes of contamination are likely to require several more years to clean up.

5.7.4.2 Stringfellow Acid Pits

The Stringfellow site is located in western Riverside County, approximately 9 miles northwest of downtown Riverside. From 1956 to 1972, the 12-acre Stringfellow Acid Pits site was operated as a hazardous waste disposal facility. Over 34 million gallons of industrial waste, primarily from metal finishing, electroplating, and pesticide production were deposited in evaporation ponds. Spray evaporation procedures were used to accelerated the reduction of pond content volume. In 1969, excessive rainfall caused the disposal ponds to overflow and resulted in the contamination of Pyrite Creek. In 1978, heavy rains caused the California Regional Water Control Board (CWRQB) to authorize the controlled release of 800,000 gallons of wastewater from the site to prevent further wastewater pond overflow and massive releases. An additional 500,000 gallons of liquid waste were removed to a federally approved facility. In 1979 and 1980, heavy rains again threatened releases from the waste ponds. Between the years 1975 and 1980, approximately 6.3 million gallons of liquid wastes and materials contaminated with pesticides were removed from the site.

Groundwater in the vicinity of the Stringfellow Acid Pits contains various volatile organic compounds (VOCs) and heavy metals such as cadmium, nickel, chromium, and manganese. Soil at the site is also, contaminated with pesticides, PCBs, sulfates, and heavy metals. The original disposal area is covered by a clay cap, fenced, and guarded by security services. Contaminated groundwater is no longer being used as a drinking water source.

Cleanup of the site is being addressed in five stages. The removal of liquid wastes, connection of affected residences to an alternate water supply, and the installation of a groundwater capture and treatment system have reduced the potential for exposure to contaminated materials at the Stringfellow site while the remaining cleanup activities are being planned and conducted.

5.7.4.3 Leaking Underground Storage Tanks

Based on the State Water Resources Control Board Leaking Underground Storage Tank Information System (LUSTIS) there are 407 cases of leaking USTs in Riverside

County (March 1999). Of these, 100 (25 percent) are Regional Board cases, while 307 (75 percent) are Local Agency Control cases[1]. Of those cases under control of local agencies, 181 involve leaks into surrounding soils, while 109 deal with leaks related to groundwater. The remainder of these cases were undefined.

The majority of UST releases are related to gasoline (of various formulations). The most common constituents that are found in gasoline are benzene, toluene, ethyl-benzene and xylene (BTEX) and methyl tertiary butyl ether (MTBE). Both of these constituents pose a threat to groundwater due to benzene's (a component of BTEX) and MTBE's carcinogenic effects on humans. In addition, MTBE's pervasiveness in groundwater adds to its risk potential. A small percentage of the UST releases involve chlorinated industrial solvents, which are suspected carcinogens. The majority of the sites where releases have occurred are automotive service stations, with tanks from industrial facilities contributing a smaller, but significant, minority. To date, these groundwater impacts have not grown to a point where drinking water supply wells have been affected. Regional Water Quality Control Boards (RWQCBs) maintain and periodically update the LUSTIS database, which identifies all known UST release sites in the three RWQCBs located within Riverside County.

5.7.5 Hazardous Materials Emergency Response

Based on information obtained from the Emergency Response Notification System (ERNS), 66 releases or spills of toxic substances occurred in Riverside County in 1997. These releases ranged in size from an undetermined amounts of drug lab waste, to 3,000 pounds of gaseous refrigerant, and 30,000 gallons of raw sewage.

The Riverside County Fire Department (RCFD) Hazardous Material (Haz-Mat) team responds to hazardous materials spills and leaks, providing expertise in the safe handling, abatement, and documentation of the emergency. The RCFD implements its program through the RCFD Hazardous Materials Response Plan that is required under Title 8 of the California Code of Regulations. The County's team is a two-piece company consisting of a Haz-Mat unit and a support unit. All team members are trained to California Specialized Training Institute (CSTI) Technical Specialist levels.

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[1] Soil and groundwater contamination cases are regulated by either Regional Board or Local Agencies depending on staff availability and magnitude of contamination.

5.8 Emergency Preparedness

Emergency preparedness planning provides general guidelines for response by a jurisdiction in the event of natural or man-made disasters. It addresses the responsibilities at each level of government and identifies the County's provision of aid once an emergency is declared. This section is based on information provided in the County of Riverside Multi-Hazard Function Plan of 1998. The goals of an emergency preparedness plans are to:

- provide prompt distribution of resources and shelter in to response to emergency conditions;
- minimize the loss of life and property damage due to disaster; and
- reinstate public services and utilities as quickly as possible.

5.8.1 Emergency Preparedness Planning in Riverside County

5.8.1.1 State of California

Emergency Services Act

The Emergency Services Act of 1970, declares that the State of California is responsible for the safety of residents within the State during an emergency situation. State agencies are thus available to prepare emergency plans, mitigate existing crises, respond to emergencies, and recover debris in the event of a disaster with the assistance of federal, local, and county offices.

Office of Emergency Services

The Office of Emergency Services (OES) was established in 1950 as the State Office of Civil Defense under the Governor. In 1970, the name of the office changed to the Office of Emergency Services. The OES is the state agency responsible for supporting local governments in the event of disaster, and is prepared to respond to natural, man-made, and wartime emergencies. In addition, the agency is prepared to respond to national and international emergencies if requested to do so. The OES is staffed 24 hours a day, 365 days per year.

In the event of a major disaster, OES will assist in helping local governments evaluate damage. Information relating to federal and state assistance applications can be obtained through the OES. To qualify for federal assistance, a local government must declare a local emergency within 10 days of the disaster. Local governments must then apply for aid within 60 days of declaring the local emergency.

A strategic plan outlines the OES's mission, vision, goals, and objectives for assistance in the event of an emergency. There are specific plans for response to earthquakes, floods, fires, hazardous material incidents, nuclear power plant emergencies, and dam failures.

Based on the intensity of the disaster and availability of resources, three levels of emergency response have been established. Level One is the lowest level of response and Level Three is the highest. Each successive level of emergency initiates another level of response. Level One is considered a minor to moderate incident in which resources are adequate and available. In the event that additional resources are requested then the situation is elevated to Level Two. At this point, the request for mutual aid will be initiated and a State of Emergency may also be proclaimed by the governor. Level Three is declared if the emergency is severe enough to require state and federal resources. In the event of a Level Three emergency, the governor is required to request a Presidential Declaration of an Emergency of a Major Disaster. The Federal Emergency Management Agency (FEMA) would provide funds and services to the state for disaster relief in this situation and serve as the main federal contact.

5.8.1.2 County of Riverside Office of Disaster Preparedness

The Riverside County Office of Disaster Preparedness is responsible for emergency situations that may be natural, man-made, or a result of wartime conditions in Riverside County. The office maintains its own plan for coordinating assistance and designating responsibility to agencies at various levels of government. This information is available in the County of Riverside Multi-Hazard Functional Plan, which sets forth systems to evaluate the scope of possible disasters, and define the roles of agencies so that response to an emergency situation can be effective and efficient. Within the Multi-Hazard Functional Plan are designations of responsibility for emergencies, field response methods, and operational area designations and programs.

5.8.1.3 Responsibility For Responding to Emergencies

Local agencies are responsible for responding to emergencies within their boundaries, and jurisdictions may call upon the services of other agencies if they are unable to resolve the situations in their jurisdictions.

County agencies are responsible for providing assistance in unincorporated areas. In addition, County agencies provide support for local jurisdictions when an emergency escalates to a point where local governments are unable to control a particular situation. The County Board of Supervisors has the ability to proclaim a local emergency.

The State of California OES is the lead agency for any state-led response[1]. OES may call upon the services of local and county agencies to assist in responding to emergencies within and outside of the State of California. During a severe emergency, OES may use the services of the California National Guard, Highway Patrol, Department of Transportation, Department of Forestry and Fire Protection, and the Department of Social Services.

5.8.2 Emergency Management System

There are multiple levels of response in the existing emergency management system. Field response, operational areas, OES Mutual Aid Regions, and state government agencies are involved in emergency management. Several agencies and departments are involved in addressing multiple issues such as policymaking, restoration of public services, medical services, debris cleanup, information gathering, and providing public information. Each component of the emergency management system has a specific role for responding to emergencies in Riverside County and the State.

5.8.2.1 Field Response

In the event of a crisis, the Emergency Operations Centers (EOC) serve as areas where policy is coordinated and disaster plans are analyzed. A communications link supplies information that can be shared between several EOCs and field units. There are two EOCs in Riverside County, which are operated by the County Office of Disaster Preparedness: Riverside and Indio.

Incident Command Systems (ICS) are part of the fire service, which help provide an coordinated response to emergencies. This system is flexible, and can be used by several local jurisdictions to address any kind of emergency management disaster.

5.8.2.2 Operational Area Emergency Management

"Operational Areas" are specific titles given to regions during a of State of War, State of Emergency, or Local Emergency. The Emergency Service Act empowers counties to function as Operational Areas *(Government Code Section 8605)*. In an emergency situation, the Operational Area acts as a communications link between EOCs and government agencies involved in the disaster relief process. For more specific information concerning the declaration of an Operational Area, see *County of Riverside Multi-Hazard Functional Plan,* Section 1.6.2.

A County official acts as the Operational Area Coordinator upon activation of an Operational Area. The Coordinator has the power to coordinate and support emergency situations except in the case where a written agreement delegates power to

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1 Typical emergencies for which the State would be lead agency are earthquakes and major floods.

another member agency. The Coordinator is responsible for assembling an Operational Area Emergency Staff.

5.8.3 Mutual Aid

The State of California is divided into six "Mutual Aid" regions. Mutual Aid is a system that provides support to local and county agencies when their resources are inadequate to respond to an emergency situation. The Mutual Aid Program, was created in 1950 as part of the California Disaster and Civil Defense Master Mutual Aid Agreement. The program has been adopted by all the municipal and county agencies in the State of California. The Fire Protection Mutual Aid Program was established in November 1970. Riverside County is located in Mutual Aid Region 6, which also includes San Bernardino, Mono, Inyo, San Diego, and Imperial counties.

In the event of an emergency, local jurisdictions are required to use their own resources first. If a local jurisdiction is unable to control a disaster, a request can be made for supplies, equipment, facilities, personnel, or services from other cities or the County government. In the event that an emergency situation occurs that is beyond Riverside County's ability to respond, aid will first come to the County from other locations in Region 6. Each region is given the power to coordinate emergency plans and coordinate staffing for the region. The State is obligated to provide services when local and county agencies become overwhelmed with a requests to respond to emergencies.

5.8.4 Critical Facilities

Certain facilities and communications equipment play an important role in responding to and informing the public of the status of an emergency. Portable satellite units are available through the OES to be used as news centers to provide emergency information. Radio and television stations, with the assistance of the Emergency Broadcast System, will provide information to the public during an emergency. Hospitals and mobile clinics are responsible for providing medical assistance. Fire and Police Stations will also provide emergency services.

Access routes for the transportation of goods and services are determined after the disaster has occurred. A more accurate forecast of reliable transportation routes can be determined by county officials after they analyze the unique circumstances of a particular event.

Section 6.0 - Housing

Existing Setting Report

Revised March 2000

6.1 Introduction

An accurate assessment of existing and future residents' housing needs in the County of Riverside forms the basis for establishing program priorities and quantified objectives in the Housing Element. This section presents statistical information and analysis of demographic and housing factors that influence the demand for, availability and cost of housing. (Due to the nature of the 1990 Census data - specifically the statistical difference between STF-1 [100% Count] and STF-3 [Sample Count] Tables - some figures may not correspond). The focus of this section is identifying the need for housing according to income level as well as by special needs groups.

6.2 Demographic Trends

6.2.1 Regional Growth

Between 1994 and 1999, Riverside County has grown by over 96,430 people or approximately 7 percent. Within the County, the eastern area has grown at a slightly faster pace (11 percent) than the western area (6 percent). In comparison, the SCAG Region, which includes the counties of Los Angeles, Orange, Riverside, San Bernardin-o, Ventura, and Imperial, and California have grown by about 6 percent during this time (Table 6.A).

Table 6.A - Regional Population Growth Trends 1994-1999

Area	1994	1999	Change (%)
Riverside County	1,376,877	1,473,307	7.0%
Cities	992,858	1,084,928	9.3%
Unincorporated	384,019	388,379	1.1%
WRCOG Area	1,082,996	1,147,629	6.0%
Cities	768,272	829,332	7.9%
Unincorporated	314,724	318,297	1.1%
CVAG Area	293,881	325,678	10.8%
Cities	224,586	255,596	13.8%
Unincorporated	69,295	70,082	1.1%
SCAG Region[1]	15,603,036	16,545,220	6.0%
California	31,960,623	33,773,466	5.7%

[1] The SCAG Region consists of the counties of: Los Angeles Orange, Riverside, San Bernardino, Ventura and Imperial.

Sources: Stanley R. Hoffman Associates, Inc., SCAG Regional Forecasts, 1998 Regional Transportation Plan, Department of Finance, January 1, 1994 -1999.

Table 6.B displays the estimated population, households, and employment for the unincorporated areas of Riverside County as of 1997. The results show that the western county area holds approximately 82 percent of the unincorporated area's population and households and 88 percent of the employment. The most populous area within the western county area is Jurupa, with approximately 22 percent of population, and 30 percent of employment.

Within the eastern county area, the Coachella-Western area maintains the highest percentage of population, households, and employment.

Table 6.B - Population, Housing and Employment Distribution Riverside County Unincorporated Area 1997

Area Plan	Population	% of Total	Households	% of Total	Employment	% of Total
WRCOG Area						
1 Jurupa	81,836	21.5%	24,578	19.2%	16,923	30.0%
3 Highgrove/Northside	7,378	1.9%	2,426	1.9%	1,626	2.9%
4 Reche Canyon/Badlands	1,765	0.5%	596	0.5%	204	0.4%
5 Eastvale	2,558	0.7%	751	0.6%	765	1.4%
6 Temescal Canyon	24,977	6.5%	7,533	5.9%	3,789	6.7%
7 Woodcrest/Lake Mathews	22,445	5.9%	6,725	5.2%	3,564	6.3%
8 March Air Force Base	3,517	0.9%	1,186	0.9%	960	1.7%
10 Upper San Jacinto Valley	35,393	9.3%	13,318	10.4%	3,034	5.4%
11 REMAP	1,339	0.4%	483	0.4%	202	0.4%
12 Lakeview/Nuevo	9,001	2.4%	2,885	2.3%	1,325	2.3%
13 Mead Valley	17,243	4.5%	5,090	4.0%	1,002	1.8%
15 Greater Elsinore	34,229	9.0%	11,451	8.9%	4,636	8.2%
16 Highway 74-79	12,548	3.3%	4,841	3.8%	1,381	2.4%
17 SunCity/Menifee Valley	31,443	8.2%	13,817	10.8%	5,663	10.0%
19 Southwest Area (SWAP)	15,253	4.0%	5,177	4.0%	2,679	4.8%
20 San Gorgonio Pass	11,736	3.1%	4,513	3.5%	1,882	3.3%
Subtotal	312,660	82.0%	105,373	82.2%	49,635	88.0%
CVAG Area						
2 Coachella-Western	39,747	10.4%	13,783	10.8%	4,318	7.7%
9 Desert Center	7,866	2.1%	1,261	1.0%	375	0.7%
14 Palo Verde Valley	9,503	2.5%	3,635	2.8%	796	1.4%
18 Coachella-Eastern	11,725	3.1%	4,066	3.2%	1,273	2.3%
Subtotal	68,841	18.0%	22,744	17.8%	6,763	12.0%
TOTAL	**381,501**	**100.0%**	**128,117**	**100.0%**	**56,398**	**100.0%**

Sources: Stanley R. Hoffman Associates, Inc., SCAG 1997 Population, Households and Employment Data Base, WRCOG 1998 Traffic Analysis Zone (TAZ) Projections, CVAG 1998 Traffic Analysis Zone (TAZ) Projections

6.2.2 Age Composition

According to the 1990 Census, two-thirds of Riverside County's population falls within the ages of 5 to 49. There is relatively little difference in age distribution between the western and eastern county areas, except to note that the western county area has a slightly higher percentage of population aged 5-49 and the eastern county area has a slightly higher percentage of population aged 55+. There is also little difference in age distribution between the incorporated and unincorporated areas of the County. A complete breakdown is presented in Table 6.C.

Table 6.C - Age Distribution, 1990

Age Group	Western County Area				Eastern County Area				Riverside County			
	Unincorp.	%	Total	%	Unincorp.	%	Total	%	Unincorp.	%	Total	%
Preschool (0-4)	20,128	8.7%	84,561	9.2%	4,438	7.9%	20,244	7.9%	24,566	8.5%	104,805	9.0%
School(5-17)	45,630	19.7%	184,276	20.1%	9,893	17.5%	44,180	17.3%	55,523	19.2%	228,456	19.5%
Young Adult (18-29)	38,687	16.7%	171,678	18.8%	10,653	18.8%	46,598	18.2%	49,340	17.1%	218,276	18.6%
Prime Working (30-49)	66,579	28.7%	264,028	28.9%	14,405	25.5%	65,270	25.6%	80,985	28.1%	329,298	28.1%
Mature(55-64)	28,670	12.4%	99,169	10.8%	8,049	14.2%	35,736	14.0%	36,720	12.7%	134,905	11.5%
Retirement(65+)	32,396	14.0%	111,295	12.2%	9,077	16.1%	43,378	17.0%	41,473	14.4%	154,673	13.2%
Total	232,090	100.0%	915,007	100.0%	56,515	100.0%	255,406	100.0%	288,605	100.0%	1,170,413	100.0%

Sources: Stanley R. Hoffman Associates, Inc.; 1990 Census, STF 3.

6.2.3 Race and Ethnicity

A greater distinction between the western and eastern portions of the county is seen in racial and ethnic composition. Table 6.D shows that the eastern county area is comprised of 38.2 percent Hispanics while the western county area has only 23 percent. The western county area has a larger percentage of Black and American Indian/Indian/Eskimo/ Aleutian population (6.1 and 4.0 percent, respectively) than the eastern county area (3.0 and 1.9 percent, respectively). This sizeable difference, however, is not seen when one compares the unincorporated areas with those that are incorporated. As shown in Table 6.D, the incorporated areas have a slightly higher amount of non-White and Hispanic populations.

Table 6.D - Racial and Ethnic Composition, 1990

Racial or Ethnic Group	Western County Area				Eastern County Area				Riverside County			
	Unincorp.	%	Total	%	Unincorp.	%	Total	%	Unincorp.	%	Total	%
White	190,726	82.2%	707,883	77.4%	42,357	74.9%	186,884	73.2%	233,083	80.8%	894,767	76.4%
Black	10,049	4.3%	55,873	6.1%	1,999	3.5%	7,718	3.0%	12,048	4.2%	63,591	5.4%
Am. Indian,	7,176	3.1%	36,656	4.0%	716	1.3%	4,935	1.9%	7,892	2.7%	41,591	3.6%

Eskimo, Aleut.												
Asian or Pacific Islander	2,712	1.2%	9,307	1.0%	663	1.2%	2,187	0.9%	3,375	1.2%	11,494	1.0%
Other	21,428	9.2%	105,288	11.5%	10,780	19.1%	53,682	21.0%	32,209	11.2%	158,970	13.6%
Total	232,090	100.0%	915,007	100.0%	56,515	100.0%	255,406	100.0%	288,605	100.0%	1,170,413	100.0%
Hispanic	47,454	20.4%	209,939	22.9%	22,913	40.5%	97,575	38.2%	70,367	24.4%	307,514	26.3%

Sources: Stanley R. Hoffman Associates, Inc.; 1990 Census, STF 3.

6.3 Employment Trends

6.3.1 Employment Characteristics

Table 6.E presents employment trends in Riverside County by comparing the number of jobs for each industry in 1990 and 1997. According to the California Employment Development Department, 93 percent of the job growth during this period occurred in the Service Producing sector. The fastest growing occupations were in Retail Trade, Health Services and Local Government. The largest declines were in Engineering and Management, Hotel, and Mining occupations.

Table 6.E - Employment Trends by Industry
Riverside County 1990-1997

	Employment			Percent Distribution		
Industry	**1990**	**1997**	**Change 1990-1997**	**1990**	**1997**	**Change 1990-1997**
Total, All Industries	321,700	385,500	63,800	100.0%	100.0%	100.0%
Total Farm	17,600	18,700	1,100	5.5%	4.9%	1.7%
Total Non-farm	304,200	366,800	62,600	94.6%	95.1%	98.1%
Goods Producing	68,600	72,200	3,600	21.3%	18.7%	5.6%
Mining	700	400	-300	0.2%	0.1%	-0.5%
Construction	31,600	27,300	-4,300	9.8%	7.1%	-6.7%
Manufacturing	36,300	44,600	8,300	11.3%	11.6%	13.0%
Durable Goods	24,200	28,800	4,600	7.5%	7.5%	7.2%
Lumber and Wood Products	3,900	4,200	300	1.2%	1.1%	0.5%
Furniture and Fixtures	1,100	1,600	500	0.3%	0.4%	0.8%
Stone, Clay, and Glass	3,100	2,400	-700	1.0%	0.6%	-1.1%
Primary Metals	1,700	1,400	-300	0.5%	0.4%	-0.5%
Fabricated Metal Products	2,400	4,100	1,700	0.7%	1.1%	2.7%
Industrial Machinery	1,500	2,600	1,100	0.5%	0.7%	1.7%
Electronic Equipment	2,300	4,300	2,000	0.7%	1.1%	3.1%
Transportation Equipment	5,300	4,000	-1,300	1.6%	1.0%	-2.0%
Aircraft, Missiles,& Space Vehicles	3,400	900	-2,500	1.1%	0.2%	-3.9%
Other Transportation Equipment	1,900	3,100	1,200	0.6%	0.8%	1.9%
Instruments and Related Products	2,600	2,600	0	0.8%	0.7%	0.0%
Miscellaneous Manufacturing	300	1,600	1,300	0.1%	0.4%	2.0%
Nondurable Goods	12,200	15,800	3,600	3.8%	4.1%	5.6%
Food & Kindred Products	2,100	2,800	700	0.7%	0.7%	1.1%
Apparel & Other Textile Products	800	1,100	300	0.2%	0.3%	0.55
Printing and Publishing	3,800	4,600	800	1.2%	1.2%	1.3%

Industry	Employment 1990	Employment 1997	Employment Change 1990-1997	Percent Distribution 1990	Percent Distribution 1997	Percent Distribution Change 1990-1997
Chemicals & Allied Products	700	1,600	900	0.2%	0.4%	1.4%
Rubber and Misc. Plastic Products	2,600	4,100	1,500	0.8%	1.1%	2.4%
Other Nondurable Goods	2,200	1,600	-600	0.7%	0.4%	-0.9%
Service Producing	235,500	294,600	59,100	73.2%	76.4%	92.6%
Transportation & Public Utilities	10,900	11,100	200	3.4%	2.9%	0.3%
Transportation	5,300	7,400	2,100	1.6%	1.9%	3.3%
Trucking and Warehousing	3,300	3,400	100	1.0%	0.9%	0.2%
Other Transportation	2,100	3,900	1,800	0.7%	1.0%	2.8%
Communications and Public Utilities	5,600	3,800	-1,800	1.7%	1.0%	-2.8%
Communications	3,200	2,300	-900	1.0%	0.6%	-1.4%
Electric, Gas, and Sanitary Services	2,400	1,500	-900	0.7%	0.4%	-1.4%
Trade	77,500	92,900	15,400	24.1%	24.1%	24.1%
Wholesale Trade	12,400	14,200	1,800	3.9%	3.7%	2.8%
Retail Trade	65,000	78,700	13,700	20.2%	20.4%	21.5%
Bldg Materials and Garden Supply	3,600	2,900	-700	1.1%	0.8%	-1.1%
General Merchandise	7,800	10,000	2,200	2.4%	2.6%	3.4%
Food Stores	9,800	11,100	1.300	3.0%	2.9%	2.0%
Automotive Dealers and Service	9,000	9,900	900	2.8%	2.6%	1.4%
Eating and Drinking Places	23,100	29,600	6,500	7.2%	7.7%	10.2%
Other Retail Trade	11,700	15,300	3,600	3.6%	4.0%	5.6%
Finance, Insurance & Real Estate	14,800	14,200	-600	4.6%	3.7%	-0.9%
Finance	6,300	6,700	400	2.0%	1.7%	0.6%
Other Fin., Ins., and Real Estate	8,500	7,600	-900	2.6%	2.0%	-1.4%
Services	73,200	105,300	32,100	22.8%	27.3%	50.3%
Hotels & Other Lodging Places	12,300	11,600	-700	3.8%	3.0%	-1.1%
Personal Services	2,400	3,300	900	0.7%	0.9%	1.4%
Business Services	10,700	17,900	7,200	3.3%	4.6%	11.3%
Amusement, Including Movies	6,100	10,000	3,900	1.9%	2.6%	6.1%
Health Services	17,000	28,000	11,000	5.3%	7.3%	17.2%
Private Educational Services	2,500	4,000	1,500	0..8%	1.0%	2.4%
Engineering & Management	6,000	5,200	-800	1.9%	1.3%	-1.3%
Other Services	16,200	25,200	9,000	5.0%	6.5%	14.1%

Industry	Employment 1990	Employment 1997	Employment Change 1990-1997	Percent Distribution 1990	Percent Distribution 1997	Percent Distribution Change 1990-1997
Government	59,200	71,000	11,800	18.4%	18.4%	18.5%
Federal Government	6,500	6,600	100	2.0%	1.7%	0.2%
State Government	9,200	11,200	2,000	2.9%	2.9%	3.1%
Local Government	43,500	53,200	9,700	13.5%	13.8%	15.2%

Source: California Employment Development Department.

Table 6.F contains a forecast of employment trends by occupation for Riverside County to the year 2002. According to information from the California Employment Development Department, there is expected to be an increase of 80,100 jobs between 1995 and 2002. The largest increase is anticipated to be found in the Professional/Technical and Service occupations (18,000 increase for each). While the Professional/Technical occupations have the second highest annual average wages at $42,416, the Service occupations have the lowest annual average wage at $16,969.

Table 6.F - Employment Forecast by Occupation: 1995-2002
Riverside County

Line #	CA OES Code	Occupational Title	Annual Averages 1995	Annual Averages 2002	Absolute Change	% Change	Avg. Hourly Wage	Annual Avg. Wage
1		**Total, All Occupations**	**338,000**	**418,100**	**80,100**	**23.7%**	**$13.61**	**28,304**
2	**100000**	**Mgrs and Admin Occupations**	**22,300**	**27,590**	**5,290**	**23.7%**	**$25.69**	**53,445**
23	**200000**	**Professional, Paraprof, Technical**	**64,820**	**82,830**	**18,010**	**27.8%**	**$20.39**	**42,416**
24	210000	Management Support Occupations	7,690	9,320	1,630	21.2%	$18.99	39,493
51	220000	Engineers, Architects, Surveyors	5,040	6,310	1,270	25.2%	$22.47	46,739
82	240000	Nat Scientists and Related Workers	750	930	180	24.0%	$20.64	42,928
101	250000	Computer, Math, Ops Research, Related	1,580	2,260	680	43.0%	$22.71	47,241
118	270000	Social Sci, Recreation, Religious	4,240	5,640	1,400	33.0%	$15.46	32,151
134	280000	Law and Related Occupations	1,740	2,120	380	21.8%	$29.96	62,312
145	310000	Teachers, Educators, Librarians	24,430	30,600	6,170	25.3%	$18.94	39,388
181	320000	Health Practitioners, Techs, Related	15,600	20,760	5,160	33.1%	$23.89	49,684
223	340000	Writers, Artists, Enter, Athletes	2,070	2,590	520	25.1%	$13.69	28,473
244	390000	Misc Profs, Paraprofs, Technical	1,680	2,300	620	36.9%	$16.53	34,374
251	**400000**	**Sales and Related Occupations**	**42,640**	**49,860**	**7,220**	**16.9%**	**$11.26**	**23,417**
252	410000	First-line Sup/mgr--sales	4,530	5,350	820	18.1%	$15.47	32,170
253	430000	Sales Agents--service	2,390	2,790	400	16.7%	$22.81	47,446

Table 6.F - Employment Forecast by Occupation: 1995-2002
Riverside County

Line #	CA OES Code	Occupational Title	Annual Averages 1995	Annual Averages 2002	Absolute Change	% Change	Avg. Hourly Wage	Annual Avg. Wage
263	490000	Merch, Products and Other Sales	35,720	41,720	6,000	16.8%	$9.95	20,700
275	**500000**	**Clerical, Administrative Support**	**59,280**	**68,670**	**9,390**	**15.8%**	**$11.28**	**23,456**
276	510000	First-line Sup/mgr, Clerl, Adm Sup	3,820	4,840	1,020	26.7%	$15.28	31,780
277	530000	Industry Specific Clerical, Admin	9,590	10,930	1,340	14.0%	$10.83	22,524
313	550000	Secretarial, General Office Occs	33,130	38,320	5,190	15.7%	$10.90	22,668
334	560000	Edp and Office Machine Occupations	1,820	1,900	80	4.4%	$10.76	22,387
343	570000	Communications, Mail Distribution	2,910	3,280	370	12.7%	$12.06	25,092
355	580000	Material Recording, Dispatching	7,030	8,170	1,140	16.2%	$11.28	23,454
367	590000	Clerical, Admin Support, Nec	980	1,230	250	25.5%	$11.52	23,970

Table 6.F - Employment Forecast by Occupation: 1995-2002
Riverside County

Line #	CA OES Code	Occupational Title	Annual Averages 1995	Annual Averages 2002	Absolute Change	% Change	Avg. Hourly Wage	Annual Avg. Wage
369	**600000**	**Service Occupations**	**63,940**	**81,920**	**17,980**	**28.1%**	**$8.16**	**16,969**
370	610000	First-line Sup/mgr--service	2,880	3,520	640	22.2%	$14.51	30,186
375	630000	Protective Service Occupations	8,740	11,810	3,070	35.1%	$12.27	25,532
393	650000	Food, Bev Prep and Service Occs	31,900	39,470	7,570	23.7%	$6.72	13,983
409	660000	Health Service, Related Occs	6,950	10,040	3,090	44.5%	$8.70	18,093
419	670000	Cleaning, Bldg Serv ex Priv Hous	8,800	10,850	2,050	23.3%	$8.31	17,279
425	680000	Misc Personal Service Occupations	3,540	4,670	1,130	31.9%	$7.02	14,598
440	690000	Misc Service Workers	1,130	1,560	430	38.1%	$9.41	19,580
441	**700000**	**Agricultural, Forestry, Fishing**	**5,800**	**7,180**	**1,380**	**23.8%**	**$9.09**	**18,908**
442	720000	First-line Sup/mgr--ag, For, Fish	170	210	40	23.5%	$13.48	28,030
450	790000	Misc Ag, Forestry, Fishing	5,630	6,970	1,340	23.8%	$8.95	18,621
465	**800000**	**Prod, Const, Oper, Mat Handling**	**79,050**	**99,830**	**20,780**	**26.3%**	**$12.42**	**25,833**
466	810000	First-line Sup/mgr-blue Collar	4,490	5,590	1,100	24.5%	$18.78	39,052
473	830000	Inspectors, Related Occupations	1,350	1,700	350	25.9%	$11.78	24,500
478	850000	Mechanics, Installers, Repairers	12,710	15,730	3,020	23.8%	$13.90	28,905
541	870000	Construction Trades	12,520	16,290	3,770	30.1%	$16.75	34,840
597	890000	Production Occupations, Precision	4,490	5,760	1,270	28.3%	$11.35	23,614
657	910000	Mach Setters, Set-up, Ops, Tenders	9,230	10,840	1,610	17.4%	$9.52	19,794
759	930000	Other Hand Workers	8,880	11,820	2,940	33.1%	$8.82	18,348
789	950000	Trans, Material Moving Machine Ops	490	600	110	22.4%	$17.71	36,829
802	970000	Taxi Drivers and Chauffeurs	12,090	14,600	2,510	20.8%	$12.76	26,550
856	980000	Const Trades, Extractive--helpers	12,800	16,900	4,100	32.0%	$8.91	18,537

Source: Stanley R. Hoffman Associates, Inc.; California Employment Development Department; Labor Market Information Division
1995 Annual Averages based on March 1996 Benchmark Data from the California Employment Development Department.

6.3.2 Housing Balance

Traffic patterns on the major east-west transportation routes indicate that Riverside County serves as a bedroom community that supplies a portion of the labor pool for the

Los Angeles-Orange County metropolitan area. Statistics for 1990 and 1997 show that the county's jobs-household balance is slowly improving, however, from 0.80 jobs per household 1990 to 0.90 jobs per household in 1997 (Table 6.G). The unincorporated area shows a severe shortage of jobs, however, with only 0.48 jobs per household in the western county and 0.26 jobs per household in the eastern county in 1997.

Table 6.G - Jobs-Household Ratios

	Total County		Western County Unincorp.	Eastern County Unincorp.
	1990	1997	1997	1997
Employment	321,700	410,433	50,495	5,903
Households	402,067	458,021	104,990	23,127
Jobs/Household Ratio	0.80	0.90	0.48	0.26

6.4 Household Characteristics

Before current housing problems can be understood and future needs anticipated, housing occupancy characteristics need to be identified. The following is an analysis of household size, and income characteristics. By definition a "household" consists of all the people occupying a dwelling unit, whether or not they are related. A single person living in an apartment is a household, just as a couple with two children living in the same dwelling unit is considered a household. By definition a "family" is two or more persons living together who are related by blood or marriage.

6.4.1 Household Size

The distribution of household size for Riverside County is displayed in Table 6.H. The data indicates that 64 percent of households in Riverside County contain 2-4 persons, 21 percent contain 1 person, and 15 percent contain 5 or more persons. This pattern of distribution is fairly consistent throughout the entire County, although the eastern county area tends to have slightly more 1-2-person households and fewer 3+ households. This is at least partially explained by the fact that a higher percentage of retirement-age persons live in the Coachella Valley than in the western portions of the county.

Table 6.H - Household Size Distribution, 1990

Household	Western County Area				Eastern County Area				Riverside County			
Size	Unincorp.	%	Total	%	Unincorp.	%	Total	%	Unincorp.	%	Total	%
1 Person	13,885	17.7%	57,775	18.8%	4,815	24.7%	25,171	26.5%	18,699	19.1%	82,946	20.6%
2 Persons	27,135	34.5%	98,305	32.0%	7,175	36.7%	34,365	36.2%	34,310	35.0%	132,670	33.0%
3-4 Persons	25,333	32.2%	102,083	33.2%	4,606	23.6%	22,474	23.7%	29,939	30.5%	124,557	31.0%
5+Persons	12,277	15.6%	49,012	16.0%	2,931	15.0%	12,882	13.6%	15,207	15.5%	61,894	15.4%

Total	78,630	100.0%	307,175	100.0%	19,526	100.0%	94,892	100.0%	98,156	100.0%	402,067	100.0%

Sources: Stanley R. Hoffman Associates, Inc.; 1990 Census, STF 3.

6.4.2 Household Income

Table 6.I reports 1990 Census income statistics by tenure for the unincorporated area. As expected, the table shows that incomes of owners were higher than renters, and incomes in the western county were higher than the eastern county. Nearly two-thirds of all owners but only one quarter of renters had incomes over $35,000. Among renters, 21 percent had incomes under $10,000 per year.

Table 6.I - Household Income by Tenure
Riverside County Unincorporated Area, 1990

	Owners			Renters		
Income	Western Co. Area	Eastern Co. Area	Total	Western Co. Area	Eastern Co. Area	Total
Under $10,000	2,042 (5%)	620 (11%)	3,022 (7%)	3,550 (20%)	1,399 (22%)	4,949 (21%)
$10,000-19,999	3,677 (9%)	749 (13%)	4,426 (10%)	4,065 (23%)	1,964 (31%)	6,030 (25%)
$20,000-34,999	7,544 (19%)	1,377 (24%)	8,921 (20%)	4,995 (28%)	1,560 (25%)	6,555 (27%)
$35,000-49,000	8,362 (21%)	1,052 (18%)	9,414 (21%)	2,838 (16%)	775 (12%)	3,613 (15%)
$50,000+	17,358 (44%)	1,973 (34%)	19,331 (43%)	2,367 (13%)	576 (9%)	2,943 (12%)
Total	39,343 (100%)	5,771 (100%)	45,114 (100%)	17,815 (100%)	6,275 (100%)	24,090 (100%)

Source: 1990 Census

The State of California uses four income categories for the purpose of determining housing affordability and need in communities. This method is consistent with definitions of low- and moderate-income households used in various Federal and State housing programs, e.g., Section 8 and State Density Bonus Law. These categories are as follows:

- **Very Low Income**—50 percent or below the median income;
- **Low Income**—51 percent to 80 percent of the median;
- **Moderate Income**—81 percent to 120 percent of the median; and
- **Above Moderate Income**—more than 120 percent of the median.

HUD develops annual median household income estimates for the Riverside-San Bernardino County MSA. The median income for a family of four in 1999 was $47,200. Table 6.J presents the distribution of household income in the Riverside County unincorporated area. These data are based on the 1990 income distribution as reported in the Census.

Table 6.J - Household Income Distribution, 1998

	Unincorporated Area			Total County		
Planning Area	Western County	Eastern County	Total	Western County	Eastern County	Total
Very Low (< 50%)	21,960 (22%)	10,345 (37%)	32,305 (25%)	47,728 (20%)	21,700 (25%)	69,428 (21%)
Low (51%-80%)	14,973 (15%)	6,431 (23%)	21,404 (17%)	37,335 (16%)	14,911 (17%)	52,246 (16%)
Moderate (81%-120%)	16,969 (17%)	4,473 (16%)	21,442 (17%)	50,255 (21%)	16,677 (19%)	66,932 (21%)
Above Moderate (> 120%)	45,916 (46%)	6,710 (24%)	52,626 (41%)	104,961 (44%)	32,829 (38%)	137,790 (42%)
TOTAL	**99,818 (100%)**	**27,959 (100%)**	**127,777 (100%)**	**240,279 (100%)**	**86,117 (100%)**	**326,396 (100%)**

Note: Data assume that the proportion of households in each category has not changed since 1990.
Source: SCAG (based on 1990 Census).

6.5 Housing Inventory and Market Conditions

This section summarizes the housing inventory and prevailing market conditions in the county.

6.5.1 Housing Stock Profile

6.5.1.1 Housing Type

Table 6.K summarizes the distribution of housing by type in the unincorporated portions of Riverside County. The results show that single-family detached (SFD) units dominate the western county area (70 percent) while mobile homes form the majority of eastern county area units(47 percent). Throughout the overall unincorporated areas of Riverside County, SFD units and mobile homes characterize the most abundant household types, with SFD homes representing 63 percent and mobile homes representing 28 percent of the total households.

Table 6.K - Housing Inventory by Type
Riverside County Unincorporated Area, 1999

Planning Area	SF Detached	SF Attached	Multiple 2-4	Multiple 5+	Mobile Homes	Total
Western County Area	80,558 (70%)	1,548 (1%)	2,051 (2%)	5,030 (4%)	26,100 (23%)	115,287 (100%)
Eastern County Area	14,661 (40%)	1,657 (5%)	1,111 (3%)	1,920 (5%)	17,119 (47%)	36,468 (100%)
TOTAL	**95,219 (63%)**	**3,205 (2%)**	**3,162 (2%)**	**6,950 (5%)**	**43,219 (28%)**	**151,755 (100%)**

Note: Allocation of units between western and eastern county unincorporated areas based on 1990 Census distribution.
Source: California Department of Finance, January 1, 1999.

6.5.1.2 Unit Size

Table 6.L displays the size of units by tenure for the unincorporated areas of Riverside County. According to the U.S. Census, 60 percent of owner-occupied units had 3 or more bedrooms while only 28 percent of rental units had 3+ bedrooms.

Both owner-occupied and rental units were larger on average in the western portion of the county reflecting the resort and second-home characteristics of the Coachella Valley.

Table 6.L - Unit Size by Tenure
Riverside County Unincorporated Area, 1990

Planning Area	Owners						Total
	Studio	1-bd	2-bd	3-bd	4+ bd	Avg. bd	
Western County Area	243 (<1%)	3,232 (6%)	17,314 (30%)	23,957 (41%)	13,182 (23%)	2.8	57,928 (100%)
Eastern County Area	272 (2%)	1,508 (12%)	5,900 (46%)	4,065 (32%)	957 (8%)	2.3	12,702 (100%)
TOTAL	**515 (1%)**	**4,740 (7%)**	**23,214 (33%)**	**28,022 (40%)**	**14,139 (20%)**	**2.7**	**70,630 (100%)**

Planning Area	Renters						Total
	Studio	1-bd	2-bd	3-bd	4+ bd	Avg. bd	
Western County Area	782 (4%)	3,956 (22%)	7,910 (43%)	4,410 (24%)	1,202 (7%)	2.1	18,260 (100%)
Eastern County Area	845 (13%)	1,793 (27%)	2,678 (40%)	1,159 (17%)	245 (4%)	1.7	6,720 (100%)
TOTAL	**1,627 (7%)**	**5,749 (23%)**	**10,588 (42%)**	**5,569 (22%)**	**1,447 (6%)**	**2.0**	**24,980 (100%)**

Source: 1990 Census.

6.5.2 Vacancy Rates and Tenure

The vacancy rate is an indicator of the general availability of housing. It also reflects how well available units meet the current housing market demand. A low vacancy rate suggests that households may have difficulty finding housing within their price range; a high vacancy rate may indicate either an imbalance between household characteristics and the type of available units, or an oversupply of housing units. The availability of vacant housing units provides households with choices on different unit types to accommodate changing needs (e.g., single persons, newly married couples and elderly households typically need smaller units than households with school age children). A low vacancy rate may contribute to higher market rents and prices, and may limit the choices of households in finding adequate housing. It may also be related to overcrowding, as discussed later.

Table 6.M provides 1990 occupancy and tenure characteristics for the unincorporated areas of Riverside County. The data indicates a 35 percent vacancy rate in the eastern county area and a 12 percent vacancy rate in the western county area. These figures combine to give the entire unincorporated area of Riverside County an 18 percent vacancy rate. Vacancy rates were higher in rental units (12 percent) than in owned units (5 percent). Owned units are more prevalent in both planning area and particularly in the western county area, where owned units represent over three-quarters of occupied units. The unusually high vacancy rate in the eastern county area is due primarily to the large number of vacation homes. Only 12 percent of rental units were actually available for rent.

Table 6.M - Housing Inventory by Tenure
Riverside County Unincorporated Area, 1990

Planning Area	Total Units	Occupied Units		Vacant Units		
		Rental	Owner	For Rent	For Sale	Other
Western County Area	86,982	18,346 (21%)	58,003 (67%)	1,980 (2%)	2,986 (3%)	5,668 (7%)
Eastern County Area	29,951	6,600 (22%)	12,835 (43%)	933 (3%)	742 (2%)	8,842 (30%)
TOTAL	**116,933**	**24,946 (21%)**	**70,838 (61%)**	**2,912 (2%)**	**3,727 (3%)**	**14,510 (12%)**

Source: 1990 Census.

6.5.3 Age of Housing Stock

Age is one measure of housing stock conditions and a factor for determining the need for rehabilitation. Without proper maintenance, housing units deteriorate over time. Thus, units that are older are likely to be in need of major repairs (e.g., a new roof or plumbing). As a general "rule of thumb," houses 30 years or older are considered aged and are more likely to require major repairs. In addition, older houses may not be built to current standards for fire and earthquake safety.

The housing stock in unincorporated areas is relatively new, with over 85 percent of all units built after 1960. As a result, a relatively small proportion of units should require major rehabilitation (Table 6.N).

It should be noted, however, that over one-quarter of all housing units in the unincorporated county and nearly half of all units in the eastern county are mobile homes. Experience has shown that these structures age much more rapidly than traditional construction and therefore assumptions regarding housing condition based solely on age may not be valid for mobile homes.

Table 6.N - Age of Housing Stock, Riverside County Unincorporated Area

Planning Area	Total	Pre-1940	% of Total	1940-1960	% of Total	1961-1980	% of Total	1980 or Newer	% of Total
Western Co. Area	76,188	2,543	*3%*	8,452	*11%*	31,573	*41%*	33,620	*44%*
Eastern Co. Area	19,431	559	*3%*	2,128	*11%*	8,960	*46%*	7,784	*40%*
TOTAL	**95,620**	**3,102**	***3%***	**10,580**	***11%***	**40,533**	***42%***	**41,405**	***43%***

Source: 1990 Census

6.5.4 Housing Costs and Rents

6.5.4.1 Existing and New Home Price Trends

Table 6.O shows median sales prices by community based on a survey of both new and resale home prices in November 1999. The median sales price for all units was $135,750. This table shows that home prices were substantially higher in the communities of Canyon Lake and Rancho Mirage than in other portions of the county. This is attributable to the popularity of resort communities with a high level of amenities (such as golf courses, tennis courts and lush landscaping). The least expensive areas were Desert Hot Springs, Indio, Perris, Sun City and Beaumont, which all had median prices below $90,000.

Table 6.O -- Median Home Prices New and Existing Condos and Single Family November 1999

Jurisdiction	Median Price	% of County
Riverside County	$135,750	100.0%
Beaumont	$77,500	57.1%
Canyon Lake	$293,000	215.8%
Cathedral City	$140,000	103.1%
Corona	$175,500	129.3%
Desert Hot Springs	$65,000	47.9%
Hemet	$93,500	68.9%
Indio	$86,000	63.4%
Lake Elsinore	$108,250	79.7%
Menifee	$148,750	109.6%
Moreno Valley	$113,000	83.2%
Murrieta	$161,000	118.6%
Norco	$190,500	140.3%
Palm Desert	$150,000	110.5%
Palm Springs	$180,000	132.6%
Perris	$84,000	61.9%
Rancho Mirage	$268,000	197.4%
Riverside	$220,000	162.1%
Sun City	$85,000	62.6%
Temecula	$180,000	132.6%
Wildomar	$132,500	97.6%

Table 6.O -- Median Home Prices New and Existing Condos and Single Family November 1999

Jurisdiction	Median Price	% of County

Sources: Stanley R. Hoffman Associates, Inc., California Association of Realtors, Transamerica Intellitech MetroScan

6.5.4.2 Rental Prices

Rental market statistics are shown in Table 6.P. Unlike home prices, rental rates are slightly lower in the eastern county than in the west. Since rental units are typically occupied by full-time residents, this reflects the weaker labor market in the Coachella Valley compared to the western county areas. The average rent in the western county area was $698 per month, while the eastern county area averaged $625 per month for all rental units.

Table 6.P - Average Rents by Unit Type Second Quarter, 1999

Planning Area	Studio	1-bd	2-bd	3+ bd	All Units
Western Co. Area	$376	$606	$753	$875	$698
Eastern Co. Area	$508	$581	$676	$838	$625

Source: Stanley R. Hoffman Associates, Inc., Market Profiles, Property Data and Market Trend Analysis, Seven Fiscal Analysis Areas, County of Riverside, November 1999.

6.5.4.3 Affordability Gap Analysis

The term “affordability gap” refers to the difference between prevailing housing costs and the income levels of area residents. Table 6.Q shows the maximum rent and purchase price by income category for Riverside County. In the Very Low category (less than 50 percent of median income) the maximum affordable rent is $590 per month using the accepted standard of paying no more than 30 percent of gross income for housing. The maximum purchase price for the same category would be approximately $75,000.

Comparing Table 6.Q with the median home price statistics in Table 6.O shows that some of the lower-priced communities have a good selection of homes in the Very-Low- and Low-income categories, and the majority of the surveyed communities have a median price that is affordable to Moderate-income households (i.e., less than $170,000).

Comparing the affordability data in Table 6.Q with the rental price statistics in Table 6.P shows that the average price for all rental units in both the western and eastern portions of the County would be in the Low category. In fact, even 3+ bedroom units have an average rent that is within the Low category maximum affordable rent payment. The western county area is more expensive for all unit types except for Studios.

Table 6.Q - Affordable Rent and Purchase Price by Annual Income, 1999 [1]

Type	Annual Income [2]	Maximum Affordable Rent Payment [3]	Maximum Affordable Purchase Price [4]
Very Low	Under $23,600	$590	$75,000
Low	$23,600 - $37,760	$944	$120,000
Moderate	$37,761 - $56,640	$1,416	$170,000
Above Moderate	Over $56,640	Over $1,416	Over $170,000

Notes: [1] Income limits established by HUD, Jan 1999.
[2] Based on HUD MFI of $47,200 for Riverside County.
[3] Based on 30 percent of income.
[4] Assumes 10 percent down payment, an 8.5 percent interest rate, 1.25 percent tax and homeowners insurance, and a 28 percent debt ratio.

6.6 Existing Housing Needs

The following section presents housing needs and special concerns relative to various segments of the population.

Several factors will influence the degree of demand for new housing in Riverside County in the coming years. Four major "needs" categories are considered in this element:

- Housing needs resulting from the overcrowding.
- Housing needs that result when households are paying more than they can afford for housing.
- Housing needs of "special needs groups" such as the elderly, large families, female-headed households, households with a disabled person, and the homeless.
- Housing needs resulting from population growth, both in the County and the surrounding region.

Analysis of demographics and market conditions indicates that the number of households at the extremes of the income spectrum will continue to grow while the traditional middle income segments decline in size and activity in the housing market. In terms of specific housing needs, home ownership and the first time homebuyer program will become critical for the moderate to above moderate income population, while the other income groups will need help in meeting the increasingly higher cost burdens.

6.6.1 Overcrowding

Table 6.R contains data regarding overcrowding for lower-income households in the unincorporated area. A household is considered to be overcrowded if there are more than 1.0 persons per room. A typical two-bedroom apartment with a living room and kitchen (a total of four rooms excluding bathrooms and hallways) would be considered overcrowded if it had more than four occupants. In the unincorporated area, nearly one-fourth of renter households were estimated to be overcrowded while only 7 percent of owner-occupied units were overcrowded.

Table 6.R - Overcrowding
Lower-Income Households, 1999

	Renter Households		Owner Households	
	Overcrowded (%)	**Total**	**Overcrowded (%)**	**Total**
Unincorporated Area	3,811 (22%)	17,428	2,372 (7%)	33,806

Source: SCAG based on 1990 Census.

6.6.2 Households Overpaying for Housing

State housing policy recognizes that cooperative participation of the private and public sectors is necessary to expand housing opportunities to all economic segments of the community. A primary State goal is the provision of decent housing and suitable living environment for Californians of all economic levels. Historically, the private sector generally responds to the majority of the community's housing needs through the production of market-rate housing. However, the percentage of the population on a statewide basis who can afford market rate housing is declining. By definition, a household is considered to be overpaying when housing cost exceeds 30 percent of gross household income. (Health and Safety Code, Section 50052.9).

Table 6.S lists the percentage of lower-income renters and homeowners with monthly housing costs exceeding 30 percent of their monthly gross income.

Table 6.S - Housing Overpayment, Lower-Income Households
Riverside County Unincorporated Area, 1999

	Renter Households		Owner Households	
	Overpayment (%)	**Total**	**Overpayment (%)**	**Total**
Unincorporated Area	10,928 (63%)	17,428	15,023 (44%)	33,806

Source: SCAG based on 1990 Census.

The table shows that in the unincorporated county area nearly two-thirds of lower-income renters are estimated to be overpaying for housing. Among lower-income owners, 44 percent are estimated to be overpaying. (NOTE: These data are derived from the 1990 Census and assume that the proportion of households overpaying has not changed since then.) However, a distinction between renter and owner housing overpayment is important -- while homeowners may overextend themselves financially to purchase a home, the owner maintains the option of selling the home and may realize tax benefits or appreciation in value. (Due to the drop in home values during the early 1990s some owners who purchased at the peak of the market may be "upside down", i.e., their current equity is less than their loan amount. This is reflected in the increased foreclosure rates during the 1990s). Renters, on the other hand, are limited to the rental market, and are generally required to pay the rent established by the market. The discrepancy between renter and owner households is largely reflective of the tendency for renter households to have lower incomes than owner households.

6.6.3 Special Needs Groups

6.6.3.1 Elderly Persons

The special housing needs of the elderly are an important concern since many retired persons are likely to be on fixed low incomes. In addition, the elderly maintain special needs related to housing construction and location. The elderly often require ramps, handrails, lower cupboards and counters to allow greater access and mobility. They also may need special security devices for their homes to allow greater self-protection. In terms of location, because of limited mobility, the elderly also typically need to have access to public facilities (i.e., medical and shopping) and public transit facilities.

As noted previously (Table 6.C) about 14 percent of the unincorporated area population was elderly in 1990. As seen in Table 6.T, about 6 percent of the elderly had either a mobility or self-care limitation. Either or both of these conditions may indicate a need for special housing.

Table 6.T - Elderly Persons (65+) with Mobility or Self-care Limitation
Riverside County Unincorporated Area, 1990

Planning Area	Total Elderly Persons	Mobility or Self-Care Limitation
Western County Area	32,396	1,900 (6%)
Eastern County Area	9,077	565 (6%)
TOTAL	**41,473**	**2,465 (6%)**

Source: 1990 Census.

6.6.3.2 Large Households

The 1990 Census reported 15,207 households in the Riverside County Unincorporated Area with five or more persons, representing 15.8 percent of all households. Of these, about one-third were renters and about two-thirds were owners. Large households are included as a special needs group because they require larger dwellings with more bedrooms. These households have the highest cost burden and report the highest percentage of housing problems. This is especially true for renter households because multifamily rental units are typically smaller than single family units.

In addition to spatial requirements, large households often face a significant cost burden for housing. Large, very-low- income households will continue to be the most impacted in terms of finding and maintaining affordable and appropriate housing. Market rate housing options available to this segment often include overcrowded rental units or poorly maintained single family homes.

Table 6.U - Large Households by Tenure Riverside County Unincorporated Area 1990

	5+ Person Households		
Planning Area	Owner	Renter	TOTAL
WRCOG Area	8,740	3,440	12,180
CVAG Area	1,562	1,465	3,027
TOTAL	10,302	4,905	15,207

Sources: Stanley R. Hoffman Associates, Inc., 1990 Census STF3

6.6.3.3 Female-Headed Households

Female-headed households are included as a special needs group because of the low rate of homeownership, lower incomes, and high poverty rates experienced by this group. According to the 1990 Census, a total of 5,390 persons or 5.6 percent of households were comprised of female households with children in the Riverside County Unincorporated Area. Table 6.V indicates the numbers and percentages, as of 1990, of those female-headed households with related children as determined by the Bureau of Census.

Table 6.V - Female Headed Households with Children Riverside County Unincorporated Area, 1990

Planning Area	Total Households	Female Headed Households w/Children	% of Total

Western County Area	76,349	4,225	5.5%
Eastern County Area	19,435	1,165	6.0%
Riverside Co. Unincorp.	95,783	5,390	5.6%
Riverside Co. Total	**402,426**	**22,753**	**5.7%**

Source: Stanley R. Hoffman Associates, Inc.; 1990 Census, STF 3.

6.7 Summary and Conclusions

6.7.1 Demographics

- Between 1994 and 1999 Riverside County grew by over 115,000 people or approximately 8 percent compared to 6 percent for the SCAG Region and California as a whole.

- About 26 percent of Riverside County's population in 1999 lived in unincorporated areas.

- In 1999 the western county area had approximately 82 percent of the unincorporated county's population and 88 percent of employment.

6.7.2 Employment

- According to the California Employment Development Department, there is expected to be an increase of 80,100 jobs (23.7 percent) between 1995 and 2002, with the largest percentage anticipated to be found in the Professional/Technical and Service occupations.

- Riverside County serves as a bedroom community that supplies a portion of the labor pool for the Los Angeles-Orange County metropolitan area

- Compared to the County as a whole, the unincorporated area is job-poor, with 0.48 jobs per household in the unincorporated western county and 0.26 jobs per household in the unincorporated eastern county in 1997. The countywide average was 0.90 jobs per household.

6.7.3 Housing Characteristics

- The median County income for a family of four in 1999 was $47,200. Incomes for owners were higher than that of renters and incomes of western county residents were higher than in eastern county residents.

- Mobile homes represented almost half of all housing units in the unincorporated eastern county in 1999, while 70 percent of all units in the western county unincorporated area were single-family detached units

- The unincorporated areas experienced an 18 percent vacancy rate in 1990. This figure is unusually high due to the large number of vacation homes in the Coachella Valley.

- The housing stock in the unincorporated areas is relatively new, with over 85 percent of all units built after 1960.

- Riverside County rental rates and purchase prices are relatively affordable compared to the urbanized Los Angeles/Orange County areas.

6.7.4 Existing Housing Needs

- In the unincorporated area in 1999, nearly one-fourth of renter households were considered overcrowded while only 7 percent of owner-occupied units were overcrowded, according to SCAG.

- In the unincorporated county area nearly two-thirds of lower-income renters were estimated to be overpaying for housing in 1999.

- About 14 percent of the unincorporated area population was elderly in 1990 , and about 6 percent of the elderly had either a mobility or self-care limitation.

- The 1990 Census reported 15,207 households in the unincorporated area with five or more persons, representing 15.8 percent of all households. Of these, about one-third were renters and about two-thirds were owners.

- According to the 1990 Census, a total of 5,390 persons or 5.6 percent of households, were comprised of female households with children in the unincorporated area.

6.7.5 General Trends

- During the 1990s home values declined with corresponding high default and foreclosure rates.

- Property maintenance has suffered in some areas, due in part to declining values.

- Large numbers of new first-time buyers have entered the market.

- There has been increasing concern about farmworker housing conditions, particularly substandard conditions, overcrowding, and a lack of affordable housing.

- Construction of new housing has continued in the fringe areas while older suburban and urban areas have declined.

Section 7.0 - Air Quality

Existing Setting Report

Revised March 2000

7.1 Introduction

Although air quality in Southern California continues to improve, Southern California still experiences the worst air quality in the nation, requiring continued diligence to meet air quality standards. Continuing the progress toward clean air is a challenging task, not only to recognize and understand complex interactions between emissions and resulting air quality, but also to pursue the best possible set of strategies to improve air quality while maintaining a healthy economy.

7.2 Air Quality Standards

Air quality has been regulated at the federal level under the Clean Air Act (CAA) since 1970. This act authorized the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for air pollutants of nationwide concern. The EPA has established standards for six criteria air pollutants. As shown in Table 7.A, these pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, suspended particulate matter (PM_{10}), and lead. Primary standards for air pollutants were established to protect public health, while secondary standards were established to protect the public welfare by preventing impairment of visibility and damage to vegetation and property.

In addition to more stringent ambient air quality standards than the corresponding NAAQS for the six criteria air pollutants, the California Air Resources Board (CARB) has set state standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. These criteria refer to episode levels representing periods of short-term exposure to air pollutants that actually threaten public health. Health effects are progressively more severe as pollutant levels increase from Stage One to Stage Three.

7.3 Existing Air Basins and Air Quality Management Districts

Riverside County is located within three different air basins: South Coast Air Basin, Mojave Desert Air Basin, and Salton Sea Air Basin (see Figure 7.1).

The western Riverside County (west of San Gorgonio Pass) is located within the South Coast Air Basin (SOCAB), which includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. Air quality conditions in the SOCAB are under the jurisdiction of the South Coast Air Quality Management District (SCAQMD).

Table 7.A - Ambient Air Quality Standards

Pollutant	Averaging Time	State	Federal	
			Primary	Secondary
Ozone	1 Hour	0.09 ppm (180µg/m³)	0.12 ppm (235 µg/m³ uu	Same as Primary Standard
	8 Hour	0.08 ppm	0.08 ppm	
Nitrogen Dioxide	Annual Average	0.053 ppm (100 µg/m³)	0.053 ppm (100 µg/m³)	Same as Primary Standard
	1 Hour	0.25 ppm (470 µg/m³)	--	
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m³)	9.0 ppm (10 mg/m³)	--
	1 Hour	20.0 ppm (23 mg/m³)	35.0 ppm (40 mg/m³)	--
Suspended Particulate Matter (PM10)	Annual Geometric Mean	30 µg/m³	--	--
	24 Hour	50 µg/m³	150 µg/m³	Same as Primary Standard
	Annual Arithmetic Mean	--	50 µg/m³	
Suspended Particulate Matter (PM25)	Annual Arithmetic Mean	--	15 µg/m³	--
	24 Hour	--	65 µg/m³	--
Sulfur Dioxide	Annual Average	--	0.03 ppm (80 µg/m³)	Same as Primary Standard
	24 Hour	0.04 ppm (105 µg/m³)	0.14 ppm (365 µg/m³)	
	3 Hour	--	--	0.5 ppm (1,300 µg/m³)
	1 Hour	0.25 ppm (655 µg/m³)	--	--
Lead	30 Day Average	1.5 µg/m³	--	--
	Calendar Quarter	--	1.5 µg/m³	Same as Primary Standard
Sulfates	24 Hour	25 µg/m³	--	--
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	--	--
Vinyl Chloride (Chloroethene)	24 Hour	0.01 ppm (26 µg/m³)	--	--
Visibility Reducing Particles	8 Hour (10 a.m. to 6 p.m. PST)	**	--	

Note: ** In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with ARB Method V.

Source: ARB Fact Sheet 39, 1998.

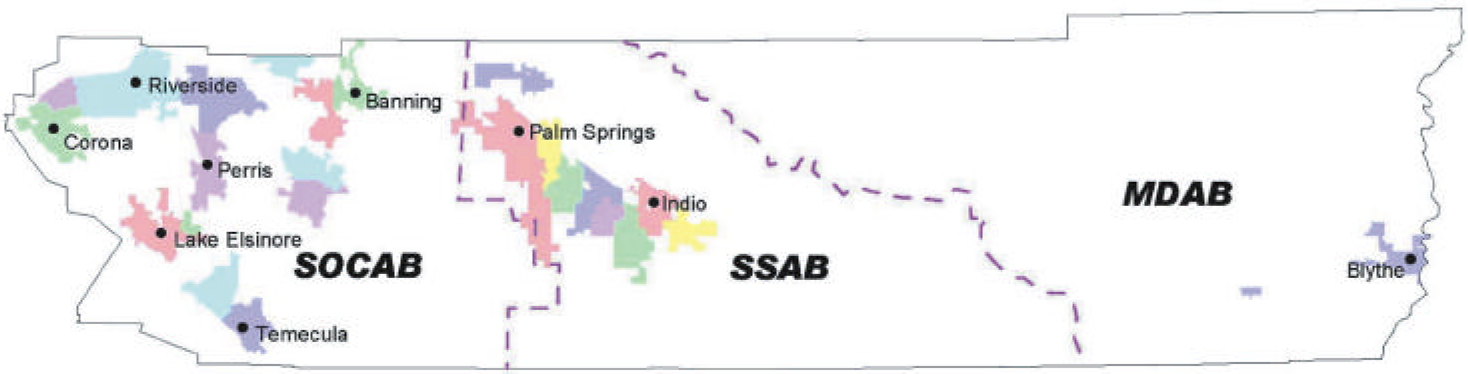
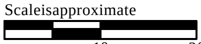


Figure7.1



RIVERSIDE COUNTY AIR QUALITY BASINS

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The far eastern end of Riverside County (approximately east of Joshua Tree National Park) is within the Mojave Desert Air Basin (MDAB), which also includes the portions of Los Angeles, Kern, and San Bernardino counties that were parts of the Southeast Desert Air Basin (SEDAB). Air quality conditions in the Riverside County MDAB are partly (western portion of the Riverside County MDAB in the Coachella Valley Planning Area) under the jurisdiction of the SCAQMD and partly (eastern portion of the Riverside County MDAB in the Southeast Desert Nonattainment Area) under the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD).

The middle part of the Riverside County (between San Gorgonio Pass and Joshua Tree National Monument), included as part of Coachella Valley Planning Area, belongs to the Salton Sea Air Basin (SSAB), which also includes the Imperial County. Air quality conditions in this portion of the Riverside County, although in SSAB, are also administered by the SCAQMD.

These regional air quality agencies regulate stationary sources of pollution throughout its jurisdiction area. Direct emissions from motor vehicles are regulated by CARB.

7.3.1 Climate/Meteorology

Air quality is not only affected by various emission sources (mobile, industry, etc.) but is also affected by atmospheric conditions such as wind speed, wind direction, temperature, and rainfall, etc.

7.3.1.1 Riverside County Portion of the South Coast Air Basin

The combination of topography, low mean mixing height, abundant sunshine, and emissions from the second largest urban area in the United States gives the SOCAB the worst air pollution problem in the nation.

Climate in the SOCAB is determined by its terrain and geographical location. The Basin consists of a coastal plain with connecting broad valleys and low hills. The Pacific Ocean forms the southwestern border, and high mountains surround the rest of the SOCAB. The SOCAB lies in the semi-permanent high pressure zone of the eastern Pacific. The resulting climate is mild, and is tempered by cool ocean breezes. This climatological pattern is rarely interrupted. However, periods of extremely hot weather, winter storms, or Santa Ana wind conditions do exist.

Annual average temperature varies little throughout the SOCAB, ranging from the low to middle 60s, measured in degrees Fahrenheit. With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The majority of annual rainfall in the SOCAB occurs between October and March. Summer rainfall is minimal and generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern portion of the SOCAB and along the coastal side of the mountains.

Although the SOCAB has a semi-arid climate, air near the surface is generally moist because of the presence of a shallow marine layer. With very low average wind speeds, there is a limited capacity to disperse air contaminants horizontally. The dominant daily wind pattern is an onshore 8 to 12 miles per hour (mph) daytime breeze and an offshore 3 to 5 mph nighttime breeze. The typical wind flow pattern fluctuates only with occasional winter storms or strong northeasterly Santa Ana winds from the mountains and deserts northeast of the SOCAB. Summer wind flow patterns represent worst case conditions, as this is the period of higher temperatures and more sunlight, which results in ozone formation.

During spring and early summer, pollution produced during any one day is typically blown out of the SOCAB through mountain passes or lifted by warm, vertical currents adjacent to mountain slopes. Air contaminants can be transported 60 miles or more from the SOCAB by ocean air during the afternoons. From early fall to winter, the transport is less pronounced because of slower average wind speed and the appearance of drainage winds earlier in the day. During stagnant wind conditions, offshore drainage winds may begin by late afternoon. Pollutants remaining in the SOCAB are trapped and begin to accumulate during the night and the following morning. A low morning wind speed in pollutant source areas is an important indicator of air stagnation and the build-up potential for primary air contaminants.

With persistent low inversions and cool coastal air, morning fog, and low stratus clouds are common. Cloudy days are less likely in the eastern portions of the SOCAB and about 25 percent greater along the coast. The vertical dispersion of air pollutants in the SOCAB is limited by temperature inversions in the atmosphere close to the earth's surface. Temperature normally decreases with altitude, and a reversal of this atmospheric state, where temperature increases with altitude, is called an inversion. The height from the earth to the inversion base is known as the mixing height.

Inversions are generally lower in the nighttime, when the ground is cool, than during daylight hours when the sun warms the ground and, in turn, the surface air layer. As this heating process continues, the temperature of the surface air layer approaches the temperature of the inversion base, causing heating along its lower edge. If enough warming takes place, the inversion layer becomes weak and opens up to allow the surface air layers to mix upward. This can be seen in the middle to late afternoon on a hot summer day when the smog appears to clear up suddenly. Winter inversions typically break earlier in the day, preventing excessive contaminant build-up.

The combination of stagnant wind conditions and low inversions produces the greatest pollutant concentrations. On days of no inversion or high wind speeds, ambient air pollutant concentrations are lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas are transported predominantly onshore into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are carbon monoxide and oxides of nitrogen because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and oxides of nitrogen to form photochemical smog.

7.3.1.2 Riverside County Portion of the Mojave Desert Air Basin (MDAB)

The MDAB consists of an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes. Many of the lower mountains which dot the vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest. These prevailing winds are due to the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada mountains to the north; air masses pushed onshore in Southern California by differential heating are channeled through the MDAB. The MDAB is separated from the southern California coastal and central California Valley regions by mountains (highest elevation approximately 10,000 feet), whose passes form the main channels for these air masses.

The Mojave Desert is bordered in the southwest by the San Bernardino Mountains, separated from the San Gabriels by the Cajon Pass (4,200 feet). A lesser channel lies between the San Bernardino Mountains and the Little San Bernardino Mountains, the Morongo Valley. The Palo Verde Valley portion of the Mojave Desert lies in the low desert, at the eastern end of a series of valleys (notably the Coachella Valley) whose primary channel is the San Gorgonio Pass (2,300 feet) between the San Bernardino and San Jacinto Mountains.

During the summer, the MDAB is generally influenced by a Pacific Subtropical High cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time they reach the desert. Most desert moisture arrives from infrequent warm, moist and unstable air masses from the south. The MDAB averages between three and seven inches of precipitation per year (from 16 to 30 days with at least 0.01 inch of precipitation). The MDAB is classified as a dry-hot desert climate (Bwh), with portions classified as dry-very hot desert (Bwhh), to indicate at least three months have maximum average temperatures over 100.4°F.

7.3.1.3 Riverside County Portion of the Salton Sea Air Basin (SSAB)

The SSAB portion of the Riverside County is separated with the SOCAB region by the San Jacinto Mountains and separated with the MDAB region by the Little San Bernardino Mountains.

Similar to the MDAB region, during the summer the SSAB is generally influenced by a Pacific Subtropical High cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The SSAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time they reach the desert. Most desert moisture arrives from infrequent warm, moist and unstable air masses from the south. The SSAB averages between three and seven inches of precipitation per year.

7.4 Existing Air Quality and Air Quality Trends

7.4.1 Air Pollution Constituents and Attainment Status

The following describes the six criteria air pollutants and their attainment status in each of the three air basins.

7.4.1.1 Ozone

Ozone (smog) is formed by photochemical reactions between oxides of nitrogen and reactive organic gases rather than being directly emitted. Ozone is a pungent, colorless gas typical of Southern California smog. Elevated ozone concentrations result in reduced lung function, particularly during vigorous physical activity. This health problem is particularly acute in sensitive receptors such as the sick, elderly, and young children. Ozone levels peak during the summer and early fall months.

The SOCAB is designated as a non-attainment area for both federal and State ozone standards, meaning that air quality standards are being exceeded. The EPA has classified the SOCAB as an "extreme" non-attainment area, and has mandated that the SOCAB achieve attainment by 2010.

The MDAB is designated as a non-attainment area for both federal and State ozone standards.

The SSAB is designated as a non-attainment area for both federal and State ozone standards.

7.4.1.2 Carbon Monoxide

Carbon monoxide (CO) is formed by the incomplete combustion of fossil fuels, almost entirely from automobiles. It is a colorless, odorless gas that can cause dizziness, fatigue, and impairments to central nervous system functions.

The SOCAB is designated as a non-attainment area for federal CO standards. However, the Riverside County area has not exceeded both the federal and state carbon monoxide standards in the past five years.

The MDAB is designated as an attainment area for both federal and State CO standards.

The SSAB is designated as an attainment area for both federal and State CO standards.

7.4.1.3 Nitrogen Oxides

Nitrogen dioxide (NO_2), a reddish brown gas, and nitric oxide (NO), a colorless, odorless gas, are formed from fuel combustion under high temperature or pressure. These compounds are referred to jointly as nitrogen oxides, or NO_x. NO_x is a primary component of the photochemical smog reaction. They also contribute to other pollution problems, including a high concentration of fine particulate matter, poor visibility, and acid deposition. NO_2 decreases lung function and may reduce resistance to infection.

The SOCAB has not exceeded both federal and State standards for nitrogen dioxide in the past five years with published monitoring data. It is designated as a maintenance area under the federal standards, and as an attainment area under the state standards.

The MDAB is designated as an attainment area for both federal and state NO_2 standards.

The SSAB is designated as an attainment area for both federal and state NO_2 standards.

7.4.1.4 Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels. SO_2 irritates the respiratory tract, can injure lung tissue when combined with fine particulate matter, and reduces visibility and the level of sunlight.

The SOCAB is in attainment with both federal and State sulfur dioxide standards.

The MDAB is designated as an attainment area for both federal and state SO_2 standards.

The SSAB is designated as an attainment area for both federal and state SO_2 standards.

7.4.1.5 Reactive Organic Compounds

Reactive organic compounds (ROC) are formed from combustion of fuels and evaporation of organic solvents. ROC is a prime component of the photochemical smog reaction. Consequently, ROC accumulate in the atmosphere more quickly during the winter when sunlight is limited and photochemical reactions are slower. Although there are no federal or state ambient air quality standards for ROCs, they contribute to ozone.

7.4.1.6 Particulate Matter

Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Coarse particles (larger than 2.5 but smaller than 10 micrometers, or PM_{10}) come from a variety of sources, including windblown dust and grinding operations. Fine particles (less than 2.5 micrometers, or $PM_{2.5}$) often come from fuel combustion, power plants, and diesel buses and trucks. Fine particles can also be formed in the atmosphere through chemical reactions.

Coarse particles (PM_{10}) can accumulate in the respiratory system and aggravate health problems such as asthma. EPA's scientific review concluded that fine particles ($PM_{2.5}$), which penetrate deeply into the lungs, are more likely than coarse particles to contribute to the health effects listed in a number of recently published community epidemiological studies at concentrations that extend well below those allowed by the current PM_{10} standards. These health effects include premature death and increased hospital admissions and emergency room visits (primarily the elderly and individuals with cardiopulmonary disease); increased respiratory symptoms and disease (children and individuals with cardiopulmonary disease such as asthma); decreased lung functions (particularly in children and individuals with asthma); and alterations in lung tissue and structure and in respiratory tract defense mechanisms.

The SOCAB is a non-attainment area for the federal and State PM_{10} standards. The attainment status of $PM_{2.5}$ in the SOCAB has not been established by the EPA or the CARB.

The MDAB is designated as a non-attainment area for both federal and state PM_{10} standards. The attainment status of $PM_{2.5}$ in the MDAB has not been established by the EPA or the CARB.

The SSAB is designated as a non-attainment area for both federal and state PM_{10} standards. The attainment status of $PM_{2.5}$ in the SSAB has not been established by the EPA or the CARB.

7.4.2 Existing Air Quality and Air Quality Trends

The SCAQMD maintains ambient air quality monitoring stations throughout the SOCAB, as shown in Figure 7.1. There are seven air quality monitoring stations in the SOCAB area of Riverside County: Norco, Riverside-Rubidoux, Riverside-Magnolia, Banning-Allesandro, Banning-Hathaway, Perris, and Lake Elsinore. These seven air monitoring stations cover the western Riverside County area.

The SCAQMD also maintains two ambient air quality monitoring stations in the SSAB portion of the Riverside County: Palm Springs and Indio (Figure 7.1). Two air quality monitoring stations in the SSAB, maintained by the SCAQMD, were closed in the past five years. The air quality monitoring station at Temecula was closed in 1994, and the air quality monitoring station in Hemet was closed in 1996.

There is no air quality monitoring station located in the MDAB portion of the Riverside County.

Tables 7.B through 7.J list the air quality data monitored at these nine air quality monitoring stations. The ambient air quality data in these tables show that nitrogen dioxide and carbon monoxide levels are either not monitored or below the relevant state and federal standards at most of the nine air monitoring stations, except at the Banning-Hathaway station where the monitored nitrogen dioxide level exceeded the state standard on one day in 1997. The federal standard for nitrogen dioxide was not exceeded. Ozone levels exceeded the state and federal standards in each of the past five years at all eight monitoring stations where ozone concentration was monitored. However, the general trend at all monitoring stations was that the maximum level of ozone was decreasing and the number of days the federal and state ozone standards were exceeded was also decreasing.

Table 7.B - Ambient Air Quality at Norco Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	158	25	NM[1]	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	.16	8	97	19	NM[1]	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.19	75	177	28	NM[1]	NM[1]
1994	NM[1]	NM[1]	NM[1]	NM[1]	.17	83	139	35	NM[1]	NM[1]
1993	NM[1]	NM[1]	NM[1]	NM[1]	.16	71	164	31	NM[1]	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.19**		**177**		**NM[1]**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	158	1	0.0330	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	.16	2	97	0	0.0360	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.19	23	177	2	0.0391	NM[1]
1994	NM[1]	NM[1]	NM[1]	NM[1]	.17	14	139	0	0.0414	NM[1]
1993	NM[1]	NM[1]	NM[1]	NM[1]	.16	17	164	1	0.0387	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.19**		**177**		**0.0414**	

Notes: [1] Not monitored at this monitoring station.
Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.C - Ambient Air Quality at Riverside-Rubidoux Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	7.0[1]	0	5.8[1]	0	.19	89	163	41	.12	0
1996	9.0	0	5.6	0	.20	92	162	43	.11	0
1995	7.0	0	5.7	0	.21	109	219	38	.15	0
1994	8.0	0	5.9	0	.25	134	161	41	.18	0
1993	8.0	0	7.1	0	.26	132	231	42	.14	0
MAXIMUM	**9.0**		**7.1**		**.26**		**231**		**.18**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	7.0[1]	0	5.8[1]	0	.19	13	163	1	0.0260	0
1996	9.0	0	5.6	0	.20	36	162	1	0.0290	0
1995	7.0	0	5.7	0	.21	52	219	4	0.0300	0
1994	8.0	0	5.9	0	.25	77	161	1	0.0260	0

1993	8.0	0	7.1	0	.26	71	231	4	0.0300	0
MAXIMUM	**9.0**		**7.1**		**.26**		**231**		**0.0300**	

Notes: [1] Not monitored for a full 12-month period. May not be representative.
Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.D - Ambient Air Quality at Riverside-Magnolia Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	11.0	0	5.5	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1996	9.0	0	5.4	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1995	9.0	0	6.5	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1994	11.0	0	7.3	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1993	10.0	0	6.3	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
MAXIMUM	**11.0**		**7.3**		**NM[1]**		**NM[1]**		**NM[1]**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	11.0	0	5.5	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1996	9.0	0	5.4	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1995	9.0	0	6.5	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1994	11.0	0	7.3	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
1993	10.0	0	6.3	0	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]
MAXIMUM	**11.0**		**7.3**		**NM[1]**		**NM[1]**		**NM[1]**	

Notes: [1] Not monitored at this monitoring station.
Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.E - Ambient Air Quality at Banning-Alessandro Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.13	36	227	14	NM[1]	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	.19	47	122	10	NM[1]	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.18	48	138	7	NM[1]	NM[1]
1994	NM[1]	NM[1]	NM[1]	NM[1]	.20	63	96	14	NM[1]	NM[1]
1993	NM[1]	NM[1]	NM[1]	NM[1]	.16	38	87	10	NM[1]	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.20**		**227**		**NM[1]**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.13	2	227	1	NM[1]	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	.19	11	122	0	NM[1]	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.18	23	138	0	NM[1]	NM[1]

1994	NM[1]	NM[1]	NM[1]	NM[1]	.20	27	96	0	NM[1]	NM[1]
1993	NM[1]	NM[1]	NM[1]	NM[1]	.16	8	87	0	NM[1]	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.20**		**227**		**NM[1]**	

Notes: [1] Not monitored at this monitoring station.
Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.F - Ambient Air Quality at Banning-Hathaway Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m_3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	NM[2]	NM[2]	NM[2]	NM[2]	.18[1]	100[1]	NM[2]	NM[2]	.31[1]	1[1]
1996	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
1995	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
1994	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
1993	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
MAXIMUM	**NM[2]**		**NM[2]**		**.18[2]**		**NM[2]**		**.31[2]**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	NM[2]	NM[2]	NM[2]	NM[2]	.18[1]	34[1]	NM[2]	NM[2]	0.0160[1]	0[1]
1996	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
1995	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
1994	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
1993	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]	NM[2]
MAXIMUM	**NM[2]**		**NM[2]**		**.18[2]**		**NM[2]**		**0.0160[2]**	

Notes: [1] Not monitored for a full 24-month period. May not be representative.
[2] Not monitored at this monitoring station.
Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.G - Ambient Air Quality at Perris Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m_3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.08	0	139	19	NM[1]	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	.18	95	87	20	NM[1]	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.20	107	145	23	NM[1]	NM[1]
1994	NM[1]	NM[1]	NM[1]	NM[1]	.18	125	112	26	NM[1]	NM[1]

1993	NM[1]	NM[1]	NM[1]	NM[1]	.20	137	131	27	NM[1]	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.20**		**145**		**NM[1]**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.08	0	139	0	NM[1]	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	.18	31	87	0	NM[1]	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.20	36	145	0	NM[1]	NM[1]
1994	NM[1]	NM[1]	NM[1]	NM[1]	.18	59	112	0	NM[1]	NM[1]
1993	NM[1]	NM[1]	NM[1]	NM[1]	.20	73	131	0	NM[1]	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.20**		**145**		**NM[1]**	

Notes: [1] Not monitored at this monitoring station.
Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.H - Ambient Air Quality at Lake Elsinore Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m_3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.10	1	NM[1]	NM[1]	.11	0
1996	NM[1]	NM[1]	NM[1]	NM[1]	.15	14	NM[1]	NM[1]	.10	0
1995	NM[1]	NM[1]	NM[1]	NM[1]	.19	72	NM[1]	NM[1]	.13	0
1994	NM[1]	NM[1]	NM[1]	NM[1]	.19	102	NM[1]	NM[1]	.11	0
1993	NM[1]	NM[1]	NM[1]	NM[1]	.19	76	NM[1]	NM[1]	NM[1]	0
MAXIMUM	**NM[1]**		**NM[1]**		**.19**		**NM[1]**			
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.10	0	NM[1]	NM[1]	0.0160	0
1996	NM[1]	NM[1]	NM[1]	NM[1]	.15	4	NM[1]	NM[1]	0.0170	0
1995	NM[1]	NM[1]	NM[1]	NM[1]	.19	23	NM[1]	NM[1]	0.0200	0
1994	NM[1]	NM[1]	NM[1]	NM[1]	.19	39	NM[1]	NM[1]	0.0210	0
1993	NM[1]	NM[1]	NM[1]	NM[1]	.19	27	NM[1]	NM[1]	NM[1]	0
MAXIMUM	**NM[1]**		**NM[1]**		**.19**		**NM[1]**		**0.0210**	

Notes: [1] Not monitored at this monitoring station.
Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.I - Ambient Air Quality at Palm Springs Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	

	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m$_3$)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	3.0	0	1.5	0	.16	45	63	1	.07	0
1996	3.0	0	1.6	0	.16	60	130	2	.08	0
1995	3.0	0	1.6	0	.16	50	68	2	.08	0
1994	4.0	0	2.1	0	.17	71	55	2	.08	0
1993	6.0	0	2.0	0	.17	79	58	1	.09	0
MAXIMUM	**6.0**		**2.1**		**.17**		**130**		**.09**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	3.0	0	1.5	0	.16	4	63	0	0.0160	0
1996	3.0	0	1.6	0	.16	12	130	0	0.0200	0
1995	3.0	0	1.6	0	.16	10	68	0	0.0220	0
1994	4.0	0	2.1	0	.17	13	55	0	0.0210	0
1993	6.0	0	2.0	0	.17	20	58	0	0.0190	0
MAXIMUM	**6.0**		**2.1**		**.17**		**130**		**0.0220**	**0**

Source: SCAQMD Air Quality Data, 1993 to 1997.

Table 7.J - Ambient Air Quality at Indio Air Monitoring Station

	Carbon Monoxide				Ozone		Fine Suspended Particulates		Nitrogen Dioxide	
	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 8-Hour Conc. (ppm)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded	Max. 24-Hour Conc. (Ug/m3)	No. of Days Exceeded	Max. 1-Hour Conc. (ppm)	No. of Days Exceeded
State Stds	>20 ppm/1 hr		>9.1 ppm/8 hr		>.09 ppm/1 hr		>50 ug/m^3, 24 hrs		>.25 ppm/1 hr	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.09	0	182	25	NM[1]	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	215	31	NM[1]	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.14	25	199	27	NM[1]	NM[1]
1994	NM[1]	NM[1]	NM[1]	NM[1]	.12	31	97	23	NM[1]	NM[1]
1993	NM[1]	NM[1]	NM[1]	NM[1]	.16	25	125	25	NM[1]	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.16**		**215**		**NM[1]**	
Federal Stds	>35 ppm/1 hr		>9.5 ppm/8 hr		>.12 ppm/1 hr		>150 ug/m^3, 24 hrs		>0.053 ppm annual average	
1997	NM[1]	NM[1]	NM[1]	NM[1]	.09	0	182	2	NM[1]	NM[1]
1996	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	NM[1]	215	2	NM[1]	NM[1]
1995	NM[1]	NM[1]	NM[1]	NM[1]	.14	3	199	1	NM[1]	NM[1]
1994	NM[1]	NM[1]	NM[1]	NM[1]	.12	0	97	0	NM[1]	NM[1]
1993	NM[1]	NM[1]	NM[1]	NM[1]	.16	3	125	0	NM[1]	NM[1]
MAXIMUM	**NM[1]**		**NM[1]**		**.16**		**215**		**NM[1]**	

Notes: [1] Not monitored at this monitoring station.
Source: SCAQMD Air Quality Data, 1993 to 1997.

The PM_{10} level monitored at these air monitoring stations exceeded the state standard in each of the past five years at all monitoring stations. However, the federal standard was exceeded less frequently at each monitoring station in all five years. $PM_{2.5}$ levels were not reported at these air monitoring stations.

7.5 Air Quality Management

The 1976 Lewis Air Quality Management Act established air districts throughout the State of California. The Federal Clean Air Act Amendments of 1977 (1977 CAAA) required that each state adopt an implementation plan outlining pollution control measures to attain the federal standards in non-attainment or maintenance areas of the state. This requirement led to the local air quality planning processes in areas like the SOCAB, MDAB, and SSAB.

The CARB oversees activities of local air quality management agencies, and is responsible for incorporating air quality management plans for local air basins into a State Implementation Plan (SIP) for federal Environmental Protection Agency (EPA) approval. The SIP is a plan that provides for implementation, maintenance, and enforcement of the AAQS.

CARB maintains air quality monitoring stations throughout the State in conjunction with local air districts. Data collected at these stations are used by the CARB to classify air basins as "attainment" or "non-attainment" with respect to each pollutant and to monitor progress in attaining air quality standards. Attainment refers to geographic areas that meet the AAQS, while non-attainment refers to areas that do not meet the AAQS. Maintenance areas refer to geographic areas that were once non-attainment but have shown recently that the areas are achieving the AAQS.

The federal CAA prohibits federal departments and agencies or other agencies from acting on behalf of the federal government, and the Metropolitan Planning Organization (MPO) from engaging in, supporting in any way, providing financial assistance for, licensing, permitting or approving any activity that does not conform to the SIP.

Southern California Association of Governments (SCAG) is the MPO for Riverside, San Bernardino, Los Angeles and Orange Counties. Federal law requires that a proposed project conform with the SIP. The Air Quality Management Plan (AQMP) must be reviewed and approved by the EPA before it becomes part of the SIP. SIP status in the region is complex because of a combination of EPA proposed action on the SIP and legal action by various parties.

7.5.1 South Coast Air Basin and Salton Sea Air Basin

The SCAQMD and SCAG are responsible for formulating and implementing the AQMP for the SOCAB and SSAB portions of Riverside County. Regional AQMPs were adopted for the SOCAB region for 1979, 1982, 1991, 1994, and 1997.

In January, 1999, the EPA rejected the provisions of the 1997 AQMP designed to attain the federal ozone standard for the SCAG region. Separate parts of the 1997 AQMP related to carbon monoxide and nitrogen dioxide have previously been approved, and EPA has yet to act on that portion of the 1997 AQMP related to fine particulates (PM_{10}). Therefore, the following SIP and AQMP are the currently approved plans for the SOCAB region:

- 1994 SIP for ozone
- 1997 SIP for carbon monoxide
- 1997 AQMP for ozone, PM_{10}, carbon monoxide, and nitrogen dioxides
- For those pollutants without an approved SIP, the 1990 inventory should be used for general conformity

7.5.2 Mojave Desert Air Basin

The Mojave Desert Air Quality Management District (MDAQMD) and SCAG are responsible for formulating and implementing the Air Quality Attainment Plan (AQAP) for the MDAB potion of Riverside County. Regional AQAPs were adopted in 1991, 1994 and 1997. The following SIP and AQMP are the currently approved plans for the MDAB region:

- 1997 SIP for ozone, PM_{10}, and nitrogen dioxides
- 1997 AQAP for ozone, PM_{10}, and nitrogen dioxides.

Section 8.0 - Noise

Existing Setting Report

Revised March 2000

8.1 Introduction

Sound is increasing to such disagreeable levels in the environment that it can threaten people's quality of life. As modern transportation systems develop and human dependence upon machines continues to increase, the general level of noise in our day-to-day living environment rises. In Riverside County, noise sensitive uses such as residences near airports, railroads, and freeways are being adversely affected by annoying or hazardous noise levels. Other activities such as construction, operation of household power tools, and industry also contribute to increasing background noise. Noise generated by high altitude aircraft overflight, such as those from Los Angeles International Airport (LAX), affects a wide area. However, its noise levels are generally low compared to other ground level noise-generating activities. Sound refers to anything that is or may be perceived by the ear. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

8.1.1 Characteristics of Sound

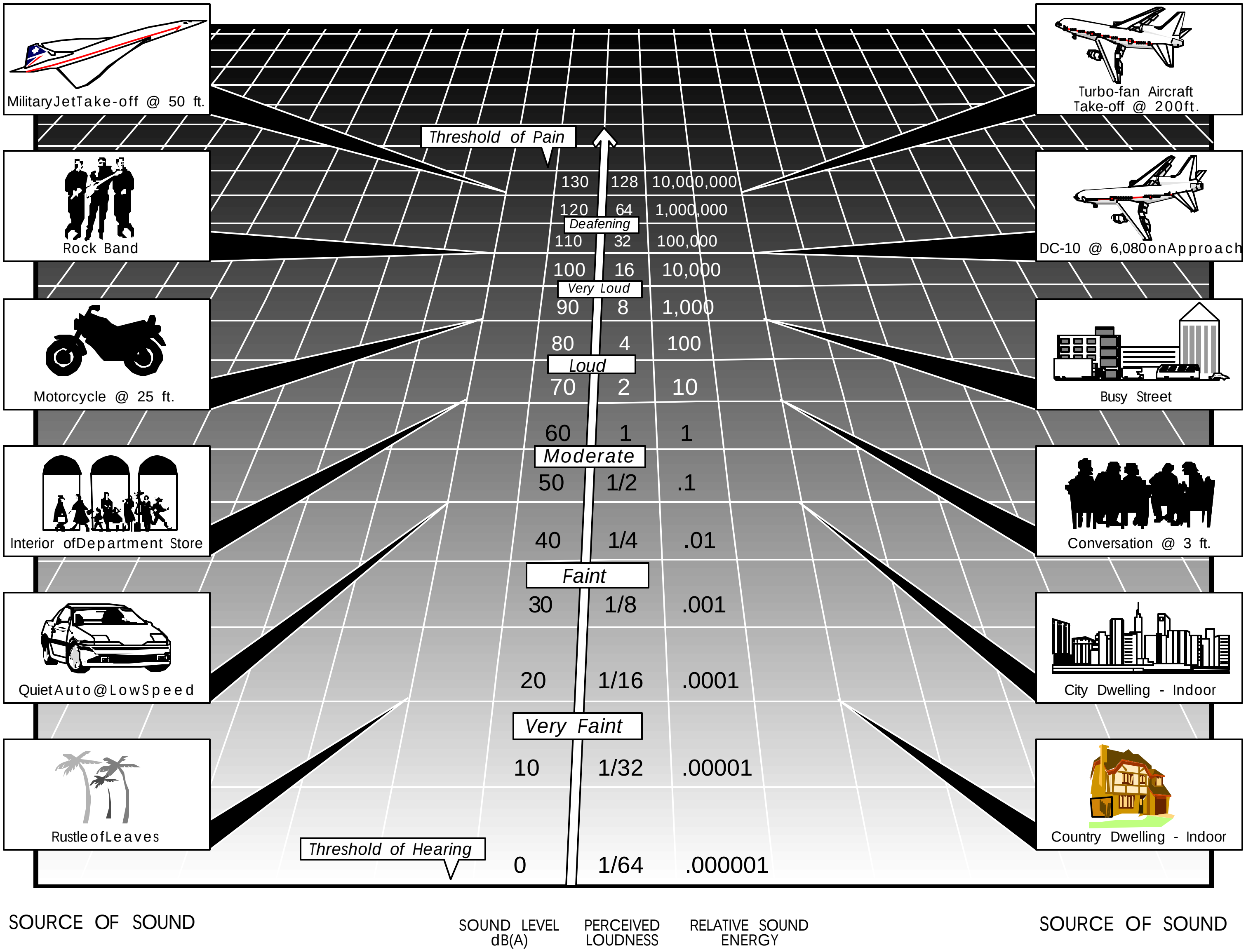
To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is the number of complete vibrations or cycles per second of a wave that result in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment, and is measured by the amplitude of the sound wave. The pitch of a sound can be an annoyance, while its loudness can affect the ability to hear. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

8.1.2 Measurement of Sound

A "decibel" is a unit for describing the amplitude of sound. Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units, such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve (see Figure 8.1).

For example, 10 decibels are 10 times more intense than one decibel, 20 decibels are 100 times more intense and 30 decibels are 1,000 times more intense. Thirty decibels represent 1,000 times as much acoustic energy as 1 decibel. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than zero decibel. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10-decibel increase in sound level is perceived by the human ear as doubling of the loudness of the sound. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Figure 8.1



Source: Coffman and Associates, 1991.

COMMON NOISE SOURCES AND NOISE LEVELS

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Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately six decibels for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source such as highway traffic or railroad operations, the sound decreases three decibels for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases four and one-half decibels for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent-Continuous Sound Level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Day-Night Average Equivalent Level (L_{dn}) based on A-weighted decibels (dBA). L_{dn} is the time-varying noise over a 24-hour period, with a weighting factor applied to the hourly Leq for noises occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours) with a weighting factor of 10 dBA. Community noise equivalent level (CNEL) is another 24-hour averaged noise scale. Similar to the L_{dn} scale, the CNEL scale has a weighting factor of 10 dBA on event occurring between the nighttime hours between 10 p.m. and 7 a.m. Additionally, CNEL adds a 5 dBA weighting factor on events occurring in the evening hours between 7 p.m. and 10 p.m. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing annoyance factor include the maximum noise level (L_{max}) and the percentile exceedance noise levels (L_N). The maximum noise level (L_{max}) is the highest exponential-time-averaged sound level that occurs during a stated time period. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise. The percentile exceedance noise levels (L_N) is the noise level exceeded N percent of the time during a specified time period. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represent the median noise level. Half the time the noise level exceeds this level and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the lowest noise level experienced during a monitoring period. It is normally referred to as the background noise level. These two noise metrics are generally used in municipal code noise ordinance regulating existing noise-generating activities or stationary sources for noise enforcement purposes.

8.1.3 Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire human system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, and thereby affecting blood pressure, functions of the heart, and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 190 dBA will rupture the eardrum and permanently damage the inner ear.

Noise impacts can be described in three categories. The first is audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 decibels (dB) or greater since this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise level of less than 1.0 dB that are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

8.1.4 Land Use Compatibility with Noise

The State of California's Office of Noise Control has established standards and guidelines for acceptable community noise levels based on the CNEL rating scale. The purpose of these standards and guidelines, summarized in Figure 8.2, is to provide a framework for setting local standards for human exposure to noise and for preparing local General Plan noise elements.

As shown in Figure 8.2, a normally acceptable designation indicates that a specified land use would achieve all noise reduction requirements with standard construction. By comparison, a conditionally acceptable designation implies that new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use type is made, and the needed noise insulation features are incorporated by design. In general, sensitive land uses should not be exposed to noise levels indicated by normally unacceptable conditions, or clearly unacceptable conditions.

Sensitive receptors are those land uses that require serenity or are otherwise adversely affected by noise events or conditions. These land uses include, but are not limited to, schools, libraries, churches, hospitals, and residential uses. In addition, many of the open space areas within the Riverside County have been set aside to preserve their serenity, as well as to preserve significant habitat areas, and should also be considered as "sensitive receptors."

Single family and multifamily residential uses, schools, libraries, and churches have a normally acceptable community noise exposure range of 60 dBA CNEL to 70 dBA CNEL. Most communities use 60 dBA CNEL or 65 dBA CNEL as their exterior residential noise standard. Office buildings are normally acceptable up to 70 dBA CNEL. Industrial and manufacturing land uses, being less sensitive to noise, are normally acceptable where the exterior noise levels are 75 dBA CNEL or less.

8.1.4.1 Existing Riverside County Noise Standards

The existing Riverside County General Plan incorporates the standards contained in Figure 8.1, above, as its General Plan definition of noise compatible land use. The

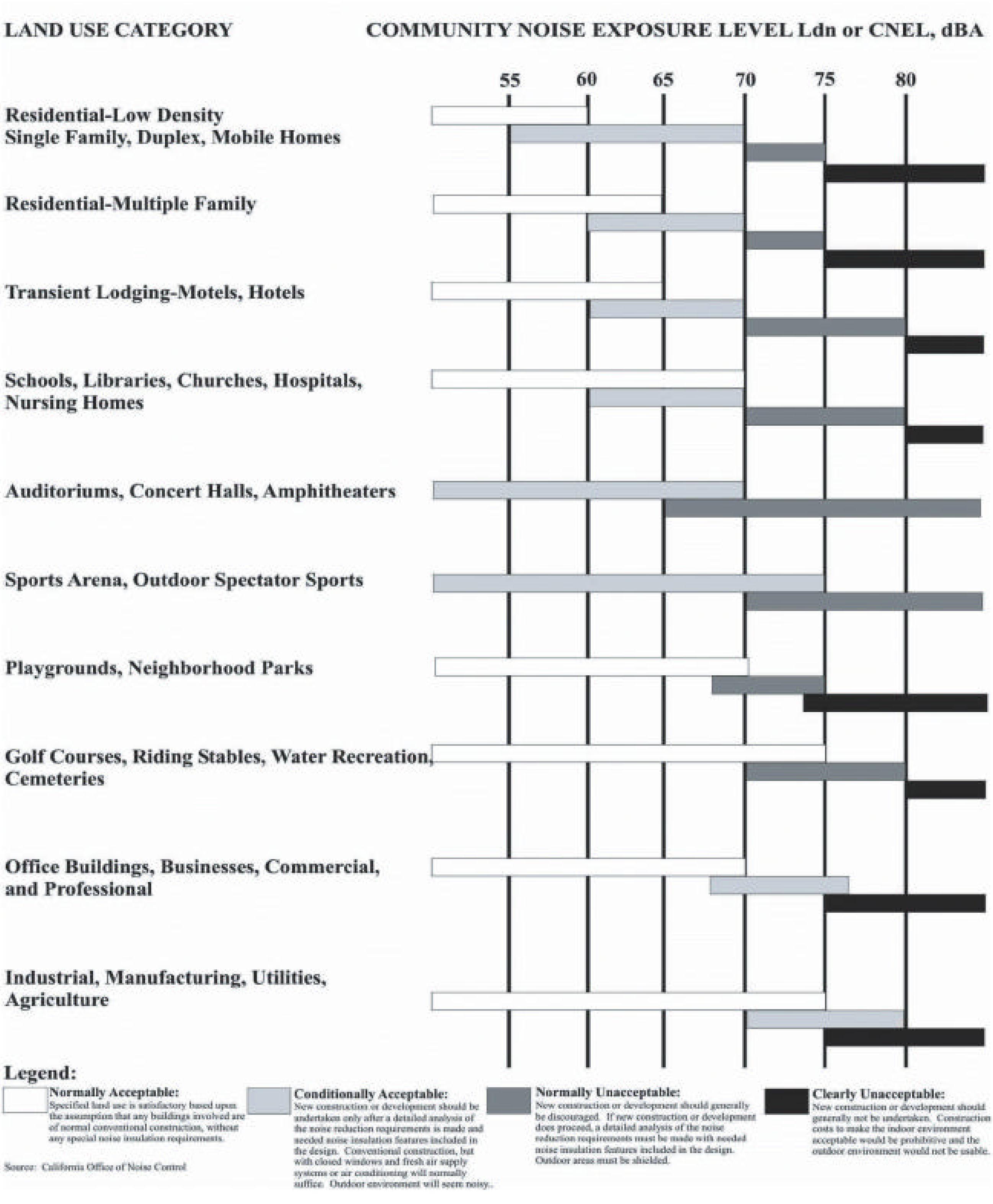


Figure8.2

LAND USE COMPATIBILITYFOR COMMUNITY NOISEEXPOSURE

existing General Plan Noise Element also contains the following specific land use standards.

- Single and multiple family residential, group homes, hospitals, schools and other learning institutions, and parks and open space where "quiet is a basis for use" are defined as noise sensitive land uses, and are "discouraged" in areas where noise is in excess of a 65 dBA CNEL.
- Businesses and professional offices where effective communication is required are to mitigate noise interior levels to 45 dBA.
- In areas adjacent to major roadways, noise levels are to be determined based on the roadway's design capacity, rather than on existing or protected traffic volumes.

8.2 Overview of the Existing Noise Environment

The primary existing noise sources within the Riverside County include transportation facilities such as airports, railroads, freeways and highways; commercial, industrial/manufacturing, agricultural land uses; recreational areas; construction; and other noise sources such as shooting range, mining, and sand and gravel operations. Noise is also directly attributable to various machines, electronic amplification of music, and the shear numbers of various power tools, machinery, televisions and stereo throughout the population.

Urban areas are subjected to increasingly pervasive noise. Although most major noise sources are transportation-related, disturbing levels of noise are common throughout many residential areas in the form of stereos, television, power mowers and other lawn care devices, shop tools, and pool and air conditioning equipment.

Commercial areas are often subjected to high levels of transportation-related noise, often preclude use of outside areas for conversation where it is necessary or desirable. Juke boxes, video games and service equipment all add another layer of noise to transportation-related noise. Industrial areas are often high noise producers with manufacturing equipment commonly adding significantly to transportation-related noise.

Agricultural operations may produce significant noise during planting and harvesting times from equipment operation. Agricultural noise may be disturbing to neighboring residential areas; a common phenomena as urban areas intrude into agricultural lands. Agricultural areas may also have noise sensitive uses which can be disturbed by high noise levels as is the case with raising of animals and poultry.

Recreational lands and wildlife habitat are also significantly impacted by noise. Recreational lands are lands where quiet is a basis for use. Uncontrolled use of off-road vehicles in parks and open space lands degrades recreational opportunities for the County's residents. Noise intrusion into wildlife habitat drives off wildlife and with prolonged use may effectively reduce the amount of land used as habitat by various species.

There are seven public use general aviation airports and a number of smaller airports and air fields within Riverside County. The most significant highway noise producers are I-10, I-215, SR-60, and SR-91. The two railroads (Union Pacific and Burlington Northern/Santa Fe) also produce significant amount of noise; however, due to relatively low volumes of traffic and the isolated nature of the current system of rail lines, they do not expose as many people to the intensity of sound as do the airports.

8.2.1 Ambient Noise Survey

A survey of Riverside County's existing noise environment was conducted on August 17-19, 1999. Noise measurements were taken in 20 minute periods. A total of 27 locations throughout the County unincorporated areas were monitored to represent existing ambient noise levels representative of the residential, commercial, and rural land use characteristics. All measurement locations had direct line-of-sight to traffic on adjacent roadways. The measured noise level ranged from 56.6 to 76.1 dBA L_{eq}. Table 8.A summarizes noise measurement data for these monitoring locations. Figure 8.3 depicts these noise monitoring locations.

8.2.2 Existing Freeway and Highway Noise

The FHWA highway traffic noise prediction model (FHWA RD-77-108), currently used throughout the United States, was used to estimate freeway and highway traffic-related noise levels in the unincorporated Riverside County area. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The average daily traffic (ADT) volumes in the area are taken from the County's traffic counts. The resultant noise levels are weighted and summed over 24-hour periods to determine the L_{dn} value. L_{dn} contours are derived through a series of computerized iterations to isolate the 60, 65, and 70 dBA L_{dn} contours for traffic noise levels.

Table 8.B provides the traffic noise levels adjacent to representative segments of the freeways and major roads in the unincorporated Riverside County. These noise levels represent the worst-case scenario, which assumes no shielding is provided between the highway traffic and the location where the noise contours are drawn. Table 8.B shows that traffic noise level measured at 50 feet from the outermost travel lane for these roadways ranges from a low of 63.2 dBA L_{dn} along Redlands Boulevard to a high of 80.1 dBA L_{dn} along I-215.

It should be noted that only roadway segments with traffic volumes higher than 6,000 ADT and representative of the subareas covering the majority of the unincorporated Riverside County were selected for analysis. In some subareas where several ADTs were presented at close range, only the segment with the highest ADT was analyzed. Along roadway segments with traffic volumes less than 6,000 ADT, the 70 and 65 dBA Ldn noise contours would be confined within the roadway right of way (i.e., within 50 feet of the roadway centerline). Therefore, no modeling of the traffic noise along these roadway segments was provided.

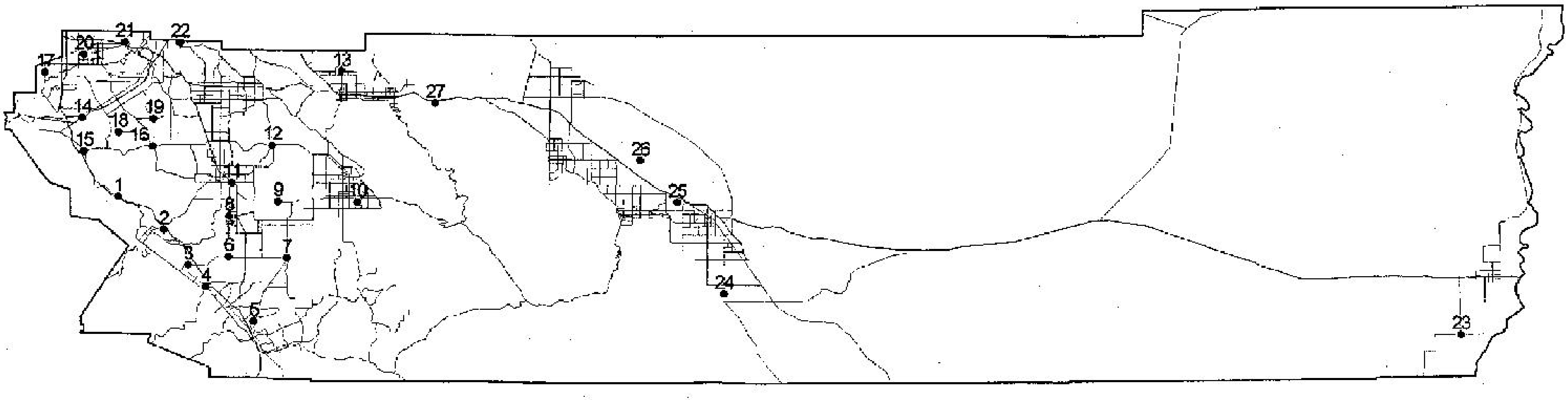
Table 8.A - Ambient Noise Monitoring Results

	Location	Start Time	Leq (dBA)	Noise Sources	Remarks
1.	15' north of Temescal Canyon Rd. near lake	8:35 a.m.	65.8	Traffic on Temescal Canyon Rd.	Trucks made up for most of the noise; overall traffic was moderate; I-15 south of the monitoring site contributed to noise level as well
2.	20' southwest of Collier Rd.; At intersection of Central St. & Collier Rd.	9:20 a.m.	64.9	Busy traffic on Collier Road; moderate Traffic on Central Ave.	Traffic was continuous on Collier Road
3.	15' south of Bundy Canyon Rd.; At intersection of Bundy Canyon Rd. & Mission Trail	10:00 a.m.	61.8	Traffic on Bundy Canyon Rd.	Traffic was dense at times and non-existent at others
4.	15' east of Clinton Keith Rd., near intersection of Clinton Keith Rd. and Palomar/Washington St.	10:45 a.m.	67.6	Traffic on Clinton Keith Road and Palomar St.	Traffic was continuous on Clinton Keith and Palomar St.
5.	15' southeast of SR-79, near intersection of Clinton Keith Rd. and Margarita Rd.	11:40 a.m.	67.2	Traffic on SR-79 and Margarita Rd.; plane flying overhead.	Traffic was heavy and continuous on SR-79; moderate traffic on Margarita Rd.
6.	15' east of Murrieta Rd., near intersection of Murrieta Rd. Bundy Canyon/Scott Rd.	12:40 p.m.	65.3	Traffic on Murrieta Rd.	Traffic was moderate on Murrieta Rd. and Scott Rd.
7.	15' west of SR-79, near intersection of SR-79 and Scott Rd.	1:25 p.m.	67.1	Busy traffic on SR-79; traffic on Scott Rd.	Traffic was busy and continuous on SR-79; moderate traffic on Scott Rd.
8.	15' south of McCall Blvd., near intersection of McCall Blvd and Murrieta Rd.	2:20 p.m.	65.1	Traffic on McCall Blvd and Murrieta Rd.; plane flying overhead	Traffic was moderate on both McCall Blvd. and Murrieta Rd.
9.	15' south of McWade Ave., near intersection of McWade Ave. and Olson Ave.	3:00 p.m.	65.3	Traffic on McWade Ave and Olson Ave.	Moderate traffic on Olson and McWade.
10	15' east of Cornell St., between parallel streets of Mayberry Ave. and McDowell St.	3:50 p.m.	66.1	Traffic on Cornell St; traffic on Mayberry Ave; traffic on McDowell St.	Moderate traffic on all three streets.
11	15' south of Ellis Ave.; SH-74 to the North.	2:40 p.m.	66.5	Traffic on Ellis Ave; traffic on SH-74.	Moderate traffic level on Ellis Ave.
12	15' south of Reservoir Ave., near intersection of Reservoir Ave. and Davis Rd./Hansen Ave.; Ramona Expressway to the north.	3:25 p.m.	65.1	Traffic on Reservoir Ave.; traffic on Davis/Hansen; traffic on Ramona Expressway.	Moderate traffic levels on Davis Rd. and Reservoir Ave.
13	15' north of Cherry Valley Blvd., near intersection of Beaumont Ave. and Cherry Valley Blvd.	4:20 p.m.	65.5	Traffic on Cherry Valley Blvd. and Beaumont Ave.	Moderate traffic levels on Cherry Valley Blvd. and Beaumont Ave.

	Location	Start Time	Leq (dBA)	Noise Sources	Remarks
14	14' from the street in the southwest corner of Magnolia Ave. and McKinley St.	9:40 a.m.	71.3	Traffic on McKinley St. and Magnolia Ave.	Both streets are major streets with heavy traffic in each direction.
15	22' from the street in the southeast corner of Cajalco Rd. and Temescal Canyon Rd.	10:40 a.m.	70.9	Tractor trailer trucks on Cajalco Rd. and recycling equipment at Liston Aluminum Company.	Intersection is all way stop; Liston Aluminum Co. is located in the northwest corner of the intersection.
16	15' from the street in the southeast corner of Cajalco Rd. and El Sobrante Rd.	11:30 a.m.	70.0	Traffic on Cajalco Rd. and El Sobrante Rd., including cars, pick up trucks, and tractor trailer trucks.	Three way intersection with a stop sign on El Sobrante Rd.
17	12' from the street in the northwest corner of Archibald Ave. and Schleisman Rd.	12:20 p.m.	73.0	High volume of trucks on Archibald Ave.	Three legged signalized intersection; dairy farms located at northwest and southwest corners.
18	15' from the street in the northeast corner of McAllister St. and El Sobrante Rd.	2:00 p.m.	71.9	Construction activity in the northwest corner of the intersection and traffic on El Sobrante Rd.	Three legged intersection; very little development nearby.
19	15' from the street in the northwest corner of Washington St. and Van Buren Blvd.	2:35 p.m.	72.3	High volume of traffic entering a 7-11 market for gasoline; continuous barking dogs.	7-11 market located in the northwest corner of intersection.
20	15' from the street in the southeast corner of Jurupa Rd. and 10th St.	3:35 p.m.	69.8	Heavy tractor trailer truck traffic on 10th St. and high volume of traffic entering Circle K market.	Across from Vanny's Auto Service located at 10596 Jurupa Rd.; all way stop intersection.
21	15' from the street in the northeast corner of Valley Rd and 34th St.	4:10 p.m.	69.9	Construction activity approximately 300 yards to the north and traffic on Valley Rd.	Intersection is signalized.
22	15' from the street in the southeast corner of Center Ave. and Mt. Vernon Ave.	5:40 p.m.	56.6	Light traffic on Center Ave. and Mt. Vernon Ave. and helicopter flyover a quarter mile away.	Intersection has an all way stop sign.
23	15' from the street in the southeast corner of Arrowhead Blvd. and 28th St.	10:35 a.m.	65.2	Traffic on 28th St. and Arrowhead Blvd. and agricultural equipment nearby.	Intersection is a three legged intersection; free-flowing traffic on 28th St.; Highway 78 is located to the east.
24	15' from the street in the northwest corner of Highway 86 and 62nd Ave.	1:05 p.m.	76.1	Heavy tractor trailer traffic on Highway 86 and agricultural tractors in the southwest direction.	Intersection is a two way controlled stop; tractors in operations were about 70 yards from the meter.
25	15' from the street in the northwest corner of Adams St. and 42nd Ave.	2:15 p.m.	67.5	Traffic on Adams St. and 42nd Ave. including cars, pick up trucks and vans.	Intersection is an all way controlled stop; residential development in three corners.

	Location	Start Time	Leq (dBA)	Noise Sources	Remarks
26	15' from the street in the southeast corner of Ramon Rd. and Via Las Palmas.	3:15 p.m.	70.5	Traffic on Ramon Rd. and Via Las Palmas.	Three-way intersection; intersection; free-flowing traffic on Ramon Rd.; many residential developments to the north of the intersection.
27	15' from the street in the northwest corner of Broadway Rd. and Bonita Ave.	4:30 p.m.	65.7	Traffic on Broadway Rd. and Bonita Ave.	Free flowing traffic on Broadway Rd.; residential developments in the southeast corner of the intersection.

Source: LSA Associates, Inc., 1999.



Legend

- Noise Monitoring Sites
- Highways
- Major Roads
- County Boundary

Figure 8.3

Scaleisapproximate
0 6 12Miles

NOISE MONITORING LOCATIONS

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Table 8.B - Existing Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 Ldn, feet	Centerline to 65 Ldn, feet	Centerline to 60 Ldn, feet	Ldn (dBA) 50' from outermost lane
La Sierra Ave at El Sobrante Rd.	12,200	< 50[1]	81	171	66.2
Van Buren Blvd. at Mockingbird Canyon Rd.	24,540	61	127	271	69.2
Alessandro Blvd. at West Frontage Rd.	21,126	56	115	246	68.6
Felspar St. at Galena St.	21,256	56	116	247	68.6
Iowa Ave. at Center St.	15,200	< 50	93	197	67.2
Market St. at Via Cerro	13,400	< 50	86	182	66.6
Mission Blvd. at Etiwanda Ave.	27,000	65	135	289	69.7
N. Main St. at Placentia Ln.	15,500	< 50	94	200	67.2
Riverview Dr. at Mission Blvd.	12,618	< 50	83	175	66.4
Sierra Ave. at Armstrong Rd.	11,700	< 50	79	166	66.0
Van Buren Blvd. at Jurupa Rd.	22,714	58	121	258	68.9
McCall Blvd. at Sun City Blvd.	10,500	< 50	74	155	65.6
Newport Rd. at Murrieta Rd.	24,200	61	126	269	69.2
Palm Dr. at Dillon Rd.	17,600	< 50	102	218	67.8
Murrieta Hot Springs Rd. at Margarita Rd.	11,528	< 50	78	165	66.0
McCall Blvd. at Sherman Ave.	10,252	< 50	73	152	65.5
Ramon Rd. at Bob Hope Dr.	20,266	54	112	239	68.4
Van Buren Blvd. at I-215	24,900	62	128	274	69.3
Van Buren Blvd. at Suttles Dr.	29,500	68	143	306	70.0
Green River Rd. at Fresno Rd.	13,000	<50	84	178	66.5
Serfas Club Dr. at Pinecrest Dr.	10,800	< 50	75	158	65.7
Grand Ave at Baldwin Blvd.	12,500	< 50	82	174	66.3
Limonite Ave. at Etiwanda Ave.	17,300	< 50	101	215	67.7
Stetson Ave. at Dartmouth St.	19,284	< 50	109	231	68.2
Washington St. at Fred Waring Dr.	23,610	60	124	264	69.1
Indian Ave. at Dillon Rd.	11,890	< 50	80	168	66.1
La Sierra Ave. at Cleveland Ave.	10,190	< 50	72	152	65.4
Van Buren Blvd. at Ridgeway Ave.	34,864	76	160	342	70.8
Palm Dr. at Varner Rd.	13,168	< 50	85	180	66.5
Van Buren Blvd. at Canyonview Dr.	26,248	64	133	284	69.5
Cajalco Rd. at Haines St.	27,448	65	137	292	69.7
Rubidoux Blvd. at 30th St.	20,840	55	114	243	68.5
Newport Rd at Avenida De Cortez	14,176	< 50	89	189	66.9
Cajalco Rd. at Brown St.	13,124	< 50	85	179	66.5
Mission Blvd. at Rubidoux Blvd.	25,420	62	130	278	69.4

Roadway Segment	ADT	Centerline to 70 Ldn, feet	Centerline to 65 Ldn, feet	Centerline to 60 Ldn, feet	Ldn (dBA) 50' from outermost lane
Van Buren Blvd. at Clay St.	46,690	91	194	416	72.0
Grand Ave. at Stoneman St.	10,166	< 50	72	151	65.4
Magnolia Ave. at McKinley St.	16,548	< 50	98	209	67.5
Mission Blvd. at Valley Way	16,708	< 50	99	210	67.6
Rubidoux Blvd. at 34th St.	25,434	62	130	278	69.4
Limonite Ave. at Clay St.	15,642	< 50	95	201	67.3
Mission Blvd. at Glen St.	10,470	< 50	73	154	65.5
McCall Blvd. at Bradley Rd.	11,112	< 50	76	161	65.8
Limonite Ave. at Collins St.	15,746	< 50	95	202	67.3
Van Buren Blvd. at Studio Pl.	34,218	75	158	338	70.7
Bundy Canyon Rd. at Sellers Rd.	10,092	< 50	72	151	65.4
Magnolia Ave. at Byron St.	15,856	< 50	96	203	67.3
Limonite Ave. at Downey Ave.	24,068	60	125	268	69.0
Mission Blvd. at Avalon St.	26,022	63	132	282	69.5
Mission Blvd. at Twining St.	15,528	< 50	94	200	67.3
Stetson Ave. at Yale St.	12,702	< 50	83	175	66.4
Etiwanda Ave. at Iberia St.	18,206	< 50	105	223	67.9
El Sobrante Rd. at Cajalco Rd.	6,112	< 50	< 50	108.6	63.2
Wood Rd. at Gentian Ave.	7,004	< 50	57.4	118.7	63.8
Corydon St. at Grand Ave.	9,600	< 50	69.6	145.9	65.2
Scott Rd. at Murrieta Rd.	7,300	< 50	58.8	121.9	64.0
Archibald Ave. at River Rd.	6,500	< 50	54.8	113	63.5
Archibald Ave. at Cloverdale Rd.	9,100	< 50	67.3	140.8	64.9
Center St. at Commercial St.	8,100	< 50	62.6	130.5	64.4
Center St. at Stephen Ave.	7,100	< 50	57.8	119.7	63.8
Iowa Ave. at La Cadena Dr. E	9,400	< 50	68.7	143.9	65.1
Mission Blvd. at Pyrite St.	7,344	< 50	59	122.4	64.0
Mission Blvd. at Conning St.	9,070	< 50	67.2	140.5	64.9
Mission Blvd. at Milliken Ave.	8,200	< 50	63.1	130.5	64.5
Pedley Rd. at Jurupa Dr.	7,100	< 50	57.8	119.7	63.8
Bradley Rd. at Cherry Hills Blvd.	6,420	< 50	54.4	112.1	63.4
Mc Call Blvd. at Hillpointe Dr.	6,466	< 50	54.7	112.7	63.4
Gilman Springs Rd. at SH-79.	6,726	< 50	56	115.6	63.6
Simpson Rd. at Patterson Ave.	8,000	< 50	62.2	129.4	64.4
Beaumont Ave. at Cherry Valley Blvd.	8,500	< 50	64.5	134.7	64.6
Highland Spring Ave. at Brookside Ave.	6,700	< 50	55.8	115.3	63.6
Redlands Blvd. at San Timoteo Canyon Rd.	6,162	< 50	53.1	109.2	63.2

Roadway Segment	ADT	Centerline to 70 Ldn, feet	Centerline to 65 Ldn, feet	Centerline to 60 Ldn, feet	Ldn (dBA) 50' from outermost lane
Dillon Rd. at Long Canyon Rd.	9,800	< 50	70.5	147.8	65.3
Jefferson St. at Fred Waring Dr.	8,864	< 50	66.2	138.4	64.8
Central Ave. at Sycamore Canyon Blvd.	9,842	< 50	70.7	148.3	65.3
Murrieta Rd. at Garboni Rd.	7,966	< 50	62	129.1	64.3
Reche Canyon Rd. at Keissel Rd.	7,606	< 50	60.3	125.2	64.1
Cajalco Rd. at Gustin Rd.	8,912	< 50	66.4	138.9	64.8
Wood Rd. at Van Buren Blvd.	8,500	< 50	64.5	134.7	64.6
Central St. at Palomar St.	7,000	< 50	57.3	118.6	63.8
Stanford St. at Mayberry Ave.	9,300	< 50	68.2	142.8	65.0
Temescal Canyon Rd. at Minnesota Rd.	8,400	< 50	64.1	133.6	64.6
Jurupa Rd. at Van Buren Blvd..	9,534	< 50	69.3	145.2	65.1
Mission Blvd. at Soto Ave.	8,600	< 50	65	135.7	64.7
Menifee Rd. at SH-74.	6,300	< 50	53.8	110.8	63.3
Simpson Rd. at Lindenberger Rd.	7,400	< 50	59.3	123	64.0
Ramona Express Way at Warren Rd.	9,172	< 50	67.6	141.6	65.0
Cajalco Rd. at Gavilin Rd.	9,416	< 50	68.7	144	65.1
Ontario Ave. at El Cerrito Rd.	7,114	< 50	57.9	119.9	63.9
Dillon Rd. at Mountain View Rd.	8,176	< 50	63	131.3	64.5
Ontario Ave. at Piute Creek.	7,146	< 50	58.1	120.2	63.9
Mission Blvd. at Lindsay St.	8,526	< 50	64.6	134.9	64.6
Jurupa Rd. at Rigel Way	7,682	< 50	60.6	126	64.2
Valley WY. at Jurupa Rd.	9,732	< 50	70.2	147.2	65.2
Murrieta Rd. at E Winchester Rd.	8,588	< 50	64.9	135.6	64.7
Murrieta Rd. at Ridgemoor Rd.	9,850	< 50	70.7	148.3	65.3
Cajalco Rd. at Clark St.	7,736	< 50	60.9	126.6	64.2
Rubidoux Blvd. at 28th St.	9,408	< 50	68.7	143.9	65.1
Reche Canyon Rd. at Reche Vista Dr.	7,800	< 50	61.2	127.3	64.3
Archibald Ave. at Schleisman Rd.	7,278	< 50	58.7	121.7	64.0
Stetson Ave. at Columbia Ave.	9,662	< 50	69.8	146.5	65.2
Mission Blvd. at Glen St.	8,830	< 50	66.1	138.1	64.8
Mc Call Blvd. at Aspel Rd.	7,888	< 50	61.6	128.2	64.3
Wood Rd. at Mariposa Ave.	9,730	< 50	70.1	147.1	65.2
Pyrite St. at Mission Blvd.	8,648	< 50	64.4	134.3	64.6
Reche Canyon Rd. at Mercadante Ln.	7,562	< 50	60.1	124.8	64.1
Mission Blvd. at Pedley Rd.	9,258	< 50	68	142.4	65.0
Stetson Ave. at Stanford St.	7,502	< 50	59.8	124.1	64.1
Market St. at Agua Mansa Rd.	9,796	< 50	70.4	147.8	65.2

Roadway Segment	ADT	Centerline to 70 Ldn, feet	Centerline to 65 Ldn, feet	Centerline to 60 Ldn, feet	Ldn (dBA) 50' from outermost lane
Hamner Ave. at Mission Blvd.	8,286	< 50	63.5	132.4	64.5
SH-243 at Pinecrest Ave.	6,500	< 50	100.7	209.2	66.7
SH-79 at Auld Rd.	9,734	65.6	129.3	272.5	68.4
SH-60 at I-15.	139,000	345	741	1595	80.0
SH-60 at Market St.	80,000	240	513	1104	77.6
I-215 at Fair Isle Dr.	143,000	352	755	1625	80.1
SH-60 at Jack Rabbit Tr.	30,500	129	271	581	73.4
I-10 at San Timoteo Canyon Rd.	48,000	172	357	785	75.4
I-10 at Washington St.	44,500	164	348	747	75.0
I-15 at Magnolia Ave.	87,000	253	542	1167	78.0
SH-74 at Briggs Rd.	17,612	92	189	403	71.0

Notes: 1 Traffic noise within 50 feet of the roadway centerline requires site specific analysis.
Source: LSA Associates, Inc. 1999.

Typical noise contour diagrams for representative portions of the freeways, arterials, major and secondary roads in the unincorporated Riverside County area are shown in Figures 8.4 through 8.16.

8.2.3 Existing Railroad Noise

Railroads are another significant noise source within the Riverside County. Currently, Union Pacific Railroad (UP) and the Burlington Northern Santa Fe (BNSF) have railroad operations in the County. Amtrak and Metrolink utilize railroad tracks owned and operated by UP and BNSF.

Discussion with railroad officials indicated that the amount of traffic along the principal railroad lines fluctuates considerably since trains (principally freight) are operated in response to demand and not on the basis of permanent schedules. Staff at the Riverside County Transportation Commission provided the following railroad operations data:

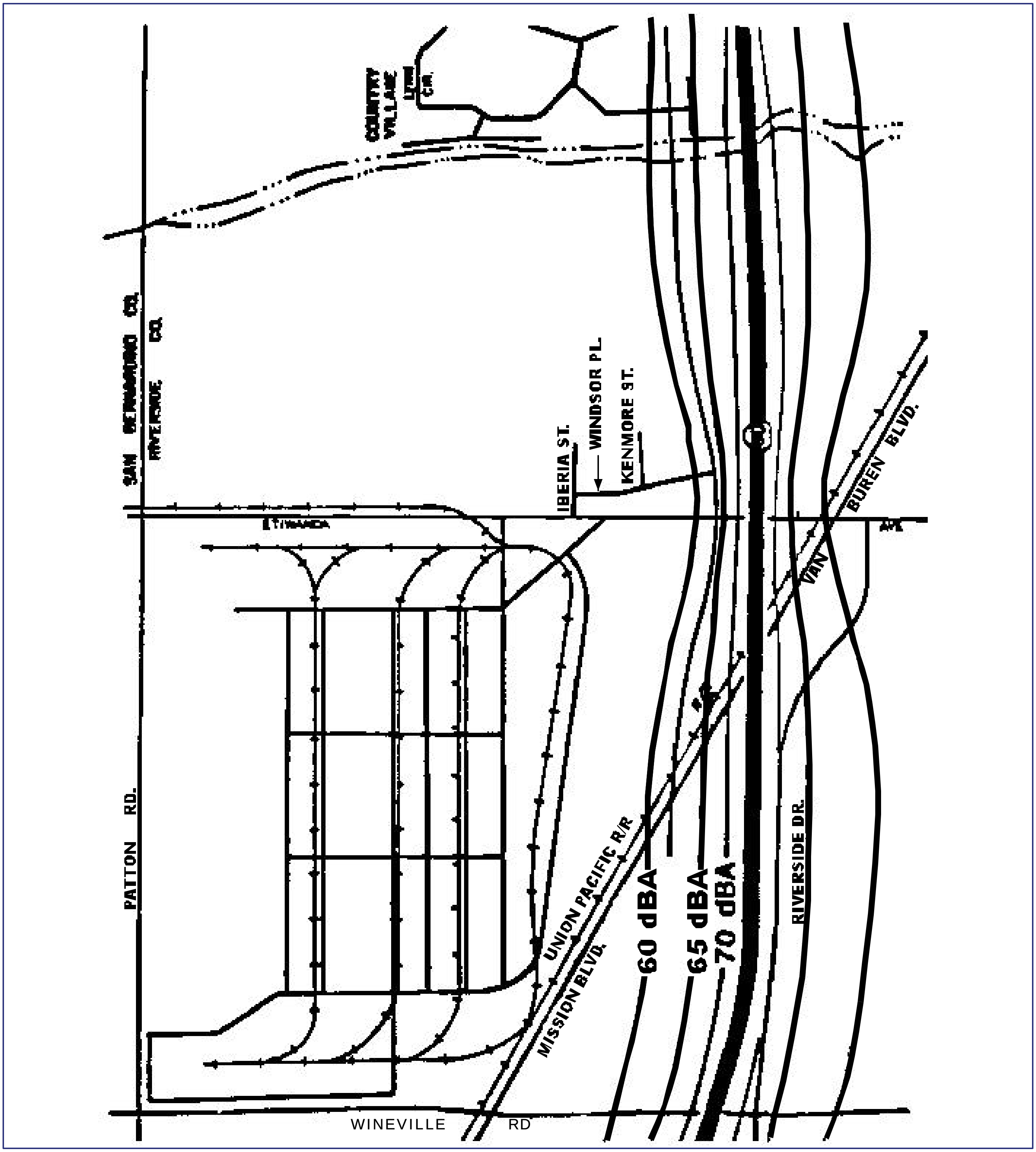
- The number of daily freight trains operating in the Riverside County are 58 in the High Grove area, 24 in Pedley, and 34 in the Green River area (southwest of Corona).
- The number of Amtrak trains are two at the High Grove area and two in the Green River area.
- Metrolink has 9 trains operating in the High Grove area, 12 in the Green River area, and 12 in the Pedley area.
- There is little data available for rail systems operating in the Coachella Valley at the current time.
- Most of the rail tracks in Western Riverside County are welded.
- There are no engines that are strictly electric. There are some engines that are combination of electric and diesel.
- The average daily speed of freight and passenger trains are not available. The size of the train along with the number of locomotives can cause the train speed to fluctuate.

Typical diagrams of railroad noise for representative sections of the major railroad lines in the County are shown in Figures 8.17 through 8.19.

8.2.4 Existing Airport Noise

Most of the airports in Riverside County have published airport noise contours map as noted below.

- Banning Airport: Includes noise contours for 1990 and 2008; last updated in 1990.



Highway 60 at Etiwanda - Mira Loma Area

Figure8.4

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

NottoScale

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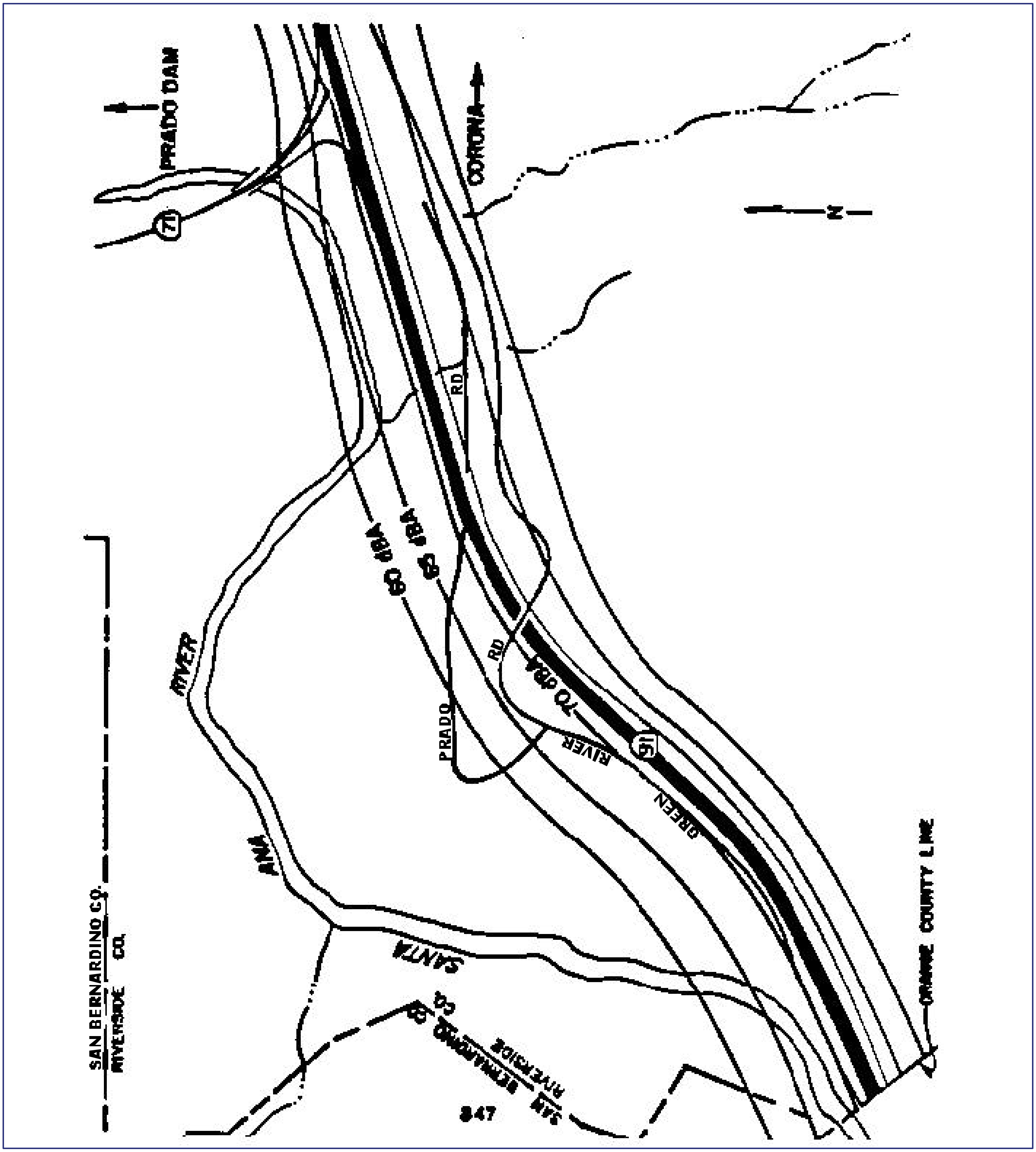
Figure 8.5 Existing Noise Contours Along Freeways and Major Highways (Hwy 91 west of Hwy 71 - Green River area)

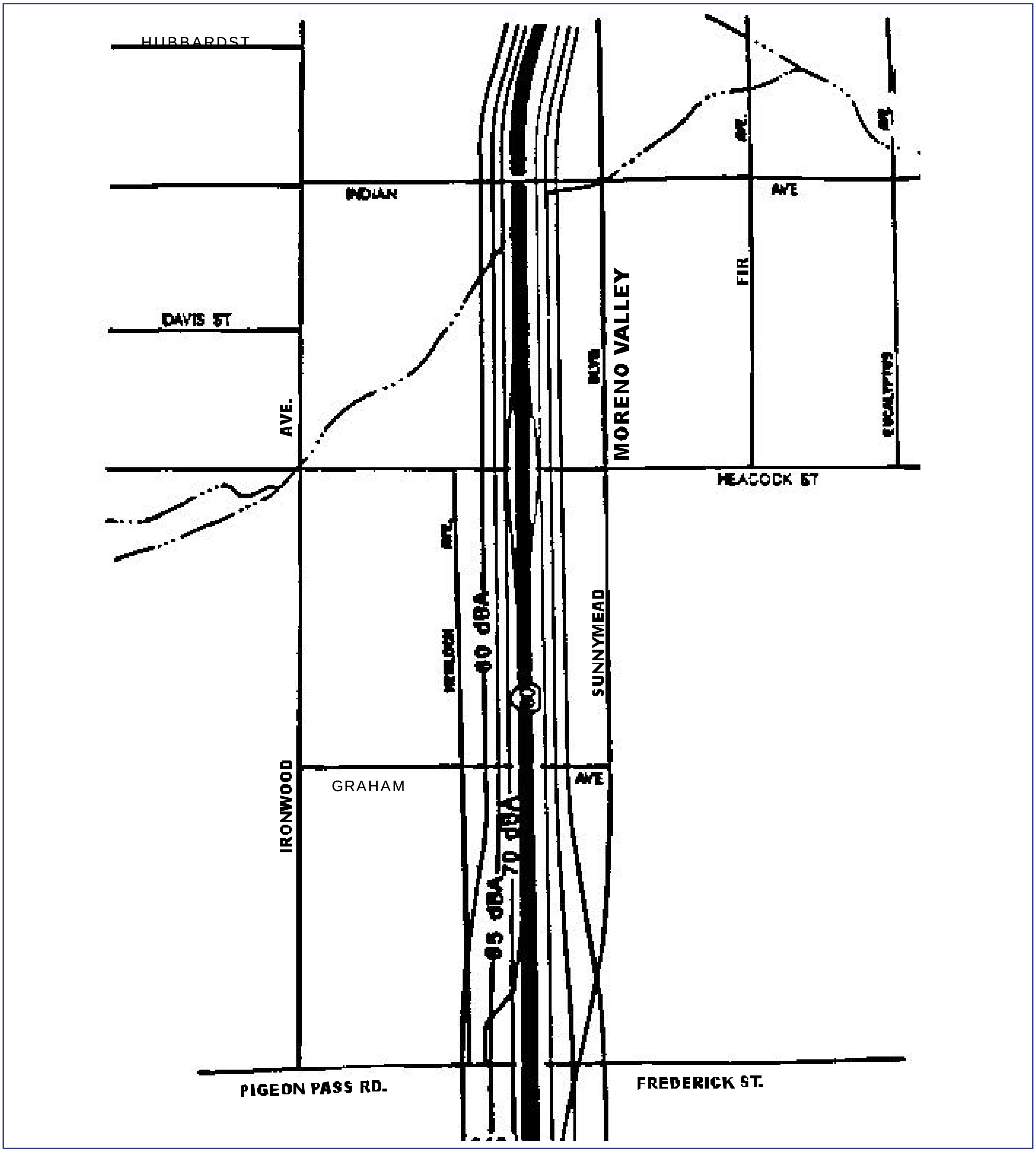


Highway 91 West of Highway 7 1 - Green River Area

Figure8.5

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

NottoScale



Highway 60 at Heacock St. - Moreno Valley Area

Figure 8.6

EXISTING NOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

Not to Scale

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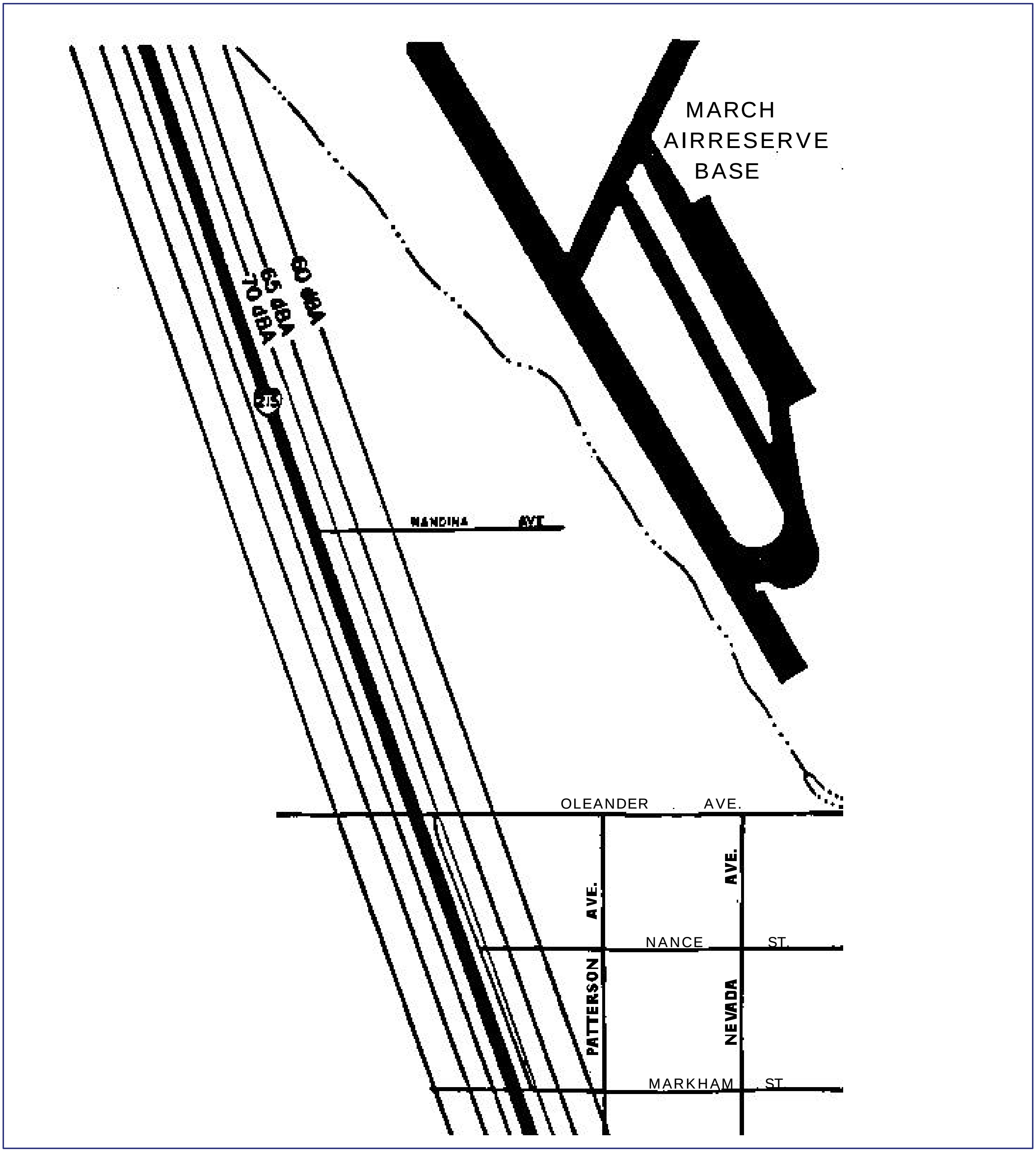
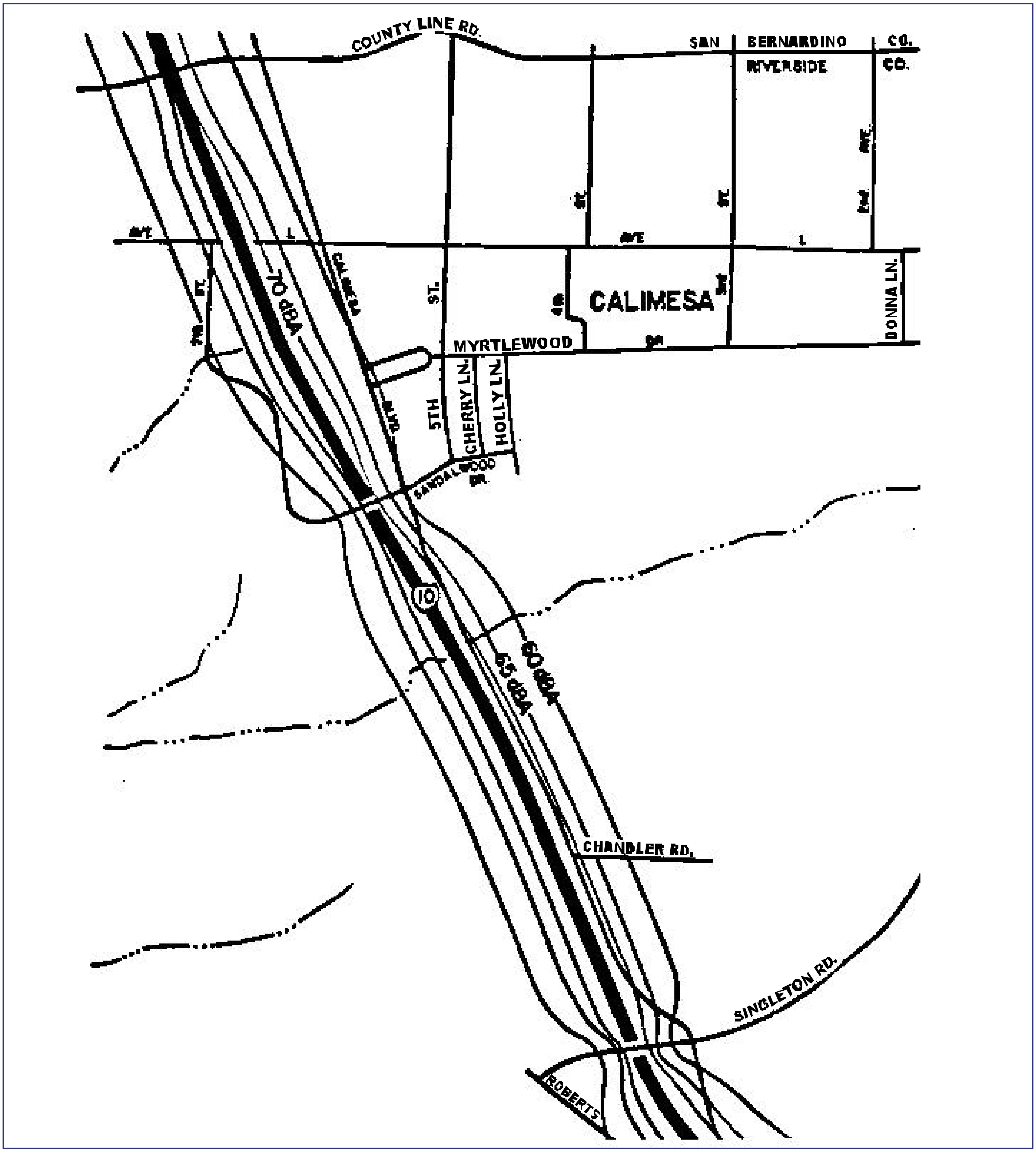


**Highway 215, South of Highway 60 -
March Air Reserve Area**

Figure8.7

**EXISTINGNOISE CONTOURS ALONG
FREEWAYS AND MAJOR HIGHWAYS**

NottoScale



Interstate 10 at Singletone Rd. - Calimesa Area

Figure8.8

N NottoScale

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

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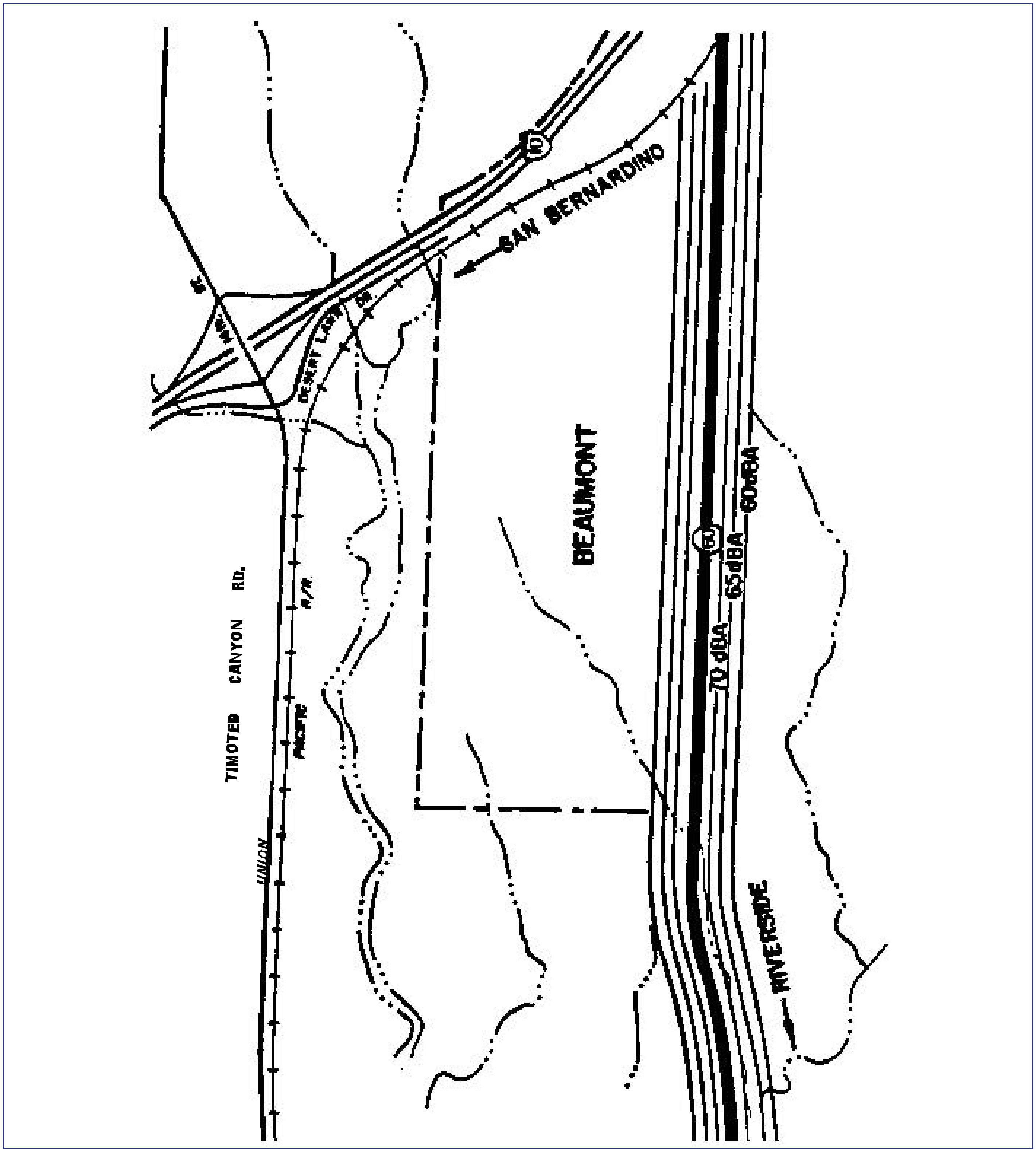
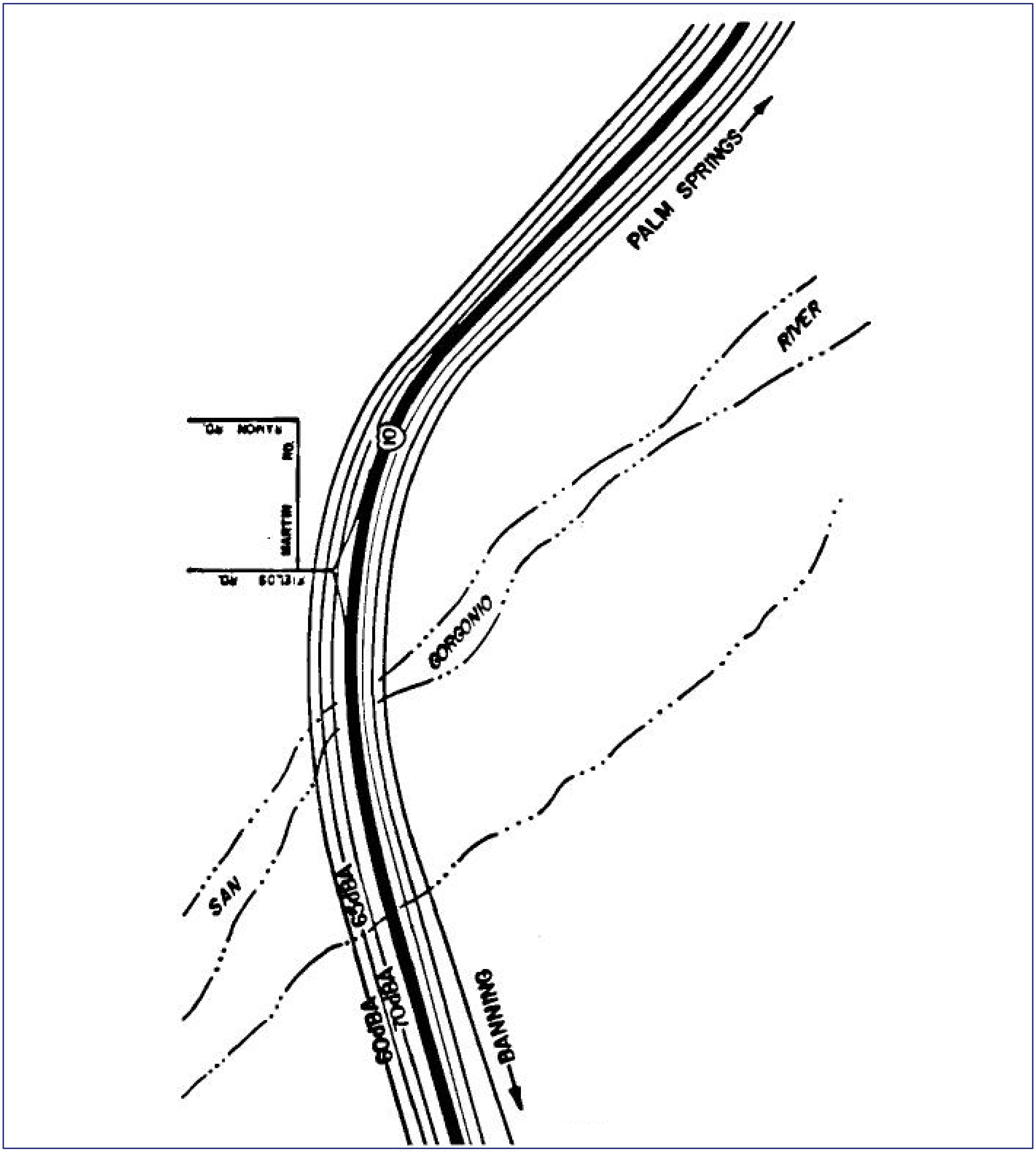


Highway 60 - West of Beaumont

Figure8.9

NottoScale

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS



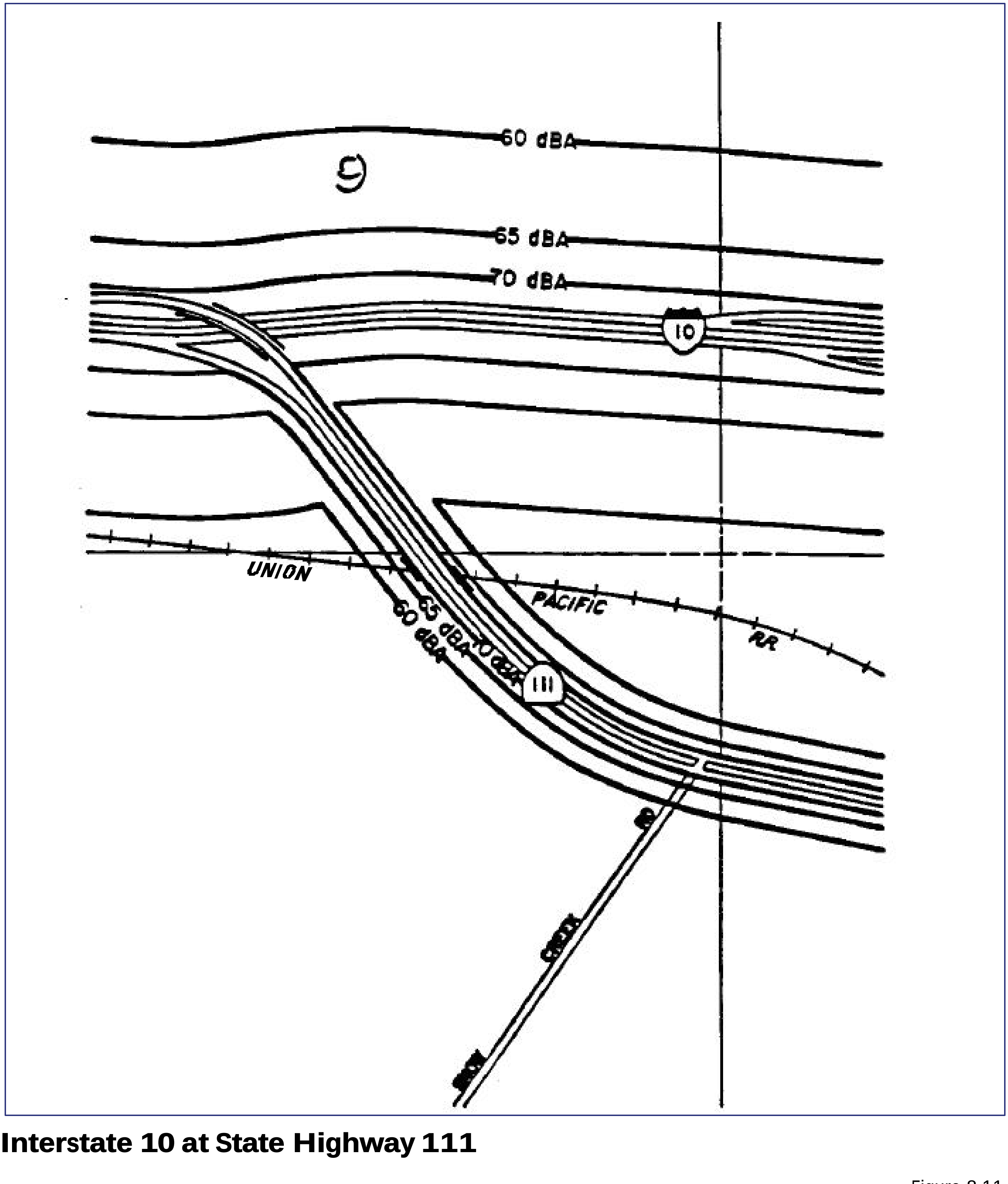
Interstate 10 at Fields Road - East of Banning

Figure 8.10

NottoScale

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

R:\SVC931-Graphics\ExistingSetting\exn-10-fields.cdr(7/5/02)

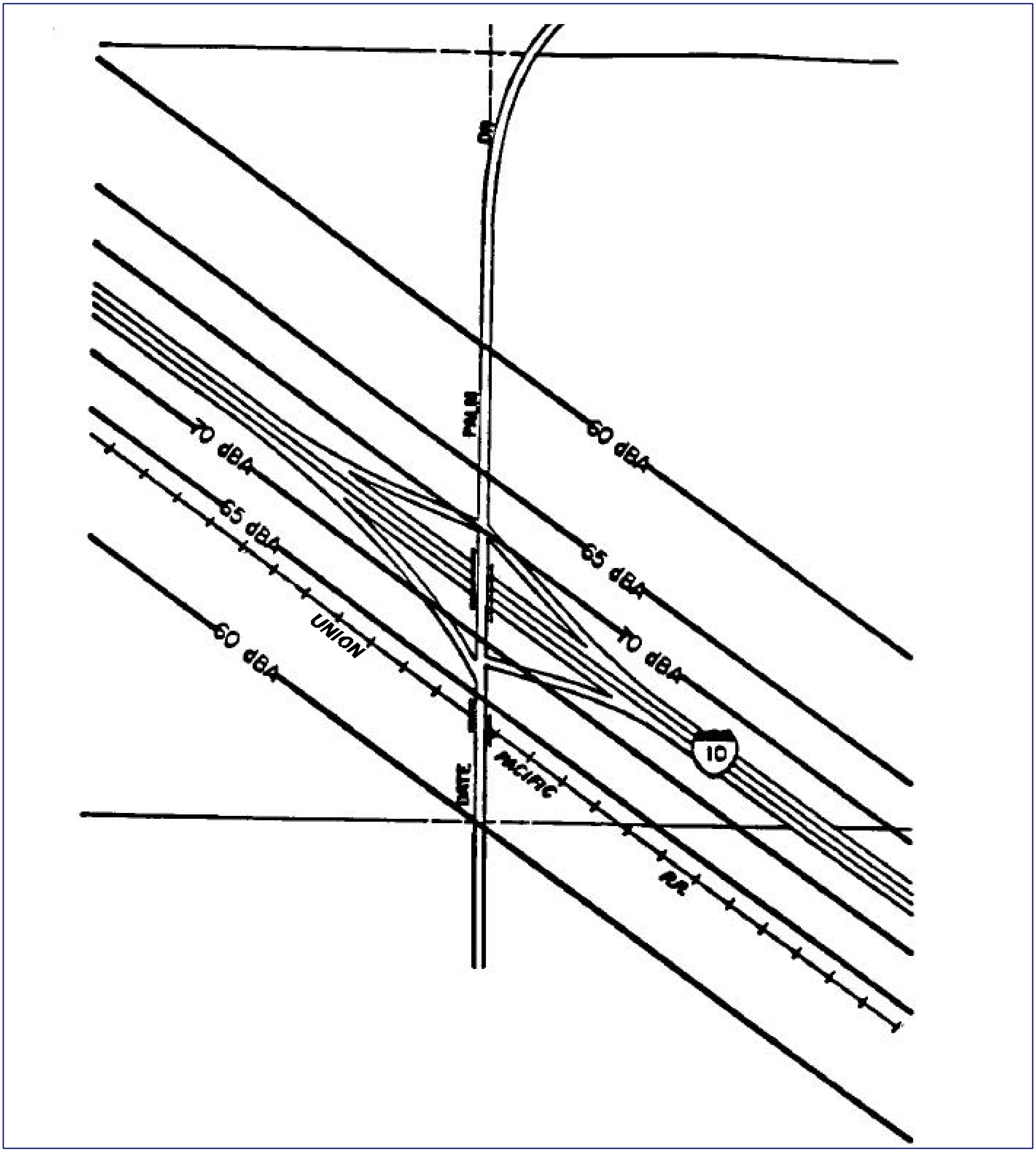


Interstate 10 at State Highway 111

Figure 8.11

Not to Scale

EXISTING NOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS



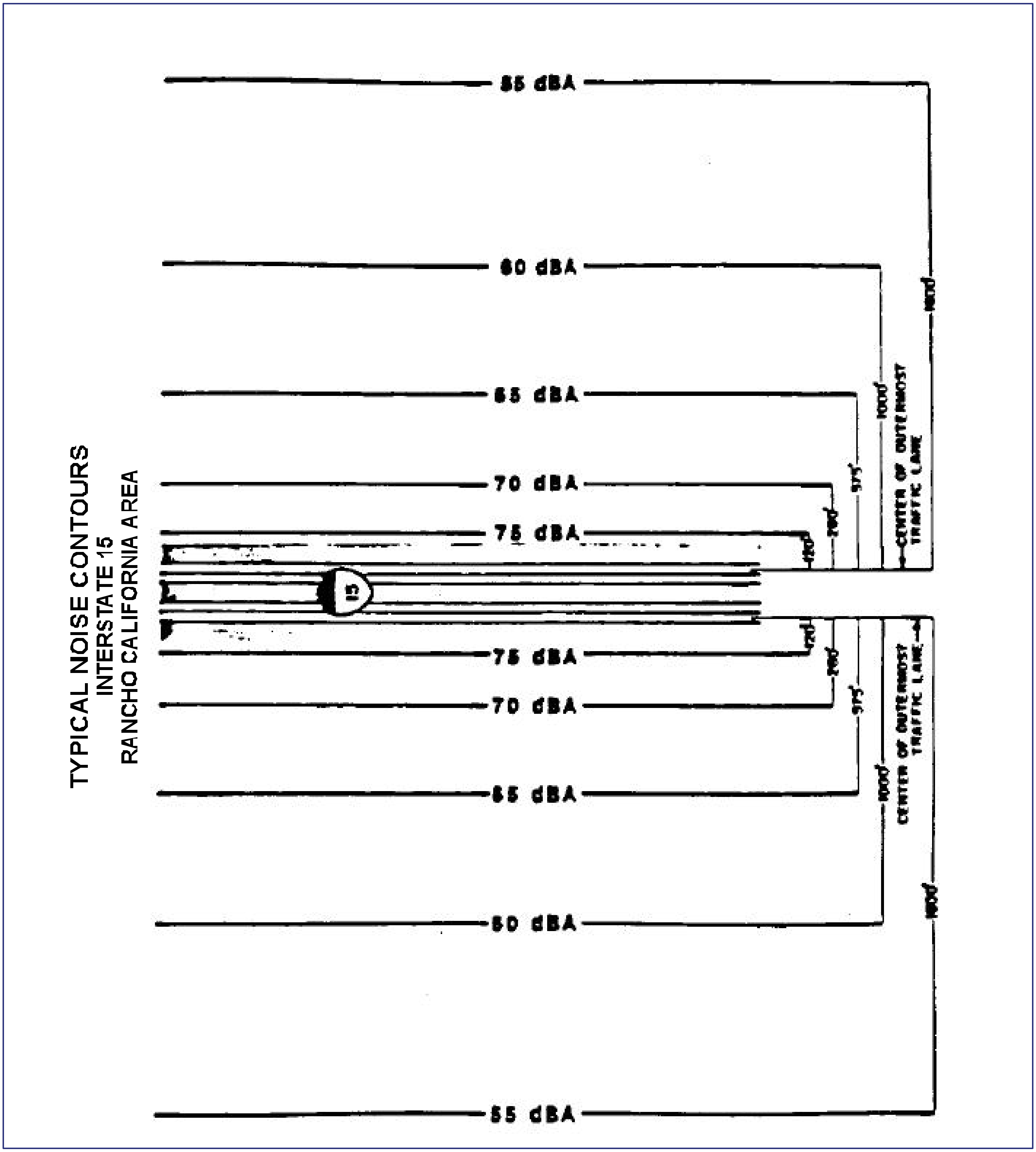
Interstate 10 at Date Palm Drive

Figure 8.12

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

NottoScale

R:\SVC931-Graphics\ExistingSetting\exn-10-datepalm.cdr(7/5/02)

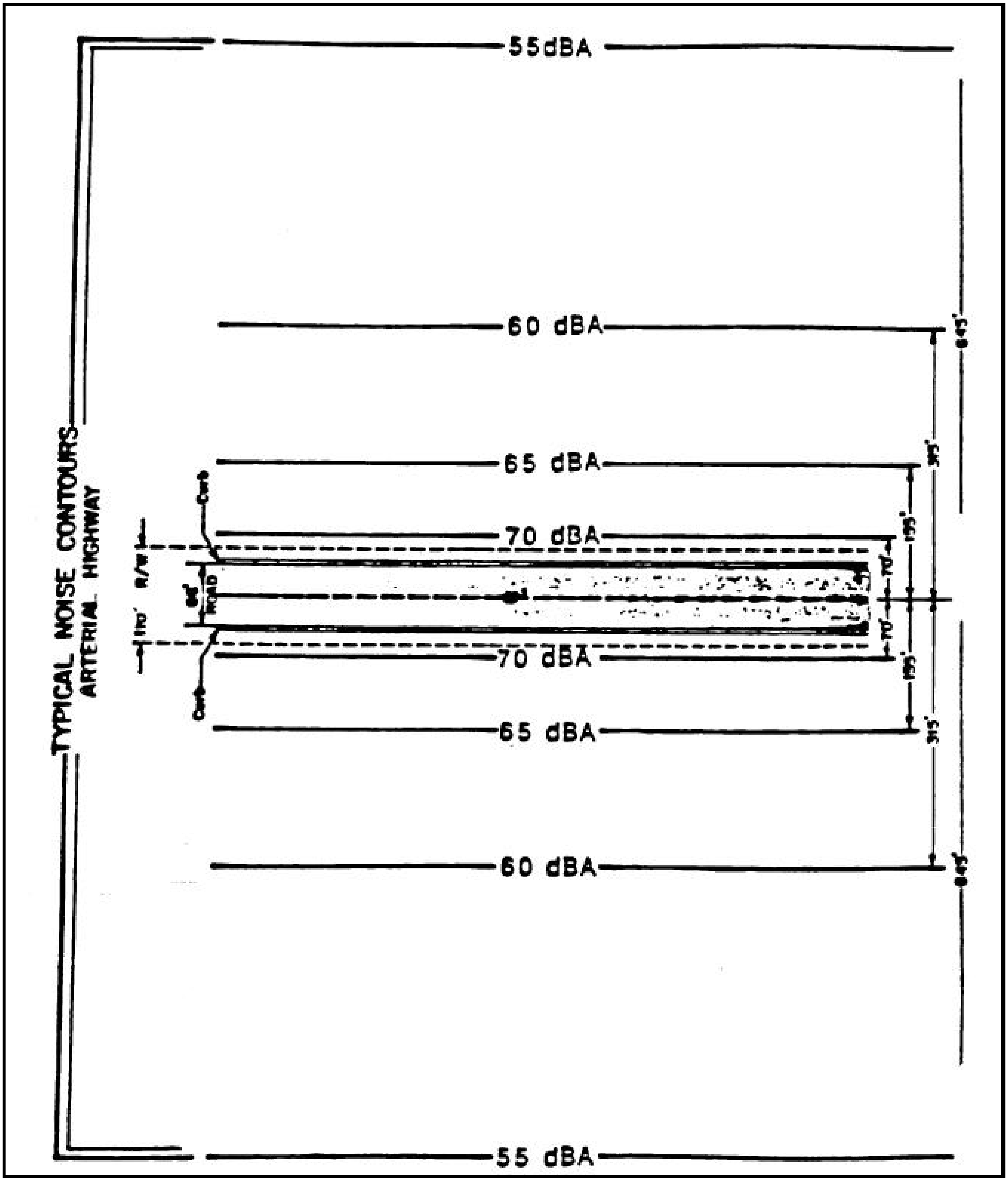


Interstate 15 - Rancho California Area

Figure 8.13

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

NottoScale

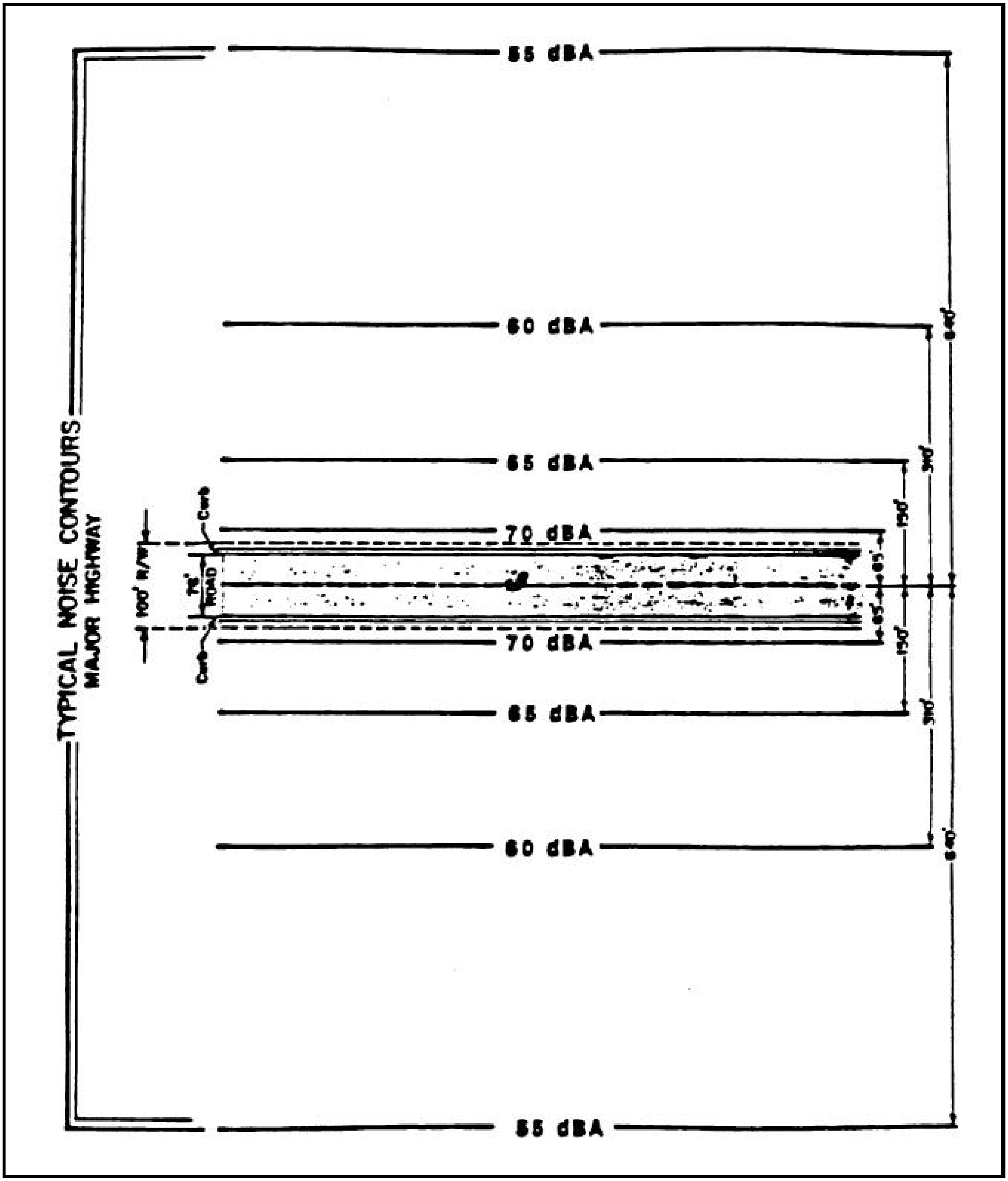


Arterial Highway

Figure 8.14

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

NottoScale



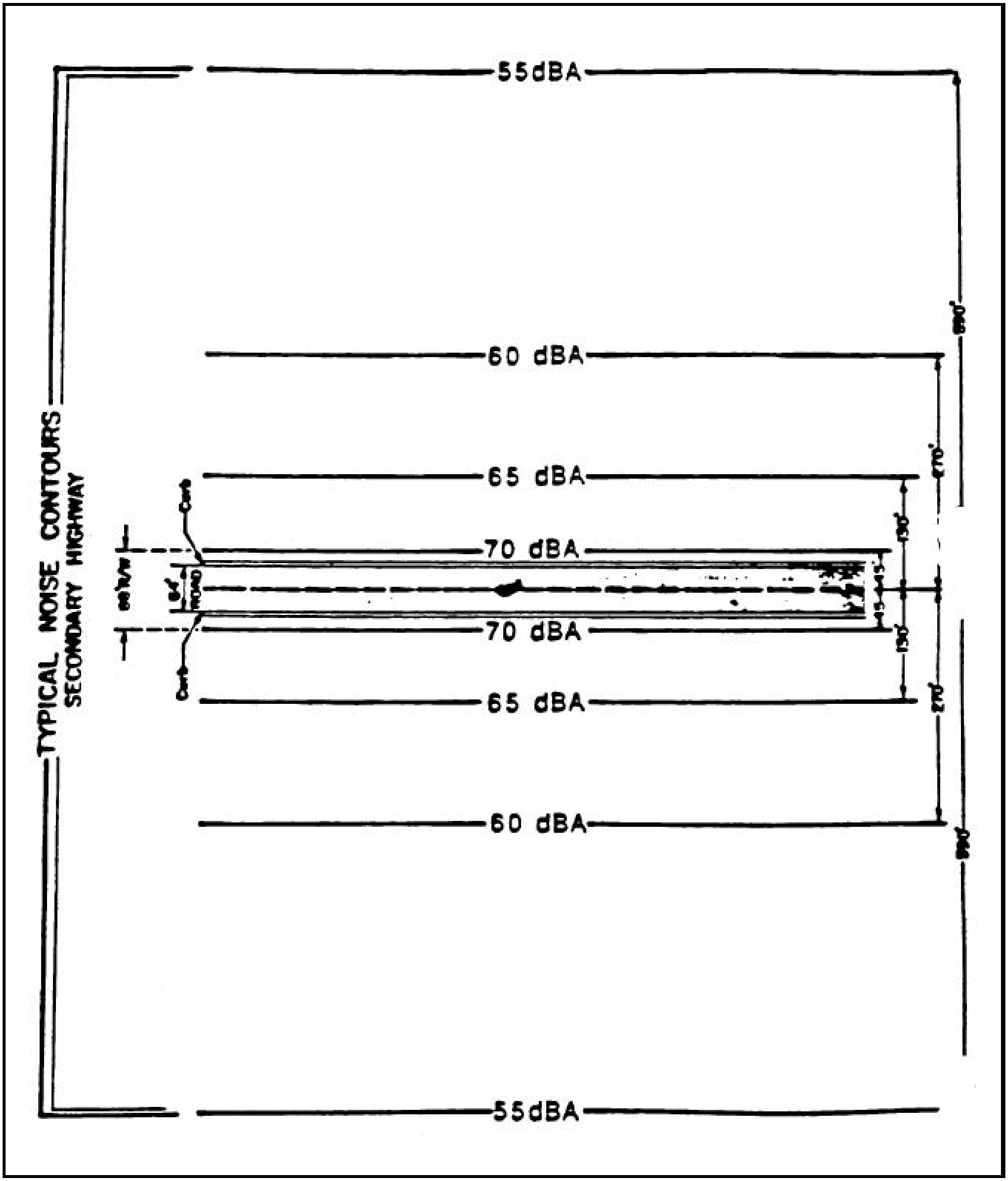
Major Highway

Figure 8.15

EXISTINGNOISE CONTOURS ALONG FREEWAYS AND MAJOR HIGHWAYS

NottoScale

R:\SVC931-Graphics\ExistingSetting\exn-major.cdr(7/5/02)



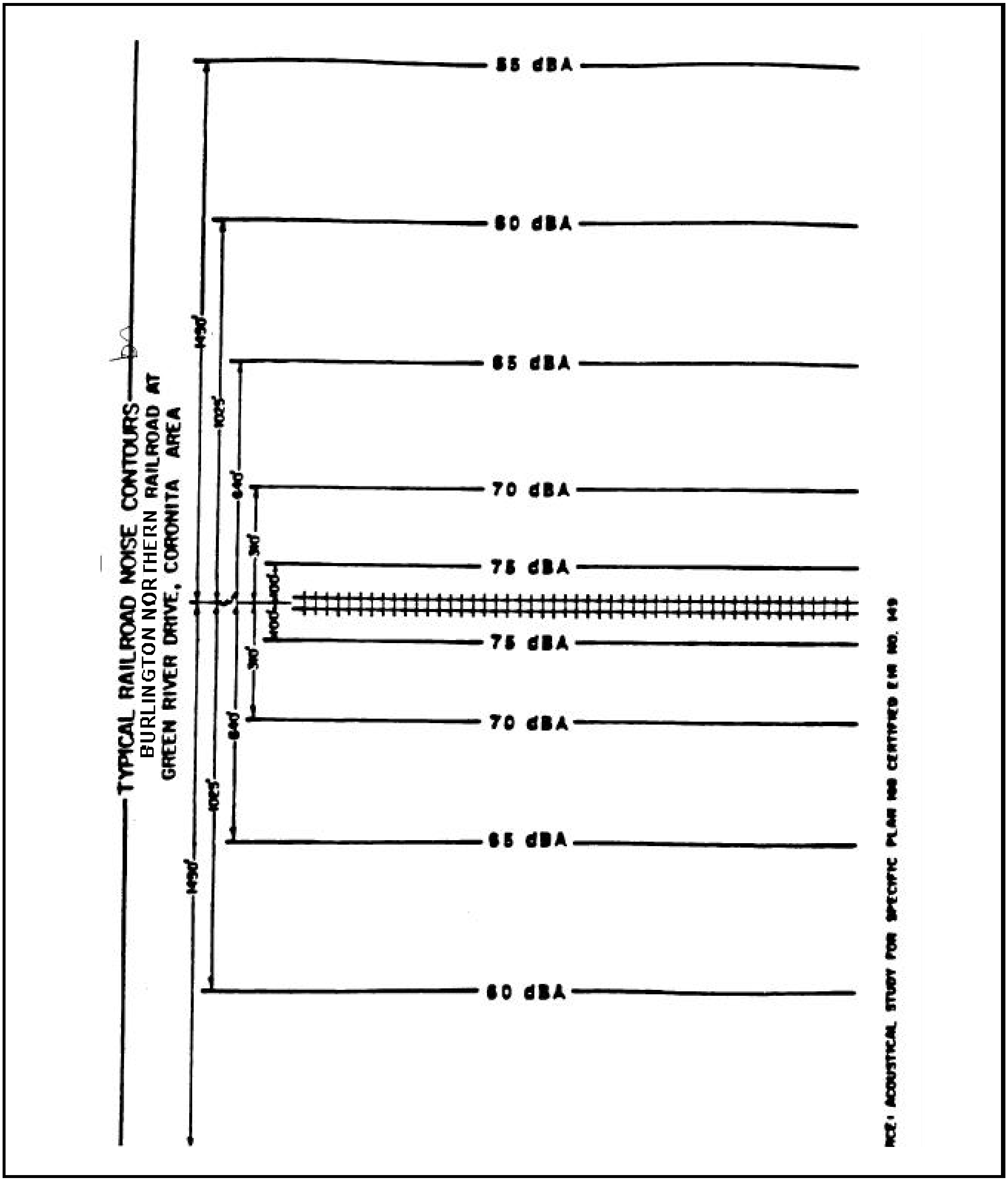
Secondary Highway

Figure 8.16

EXISTINGNOISE CONTOURS ALONG
FREEWAYS AND MAJOR HIGHWAYS

NottoScale

R:\SVC931-Graphics\ExistingSetting\exn-secondary.cdr(7/5/02)



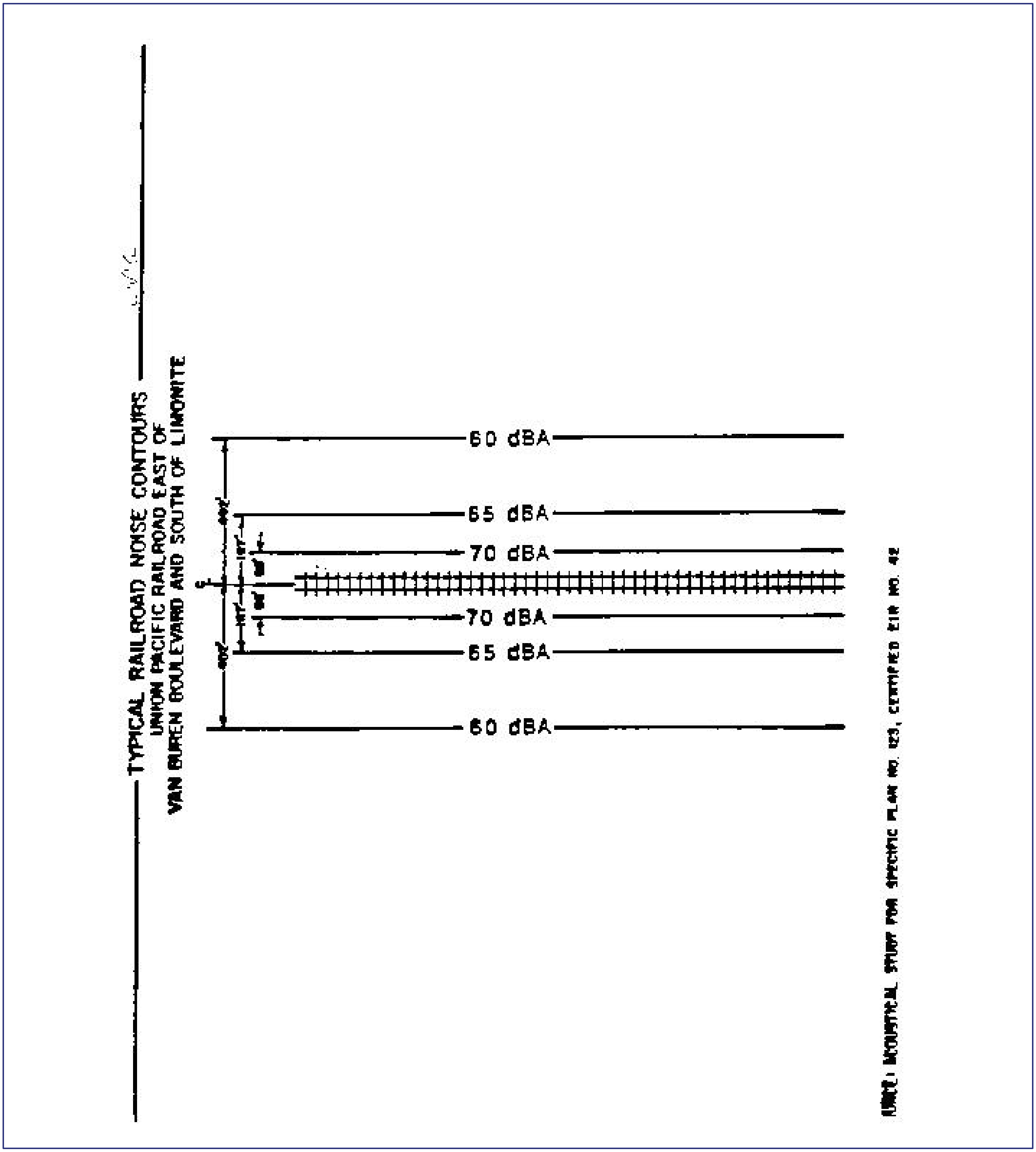
Burlington Northern Railroad at Green River Drive - Coronita Area

Figure 8.17

TYPICAL DIAGRAM OF RAILROAD NOISE AND LINES

NottoScale

R:\SVC931-Graphics\ExistingSetting\rr-bnratgreenriver.cdr(7/5/02)



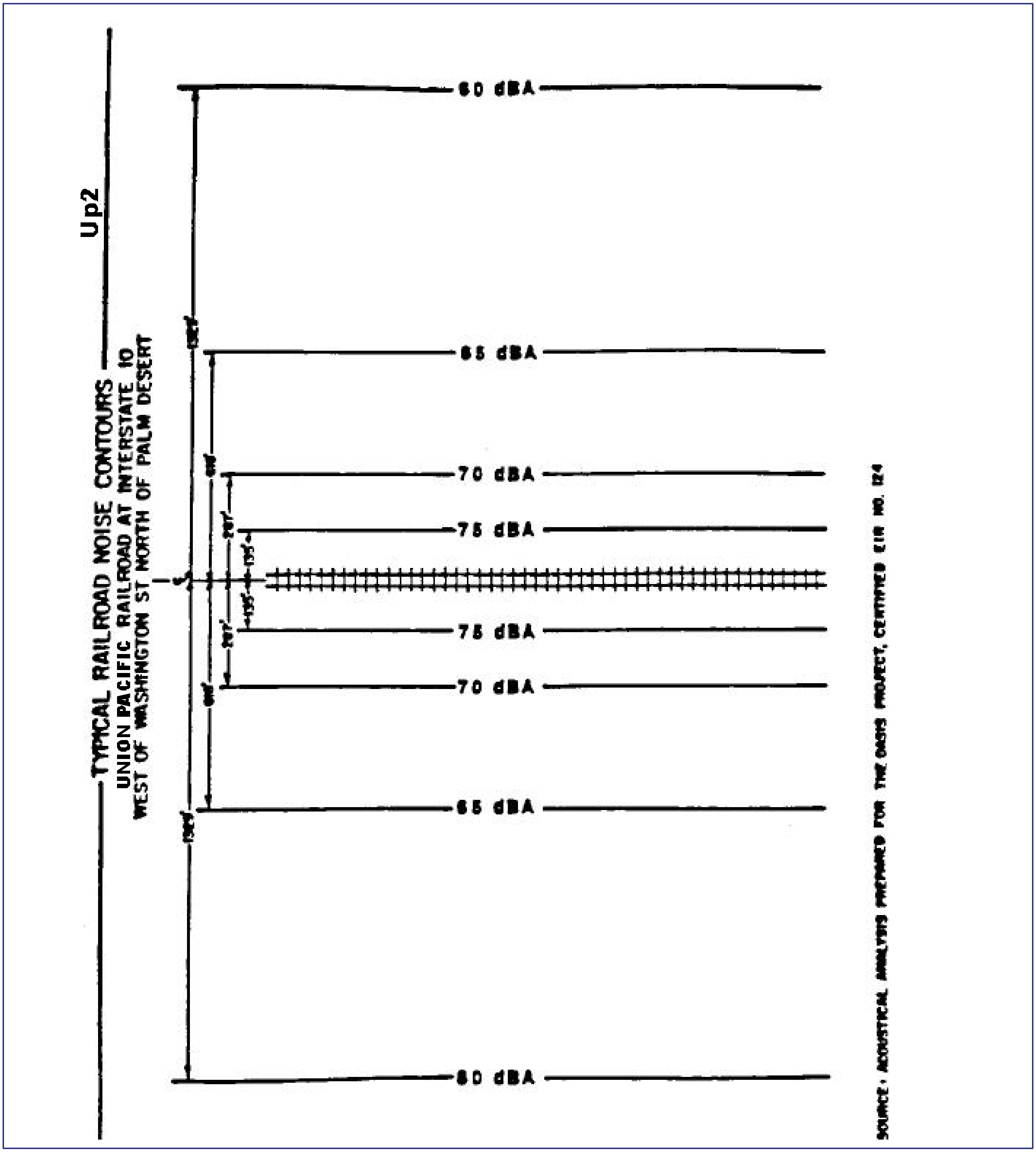
Union Pacific Railroad - East of Van Buren Boulevard and South of Limonite

Figure 8.18

TYPICAL DIAGRAM OF RAILROAD NOISE AND LINES

NottoScale

R:\SVC931-Graphics\ExistingSetting\rr-UPR-vb.cdr(7/5/02)



Union Pacific Railroad at Interstate 10 - West of Washington St., North of Palm Desert

Figure 8.19

TYPICAL DIAGRAM OF RAILROAD NOISE AND LINES

NottoScale

R:\SVC931-Graphics\ExistingSetting\rr-UPR-10.cdr(7/5/02)

- Bermuda Dunes Airport: Includes noise contours for 1986 and an unknown future year, last updated in 1986.
- Blythe Airport: Includes noise contours for 2015.
- Chiriaco Summit Airport: Includes noise contours for 2015.
- Corona Municipal Airport: Includes noise contours for 1990 and 1997, last updated in1993.
- Desert Center Airport: Includes noise contours for 2015.
- Desert Resorts Regional Airport: Includes noise contours for 2010.
- Flabob Airport: Includes noise contours for 1985.
- French Valley Airport: Includes noise contours for 1993 and 2013, last updated in 1995.
- Hemet-Ryan Airport: Includes noise contours for 1986 and an unknown future year, last updated in 1986.
- March Air Reserve Base: Include noise contours for 1998, last updated in 1999.
- Palm Springs Regional Airport: Includes noise contours for 1999 and 2015, last updated in1995.
- Perris Valley Airport: No noise contours map available.
- Riverside Municipal Airport: Includes noise contours for 1989 and 2010, last updated in 1998.
- Skylark Airport: No noise contours map available.

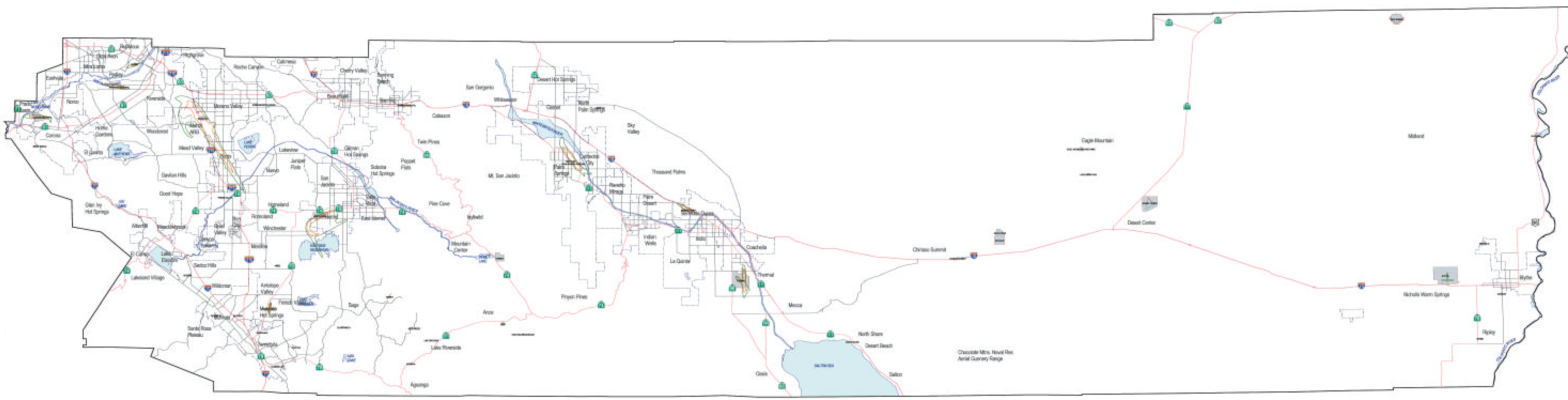
Figure 8.20 shows existing noise contours around the eight airports with existing (pre-2000) airport noise contours available. Figure 8.20 also shows the existing noise contours for the Chino Airport. Although it is not within the Riverside County Boundary, the noise contours affect areas within the County. Noise contours from LAX do not extend to the Riverside County border, and therefore are not included.

8.2.5 Existing Industrial/Commercial Noise Sources

There are several major industrial and commercial sites that generate relatively high noise levels that are potentially affecting their individual neighborhood. These sources include the following:

- Numerous industrial sites in Mira Loma area;
- Desert Hills Truck Stop/Inspection Facility on I-10 in Cabazon;
- Numerous auto body shops on Mission Avenue in the Rubidoux area;
- Windmills near Palm Springs;

- Lake Elsinore Storm Stadium, located at 500 Diamond Drive in Lake Elsinore;



LEGEND

Airports

CNEL Noise Contours

- 55 dB
- 60 dB
- 65 dB

Jurisdictional and Infrastructure

- Rivers, Channels, and Ephemeral Waterways
- Water Bodies
- County Boundary
- City Boundaries
- Highways
- Major Roads

Figure 8.20

Scale is approximate
0 6 12 Miles

EXISTING NOISE CONTOURS AROUND AIRPORTS

R:\SVC931-Graphics\ExistingSetting\airportnoise.cdr(7/5/02)

- El Sobrante Landfill near Corona at 10910 Dawson Canyon Road;
- All American Asphalt mining, located at 400 East 6th Street in Corona; and
- 3M mining, located at 18750 Minnesota Road in Corona.

Noise levels from point source noise producers such those listed above are highly variable. To ensure noise compatible land uses, site specific studies and special acoustical engineering and/or site design may be necessary to reduce noise.

8.3 Other Existing Major Noise Sources

In addition to the noise sources described above, there are several noise sources within the unincorporated Riverside County area that are considered to have potential noise impacts to their immediate neighborhood. These noise sources include the following:

- Mike Raahauges Shooting Range near Norco on River Road off 2nd Street exit on I-15;
- Rice Valley Dunes off-road vehicle park, located 5 miles south of Rice Valley exit on Highway 62;
- Ira G. Long off-road vehicle park, in Palm Springs;
- Gas line pressure release valves in various locations;
- Water activities on the Colorado River; and
- Water wells in various locations.

However, no specific noise information is available for these noise sources. In addition, most of these noise sources are not considered stationary sources or point sources. Therefore, no noise contour map was provided for these sources.

Section 9.0 - Public Services and Facilities

Existing Setting Report

9.1 Introduction

The purpose of this portion of the Existing Setting Report is to delineate the various public services and facilities that are available throughout Riverside County. The importance of these services and facilities can not be overstated for they determine where and when urban intensity development can occur. For example, without a safe and efficient municipal water system, land can not be transformed from open or rural to a more closely knit development pattern, in which someone other than the end water user must be responsible for obtaining and distributing the water that is used.

The three most prominent characteristics of Riverside County affecting the delivery of services are its size, diverse topography, and land use pattern. The focus of the land use pattern is built around the County's 24 cities. These cities not only provide housing for citizens but also establish a pattern that relates directly to the location of citizens throughout the County, incorporated as well as unincorporated, and their need for public services and facilities.

9.1.1 Overview of Public and Semi-Public Services

Due to an overlap of service provision by a variety of agencies, the existence of other services and service agencies that have a direct influence on the citizens of unincorporated areas must be acknowledged. In general, services are provided by a variety federal, state, county, municipal, special district, and community-based organizations.

9.1.1.1 Federal Agencies

The federal government is the largest landowner in riverside County, and thus has control over the largest land area. General federal services provided to Riverside County that are relevant to General Plan issues include the following:

- Ownership and management of land, such as through the Bureau of Land Management, National Park Service, and Department of Defense
- Enforcement of the provisions of the Endangered Species Act
- Assistance with the financing of transportation improvements.

9.1.1.2 State Agencies

In addition to requirements for the preparation of a General Plan and other provisions of State Planning, Zoning, and Development Laws, State agencies play an active role in land development and environmental management. General State services provided to Riverside County that are relevant to General Plan issues include the following:

- Construction and maintenance of freeway and State highways

- Wildland fire protection
- Acquisition and management of State parks
- Acquisition and management of open space lands for resource conservation purposes.

9.1.1.3 County Agencies

General County services which are discussed in this Chapter include the following:

- Fire protection
- Sheriff Department law enforcement services
- Road construction and maintenance
- Health care
- Recreation and parks
- Libraries
- Maintenance of solid waste disposal facilities.

9.1.1.4 Cities

Some of the more typical services provided by cities include the following, which may be provided to certain cities under contract by the County. Other services may be provided to certain cities by special districts.

- Fire protection
- Law enforcement
- Recreation and Parks
- Road construction and maintenance
- Libraries
- Refuse Collection
- Water and sewer services.

These types of services establish a basis upon which not only citizens within incorporated areas can rely but which benefit unincorporated residents as well. For example, mutual aid provided by city fire and police services allow an increased level of service to residents in the unincorporated portion of the County. City parks and libraries provide additional recreational and educational opportunities for County residents as well.

9.1.2 Identification of the Services Evaluated in this Section

The public services evaluated this Chapter include the following

- Community domestic water and wastewater services
- Solid waste disposal
- Parks and Recreation

- School facilities for grades K-12
- Resource Conservation Districts
- Cemetery Districts
- Libraries
- Mosquito and Vector Control Services
- Community Service Districts
- Health Care Districts
- Irrigation Districts.

In addition to the listing above additional information has been provided on region-wide and County-wide services, such as natural gas and electric utilities, along with County operated services for sheriff and fire suppression, libraries, and health care. Information regarding these services was obtained through the use of a number of sources including the following:

- A survey distributed to districts and agencies throughout Riverside County.
- Riverside County LAFCO data.
- Internet web sites of service agencies.

The basis for the survey was a listing of districts obtained from the Riverside County Local Agency Formation Commission, State Health Services Department, and the County of Riverside. The survey provided preliminary data on the services and/or facilities operated by districts and agencies throughout the County. Follow-up telephone calls were made in an attempt to clarify data when necessary. Data from individual cities was obtained from information supplied by Riverside County LAFCO in their *Handbook of Cities In Riverside County, 1999*. Information related to the authority upon which districts could operate was obtained from information published by the San Diego County LAFCO entitled *LAFCO Procedures Guide*.

9.2 Regional Agencies

The County of Riverside is served by several major utilities that provide electricity and natural gas. The two major providers of electricity in the region are Southern California Edison (SCE) and the Imperial Irrigation District (IID). SCE provides electrical service to customers within a 50,000 square mile area of central, coastal, and Southern California, including western Riverside County. The Imperial Irrigation District provides electrical service to the southern end of the Coachella Valley, all of Imperial County, and parts of San Diego County. West of IID is the Anza Electric CO-OP. In addition to these providers the Cities of Banning and Riverside provide electrical service to local customers.

Natural gas is provided to the region by The Gas Company, which provides service to 17 million people in California and has three major natural gas pipelines traversing Riverside County.

Each of these agencies maintains specific criteria to determine future service demands from specific land uses. Each of the agencies providing service to unincorporated areas has indicated that they have the ability to meet future demands for utility services.

9.3 Countywide Facilities and Services

The County of Riverside provides a variety of facilities and services to residents on a County-wide basis. These services have been listed above and are contained in various sections of this document. Those services and facilities most applicable to this section of the report relate to the following:

- Fire Protection
- Law Enforcement
- Solid Waste Disposal
- Parks and Recreation
- Library
- Hospitals
- Schools[1].

9.3.1 Fire Department

The Riverside County Fire Department operates 85 fire stations within the County. A total of 51 of these stations, as well as three stations operated by the California Department of Forestry are located in the unincorporated portion of the County. In addition to providing fire protection services to unincorporated areas, the County Fire Department provides fire protection services to 16 cities on a contractual basis. These cities are identified in Table 9.A.

Table 9.A - Cities Served by the Riverside County Fire Department

Western Riverside County	Eastern Riverside County
Banning	Coachella
Beaumont	Desert Hot Springs
Calimesa	Indian Wells
Canyon Lake	Indio
Lake Elsinore	La Quinta
Moreno Valley	Palm Desert

[1] Schools are not a County operated or maintained service, but are organized in a series of districts on a county basis.

Perris	Rancho Mirage
San Jacinto	
Temecula	

9.3.1.1 Types of Services Provided

The Riverside County Fire Department provides the following services:

- Structural and wildland fire response
- Weed abatement
- Ambulance response
- Swift water rescue
- Level 1 hazardous material team.

In the case of a fire response the County is part of a mutual aid program with all of the cities in the County. Upon the receipt of a call for mutual aid through the County's Emergency Command Center, the County's mutual aid coordinator will determine whether a city or the county will provide a response.

9.3.1.2 Facilities and Service Areas

Fire stations serving Riverside County are identified in Table 9.B.

Table 9.B - Fire Stations Serving Riverside County

Station Number	County Fire Stations	
	Name	Location
1	Perris	210 West San Jacinto Ave., Perris
2	Sunnymead	23770 Sunnymead Blvd., Moreno Valley
3	Nuview	29490 Lakeview Ave., Nuevo
4	Cajalco	17650 Cajalco Blvd., Perris
5	Quail Valley	28971 Goetz Road, Quail Valley
6	Edgemont	22250 Eucalyptus Ave., Moreno Valley
7	Sun City	27860 Bradley Road, Sun City
8	Woodcrest	17800 Van Buren Blvd., Riverside
9	Goodmeadow	21565 Steele Peak Road, Perris
10	Elsinore	410 W. Graham Ave., Lake Elsinore
11	Lakeland Village	17643 Brightman Ave., Lake Elsinore
12	Temecula	28330 Mercedes Street, Temecula
13	Home Gardens	135 N. McKinley, Corona

Station Number	County Fire Stations	
	Name	Location
14	Corona	1511 Hamner Ave., Norco
15	El Cerrito	20320 Temescal Canyon Road
16	Pedley	9270 Limonite Ave., Pedley
17	Glen Avon	10400 San Sevaine Way, Mira Loma
18	West Riverside	7545 Mission Blvd., Riverside
19	Highgrove	469 Center Street, Highgrove
20	Beaumont	1550 E. 6th Street, Beaumont
21	Calimesa	906 Park Ave., Calimesa
22	Cherry Valley	10055 Avenida Mira Villa, Cherry Valley
23	Pine Cove	24919 Marion Ridge Road, Idyllwild
24	Cabazon	14580 Broadway, Cabazon
25	San Jacinto	132 South San Jacinto, San Jacinto
26	Little Lake	25954 Stanford Street, Hemet
27	Ryan Field	36850 Stetson Ave., Hemet
28	Sage	37381 Sage Road, Sage
29	Anza	56560 Hwy 371, Anza
30	Pinyon	70080 Highway 74, Mountain Center
31	Bermuda Dunes	78400 Avenue 42, Indio
32	La Quinta	78136 Frances Hack Lane, La Quinta
33	Palm Desert	44400 Town Center Way, Palm Desert
34	Winchester	To be constructed
35	Thousand Palms	72695 La Canada Way, Thousand Palms
36	North Palm Springs	63775 Dillion Road, North Palm Springs
37	Desert Hot Springs	65958 Pierson Blvd., Desert Hot Springs
38	Rubidoux	3590 Rubidoux Blvd., Riverside
39	Thermal	56925 Tyler Street, Thermal
40	Mecca	91100 Fourth Street, Mecca
41	North Shore	99065 Corvina Road, North Shore
42	Oasis	76800 Highway 86, Thermal
43	Blythe	140 West Barnard Street, Blythe
44	Ripley	13950 Broadway Ave., Ripley
45	Blythe Air Base	17280 W. Hobson Way, Blythe
46	Riverbend	HCR 20, Blythe
47	Lost Lake	Parker Star Route, Hwy 95, Blythe
48	Sunnymead Ranch	10511 Village Road, Moreno Valley
49	Lake Tamarisk	43880 Lake Tamarisk, Desert Center
50	South Rancho Mirage	70801 Highway 111, Rancho Mirage
51	El Cariso	32353 Ortega Highway, Lake Elsinore

Station Number	County Fire Stations	
	Name	Location
52	Cottonwood	44222 Sage Road, Aguanga
53	Garner Valley	59200 Morris Ranch Road, Mountain Center
54	Homeland	25730 Sultanas Road, Homeland
55	Indian Wells	44900 El Dorado Drive, Indian Wells
56	Sky Valley	72985 Dillon Road, Desert Hot Springs
57	Indio Hills	80400 Dillon Road, Desert Hot Springs
58	Moreno	28020 Bay Ave., Moreno Valley
59	Mead Valley	19450 Clark Street, Perris
60	Canyon Lake	28730 Vacation Drive, Canyon Lake
61	Wildomar	32637 Gruwell Street, Wildomar
62	Rancho Carrillo	Lot #51 Verdugo Road, San Juan Capistrano
63	Poppet Flats	49575 Orchard, Banning
64	Juniper Flats	Vacant
65	Dennedy Park	15111 Indian Ave., Moreno Valley
66	Beaumont City	628 Maple Street, Beaumont
67	Mesa View	73200 Mesa View Drive, Palm Desert
68	Menifee	26020 Wickerd Road, Menifee
69	Rancho Mirage North	71751 Gerald Ford Drive, Rancho Mirage
70	La Quinta South	54001 Madison Ave., La Quinta
71	Palm Desert North	73995 Country Club Drive, Palm Desert
72	Valley Vista	25175 Fairview, Hemet
73	Rancho California	27415 Enterprise Circle West, Temecula
74	Rancho Capistrano	35420 Calle Grande, Lake Elsinore
75	Bear Creek	38900 Clinton Keith Road, Murrieta
76	Menifee Lakes	Menifee (to be constructed)
77	Lake Riverside	Aguanga
78	Mountain Center	28500 Highway 243, Mountain Center
79	Coachella	1377 6th Street, Coachella
80	Eagle Mountain	18250 Court Street, Desert Center
81	North Bermuda Dunes	Palm Desert (under construction)
82	Lake Hills	17452 Lake Pointe Drive, Riverside
83	French Valley	37500 Sky Canyon Drive, Murrieta
84	Parkview	30650 Pauba Road, Temecula
86	Indio 1	46-990 Jackson Street, Indio
87	Indio 2	43-715 Jackson Street, Indio
88	Indio 3	46-621 Madison Street, Indio
89	Banning	172 North Murray, Banning
276	Cabazon Indian Fire	84245 Indio Springs Road, Indio

Station Number	County Fire Stations	
	Name	Location
277	Pechanga Indian Fire	Pechanga Indian Reservation, Temecula
278	Morongo Indian Fire	11581 Potrero Road, Banning
Bautista	Conservation Camp	33015 Bautista Road, Hemet
Norco	Conservation Camp	5th and Western Blvd., Norco
Oak Glen	Conservation Camp	41100 Pine Bench Road, Yucaipa

9.3.1.3 Service Criteria/Growth Factors

Most County fire stations have a minimum of two career firefighters (typically, a Captain and a firefighter) on duty at all times[1]. Volunteer firefighters typically augment the career firefighters on the *first-roll* engine. Additional volunteer firefighters may respond on a rescue squad or *second-roll* fire engine, which are exclusively staffed by volunteer firefighters.

The County standard for the establishment of a new fire station is the development of 2,000 dwelling units or 3.5 million square feet of commercial or industrial development. The County also requires the payment of mitigation fees to collect revenue for the establishment of the new stations. The County currently requires new development to pay mitigation fees to help off-set the cost of providing new fire facilities. The current County fees are $400.00 per single family dwelling unit and $0.25 per square foot for all other types of development.

9.3.1.4 Ability to Meet the Needs of Future Growth

The County Fire Department's ability to support the needs of future growth is dependent upon their ability to secure sites for, construct, and equip new fire stations on a timely basis. The County's reliance on volunteer firefighters also requires that a sufficient number of volunteer firefighters can be recruited and maintained.

1 An engine company typically consists of four members (Captain and three firefighters).

9.3.2 Sheriff's Department

9.3.2.1 Types of Services Provided

The County provides both community policing and the operation and maintenance of correctional facilities. The Riverside County Sheriffs Department has 2,720 total employees, including 1,330 sworn personnel to provide for community policing services. Sheriff sub-stations are located throughout the County to provide area level community service. The Sheriff's Department is a "demand response" agency which maintains limited patrol services. The Department also operates the five adult correction or detention centers throughout the County, as well as juvenile detention facilities.

9.3.2.2 Facilities and Service Areas

The Sheriff's Department maintains nine substations, and also operates the Moreno Valley Police Department station in the City of Moreno Valley. Locations of these substations are presented in Table 9.C.

Table 9.C - Sheriff's Department Substations

Stations	Location
Banning	155 E. Hays, Banning
Blythe	260 N. Spring, Blythe
Hemet	910 N. State Street, Hemet
Indio	82-695 Carreon Drive, Indio
Jurupa Valley	7477 Mission Blvd., Riverside
Lake Elsinore	117 N. Langstaff, Lake Elsinore
Moreno Valley Police Department	22850 Calle San Juan De Los Lagos, Moreno Valley
Palm Desert	73520 Fred Waring, Palm Desert
Perris	403 E. 4^{th}, Perris
Southwest	30755-A Auld Road, Murrieta

In addition to substations, the Sheriff's Department operates the five adult correctional facilities identified below.

- ***Robert Presley Detention Center***. Located in downtown Riverside, this facility contains a total of 1,254 beds.
- ***Southwest Detention Center***. Located in the City of Murrieta, this facility contains 535 beds.
- ***Indio Jail***. Located in Indio, the jail contains 353 beds.
- ***Banning Correctional Facility***. Located in the City of Banning, this facility contains 630 beds.
- ***Blythe Jail***. Located in the City of Blythe, this jail contains 107 beds.

9.3.2.3 Service Criteria/Growth Factors

The criteria used by the County and State to determine the level of personnel or capacity of correctional facilities is listed below.

- ***Community Policing***: For community policing efforts, the County Sheriff's Department attempts to maintain a ratio of one deputy per 1,000 population.
- ***Correctional Facilities***: The capacity of the prison system is occupancy capacity, with is set by federal court order. The order provides that the County can not run the correctional system at more than 90 percent capacity, except for the Presley Facility which can be run at 95 percent. As such, the facilities are always at capacity and are projected to remain at capacity. However, the Sheriffs Depart-

ment indicated there was a continuous turn-over in the prison population and, as such, the number of inmates remain relatively constant.

The County requires the payment of developer mitigation fees prior to the final inspection by the Building and Safety Department for any residential dwelling and any mobile home installed on a permanent foundation. The fees are for the construction and acquisition of public facilities.

9.3.2.4 Ability to Meet the Needs of Future Growth

The Sheriff's Department's ability to support the needs of future growth is dependent upon their financial ability to hire additional deputies. In addition, a growing population will require that the Department secure sites for, and construct new detention facilities on a timely basis.

9.3.3 Solid Waste Disposal

9.3.3.1 Types of Services Provided

The Riverside County Waste Management Department operates six active landfills, and administers a contract with El Sobrante Landfill. The Department also maintains closed landfill/dump sites throughout the County.

9.3.3.2 Facilities and Service Areas

Riverside County operates and maintains landfills which are used by solid waste collection companies throughout the County. Franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout unincorporated Riverside County under the County's general operating authority. These companies are regulated by the Riverside County Environmental Health Department. In addition, County landfills accept wastes collected in incorporated cities. Within these cities, solid wastes are either collected by the city, or are collected by private firms pursuant to a franchise agreement with the city.

A listing of the companies providing collection service and the County's landfills and their capacity are included within the discussion section of each individual Fiscal Analysis areas. Identified below are the primary landfills within Riverside County, as well as those that are either inactive or open limited times.

- ***Primary Riverside County Landfills***

    - Badlands Sanitary Landfill
    - Blythe Sanitary Landfill
    - Edom Hill Sanitary Landfill
    - El Sobrante Sanitary Landfill
    - Lamb Canyon Sanitary Landfill

- Mecca II Sanitary Landfill (open three days per week)

- ***Other Landfills***

  - Desert Center Sanitary Landfill (open one day per week)
  - Oasis Sanitary Landfill (open two days per year)
  - Anza Sanitary Landfill (inactive pending closure)

9.3.4 Parks and Recreation

Riverside County maintains 35 regional parks, encompassing 22,317 acres. These parks are described in Section 4.7 of this report.

9.3.4.1 Types of Services Provided

The County owns and operates a variety of park facilities throughout the County. The type of park or open space uses available at County parks include camping, hiking, ballfields, equestrian facilities, boating, and cultural facilities.

9.3.4.2 Facilities and Service Areas

The variety of facilities and services offered throughout the County are described in Section 4.7 of this report.

9.3.4.3 Service Criteria/Growth Factors

The County of Riverside utilizes the following ratio to determine park and open space needs.

- ***Active Recreation***: 1.5 acres of developed regional recreation land per 1,000 population.

- ***Natural Open Space***: 25 acres of open space per 1,000 population.

9.3.4.4 Ability to Meet the Needs of Future Growth

In general, the County Parks Department believes the existing park and recreational facilities it operates meet the current needs of County residents. However, projected growth, will require that additional regional park land be acquired and improved. The type of location of these facilities are currently being evaluated by the County Parks Department.

9.3.5 Libraries

The County of Riverside operates a system of 24 libraries to serve unincorporated populations.

9.3.5.1 Types of Services Provided

In addition to providing the opportunity to review and/or check-out materials for personal use at its 24 branches, the County also operates a number of specific programs, including the following:

- Adult and family literacy
- After school and pre-school programs.

9.3.5.2 Facilities and Service Areas

The locations of County libraries are identified in Table 9.D.

Table 9.D - Library Facilities

Library	Location	Hours of Operation	
Anza	57430 Mitchell Road, Anza	Monday	8-3
		Tuesday	8-7
		Wednesday	8-7
		Thursday	8-7
		Friday	8-3
		Saturday	10-2
Calimesa	908 Park, Calimesa	Monday	9-5
		Tuesday	10-5
		Wednesday	10-5
		Thursday	10-5
		Friday	10-5
Canyon Lake	31508 Railroad Canyon Rd., Canyon Lake	Monday	10-6
		Wednesday	10-9
		Saturday	10-2
Cathedral City	33-520 Date Palm Drive	Monday	10-6
		Tuesday	10-6
		Wednesday	12-8
		Thursday	10-6
		Friday	9-1
		Saturday	9-1
		Sunday	2-6

Library	Location	Hours of Operation	
Coachella	1538 7th Street	Monday	2-6
		Tuesday	10-6
		Wednesday	2-6
		Thursday	10-6
		Saturday	11-3
Desert Hot Springs	11691 West Drive	Tuesday	9-5
		Wednesday	12-5
		Thursday	9-8
		Saturday	9-1
Glen Avon	9244 Galena	Monday	10-8
		Tuesday	10-8
		Wednesday	12-8
		Thursday	2-6
		Friday	10-6
		Saturday	10-6
		Sunday	1-5
Highgrove	690 W. Center Street	Tuesday	10-6
		Thursday	10-6
Idyllwild	54185 Pinecrest	Monday	10-6
		Wednesday	12-8
		Friday	10-6
		Saturday	12-4
Indio	200 Civic Center Mall	Monday	12-8
		Tuesday	10-6
		Wednesday	10-6
		Thursday	10-6
		Saturday	10-6
La Quinta	78-080 Calle Estado #2	Tuesday	10-8
		Wednesday	10-6
		Thursday	12-8
		Friday	10-4
		Saturday	10-2
		Sunday	12-4
Lake Elsinore	400 W. Graham	Monday	11-6
		Tuesday	1-8
		Thursday	11-6
		Friday	11-6
		Saturday	10-1
Lake Tamarisk	43880 Lake Tamarisk Drive	Tuesday	2-6
		Thursday	11-7
		Saturday	10-2
Mecca	65-250A Coahuilla Street	Monday	1-5
		Wednesday	9-5
		Thursday	1-5

Library	Location	Hours of Operation	
Norco	3954 Old Hamner	Monday	10-6
		Tuesday	12-8
		Wednesday	10-6
		Thursday	2-6
		Saturday	10-4
Nuview	29990 Lakeview Road	Monday	10-6
		Friday	10-6
Palm Desert	73-300 Fred Waring Drive	Monday	10-8
		Tuesday	10-8
		Wednesday	10-8
		Thursday	1-5
		Friday	10-5
		Saturday	10-5
		Sunday	1-5
Perris	163 E. San Jacinto	Monday	10-6
		Tuesday	1-9
		Wednesday	1-9
		Thursday	10-6
		Saturday	10-6
		Sunday	1-5
Rubidoux	5763 Tilton	Tuesday	10-6
		Wednesday	10-6
		Thursday	12-8
		Saturday	10-6
San Jacinto	165 W. 7th	Monday	10-6
		Wednesday	10-6
		Saturday	10-2
Sun City	26982 Cherry Hills Blvd.	Monday	9-5
		Wednesday	9-5
		Friday	9-5
		Saturday	9-5
Temecula	41000 County Center Drive	Monday	12-9
		Tuesday	10-6
		Wednesday	10-6
		Thursday	10-6
		Friday	10-6
		Saturday	10-5
		Sunday	1-5
Thousand Palms	72-715 La Canada Way	Monday	2-6
		Wednesday	10-6
		Saturday	10-1
Valle Vista	43975 E. Florida Ave.	Tuesday	10-6
		Thursday	10-4
		Friday	10-6

9.3.5.3 Service Criteria/Growth Factors

The County library system did not indicate that it maintained a specific numerical factor to analyze the needs created by new development. However, the American Library Association suggests that an appropriate service criteria would be availability of convenient library facilities and book reserves at a rate of 0.5 square foot of library space and 2.5 volumes per capita.

9.3.5.4 Ability to Meet the Needs of Future Growth

The County's ability to support the needs of future growth is dependent upon its ability to secure sites for, construct, and stock new libraries on a timely basis. At present, there is no specific funding mechanism for expansion of library facilities. No specific problems have been identifies.

9.3.6 Hospitals and Medical Facilities

The County of Riverside operates one hospital and nine clinics throughout the County.

9.3.6.1 Types of Services Provided

Hospital

The County operates a hospital facility in Moreno Valley. The hospital is licensed for 364 beds within the 520,000square-foot facility. It is estimated the facility has the capacity to provide 200,000 annual patient visits in specialty outpatient clinics, and increase of 80,000 from previous facility in Riverside. The emergency room/trauma unit has the capacity to manage 100,000 annual patient visits, which is 40,000 more than the previous facility.

Riverside County Hospital provides a variety of services, but some of the more extensive or unique programs include the following:

- Trauma center
- Sexual assault team for adults and children
- Pediatric and neo-natal intensive care
- Teaching/instruction for medical professionals.

Community Based Clinics

In addition to the hospital in Moreno Valley, Riverside County operates nine separate clinics throughout the County. A tenth clinic is located within the County hospital. In general, the clinics will see anyone regardless of residency and ability to pay. Each clinic has a family practice physician on staff, and is open from 8:00 a.m. to 5:00 p.m., Monday through Friday. The general services provided by each clinic include the following:

- Primary care, including ambulatory care for acute and chronic illnesses for adults and children
- Pediatric and adult immunizations
- Anonymous and confidential HIV testing
- Tuberculosis testing

- Sexually transmitted disease testing and treatment
- Family planning
- Comprehensive perinatal services program
- Child health exams
- Nutrition services
- Cancer screening.

9.3.6.2 Facilities

In addition to the County Hospital in Moreno Valley, the County Health Department operates clinics at the following locations:

- Banning Family Care Center located at 3055 W. Ramsey, Banning.

- Corona Family Care Center.

- Hemet Family Care Center located at 880 N. State Street, Hemet.

- Indio Family Care Center located at 47-923 Oasis Street, Indio.

- Jurupa Family Care Center located at 9415 Mission Blvd.. In addition to general medical services, this facility provides family planning services.

- Lake Elsinore Family Care Center located at 30195 Fraser Drive, Lake Elsinore. In addition to general medical services, this facility provides travel immunizations.

- Palm Springs Family Care Center located 3111 Tahquitz Canyon Way, Palm Springs. In addition to general medical services, this facility provides travel immunizations and HIV/AIDS primary care.

- Perris Family Care Center located at 227 N. ‘D’ Street, Perris. In addition to general medical services, this facility provides urgent care, travel immunizations, HIV/AIDS primary care, occupational health services, and family planning services.

- Riverside Neighborhood Health Center located at 7140 Indiana Ave., Riverside. In addition to general medical services, this facility provides family planning services.

9.3.6.3 Service Criteria/Growth Factors

No specific criteria are maintained for determining future needs for public hospital or medical clinics.

9.3.6.4 Ability to Meet the Needs of Future Growth

The Riverside County Health Department reported that it had adequate hospital capacity6 to meet current and future needs. In addition, the Department noted that community-based clinics were sized to meet future needs.

9.4 Evaluation of Services and Facilities by Fiscal Analysis Area

9.4.1 Fiscal Analysis Area 1: Northwest Riverside County

This area is located in the northeast portion of the County, and includes the Cities of Corona, Norco, Riverside, Moreno Valley, and Perris (see Figure 1.1). Significant unincorporated areas include Mead Valley, El Cerrito, and Jurupa. A listing of the services provided by the incorporated cities in this are is presented in Table 9.E.

Table 9.E - Services Provided by Incorporated Cities in Northwestern Riverside County

	Type of City Services Provided								
City	**Public Works**	**Parks/ Recreation**	**Planning/ Building**	**Library**	**Refuse Collection**	**Water and/or Sewer**	**Police**	**Fire**	**Other**
Corona	Yes	Yes	Yes	Yes	Contract	Sewer	Yes	Yes	Animal Control, Senior Center
Norco	Yes	Yes	Yes	No	Contract	Water	Contract	Contract	Animal Control, Senior, Ambulance
Riverside	Yes	Yes	Yes	Yes	Contract	Water and sewer	Yes	Yes	Electric, Senior Center
Moreno Valley	Yes	Yes	Yes	Con-tract	Contract	No	Contr.	Contract	Animal Control
Perris	Yes	Yes	Yes	No	Contract	Water and sewer	Contract	Contract	Senior Center

Some of the public services and facilities provided in this area are provided by special districts. Some of the more significant districts in this area are Western Municipal Water District (WMWD) and Eastern Municipal Water District (EMWD), which provides water and sewer service to unincorporated areas and some cities in the area; the Jurupa and Rubidoux Community Service Districts, which provides a variety of community services; and the Jurupa, Alvord, Riverside, Corona-Norco, Moreno Valley, and Val Verde Unified School Districts, which provide K-12 educational services. An overall listing of the services provided is included in Table 9.F.

Table 9.F - Public Services Provided in Northwest Riverside County

	Types of Services Provided								
Agency	Water	Sewer	Fire	Library	Schools	Park and Recreation	Solid Waste	Health Care	Other
EMWD	Yes	Yes							
WMWD	Yes								
Home Gardens Sanitary District		Yes							
W. San Bernardino County Water Dist.	Yes								
Burrtec							Yes		
Waste Manage.							Yes		
Internat. Rubbish Service							Yes		
Jurupa Area Rec. and Park District						Yes			
Alvord Unified School District					Yes				
Corona Norco Unified School District					Yes				
Jurupa Unified School District					Yes				
Moreno Valley Unified School District					Yes				
Riverside Unified School District					Yes				
Val Verde Unified School District					Yes				
Nuview Union School District					Yes				
Perris Elem. School District					Yes				
Romoland School District					Yes				
Perris Union High School District					Yes				
Riverside Comm. College District					Yes				

	Types of Services Provided							
Agency	Water	Sewer	Fire	Library	Schools	Park and Recreation	Solid Waste	Health Care	Other
Riverside - Corona Resource Conservation Dist.									Resource Conservation
Perris Valley Cemetery District									Cemetery
Northwest Mosquito & Vector Control District									Vector control
Edgemont Com. Services District		Yes							Street Lighting
Rubidoux Community Services District	Yes	Yes	Yes				Yes, Contract		Street lighting Weed abatement
Jurupa Comm. Services District	Yes	Yes				Yes			Street lighting; landscape mtnce.

9.4.1.1 Water and Sewer Districts

The principal water and sewer agencies in northwestern Riverside County are EMWD, WMWD, Home Gardens Sanitary District, and West San Bernardino County Water District. In addition, the Rubidoux Community Service District (CSD), Edgemont CSD, and the Jurupa CSD also provide water and sewer services.

Authority

The Districts listed above operate under specific legislative authority, as noted below:

- EMWD and WMWD are municipal water districts. As such, they have the following authority:
  - Supply water for beneficial purposes.
  - Construct, improve, and operate public recreational facilities associated with the facilities operated or contracted to be operated by the district.
  - Acquire, construct, and operate facilities to provide fire protection and emergency medical services, including ambulance and paramedic services

- Acquire waterworks or a waterworks system, waters or water rights.

- Acquire, construct, and operate sanitation facilities.

- Home Gardens Sanitary District has organized a Sanitary District, and has the authority to acquire, plan, construct, reconstruct, alter, enlarge, lay, renew, replace, maintain, and operate the following:

  - Solid waste collection and disposal, including construction and operation of landfills

  - Septic tank maintenance; sewage collection, treatment, and disposal systems

  - Storm water collection, outfall, and disposal systems

  - Water reclamation and distribution systems, including water recycling.

- The West San Bernardino County Water District is a County Water District. In general, the powers of this District include the following:

  - Furnishing sufficient water throughout the District for any present or future beneficial use, which includes the storage and conservation of water and water rights, and the operation of water works.

  - Generate and sell electric power in connection with a water conservation project.

  - Acquire, construct, and operate facilities for the collection, treatment, and disposal of sewage and storm water.

  - Draining and reclaiming lands within the District.

  - Fire protection services

  - Acquire, construct, maintain, and operate facilities appropriate or related to the recreational use of water.

Facilities and Service Areas

The general service area boundaries of the four districts are described below. Information on the services of each district are provided in Table 9.G.

- ***EMWD*** stretches from Moreno Valley and Perris on the north and west, to San Jacinto and Hemet on the east, and Temecula on the south. As such, EMWD's service area includes Fiscal Analysis Areas 1, 2, and 3.

- ***WMWD*** serves customers in Fiscal Analysis Areas 1 and 2, and provides water to the cities of Corona, Norco, Riverside, and acts as a wholesaler to other water districts, including Elsinore Valley Municipal Water District, Lee Lake Water District, and Rancho California Water District.

Table 9.G - Water Agency Services in Northwestern Riverside County

	Agency Services and Functions				
	Water		Sewer		Service Area Size
Agency	Distribution	Storage	Collection	Treatment	
EMWD	Yes	Yes	Yes	Yes, 5 plants	550 sq. miles
WMWD	Yes	Yes	No	No	510 sq. miles
Home Gardens Sanitary District	No	No	Yes	Yes, 2 plants, one of which is owned by another district	672 acres
West San Bernardino County Water District	Yes	Yes	No	No	30 sq. miles
Rubidoux CSD	Yes	Yes	Yes	No Treatment is provided by City of Riverside.	16 sq. miles
Edgemont CSD	No	No	Yes	No Treatment is provided by the City of Riverside.	2.35 sq. miles
Jurupa CSD	Yes	Yes	Yes	Yes, 1 plant. Additional treatment provided by the City of Riverside.	48 sq. miles

C ***Home Gardens Sanitary District*** provides service to the Home Gardens community located adjacent to the eastern portion of the City of Corona.

C ***West San Bernardino County Water District*** primarily provides water within San Bernardino County; however, a portion of the District also serves the unincorporated area of Riverside County located south of Rialto near the Santa Ana River.

Service Criteria/Growth Factors

Table 9.H identifies the water consumption and sewage generation factors used by water districts within northwestern Riverside County in determining the demands upon their systems.

As can be seen from Table 9.H, water and sewer usage factors vary to a significant degree between agencies. This could be due to differences in household size related to the number of elderly residents, as well as landscaping patterns within the various districts.

Table 9.H - Water Consumption and Sewage Generation Factors used by Water Districts in Northwestern Riverside County

Agency	Agency Factors by Service		
	Water	Sewer	Comments
EMWD	180 - 200 gallons per capita per day (gpcd)	100 to 105 gpcd	Range is based upon density of single family homes. EMWD generally estimates 450 gallons per day per household.
WMWD	1140 gpcd	N/A	Figure is based upon a factor of 3.8 persons per household.
Home Gardens Sanitary District	N/A	250 gallons per day per residence	
West San Bernardino County Water District	700 gallons per day per residence	N/A	
Rubidoux CSD	No factors available	No factors available	
Edgemont CSD	N/A	110 gallons per day per residence	Figure is based on 2.85 persons per household
Jurupa CSD	The District does not have specific criteria.	280 gallons per day per residence	

Ability to Meet the Needs of Future Growth

Each of the water and sewer districts and CSDs have the current capacity to meet demand, and adequate capability to expand to meet projected demand. In the case of Rubidoux and Edgemont CSDs they have sized their facilities to meet the future development needs. The districts report that current facilities and/or infrastructure of all the agencies are in good shape.

EMWD and WMWD were surveyed to obtain a general representation of conservation practices due to their size and scope of operations within this portion of Riverside County. Their conservation measures were divided into two (2) separate areas:

Philosophy: What approach does the district undertake to promote or attempt to effectuate water conservation; and

Regulatory requirements: What specific approaches or practices are undertaken to achieve water conservation.

Both districts comply with the California Urban Water Conservation Council, Best Management Practices (BMPs). These practices include 14 different programs intended to help districts promote and increase water conservation. EMWD is one of the original signatories to the program and its associated BMPs. WMWD employs the programs as part of any annexation to the District. The BMPs contain the following programs:

- Water survey programs for single-family residential and multi-family residential customers.
- Residential plumbing retrofit.
- System water audits, leak detection and repair.
- Metering with commodity rates for all new connections and retrofit of existing connections.
- Large landscape conservation programs and incentives.
- High-efficiency washing machine rebate programs.
- Public information programs.
- School education programs.
- Conservation programs for commercial, industrial and institutional accounts.
- Wholesale agency assistance programs.
- Conservation pricing.
- Conservation coordinator.
- Water waste prohibition.
- Residential ultra-low-flush toilets replacement programs.

The districts generally view the 14 BMPs as both philosophical ideals and regulatory programs to achieve water conservation. Both districts undertake demonstration projects and education programs for public schools to promote water conservation practices. EMWD also undertakes household surveys and distributes, free of charge, low flow toilets.

9.4.1.2 Solid Waste Management

Solid waste collection and disposal services are provided by private haulers under franchise agreements with the County, and the Rubidoux CSD within the boundaries of that District. Disposal occurs at sanitary landfills operated by the County of Riverside.

Authority

Under the general operating authority of the County, franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout the County. The County of Riverside also operates and maintains open and closed landfills used by the solid waste collection companies.

Facilities and Service Area

The three franchise waste haulers that collect solid waste in the unincorporated area are Waste Management, Burrtec, and International Rubbish Service. The County of Riverside does not mandate solid waste collection. Therefore, residents have a choice as to whether or not they receive service. Collection service is provided on a weekly basis. Green waste is not collected separately.

Solid wastes collected within northwestern Riverside County are taken to one of the following sanitary landfills:

- Badlands
- El Sobrante
- Lamb Canyon.

The Robert A. Nelson Transfer Station is used by waste haulers in the region to reduce the loads and distances necessary to transport waste to sanitary landfills.

Service Criteria/Growth Factors

Capacity and use figures for the three landfill facilities serving northwest Riverside County are presented in Table 9.I.

Table 9.I - Landfill Usage and Capacity for Northwestern Riverside County

	Landfill Data	
Landfill	**Daily Usage**	**Projected Closure Date**
Badlands Sanitary Landfill	1,400 tons	2010
El Sobrante Sanitary Landfill	4,000 tons	2005
Lamb Canyon	1,900 tons	2006

Ability to Meet Future Demand

Riverside County has proposed the expansion of the Badlands and El Sobrante Landfills. The proposed expansion will provide the capacities identified in Table 9.J.

Based upon the proposed expansion plans, adequate landfill capacity will be available to meet projected demand.

Table 9.J - Proposed Expansion of Landfills Serving Northwestern Riverside County

Landfill	Proposed Landfill Expansions		
	Disposal Area	Annual Capacity	Life Expectancy
Badlands Sanitary Landfill	Current: 141 acres	Current: 720,897 cubic yards	Current:2010
	Additional area: 851 acres	Additional: 33 million cubic yards	Proposed: 2033
El Sobrante	Current: 90 acres	Current: 1,901,586 cubic yards.	Current: 2005
	Additional area: 405 acres	Additional: 179.7 mill. cu. yds.	Proposed: 2035

9.4.1.3 Recreation and Parks

In addition to the parks available within unincorporated areas which were described in Section 4.7, cities within northwest Riverside County currently maintain 90 parks encompassing 3,027 acres, including river trails and 271 acres of the Santa Ana River bottom.

Within northwestern Riverside County are located two special districts providing park facilities and recreation services: the Jurupa Community Services District (CSD) and the Jurupa Area Recreation and Park District.

Authority

The Jurupa CSD and the Jurupa Area Recreation and Park District provide park and recreation services to unincorporated areas northwest of the City of Riverside. The authority that CSDs operate under is described below under Community Service Districts. Recreation and Park Districts are authorized under the Public Resources Code, are authorized to plan, adopt, lay out, landscape develop, and otherwise improve, extend, control, operate, and maintain a system of public parks, playgrounds, golf courses, beaches, trails, natural areas, ecological and open space preserves, parkways, scenic drives, boulevards, and other facilities for public recreation.

Service Criteria/Growth Factors

County factors and criteria were delineated as part of the description of region-wide services in Section 4.7 of this report. The Jurupa Area Recreation and Park District is attempting to increase the amount of acreage devoted to recreational use to achieve a ratio of 5.0 acres per 1,000 population. The District has estimated the population within its service area as approximately 80,000. At present, the District has less than 1.0 acre per 1,000 population.

Ability to Meet the Needs of Future Growth

The ability of the County Regional Park and Open-Space District to meet current and projected demands was delineated as part of the description of region-wide services earlier in this Chapter. No parks exist within the Jurupa CSD service area and, therefore, the District does not provide park and recreation services at this time.

The Jurupa Area Recreation and Park District indicated that it is in the process of upgrading their facilities, and is attempting to obtain additional funding to meet future needs. At this time, the District has insufficient park land to meet current needs. Due to funding constraints, it may be difficult to bring the amount of parkland up to the District's desired goal of 5.0 acres per 1,000 population.

9.4.1.4 Schools

The school districts that provide K-12 educational services within Northwestern Riverside County include:

- Alvord Unified School District[1]
- Corona/Norco Unified School District
- Jurupa Unified School District
- Moreno Valley Unified School District
- Riverside Unified School District
- Val Verde Unified School District
- Nuview Union School District
- Perris Elementary School District
- Romoland School District

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[1] A *unified* school district includes grades K-12. An *elementary* school district indicates grades K-6 or grades K-8. A *high school* district includes grades 9-12, but may also include grades 7 and 8. The word *union* in the name of an elementary school district indicates that it was formed from two or more districts. The word *joint* in a district's name indicates that is includes territory from one or more counties.

- Perris Union High School District.

The Riverside Community College District provides advanced educational instruction.

Facilities and Service Areas

Information on the number of schools and area served by each district is delineated in Table 9.K.

Table 9.K - School Districts Serving Northwestern Riverside County

	School District Services			
School District	Number of Elementary Schools	Number of Middle/ Intermediate Schools	Number of High Schools	General Area Served
Alvord Unified School District	12, Grades K-6	3, Grades 7-8	3, Grades 9-12	Western City of Riverside; eastern City of Corona
Corona/Norco Unified School District	21, Grades K-6	5, Grades 7-8	4, Grades 9-12	Cities of Corona and Norco; Home Gardens, El Cerrito, Coronita, Mira Loma, and Lake Mathews.
Jurupa Unified School District	16, Grades K-6	3, Grades 7-8	2, Grades 9-12	North of Santa Ana River; west of Rubidoux Blvd.
Moreno Valley Unified School District	19, Grades K-5	6, Grades 6-8	3,Grades 9-12	City of Moreno Valley, generally east of I-215
Riverside Unified School District	27, Grades K-6	6, Grades 7-8	5, Grades 9-12	City of Riverside, east of Alvord Unified
Val Verde Unified School District	7, Grades K-6	2, Grades 7-8	3, Grades 9-12	South of Van Buren to Citrus, along both sides of I-215
Nuview Union School District	2, Grades K-5	1, Grades 6-8	N/A	North of the Ramona Expy. to south of Nuevo Road
Perris Elementary School District	6, Grades K-5 at five schools and Grade 6 at one school.	N/A	N/A	City of Perris, west to Lake Elsinore

Romoland School District	2, Grades K-8	See elementary schools	N/A	North & south of SR-74, east & west of I-215
Perris Union High School District	N/A	1, Grades 6-8	2, Grades 9-12	Menifee, Nuview, Perris Elementary, and Romoland School Districts.

Note: Continuation High Schools are not listed. Perris Union High School also has a Community Day School and a Charter School.

The Riverside Community College District generally extends from the Riverside/San Bernardino/Orange County Line south to the Alberhill area north of Lake Elsinore and to the easterly side of Moreno Valley. The Riverside Community College District has three separate campuses located in Riverside, Moreno Valley, and Norco. The Moreno Valley and Norco campuses will be separated from the Riverside Community College District in 2003 when each will form their own district.

Service Criteria/Growth Factors

Only three of the school districts in this area provided information on student generation factors, which in Table 9.L. Projected increases in student population, as estimated by individual school districts is provided in the Table 9.M.

Table 9.L - Student Generation Factors in Northwestern Riverside County

	Student Generation per Household		
District	**Elementary**	**Middle School**	**High School**
Val Verde USD	0.465	0.263	0.286
Corona/Norco USD	0.350	0.110	0.280
Perris Union High School		Middle and High School: 0.20	

Table 9.M - Projected Student Enrollments

	Projected Student Enrollments			
District	**Elementary School**	**Middle School**	**High School**	**District Total**
Alvord Unified School District	Current: 9,878 (1998) Projected: 9,855 (2003) Percent Change: –0.2%	Current: 2,582 (1998) Projected: 2,791 (2003) Percent Change: +8%	Current: 3,937 (1998) Projected: 4,312 (2003) Percent Change: +10%	Current: 16,397 (1998) Projected: 16,958 (2003) Percent Change: +3%

District	Projected Student Enrollments			
	Elementary School	Middle School	High School	District Total
Corona/ Norco Unified School District	Current: 19,766 (1999) Projected: 23,388 (2004/05) Percent Change: +18%	Current: 5,486 (1999) Projected: 7,354 (2004/05) Percent Change: +3%	Current: 9,972 (1999) Projected: 12,903 (2004/05) Percent Change: +29%	Current: 35,224 (1999)* Projected: 43,645 (2004/05) Percent Change: +24%
Jurupa Unified School District	Current: 10,356 (1998) Projected: 11,297 (2003) Percent Change: +9%	Current: 2,868 (1998) Projected: 3,553 (2003) Percent Change:+24%	Current: 4,705 (1998) Projected: 5,954 (2003) Percent Change: +27%	Current: 17,938 Projected: 20,670 Percent Change: +15%
Moreno Valley Unified School District	Current: 14,891 (1999) Projected: 15,777 (2003/04) Percent Change: +6%	Current: 7,661 (1999) Projected: 8,060 (2003/04) Percent Change: +5%	Current: 8,654 (1999) Projected: 9,862 (2003/04) Percent Change: +14%	Current: 31,975 (1999) Projected: 33,699 (2003/04) Percent Change: +5%
Riverside Unified School District	Current: 19,117 (1997) Projected: 18,591 (2002) Percent Change: -3%	Current: 5,200 (1997) Projected: 5,582 (2002) Percent Change: +7%	Current: 8,741 (1997) Projected: 9,354 (2002) Percent Change: +7%	Current: 33,058 (1997) Projected: 33,527 (2002) Percent Change: +1.4%
Val Verde Unified School District	Current: 5,454 (1998/99) Projected: 6,265 (2003/04) Percent Change: +15%	Current: 1,345 (1998/99) Projected: 1,734 (2003/04) Percent Change: +29%	Current: 2,295 (1998/99) Projected: 3,005 (2003/04) Percent Change: +31%	Current: 9,479 (1998/99) Projected: 11,463 (2003/04) Percent Change: +21%
Nuview Union School District	Current: 824 (K-5, 1998) Projected: 824 (2001) Percent Change: 0%	Current: 420 (6-8, 1998) Projected: 420 (2001) Percent Change: 0%	N/A	Current: 1,244 (1998) Projected: 1,244 (2001) Percent Change: 0%

	Projected Student Enrollments			
District	Elementary School	Middle School	High School	District Total
Romoland School District	Current: 1,037 (1998/99) Projected: 2,862 (2003/04) Percent Change: +176%	N/A		Current: 1,037(1998/99) Projected: 2,862 (2003/04) Percent Change: +176%
Perris Elementary School District	Information not provided	Information not provided	Information not provided	Information not provided
Perris Union High School District	Information not provided	Information not provided	Information not provided	Information not provided

Note: * Excludes continuation schools or other non-traditional study programs.

Most of the school districts serving this portion of the County expect a significant increase in students. Other Districts, such as Riverside Unified School District are located in largely built out areas.

The current 1999-year enrollment for the Riverside Community College District is 28, 201, and is divided between their three campuses as follows. Information on future enrollment projections was not provided by the District.

- Riverside: 18,851
- Moreno Valley: 5,942
- Norco: 6,845

Ability to Meet the Needs of Future Growth

In general, school districts are lacking in revenue to expand existing school facilities due to fiscal constraints. Adequate revenue cannot be collected from the state nor from local developer fees to construct new facilities and upgrade existing ones. Reductions in class room size for lower grades has further constrained existing school facilities. For a more detailed discussion on school construction funding, see Appendix B.

9.4.1.5 Cemetery Districts

The only Cemetery District operating within Northwestern Riverside County is the Perris Valley Cemetery District.

Authority

Cemetery Districts are formed under the Health and Safety Code, and allow for the maintenance of a cemetery(s) or acquire and maintain a mausoleum, if a mausoleum was built prior to May 1, 1937.

Facilities and Service Area

The Perris Valley Cemetery District serves the burial needs of Northwestern Riverside County in addition to those of Southwestern and Central Riverside County Fiscal Analysis Areas. The District's cemetery facilities are at 915 N. Perris Blvd., Perris.

Criteria/Factors

Future needs are available on the number of available spaces within District facilities. The District did not indicate a specific numerical factor upon which to base future need.

Ability to Meet Future Demand

The District indicated they have adequate ability to meet the current and future burial needs.

9.4.1.6 Mosquito and Vector Control Districts

The Northwest Mosquito and Vector Control District provides service to Northwestern Riverside County.

Authority

Mosquito and Vector Control Districts operate under the authority of the Health and Safety Code and have the following powers:

- The extermination of mosquitos, flies or other insects either inside or outside the district;
- The extermination of rats; and
- The undertaking or contracting for algae research, control, and monitoring projects.

Facilities and Service Area

The Northwest Mosquito and Vector Control District provides vector control services in the northwest portion of the County, including the Cities of Corona, Norco, Lake Elsinore, and a portion of the City of Riverside. The unincorporated areas covered by the District include Mira Loma, Glen Avon, Jurupa, Woodcrest, Highgrove, Home Gardens, Cerritos, Eastvale and, La Sierra. The District currently operates out of a 23,000 square foot structure on 2.5 acres in Corona.

Criteria/Factors

The District did not note a particular factor or ratio upon which they estimate usage or project needs. Workloads are continually evaluated due to a variety of reasons, including changes in land use.

Ability to Meet Future Demand

The District uses tax revenue, and reported that it is able to provide adequate services for current and projected needs.

9.4.1.7 Community Services Districts

The Rubidoux, Edgemont, and Jurupa Community Services Districts (CSDs) provide service within Northwestern Riverside County.

Authority

Community Services Districts have the authority to:

- Supply inhabitants of the district with water for domestic, irrigation, sanitation, industrial, fire protection, and recreation use.
- Collect, treat, or dispose of sewage, waste, and storm water.
- Collect or dispose of garbage or refuse matter.
- Protect against fire.
- Provide public recreation and parks, playgrounds, golf courses, and related features.
- Provide street lighting.
- Provide mosquito abatement.

- Provide police protection and other security services.
- Provide library buildings and library services.
- Provide street improvement, maintenance, and repair.
- Construct and improve bridges, culverts, curbs, gutters, and drains.
- Convert overhead electric and communications facilities to underground locations when such facilities are owned and operated by a "public utility" or "public agency," subject to consent of the public utility or public agency responsible for such facilities.
- Contract for ambulance service.
- Provide and maintain public airports and landing places for aerial traffic.
- Provide transportation services.
- Abate graffiti.
- Construct, maintain, and operate flood control facilities.
- Establish improvement districts.

Facilities and Service Areas

Rubidoux Community Services District

The Rubidoux Community Services District serves approximately 14 square miles and about 25,000 residents in the Rubidoux area northwest of the City of Riverside with the following services:

- Water: The District uses groundwater sources, and operates a 4.0 mgd (million gallons per day) water treatment facility. The District is the water retailer within its service boundary.
- Sewer: The District is the sewage collection agency for its service area. It collects 2.0 mgd of sewage daily which is treated by the City of Riverside at its municipal treatment plant. The District has an available capacity at the City of 3.0mgd.
- Street Lighting: The District provides energy to the street lights adjacent to the public roadway or within a County Service Area. Southern California Edison is responsible for the maintenance of the lights.

- Fire Protection: The District operates Station No. 38, with three full-time personnel, and has a mutual aid agreement with Riverside County Fire Department.

- Solid Waste: Burrtec Waste Industries provides once weekly, automated curbside pick-up and a green waste pick-up as a franchise from the Community Services District.

- Weed Abatement: The District inspects and sends out weed abatement notices to properties within their service area.

Edgemont Community Services District

The Edgemont Community Services District covers approximately 2.35 square miles along the east side of the I-215 freeway in the cities of Moreno Valley and Riverside. The District provides the following services to about 6,000 residents.

- Sewer: The District collects wastewater to be treated by the City of Riverside at its municipal treatment plant.

- Street Lighting: The District provides energy to street lights, although the District's lights are intermingled with those of the Cities of Riverside and Moreno Valley. Southern California Edison is responsible for the maintenance of the street lights.

Jurupa Community Services District

The Jurupa Community Services District covers approximately 48 square miles in the unincorporated area of the County northwest of the City of Riverside, west of the Rubidoux Community Services District. It provides the following services to about 48,000 residents.

- Water: The District uses groundwater sources.

- Sewer: The District collects and treats wastewater at one treatment plant. The additional effluent is transmitted to the City of Riverside for treatment.

- Street Lighting: The District provides energy to the street lights adjacent to the public roadway. Southern California Edison is responsible for the maintenance of the lights.

- Parks: The District provides park and recreation services to the Eastvale area of their service area, located east of the I-15 Freeway.

The Jurupa Community Services District has also formed a Lighting and Landscape Maintenance District to maintain street rights-of-way within its service area through a contract with a private firm. The District has also established a Community Facilities District to provide funding for the installation of water, sewer, flood control, and street improvements in the Mira Loma area.

Service Criteria/Growth Factors

Any criteria for the operation of district services are noted within the applicable service section.

Ability to Meet the Needs of Future Growth

Each of the CSDs indicated they can adequately meet current and future demand for services. The Edgemont and Rubidoux Districts, for example, indicated their water/sewer facilities have been sized to meet ultimate demand due to the size of their districts and projected development plans.

9.4.2 Fiscal Analysis Area 2: Southwestern Riverside County

The Southwestern Riverside County Fiscal Analysis Area is located in the southwest portion of the County, and encompasses the Cities of Lake Elsinore, Murrieta, and Temecula (see Figure 1.1). Significant unincorporated areas in area include Temescal Canyon, El Cerrito, and French Valley.

A listing of the services provided by the incorporated cities in this are is presented in Table 9.N.

Table 9.N - City Services Provided in Southwestern Riverside County

	Types of Services Provided								
City	Public Works	Parks and Recreation	Planning and Building	Library	Refuse Collection	Water and/or Sewer	Police	Fire	Other
Lake Elsinore	Yes	Yes	Yes	Contract w/County	Contract		Contract w/County	Contract w/County	Senior Center

Types of Services Provided

City

	Public Works	Parks and Recreation	Planning and Building	Library	Refuse Collection	Water and/or Sewer	Police	Fire	Other
Murrieta	Yes	Yes	Yes	Contract w/County	Contract		Yes	Yes	
Temecula	Yes	Yes	Yes	Contract w/County	Contract		Contract w/County	Contract w/County	Senior and Teen Center

Some of the public services and facilities provided in Southwestern Riverside County are provided by special districts. Some of the more significant districts in this area are Eastern Municipal Water District (EMWD), Elsinore Valley Municipal Water District, and Rancho California Water District which provide water and sewer service; Western Municipal Water District (WMWD), which provides water supplies water retailers in the area; and the Lake Elsinore, Murrieta Valley, and Temecula Valley Unified School Districts which provide K-12 educational services. An overall listing of the services provided by special districts in Southwestern Riverside County is provided in Table 9.O

Table 9.O - Special District Services Provided in Southwestern Riverside County

	Types of Services Provided				
Agency	Water	Sewer	Schools	Solid Waste	Other
EMWD	Yes	Yes			
WMWD	Yes				
Rancho California Water District	Yes	Yes			
Elsinore Valley Municipal Water District	Yes	Yes			
Lee Lake Water District	Yes	Yes			
Waste Management				Yes	
Intern. Rubbish Service				Yes	
CR&R				Yes	
Lake Elsinore Unified School District			Yes		
Murrieta Valley Unified School District			Yes		
Temecula Valley Unified School District			Yes		
Perris Elemen. School District			Yes		

Agency	Types of Services Provided				
	Water	Sewer	Schools	Solid Waste	Other
Riverside Comm. College District			Yes		
Mt. San Jacinto Community College District			Yes		
Riverside - Corona Resource Conservation Dist.					Resource Conservation
Elsinore Valley Cemetery District					Cemetery
Temecula Public Cemetery District					Cemetery
Perris Valley Cemetery District					Cemetery
Murrieta Valley Cemetery District					Cemetery
Wildomar Cemetery District					Cemetery
Santa Rosa Comm. Services District				Contract	Supplement. sheriff, road maintenance
Tenaja Comm. Services District					Road maintenance

9.4.2.1 Water and Sewer Districts

The principal water and sewer agencies serving Southwestern Riverside County are Eastern Municipal Water District (EMWD), Western Municipal Water District (WMWD), Elsinore Valley Municipal Water District, Lee Lake Water District, and Rancho California Water District.

Authority

Each of the Districts listed above operate under the specific legislative authority described below. EMWD, WMWD, and Elsinore Valley Municipal Water Districts are municipal water districts. As such, they have the following authority

- Supply water for beneficial purposes.
- Construct, improve, and operate public recreational facilities associated with the facilities operated or contracted to be operated by the district.
- Acquire, construct, and operate facilities to provide fire protection and emergency medical services, including ambulance and paramedic services
- Acquire waterworks or a waterworks system, waters or water rights.
- Acquire, construct, and operate sanitation facilities.

Lee Lake and Rancho California Water District are California Water Districts and have the following authority:

- Acquire and operate works for the production, storage, transmission, and distribution of water for irrigation , domestic, industrial, and municipal purposes.

- Acquire or operate any drainage or reclamation works related to the operation of water.

Facilities and Service Areas

Water and sewer agencies serving Southwestern Riverside County have the following boundaries. Services provided by these Districts are summarized in Table 9.P.

Table 9.P - Water and Sewer Agencies Serving Southwestern Riverside County

	Agency Services and Functions				
	Water		Sewer		Service Area Size
Agency	Distribution	Storage	Collection	Treatment	
EMWD	Yes	Yes	Yes	Yes, 5 plants	550 sq. miles
WMWD	Yes	Yes	No	No	510 sq. miles
Elsinore Valley MWD	Yes (District also operates a 9.0 mgd filtration plant)	Yes	Yes	Yes, 3 plants	96 sq. miles
Lee Lake Water District	Yes	Yes	Yes	Yes, 3 plants	Unknown
Rancho Cal. Water District	Yes	Yes	Yes	Yes, 1 plant	150 sq. miles

- ***EMWD*** stretches from Moreno Valley and Perris on the north and west, to San Jacinto and Hemet on the east, and Temecula on the south. As such, EMWD's service area includes Fiscal Analysis Areas 1, 2, and 3 (Northwestern, Southwestern, and Central Riverside County, respectively).

- ***WMWD*** serves customers in Fiscal Analysis Areas 1 and 2, and provides water to the cities of Corona, Norco, Riverside, and acts as a wholesaler to other water districts, including Elsinore Valley Municipal Water District, Lee Lake Water District, and Rancho California Water District.

- ***Elsinore Valley Municipal Water District*** provides service to the cities of Lake Elsinore, Canyon Lake, and Murrieta. It also serves the unincorporated areas of

Wildomar, Meadowbrook, Lakeland Village, Horsethief Canyon, and Temescal Canyon.

- ***Lee Lake Water District*** provides service along the east and west sides of the I-15 Freeway, stretching south of the westerly extension of Lake Mathews to a point northwest of Lake Elsinore.

- ***Rancho California Water District*** serves the City of Temecula and adjacent unincorporated areas.

Service Criteria/Growth Factors

The water and sewer Districts serving Southwestern riverside County use the water consumption and sewage generation factors presented in Table 9.Q in determining the demands upon their systems.

Table 9.Q - Water and Sewer Factors Used by Agencies Serving Southwestern Riverside County

Agency	Agency Factors by Service		
	Water	Sewer	Comments
EMWD	180 to 200 gallons per capita per day	100 to 105 gallons per capita per day	Range is based upon density of single family dwellings.
WMWD	1,140 gallons per day per residence.	N/A	Figure is based upon a factor of 3.8 persons per household.
Elsinore Valley MWD	500 gallons per day per residence.	250 gallons per day per residence.	District estimates 2.5 persons per household.
Lee Lake Water District	650 gallons per day per residence.	260 gallons per day per residence.	
Rancho Cal. Water District	200 gallons per capita	250 gallons per day per residence.	

The water and sewer usage factors vary to a significant degree depending upon the pattern of development and water usage within each District.

Ability to Meet the Needs of Future Growth

All responding water and sewer districts stated that they have the current capacity to meet demand and adequate capability to expand to meet projected demand. The current facilities and/or infrastructure of all the agencies are reported by the agencies to be in very good shape.

EMWD and Elsinore Valley MWD were surveyed to obtain a general representation of conservation practices due to their size and scope of operations within this portion of Riverside County. Their conservation measures were of the two types described below

- ***Philosophy***. What approach does the district undertake to promote or attempt to effectuate water conservation; and

- ***Regulatory requirements***. What specific approaches or practices are undertaken to achieve water conservation.

EMWD complies with the California Urban Water Conservation Council, Best Management Practices (BMPs) as outlined and discussed earlier in Section 9.4.1.1. These practices include 14 different programs intended to help districts promote and increase water conservation. EMWD is one of the original signatories to the program and its associated BMPs. Elsinore Valley MWD has not adopted the BMPs described above.

EMWD generally views the 14 BMPs as both philosophical ideals and regulatory programs to achieve water conservation. Both Districts undertake demonstration projects and education programs for public schools to promote water conservation practices. EMWD also undertakes household surveys and distributes, free of charge, low flow toilets.

9.4.2.2 Solid Waste

Solid waste collection and disposal services are provided by franchise haulers. The County of Riverside operates the sanitary landfills to which solid waste is taken. The Santa Rosa Community Services District provides this service to a portion of Southwestern Riverside County through a franchise, and uses the landfills and one of the haulers described below.

Authority

Under the general operating authority of the County, franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout the County. The County of Riverside also operates and maintains open and closed landfills used by the solid waste collection companies.

Facilities and Service Areas

The three franchise waste haulers that collect solid waste in the unincorporated area are Waste Management, International Rubbish Service, and CR&R. The County of Riverside does not mandate solid waste collection. Therefore, residents have a choice as to whether or not they receive service. Collection service is provided on a weekly basis. Green waste is not collected separately.

The sanitary landfills to which waste from Southwestern Riverside County is taken consist of the following:

- Badlands Sanitary Landfill
- El Sobrante Sanitary Landfill.

Although not a landfill, the Robert A. Nelson Transfer Station is used by waste haulers in the region to reduce the loads and distances necessary to transport waste**.**

Service Criteria/Growth Factors

The two facilities have to which waste from Southwestern Riverside County is taken the capacity and daily usage shown in Table 9.R.

Table 9.R - Sanitary Landfills Serving Southwestern Riverside County

Landfill	Landfill Data	
	Daily Usage	Projected Closure Date
Badlands Sanitary Landfill	1400 tons	2010
El Sobrante Sanitary Landfill	4000 tons	2005

Ability to Meet the Needs of Future Growth

Riverside County has proposed the expansion of the Badlands and El Sobrante Landfills, as shown in Table 9.S.

Based upon the proposed expansion plans adequate landfill capacity would be available to meet projected demand.

Table 9.S - Proposed Expansion of Landfills Serving Southwestern Riverside County

Landfill	Proposed Landfill Expansions		
	Disposal Area	Annual Usage	Life Expectancy

Badlands Sanitary Landfill	Current: 141 acres	Current: 720,897 cubic yards	Current:2010
	Additional area: 851 acres	Additional capacity: 33 million cu. yds.	Proposed: 2033
El Sobrante	Current: 90 acres	Current: 1,901,586 cu. yds.	Current: 2005
	Additional area: 405 acres	Additional capacity: 179.7 million cu. yds.	Proposed: 2035

9.4.2.3 Recreation and Parks

A variety of parks exist within the unincorporated area of the County. However, parkland and park/recreational services are provided by a variety of agencies including area cities and the County of Riverside. Within the cities of Lake Elsinore, Murrieta, and Temecula are 51 parks encompassing 392 acres of park land. An additional 130 acres of undeveloped park land is located within the City of Temecula.

In addition to City facilities, the County operates a number of park and recreational services throughout the area (see Section 4.7)

Ability to Meet the Needs of Future Growth

The ability of the County Regional Park and Open-Space District to meet current and projected demands were delineated as part of the description of region-wide services in Section 9.3.4.4 of this report.

9.4.2.4 Schools

The school districts that provide K-12 educational services within Southwestern Riverside County include the following:

- Lake Elsinore Unified School District
- Murrieta Valley Unified School District
- Temecula Valley Unified School District
- Perris Elementary School District
- Perris Union High School District.

The Riverside Community College District and Mt. San Jacinto Community College District provide advanced educational instruction.

Facilities and Service Areas

The number of schools and area served by each district within Southwestern Riverside County is delineated in Table 9.T. Perris Elementary and Perris Union High School Districts cover only a very small portion of Southwestern Riverside County near the City of Lake Elsinore.

The Riverside Community College District extends only into the northwesterly portion of this Fiscal Analysis Area. However, the primary Community College District is the Mt. San Jacinto Community College District which covers to the east and south of the Riverside Community College District to the San Diego County Line, north to the San Bernardino County Line, and east to the edge of the Coachella Valley.

Table 9.T - School Districts Serving Southwestern Riverside County

	School District Services			
School District	**Number of Elementary Schools**	**Number of Middle Schools**	**Number of High Schools**	**Area Served**
Lake Elsinore Unified School District	11, grades K-5	3, grades 6-8	2, grades 9-12	In and around the City of Lake Elsinore
Murrieta Valley Unified School District	6, grades K-5	2, grades 6-8	1, grades 9-12	In and around the City of Murrieta
Temecula Valley Unified School District	9, grades K-5	3, 6-8	2, 9-12	In and around the City of Temecula
Perris Elementary School District	6, grades K-5 at five of the schools and 6th Grade at one school.	N/A	N/A	Generally includes Perris and an area west to Lake Elsinore
Perris Union High School	N/A	1, grades 6-8	2, grades 9-12	Menifee, Nuview, Perris Elementary, and Romoland School Districts.

Service Criteria/Growth Factors

None of the districts within Southwestern Riverside County provided information on student generation factors, except the Temecula Valley Unified School District whose student generation rates are provided in Table 9.U.

Table 9.U - Student Generation Factors for the Temecula Unified School District (students per household)

Housing Type	Grades			
	Elementary	Middle	High	Total
Single Family	0.4258	0.1804	0.1893	0.7955
Multi Family	0.3529	0.1647	0.1177	0.6353

The projected increase in student population as reported by area school districts is presented in Table 9.V.

Table 9.V - Projected Increases in Student Population in Southwestern Riverside County

	Student Enrollment			
District	Elementary School	Middle School	High School	Overall Projected Change
Lake Elsinore Unified School District	Current: 7,798 (1998/99)	Current: 3,514 (1998/99)	Current: 3,928 (1998/99)	Current: 15,240 (1998/99)*
	Projected: 9,109 (2003/04)	Projected: 4,443 (2003/04)	Projected: 5,840 (2003/04)	Projected: 19,392 (2003/04)*
	Percent Change: +17%	Percent Change: +26%	Percent Change: +50%	Percent Change:+27%
Murrieta Valley Unified School District	Current: 5,350 (1999)	Current: 2,646 (1999)	Current: 2,971 (1999)	Current: 10,967 (1999)
	Projected: 8,352 (2004)	Projected: 4,051 (2004)	Projected: 4,419 (2004)	Projected: 16,982 (2004)
	Percent Change: +59%	Percent Change: +53%	Percent Change: +49%	Percent Change: +55%
Temecula Valley Unified School District	Current: 7,991 (1999)	Current: 3,873 (1999)	Current: 4,853 (1999)	Current: 16,717 (2004)
	Projected: 10,801 (2004)	Projected: 5,078 (2004)	Projected: 6,065 (2004)	Projected: 21,944 (2004)
	Percent Change: +35%	Percent Change: +31%	Percent Change: +25%	Percent Change: +31%
Perris Elementary School District	Information not provided	Information not provided	Information not provided	Information not provided
Perris Union High School	Information not provided	Information not provided	Information not provided	Information not provided

Note: * Excludes continuation schools or other non-traditional study programs.

The Mt. San Jacinto Community College District enrollment is currently 5,860 full-time equivalent students. The District has a planned growth of at least 10 percent per year. Information on the Riverside Community College District was provided in Section 9.4.1.4.

Ability to Meet the Needs of Future Growth

In general, school districts are lacking in revenue to expand existing school facilities s due to fiscal constraints. Adequate revenue can not be collected from the state nor from local developer fees to construct new facilities and upgrade existing ones. Reductions in class room size for lower grades has further constrained existing school facilities. For a more detailed discussion on school construction funding, see Appendix B.

Mt. San Jacinto Community College District indicated its facilities were currently at capacity, and they would not be adequate to meet future needs.

9.4.2.5 Resource Conservation Districts

The primary Resource Conservation District in Southwestern Riverside County is the Elsinore-Murrieta-Anza Resource Conservation District. The Riverside-Corona Resource Conservation District covers a portion of this area as well. For further information on the Riverside-Corona Resource Conservation District see Section 9.4.1.5.

Authority

Resource Conservation Districts are governed by the provisions in the Public Resources Code, Sections 9000 to 9978. A resource conservation district may be formed to provide the following:

- Control of runoff.
- Prevention or control of soil erosion
- The development and distribution of water.
- The improvement of land capabilities.

Facilities and Service Areas

The focus of Elsinore-Murrieta-Anza Resource Conservation District services, other than those generally provided by a Resource Conservation District, are related to erosion control, urban/rural interface issues, and drainage/tributary runoff and protection. The District encompasses approximately 790 square miles, and serves an area extending from Lake Elsinore on the north to the County line on the south, and from Orange County on the west to the Coachella Valley Resource Conservation District on the east.

Service Criteria/Growth Factors

The District did not note a specific factor or ratio upon which they estimate usage or projected needs.

Ability to Meet the Needs of Future Growth

The Elsinore-Murrieta-Anza Resource Conservation District currently is staffed by volunteers working out of a residence. No funding is currently available to the District, except through grants. The District is working with other districts to craft legislation to have the State of California fund Resource Conservation Districts.

The District estimated minimum base funding for districts would be in the range of $43,000 to $83,000 per year. This would allow full-time staff and the maintenance of office space. Due to the District's funding limitation, it is not able to meet current needs nor future needs without a change in the funding process or mechanism.

9.4.2.6 Cemetery Districts

Five Cemetery Districts operate within Southwest riverside County: Perris Valley, Murrieta Valley, Wildomar, Elsinore Valley, and Temecula Public Cemetery Districts.

Authority

Cemetery Districts are formed under the Health and Safety Code and allow for the maintenance of a cemetery(s) or acquire and maintain a mausoleum, if a mausoleum was built prior to May 1, 1937.

Facilities and Service Areas

The locations of cemetery facilities operating by the Cemetery districts serving Southwestern Riverside County are identified in Table 9.W.

Table 9.W - Cemetery Facilities Serving Southwestern Riverside County

Cemetery Districts	Cemetery Facilities	
	Facility Location	Facility Size

Elsinore Valley Cemetery	18170 Collier Ave. Lake Elsinore	26.5 acres
Temecula Public Cemetery	41911 C Street, Temecula	17 acres
Murrieta Valley Cemetery	42800 Ivy Street, Murrieta	Unknown
Perris Valley	915 N. Perris Blvd., Perris	20 acres
Wildomar	21400 Palomar Road, Wildomar	Unknown

Service Criteria/Growth Factors

Future needs are available on the number of available spaces within District facilities. The District did not indicate a specific numerical factor upon which to base future need.

Ability to Meet the Needs of Future Growth

All of the Districts serving Southwestern Riverside County indicated they have adequate ability to meet current and future burial needs.

9.4.2.7 Community Services Districts

The Santa Rosa Community Services District and Tenaja Community Services District provide services within Southwestern Riverside County.

Authority

Community services districts have the authority to:

- Supply inhabitants of the district with water for domestic, irrigation, sanitation, industrial, fire protection, and recreation use.
- Collect, treat, and dispose of sewage and storm water.
- Collect or dispose of garbage or refuse matter.
- Protect against fire.
- Provide public recreation and parks, playgrounds, golf courses, and related features.
- Provide street lighting.
- Provide mosquito abatement.

- Provide police protection and other security services.
- Provide library buildings and library services.
- Provide street improvements, maintenance, and repair.
- Construct and improve bridges, culverts, curbs, gutters, and drains.
- Convert overhead electric and communications facilities to underground locations when such facilities are owned and operated by a “public utility” or “public agency”, subject to consent of the public utility or public agency responsible for such facilities.
- Contract for ambulance service.
- Provide and maintain public airports and landing places for aerial traffic.
- Provide transportation services.
- Abate graffiti.
- Construct, maintain, and operate flood control facilities.
- Establish improvement districts.

Facilities and Service Areas

Information on the services provided by the Santa Rosa Community Services District and the Tenaja Community Services District, as well as their service areas are presented in Table 9.X.

Table 9.X - Services Provided by the Santa Rosa Community Services District and the Tenaja Community Services District

	District Services	
District	Services Provided	Area Served

San ta Rosa Community Services District	Sheriff: 2 dedicated deputies Road Maintenance: 85 miles of roads maintained Refuse: Franchise with International Refuse Services	20,000 acres generally south of Temecula
Tenaja Community Services District	Road Maintenance	Generally in the Santa Rosa Hills north of the Santa Rosa CSD.

9.4.3 Fiscal Analysis Area 3: Central Riverside County

Fiscal Analysis Area 3 covers the west central portion of the County from the Lakeview/Nuevo and Menifee communities on the west and southwest to the cities of San Jacinto and Hemet on the north and east. The significant unincorporated areas include Winchester, Lakeview/Nuevo, Sun City, and Menifee. Collectively, this area is referred to as “Central Riverside County.” A listing of the services provided by the incorporated cities in Central Riverside County is provided in Table 9.Y.

Table 9.Y - Services Provided by Cities within Central Riverside County

	Type of City Services Provided								
Agency	**Public Works**	**Parks and Recreation**	**Planning and Building**	**Library**	**Refuse Collection**	**Water and/or Sewer**	**Police**	**Fire**	**Other**
Hemet	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Animal Control
San Jacinto	Yes	Yes	Yes	Contract	Contract	Yes	Yes	Contract	Animal Control, Senior Center

Some of the public services and facilities provided in Central Riverside County are provided by special districts. Some of the more significant districts in this area are Eastern Municipal Water District (EMWD), which provides water and sewer service; Valley-Wide Recreation and Park District, which provides open space and recreation services; and the Hemet and San Jacinto Unified School Districts, which provide educational services for grades K-12. An overall listing of the services provided is provided in Table 9.Z.

Table 9.Z - Special District Services Provided to Central Riverside County

District	Type of Services Provided						
	Water	Sewer	Schools	Park and Recreation	Solid Waste	Health Care	Other
EMWD	Yes	Yes					
Lake Hemet MWD	Yes	Yes					
Waste Management					Yes		
OK and Associates					Yes		
Valley-Wide Recreation and Park District				Yes			
Hemet Unified School District			Yes				
San Jacinto Unified School District			Yes				
Menifee Union School District			Yes				
Mt. San Jacinto Comm. College District			Yes				
San Jacinto Basin Resource Conservation							Resource Conservation
Perris Valley Cemetery District							Cemetery
San Jacinto Valley Cemetery District							Cemetery
Valley Health Systems						Yes	

9.4.3.1 Water and Sewer Districts

The principal water and sewer agencies serving Central Riverside County are EMWD, which was discussed earlier in Section 9.4.1.1 and the Lake Hemet Municipal Water District.

Authority

EMWD and Lake Hemet Municipal Water Districts are organized as municipal water districts. As such, they have the following authority:

- Supply water for beneficial purposes.

- Construct, improve, and operate public recreational facilities associated with the facilities operated or contracted to be operated by the district.

- Acquire, construct, and operate facilities to provide fire protection and emergency medical services, including ambulance and paramedic services

- Acquire waterworks or a waterworks system, waters or water rights.

- Acquire, construct, and operate sanitation facilities.

Facilities and Service Areas

The general service area boundaries of the two municipal water districts are as follows.

- ***EMWD*** stretches from Moreno Valley and Perris on the north and west to San Jacinto and Hemet on the east and Temecula on the south. As such, EMWD's service area encompasses portions of Northwest, Southwest, and Central Riverside County.

- ***Lake Hemet MWD*** generally includes the area east of the City of Hemet, although small portions of the easterly side of the incorporated cities of Hemet and San Jacinto are included.

The general services and facilities of each district are delineated in Table 9.AA.

Table 9.AA - Water and Sewer Services in Central Riverside County

	Agency Services and Functions				
	Water		Sewer		
Agency	Distribution	Storage	Collection	Treatment	Service Area Size
EMWD	Yes	Yes	Yes	Yes, 5 plants	550 sq. miles
Lake Hemet MWD	Yes	Yes	Yes	No	29.2 sq. miles

Service Criteria/Growth Factors

The two water Districts serving Central Riverside County use the factors shown in Table 9.AB in determining demand upon their systems resulting from new development.

Table 9.AB - Water Districts in Central Riverside County

Agency	Agency Factors by Service		
	Water	Sewer	Comments
EMWD	180 to 200 gallons per capita per day	100 to 105 gallons per capita per day	Range is based upon density of development.
Lake Hemet MWD	160 gallons per capita per day	No figures available	

Ability to Meet the Needs of Future Growth

Both districts report that they have the current capacity to meet demand and adequate capability to expand to meet projected demand. Each agency report that their current facilities and/or infrastructure are in good shape**.**

EMWD and Lake Hemet MWD were surveyed to obtain a general representation of conservation practices due to their size and scope of operations within this EDZ. Their conservation measures were of two types.

- ***Philosophy***. What approach does the district undertake to promote or attempt to effectuate water conservation; and

- ***Regulatory requirements***. What specific approaches or practices are undertaken to achieve water conservation.

The EMWD complies with the California Urban Water Conservation Council, Best Management Practices (BMPs). These practices include 14 different programs intended to help districts promote and increase water conservation (see Section 9.4.1.1 for a listing of the programs). EMWD is one of the original signatories to the program and its associated BMPs. EMWD generally view the 14 BMPs as both philosophical ideals and regulatory programs to achieve water conservation. EMWD undertakes demonstration projects and education programs for public schools to promote water conservation practices. EMWD also undertakes household surveys and distributes, free of charge, low flow toilets.

Lake Hemet MWD has not adopted the BMPs described above. Lake Hemet MWD has a tiered water rate system in which costs increase for those customers using more water. Such a program could have the affect of limiting water use, although that was not the initial reason for its establishment.

9.4.3.2 Solid Waste

Solid waste collection and disposal services are provided by franchise haulers and the County of Riverside operates the sanitary landfills.

Authority

Under the general operating authority of the County, franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout the County. The County of Riverside also operates and maintains open and closed landfills used by the waste collection companies.

Facilities and Service Areas

The two franchise waste haulers collect solid waste in the unincorporated area are Waste Management and OK and Associates. The County of Riverside does not mandate solid waste collection. Therefore, residents have a choice as to whether or not they receive service. Collection service is provided on a weekly basis. Green waste is not collected separately.

The sanitary landfills to which refuse collected within Central Riverside County is taken are:

- Badlands Sanitary Landfill
- El Sobrante Sanitary Landfill
- Lamb Canyon Sanitary Landfill.

Although not a landfill, the Robert A. Nelson Transfer Station is used by waste haulers in the region to reduce the loads and distances necessary to transport waste.

Service Criteria/Growth Factors

Capacity and use figures for the three facilities are shown in Table 9.AC. This information is identical to that provided for Northwestern Riverside County (see Section 9.4.1.2.

Table 9.AC - Landfills Serving Central Riverside County

Landfill	Landfill Data	
	Daily Usage	Projected Closure Date
Badlands Sanitary Landfill	1,400 tons	2010
El Sobrante Sanitary Landfill	4,000 tons	2005
Lamb Canyon	1,900 tons	2006

Ability to Meet the Needs of Future Growth

Riverside County has proposed the expansion of the Badlands and El Sobrante Landfills. The effect of proposed expansion is shown in Table 9.AD, and is identical to that provided for Northwestern Riverside County in Section 9.4.1.2

Table 9.AD - Proposed Expansion of Landfills Serving Central Riverside County

Landfill	Proposed Landfill Expansions		
	Disposal Area	Annual Capacity	Life Expectancy
Badlands Sanitary Landfill	Current: 141 acres Additional area: 851 acres	Current: 720,897 cubic yards Additional capacity: 33 million cubic yards	Current:2010 Proposed: 2033
El Sobrante Landfill	Current: 90 acres Additional area: 405 acres	Current: 1,901,586 cubic yards. Additional capacity: 179.7 million cu. yds.	Current: 2005 Proposed: 2035
Lamb Canyon Sanitary Landfill	Current: 788 acres Additional area 354 acres	Current: 978,603 cubic yards. Additional capacity: 20,833 million cu. yds.	Current: 2006 Proposed: 2036

Based upon the proposed expansion plans adequate landfill capacity is available to meet project demand.

9.4.3.3 Recreation and Parks

A variety of parks exist within the unincorporated area of the County. However, parkland and park/recreational services are provided by a variety of agencies including cities, the County of Riverside, and the Valley-Wide Recreation and Park District. In addition to the parks identified in Section 4.7, The cities of Hemet and San Jacinto maintain 13 parks encompassing 656 acres, including a 480 acre site transferred from the U.S. Bureau of Land Management to the City of Hemet.

In addition, the Valley-Wide Recreation & Park District maintains 55 acres of park land within the City of Hemet, and owns 10 acres of undeveloped park land within southwestern portion of the City of Hemet. The District also operates a number of park and recreational services within the unincorporated portion of Central Riverside County, which are described in Section 4.7. The characteristics of the District are described below.

Authority

Recreation and Park Districts are authorized under the Public Resources Code and is authorized to plan, adopt, lay out, plant, develop, and otherwise improve, extend, control, operate, and maintain a system of public parks, playgrounds, golf courses, beaches, trails, natural areas, ecological and open space preserves, parkways, scenic drives, boulevards, and other facilities for public recreation.

Facilities and Service Areas

The District provides recreation and park services to residents within an 800 square mile area covering the Cities of Hemet and San Jacinto, and the unincorporated areas of Winchester, Sage, and Aguanga. The District extends from Moreno Valley on the north to the San Diego County line on the south, from Winchester on the west to the San Jacinto Mountains on the east. A total of 141 acres of parkland are maintained by the District which are discussed in Section 4.7 of this Report.

Service Criteria/Growth Factors

The Valley-Wide Recreation & Park District uses a factor of 3.0 acres of park per 1,000 population.

Ability to Meet the Needs of Future Growth

The Valley-Wide Recreation & Park District currently provides less than its standard of 3.0 acres of park per 1,000 population listed above. The District indicated they could not make up for the deficiency due to their inability to obtain additional revenue. One of their revenue problems cited by the District is the amount of Quimby Act fees they can request. Since the amount of parkland within the District at the time of its establishment was less than 3.0 acres per 1,000 population, they are limited by law to requesting funds based on a maximum standard of 3.0 acres per 1,000 population. The District stated that if they were able to request development fees equaling 5.0 acres of park per 1,000, they would gain significantly more revenue, and be able to achieve their districtwide standard of 3.0 acres of park per 1,000 population. The District General Manager indicated that the District received approximately $22.00 per new residential dwelling, which is substantially below the $360.00 that is received by the City of Temecula, for example.

9.4.3.4 Schools

The primary school districts that provide K-12 educational services within Central Riverside County are the Hemet and San Jacinto Unified School Districts. The Mt. San Jacinto Community College District provides advanced educational instruction.

Facilities and Service Areas

The number of schools and areas served by each district providing K-12 educational services within Central Riverside County are delineated in Table 9.AE.

Table 9.AE - School Facilities Serving Central Riverside County

	School District Services			
School District	**Elementary Schools**	**Middle Schools**	**High Schools**	**Area Served**
Hemet Unified School District	7, grades K-5 3, grades K-8	3, grades 6-8	2, grades 9-12	Generally extends from the west side of the City of Hemet to east of Idyllwild, and to the San Diego County line on the south
San Jacinto Unified School District	4, Grades K-4 and 1, Grades 5-6	1, Grades 7-8	1, Grades 9-12	In and around the City of San Jacinto
Romoland School District	2, Grades K-8	See Elementary	N/A	North and south of Highway 74, east and west of I-215
Perris Union High School District	N/A	1, Grades 6-8	2, Grades 9-12	Menifee, Nuview, Perris Elementary, and Romoland School Districts.
Menifee Union School District	4, K-6	1, Grades 7-8	N/A	Includes portions of the Cities of Perris, Lake Elsinore, Murrieta, as well as Menifee Valley.

Note: There is one Continuation High School in the Hemet Unified School District.

The Mt. San Jacinto Community College District provides advanced educational instruction and covers the entire Central Riverside County Fiscal Analysis Area.

Service Criteria/Growth Factors

The estimated student generation factors and projected student population for the Hemet Unified School District are listed in Table 9.AF. Student generation factors were not provided by the other districts.

Table 9.AF - Hemet Unified School District Student Generation Factors (In student per household)

Housing Type	Grades			
	K - 5	6 - 8	9 - 12	All Students
Single Family	0.316	0.087	0.203	0.606
Multiple Family	0.194	0.028	0.056	0.278

The factors noted above are significantly less than those for the Alvord School District in Northwestern Riverside County, 1, for example, but are greater than those noted for the Desert Sands School District in the Coachella Valley.

Projected increases in student enrollment as reported by area school districts is presented in Table 9.AG.

Table 9.AG - Projected Increases in Student Enrollment

School District	Projected Student Enrollment			
	Elementary School	Middle School	High School	Total
Hemet Unified School District	Current: 8,750 (Grades K-6, 1998)	Current: 2,467 Grades 7-8, 1998)	Current: 4,133 (Grades 9-12, 1998)	Current: 15,350 (1998)
	Projected: 9,462 (Grades K-6, 2003)	Projected: 3,023 (Grades 7-8, 2003)	Projected: 5,067 (Grades 9-12, 2003)	Projected: 17,552 (2003)
	Percent Change: +8%	Percentage Change: +22%	Percent Change: +23%	Percent Change: +14%
San Jacinto Unified School District	Current: 2,995 (Grades K-6, 1998/99)	Current: 737 (Grades 7-8, 1998/99)	Current: 1,198 (Grades 9-12, 1998/99)	Current: 4,930 (1998/99)
	Projected: 3,131 (Grades K-6, 2003/04)	Projected: 862 (Grades 7-8, 2003/04	Projected: 1,489 (Grades 9-12, 2003/04)	Projected: 5,482 (2003/04)
	Percent Change: +4.5%	Percent Change: +17%	Percent Change: +24%	Percent Change: +11%

School District	Projected Student Enrollment Elementary School	Middle School	High School	Total
Perris Union High School District	N/A	N/A	Information not provided	Information not provided
Menifee Union School District	Current: 3,531 (Grades K-6, 1998/99) Projected: 4,520 (Grades 7-8, 2003/04) Percent Change: +28%	Current: 919 (Grades 7-8, 1998/99) Projected: 1,654 (Grades 7-8, 2003/04) Percent Change: +80%	N/A	Current 4,450 (1998/99) Projected: 6,174 (2003/04) Percent Change: +39%

The Mt. San Jacinto Community College District enrollment is currently 5,860 full-time equivalent students. The District has a planned growth of at least 10 percent per year.

Ability to Meet the Needs of Future Growth

The Hemet Unified School District has substantially exceeded its capacity, as calculated by the Education Code, for the elementary and middle school grades. However, the high school grades are under the identified capacity, as noted in Table 9.AH.

Table 9.AH - School Capacity within the Hemet Unified School District

Grade Level	Existing School Facilities Capacity and Enrollment 1998-99 Capacity	1998-99 Enrollment	Excess Capacity (Shortage)
Elementary School (Grades K-6)	5,751	8,753	(3,002)
Middle School (Grades 7-8)	1,674	2,503	(829)
High School (Grades 9-12)	5,076	4,395	681
Total	***12,501***	***15,651***	***(3,150)***

In general, school districts are lacking in revenue to expand existing school facilities s due to fiscal constraints. Adequate revenue can not be collected from the state nor from local developer fees to construct new facilities and upgrade existing ones. Reductions in class room size for lower grades has further constrained existing school facilities. For a more detailed discussion on school construction funding, see Appendix B.

9.4.3.5 Resource Conservation Districts

The Resource Conservation District serving Central Riverside County is the San Jacinto Basin Resource Conservation District.

Authority

Resource Conservation Districts are governed by the provisions in the Public Resources Code, Sections 9000 to 9978. A resource conservation district may be formed to provide the following:

- Control of runoff.
- Prevention or control of soil erosion
- The development and distribution of water.
- The improvement of land capabilities.

Facilities and Service Areas

The San Jacinto Basin Resource Conservation District provides a variety of services, including soil and water conservation and programs aimed at conserving natural resources within its boundaries. The District operates from a small suite in the City of San Jacinto, and its area of responsibility covers approximately 550 square mile area extending from the area north of Lake Perris, south to Murrieta, and from the City of Perris east into the Santa Rosa Mountains, east of Idyllwild. As such, the District provides service to areas in Central Riverside County, as well as parts of the REMAP area.

Service Criteria/Growth Factors

The San Jacinto Basin Resource Conservation District does not maintain a specific growth particular factor or ratio upon which they estimate future service demands resulting from new development.

Ability to Meet the Needs of Future Growth

The District is currently funded through revenue received from EMWD and the U.S. Bureau of Reclamation, in the amount of $15,000 and $20,000, respectively. The

District is not a taxing agency, although a small portion of its revenue, approximately $2,000, comes from property taxes. Without the financial support of EMWD and the Bureau of Reclamation the District could not maintain its office and field staff. As such, the District expressed a concern that it may not exist in the future if it could not continue to obtain revenue from these sources or grant funding.

9.4.3.6 Cemetery Districts

The Cemetery Districts operating within Central Riverside County are the Perris Valley and San Jacinto Valley Cemetery Districts.

Authority

Cemetery Districts are formed under the Health and Safety Code and allow for the maintenance of a cemetery(s) or acquire and maintain a mausoleum, if a mausoleum was built prior to May 1, 1937.

Facilities and Service Areas

The Cemetery districts serving the burial needs of EDZ No. 3 are the Perris Valley and San Jacinto Valley Cemetery Districts. The Districts have cemetery facilities at the locations identified in Table 9.AI.

Table 9.AI - Cemetery District Facilities Serving Central Riverside County

Cemetery Districts	Cemetery Facilities	
	Location	Size
San Jacinto Valley Cemetery	North of Menlo Ave., between Santa Fe Street and San Jacinto Street, in San Jacinto	45 to 50 acres
Perris Valley Cemetery	915 N. Perris Blvd., Perris	20 acres

Service Criteria/Growth Factors

Future needs are available on the number of available spaces within District facilities. The District did not indicate a specific numerical factor upon which to base future need.

Ability to Meet the Needs of Future Growth

Each of the Districts serving Central Riverside County indicated they have adequate ability to meet current and future burial needs.

9.4.3.7 Health Care Districts

Valley Health Systems - Health Care District provides health care services to residents within Central Riverside County.

Authority

The specific powers of a Health Care Districts are to establish, maintain, and operate, or provide assistance in the operation of one or more health facilities or services, including, but not limited to:

- Outpatient programs, services and facilities
- Retirement programs
- Chemical dependency programs, services and facilities
- Other health care programs, services and facilities
- Activities at any location inside and outside the district for the benefit of the district and people served by the district.
- Acquire, maintain, and operate ambulances, or ambulance services inside and outside the district.
- Establish a nurses' training school, or a child care facility or the benefit of employees of the hospital or residents of the district.

Facilities and Service Areas

The Valley Health Systems - Health Care District operates and maintains three hospitals and one 120 bed nursing home. The characteristics of each hospital are identified in Table 9.AJ.

Table 9.AJ - Hospital Facilities Serving Central Riverside County

	Hospital Facilities and Services	
Hospital	**Number of Beds**	**Types of Services Provided**

Hemet Valley Medical Center, 1117 E. Devonshire Ave., Hemet	240	• 24-hour emergency department • Radiation therapy treatment center for cancer • CT scanning and magnetic resonance imaging • Inpatient and outpatient surgical services • Maternity and women's services • Cardiac care services • Speech, physical, and occupational therapy and x-ray services • Inpatient/outpatient laboratory and x-ray services • Behavioral health services • Skilled nursing facility • Subacute nursing care • Community education programs • Support groups
Menifee Valley Medical Center, 28400 McCall Blvd., Sun City	84	• 24-hour emergency department • Inpatient/outpatient x-ray services • Inpatient and outpatient surgical services • Inpatient and outpatient laboratory services • Physical therapy services • Community education programs • Support groups
Moreno Valley Community Hospital, 27300 Iris Ave., Moreno Valley	101	• Basic emergency • Outpatient Services • Respiratory Care Service • Social Services • Physical Therapy

Service Criteria/Growth Factors

Determining the need for hospital beds is based upon a variety of factors including ability to secure insurance and insurance company requirements for duration of stay. No specific criteria for determining future need was noted. The District is in the process of assessing needs based upon occupancy and actual utilization of services.

Ability to Meet the Needs of Future Growth

The Valley Health Systems - Health Care District currently has excess hospital bed space. The District felt this was common for hospitals due to a variety of reasons, including insurance requirements and outpatient surgery. Thus, the District believes that it has adequate hospital capacity to meet future needs.

9.4.4 Fiscal Analysis Area 4: San Gorgonio Pass Area

The San Gorgonio Pass Area encompasses the cities of Banning, Beaumont, and Calimesa, as well as nearby unincorporated areas such as Cherry Valley and Cabazon. This area is generally bounded by the Riverside County line on the north, the Santa Rosa Mountains on the south, the Badlands on the west, and the Coachella Valley on the east.

A number of services are provided by the incorporated cities in is area, as identified in Table 9.AK.

Table 9.AK - Services Provided by Cities within the San Gorgonio Pass Area

	Type of Services Provided								
City	Public Works	Parks and Recreation	Planning and Building	Library	Refuse Collection	Water and/or Sewer	Police	Fire	Other
Banning	Yes	Yes	Yes	Yes	Contract	Yes	Yes	Yes	Electricity, Transit
Beaumont	Yes		Yes		Contract	Yes	Yes	Contract	Animal control
Calimesa	Yes	Yes	Yes		Contract		Contract	Contract	Senior center

Some of the public services and facilities provided in the San Gorgonio Pass are provided by special districts. Some of the more significant districts in the Pass area are the Beaumont-Cherry Valley Water District and the San Gorgonio Pass Water Agency, which provide or will provide water service; the Beaumont-Cherry Valley Recreation and Park District, which provides recreational and open space; and, the Beaumont and Banning Unified School Districts, which provide K through 12 educational services. Table 9.AL identifies services provided by special districts within the San Gorgonio Pass Area.

9.AL - Special District Services in the San Gorgonio Pass Area

	Type of Services Provided						
Agency	Water	Fire	Library	Schools	Park and Recreation	Solid Waste	Health Care
Beaumont - Cherry Valley Water District	Yes						
San Gorgonio Pass Water Agency	Yes						
High Valley Water District	Yes						
Cabazon County Water District	Yes						
Cherry Valley Sanitation						Yes	

	Type of Services Provided						
Agency	**Water**	**Fire**	**Library**	**Schools**	**Park and Recreation**	**Solid Waste**	**Health Care**
Cabazon Disposal						Yes	
Beaumont - Cherry Valley Rec. and Park District					Yes		
Beaumont Unified School District				Yes			
Banning Unified School District				Yes			
Mt. San Jacinto Comm. College District				Yes			
Banning USD Library District			Yes				
Beaumont Library District			Yes				
San Gorgonio Memorial Health Care District							Yes

9.4.4.1 Water and Sewer Districts

The principal water and sewer agencies in the Pass area are the Beaumont-Cherry Valley Water District, San Gorgonio Pass Water Agency, Cabazon County Water District, and High Valley Water District.

Authority

Each of the Districts listed above operate under specific legislative authority.

Beaumont-Cherry Valley Water District is organized as an irrigation district, and serves a limited number of customers within a 10 square mile. The District has a variety of specific powers under the Health and Safety Code that include the following:

- Supply water for beneficial purposes
- Provide for drainage of irrigation water provided for by the district
- Purchase or lease electric power and provide for the acquisition, operation, and control of plants for the generation, transmission, etc. of electric power.
- Acquire and operate an airport or aviation school.
- Provide, maintain, and operated flood control works (available to districts having more than 200,000 acres).
- Reclaim wastewater for beneficial use.
- Provide for sewage disposal.

- Construct, maintain, and operate recreational facilities in connection with dams, reservoirs, or other works owned and constructed by the district.

The San Gorgonio Pass Water Agency provides water for groundwater recharge, as well as supplemental domestic water supplies to the City of Banning, Beaumont-Cherry Valley Water District, and Yucaipa Valley Water District. The Agency was created by the Legislature to be a direct contractor to provide State Water Project water to customers as a wholesale agency.

The Cabazon County Water District is a County Water District. In general, the powers of this District include:

- Furnishing sufficient water throughout the District for any present or future beneficial use, which includes the storage and conservation of water and water rights, and the operation of water works.

- Generate and sell electric power in connection with a water conservation project.

- Acquire, construct, and operate facilities for the collection, treatment, and disposal of sewage, waste and storm water.

- Draining and reclaiming lands within the District.

- Provide fire protection.

- Acquire, construct, maintain, and operate facilities appropriate or related to the recreational use of water.

High Valley Water District is a California Water District with the authority granted it under the Water Code. In general, the powers of the District include the following:

- Furnishing sufficient water throughout the District for any present or future beneficial use, which includes the storage and conservation of water and water rights, and the operation of water works.

- Generate and sell electric power in connection with a water conservation project.

- Acquire, construct, and operate facilities for the collection, treatment, and disposal of sewage, waste and storm water.

- Drain and reclaim lands within the District.

- Provide fire protection.

- Acquire, construct, maintain, and operate facilities appropriate or related to the recreational use of water.

Sewage services are not currently available within the unincorporated portions of the Pass area.

Facilities and Service Areas

All four water districts provide similar services. The general service area boundaries are as follows:

- ***Beaumont - Cherry Valley Water District*** serves a relatively small area in the Beaumont-Cherry Valley area.
- ***San Gorgonio Pass Water Agency*** facilities are currently under construction. Water will be provided to retail water agencies in the area between Yucaipa and Banning.
- ***Cabazon County Water District*** is generally located along both sides of I-10 in the Cabazon area east of Banning.
- ***High Valley Water District*** is generally located south of the City of Banning.

The general services and function of each district are delineated in Table 9.AM.

Table 9.AM - Water District Services in the San Gorgonio Pass Area

	Agency Services and Functions				
	Water		Sewer		Service Area
Agency	Distribution	Storage	Collection	Treatment	Size
Beaumont - Cherry Valley Water District	Yes	Yes	No	No	10 sq. miles
High Valley Water District	Yes	Yes	No	No	900 parcels south of Banning
San Gorgonio Pass Water Agency	Yes (proposed)	Yes (proposed)	No	No	250 sq. miles
Cabazon County Water District	Yes	Yes	No	No	18 sq. miles

Service Criteria/Growth Factors

The various Districts use the following factors in determining the demands upon their systems.

- ***Beaumont - Cherry Valley Water District*** did not indicate a specific water consumption factor it uses to determine water demands of future development.

- ***High Valley Water District*** did not indicate a specific water consumption factor it uses to determine water demands of future development.

- ***San Gorgonio Pass Water Agency*** uses a factor of 0 .64 acre-feet/year connection, which includes agricultural users.

- ***Cabazon County Water District*** uses a factor of 500 gallons per day per residence. The District primarily services residential users.

Ability to Meet the Needs of Future Growth

Each of the water and sewer agencies serving the Pass area have or are projected to have adequate capacity to meet current and future demand. The current facilities and/or infrastructure of all the agencies are in good shape, except for the High Valley and Cabazon Water Districts. The High Valley Water District reports that its infrastructure is in poor condition, and that the District is in the process of upgrading its system. The Cabazon Water District indicated its facilities could be classified as good to very good except for the recent incorporation of another water agency. Due to this action, the District felt that the status of its facilities must be downgraded to "adequate."

9.4.4.2 Solid Waste

Solid waste collection and disposal services are provided by franchise haulers and the County of Riverside operates the sanitary landfills.

Authority

Under the general operating authority of the County, franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout the County. The County of Riverside also operates and maintains open and closed landfills used by the waste collection companies.

Facilities and Service Areas

Cherry Valley Sanitation and Cabazon Disposal provide solid waste collection services to unincorporated residents throughout the Pass area. The County of Riverside does not mandate solid waste collection. Therefore, residents have a choice as to whether or not they receive service. Collection service is provided on a weekly basis. Green waste is not collected separately.

The landfills used for disposal of solid waste generated in the Pass area include the following:

- Badlands Sanitary Landfill
- Lamb Canyon Sanitary Landfill
- Edom Hill Sanitary Landfill.

Service Criteria/Growth Factors

Capacity and use figures for the three facilities serving the Pass area are shown in Table 9.AN.

Table 9.AN - Landfills Serving the San Gorgonio Pass Area

Landfill Name	Landfill Data	
	Daily Usage	Projected Closure Date
Badlands Sanitary Landfill	1,400 tons	2010
Edom Hill Sanitary Landfill	1,200 tons	2003
Lamb Canyon Sanitary Landfill	1,900 tons	2006

Ability to Meet the Needs of Future Growth

The County has proposed the expansion of the Badlands and Lamb Canyon Sanitary Landfills. Table 9.AO identifies the proposed expansion capacity.

Table 9.AO - Proposed Expansion of Landfills Serving the San Gorgonio Area

Landfill	Proposed Landfill Expansions		
	Disposal Area	Annual Capacity	Life Expectancy
Badlands Sanitary Landfill	Current: 141 acres Additional area: 851 acres	Current: 720,897 cubic yards Additional capacity: 33 million cubic yards	Current:2010 Proposed: 2033
Lamb Canyon Sanitary Landfill	Current: 788 acres Additional area 354 acres	Current: 978,603 cubic yards. Additional capacity: 20,833 million cu. yds.	Current: 2006 Proposed: 2036

Based upon the proposed expansion plans adequate landfill capacity is available to meet project demand.

9.4.4.3 Recreation and Parks

A variety of parks exist within the unincorporated area of the County. These facilities are described in Section 4.7 of this report. However, parkland and park/recreational services are also provided within the Pass area by the cities of Banning, Beaumont, and Calimesa. These cities currently maintain 9 parks 50.15 acres. In addition, the City of Banning owns 160 acres of undeveloped parkland. Along with Riverside County, the Beaumont-Cherry Valley Recreation and Park District provides park facilities to the unincorporated portions of the Pass area.

Authority

The Beaumont-Cherry Valley Recreation and Park District is organized as a Recreation and Park District, and is authorized under the Public Resources Code to plan, adopt, lay out, plant, develop, and otherwise improve, extend, control, operate, and maintain a system of public parks, playgrounds, golf courses, beaches, trails, natural areas, ecological and open space preserves, parkways, scenic drives, boulevards, and other facilities for public recreation.

Facilities and Service Areas

The Beaumont-Cherry Valley Recreation and Park District encompasses approximately 72 square miles, and serves a population of about 18,000. District facilities within unincorporated areas are described n Section 4.7 of this Report.

Service Criteria/Growth Factors

The Beaumont-Cherry Valley Recreation and Park District uses a factor of 5.0 acres of park per 1,000 population to determine needs generated by new development. This is similar to at least several other cities in the region. The current ratio of developed District parkland to population is approximately four acres per 1,000 population.

Ability to Meet the Needs of Future Growth

The Beaumont-Cherry Valley Recreation and Park District indicated their facilities are at capacity, and that they may not be able to meet future demand. The District has the ability to collect revenue to build new parks and upgrade existing parks through developer fees, such as Quimby Fees, or obtaining grant funds. However, the District has not been able to come to an agreement with the City of Beaumont on Quimby Act fees. Therefore, Beaumont does not require the payment of park fees to the District.

9.4.4.4 Schools

The Banning and Beaumont Unified School District school districts provide K-12 educational services within the Pass area. Mt. San Jacinto Community College District provides advanced educational services.

Facilities and Service Areas

The number of schools and area served by each district are delineated in Table 9.AP.

Table 9.AP - School Facilities Serving the San Gorgonio Pass Area

	School Facilities			
District	Elementary Schools	Middle Schools	High Schools	Area Served
Banning Unified School District	3, Grades K-5, 1, Grades K-3	2, Grades 6-8	1, Grades 9-12	303 sq. miles encompassing City of Banning, Cabazon, Whitewater, Poppet Flats, and the Morongo Indian Reservation.
Beaumont Unified School District	4, Grades K-6	1, Grades 7-8	1, Grades 9-12	In and adjacent to Beaumont, Calimesa, and Cherry Valley

The Mt. San Jacinto Community College District enrollment is currently 5,860 full-time equivalent students. The District has a planned growth of at least 10 percent per year.

Service Criteria/Growth Factors

The projected increase in student population reported by the Banning and Beaumont Unified School Districts are presented in Table 9.AQ.

Ability to Meet the Needs of Future Growth

In general, school districts are lacking in revenue to expand existing school facilities s due to fiscal constraints. Adequate revenue can not be collected from the state nor from local developer fees to construct new facilities and upgrade existing ones.

Reductions in class room size for lower grades has further constrained existing school facilities. For a more detailed discussion on school construction funding, see Appendix B.

Table 9.AQ - Projected Student Enrollment in the San Gorgonio Pass Area

School District	Projected Student Increase			
	Elementary School	Middle School	High School	Overall Projected Change
Banning Unified School District	Current: 2,125 (1997/98) Projected: 1,961 (1997/98)* Percent Change: -8%*	Current: 1,022 (1997/98) Projected: 596 (1997/98)* Percent Change: -42%*	Current: 1,247 (1997/98) Projected: 1,140 (1997/98) Percent Change: +9%	Current 4,394 (1997/98) Projected: 3,697 (2002/03) Percent Change: +16%
Beaumont Unified School District	Information not provided	Information not provided	Information not provided	Information not provided

Note: * Projected enrollment combined K-8, which is not compatible with elementary and middle school grades.

9.4.4.5 Cemetery Districts

The Summit Cemetery District provides burial services to the Pass and Coachella Valley areas.

Authority

Cemetery Districts are formed under the Health and Safety Code and allow for the maintenance of a cemetery(s) or acquire and maintain a mausoleum, if a mausoleum was built prior to May 1, 1937.

Facilities and Service Areas

The Summit Cemetery District covers 305 square miles, extending from North Palm Springs to Calimesa. The cemeteries serving the Pass area and their locations are identified in Table 9.AR.

Table 9.AR - Cemetery Facilities Serving the San Gorgonio Pass Area

Cemeteries	Cemetery Facilities	
	Facility Location	Facility Size
San Gorgonio Memorial Park	2201 N. San Gorgonio, Banning	27 acres
Mt. View	1325 Egdar Ave., Beaumont	12 acres
Stuart Sunnyslope	40 S. Pennsylvania, Beaumont	16 acres

Service Criteria/Growth Factors

Future needs are available on the number of available spaces within District facilities. The District did not indicate a specific numerical factor upon which to base future need.

Ability to Meet the Needs of Future Growth

The District indicated they have more than adequate capacity to meet future demand.

9.4.4.6 Library Districts

Two library districts serve the Pass area, including the Banning Unified School District Library District and the Beaumont Library District.

Authority

Understate law, a governing body is established by law to administer the operation of the library district. The body is comprised of a board of trustees, appointed by the County Board of Supervisors. The specific powers of the trustees are as follows:

- Establish, equip, and maintain a public library for the dissemination of knowledge of the arts, sciences, and general literature.
- Undertake all actions necessary to accomplish the purposes of these provisions.

Facilities and Service Areas

The facilities and hours of operation for each library are identified in Table 9.AS.

Service Criteria/Growth Factors

Neither of the Districts indicated a specific numerical factor upon which to base future need. However, the Districts indicated their determination of need was based upon the perceived needs of their community, due to socio-economic status or local desires; i.e., internet access, rather than a particular ratio or factor.

Table 9.AS- Library Facilities Serving the San Gorgonio Pass Area

	Library Facilities and Service			
District	**Facility Location**	**Facility Condition**	**Population/Area Served**	**Hours**
Beaumont Library District	125 East Eighth Street, Beaumont	Originally built in 1912, added to in 1968. A portion of the building is not ADA compliant.	Approximately 25,000 people within the District's 60 sq. mile service area.	Mon./Wed.: 10 am to 5:30 pm. Tue./Thurs.: 10 am to 8 pm. Fri./Sat.: 10 am to 5 pm.
Banning Unified School District Library District	***Banning Library*** 21 West Nicolet Street, Banning.	Banning facility is 9,573 sq. ft. in size and in very good condition.	Approximately 24,000 people within the District's 306 sq. mile service area.	Mon./Wed.: 9 am to 7 pm. Tue./Thurs.: 9 am to 6 pm. Fri.: 9 am to 5 pm. Sat: 9 am to 2 pm
	Cabazon Library 50171 Ramona, Cabazon	Cabazon facility is 1,300 sq. ft. in size and is in need of improvement/ upgrade.		Wed. to Fri.: 10 am to 3 pm

Ability to Meet the Needs of Future Growth

The Districts reported that they have adequate capacity to meet future demand due either to the fact little growth is projected for the area (Beaumont) or the facility is in good condition (Banning).

9.4.4.7 Hospital Districts

The San Gorgonio Memorial Health Care District provides medical services to the San Gorgonio Pass area.

Authority

The specific powers of a Health Care Districts are to establish, maintain, and operate, or provide assistance in the operation of one or more health facilities or services, including but not limited to the following:

- Outpatient programs, services and facilities
- Retirement programs
- Chemical dependency programs, services and facilities
- Other health care programs, services and facilities
- Activities at any location inside and outside the district for the benefit of the district and people served by the district.
- Acquire, maintain, and operate ambulances, or ambulance services inside and outside the district.
- Establish a nurses' training school, or a child care facility or the benefit of employees of the hospital or residents of the district.

Facilities and Service Areas

The San Gorgonio Memorial Health Care District serves more than 50,000 area residents of Cabazon, Banning, Beaumont, Cherry Valley, and the Morongo Indian Reservation. The District operates a 68 bed acute care hospital, in which 52 beds are for acute care, and 16 are skilled nursing. The District is currently constructing a women's center that will have eight beds, and is adding a new CAT scan facility. The District also just completed a remodel of the hospital. The hospital offers the following patient care services:

- General medical-surgical care
- Intensive care
- Emergency and urgent care
- Obstetrics
- Surgery (inpatient and outpatient)
- Ambulatory services, including diagnostic imaging (X-ray, ultrasound, CT scan, nuclear medicine, mammography), transitional care, and specialized healthcare services for women.

Service Criteria/Growth Factors

Determining the need for hospital beds is based upon a variety of factors including ability to secure insurance and insurance company requirements for duration of stay. No specific criteria for determining future need was noted.

Ability to Meet the Needs of Future Growth

All bed space at the hospital is currently occupied. However, due to the recent upgrades mentioned above, such as the construction of the new women's center, the District believes it has adequate hospital capacity to meet future needs.

9.4.5 Fiscal Analysis Area 5: Mountains (REMAP) Area

The "REMAP" area generally covers the Santa Rosa Mountains and Anza-Borrego Desert areas, located between the Coachella Valley on the east and the San Jacinto and Temecula valleys on the west. No incorporated cities are located within this area. The most significant unincorporated communities are Idyllwild, Pine Cove, Anza, Aguanga, and Pinyon Pines.

The public services and facilities provided in this area are those provided by special districts and the County of Riverside. Some of the more significant districts serving REMAP are the Idyllwild, High Valley, Pinyon Pines, and Pine Cove Water Districts, which provide water service; the Hemet Unified School District, which provides grades K-12 educational services; and the Idyllwild Fire Protection District, which provides fire suppression and medical response services. An overall listing of the special district services provided in the REMAP area is provided in Table 9.AT.

Table 9.AT - Special District Services Provided in the REMAP Area

Agency	Type of Services Provided				
	Water	Sewer	Fire	Schools	Solid Waste
Idyllwild Water District	Yes	Yes			
Pinyon Pines Water District	Yes				
Pine Cove Water District	Yes				
Fern Valley Water District	Yes				
Waste Management					Yes
Hemet Unified School District				Yes	
Mt. San Jacinto Community College District				Yes	
Idyllwild Fire Protection Dist.			Yes		

9.4.5.1 Water and Sewer Districts

The principle water and sewer agencies in the REMAP area are Fern Valley Water District, Idyllwild Water District, Pine Cove Water District, and Pinyon Pines County Water District.

Authority

No sewer agencies exist in the REMAP area. Four water districts within REMAP provide local water service to area communities. Each of the Districts operate under specific legislative authority.

- ***Fern Valley Water District*** is a California Water District, which is authorized to acquire and operate works for the production, storage, transmission, and distribution of water for irrigation, domestic, industrial, and municipal purposes, as well as to acquire or operate any drainage or reclamation works related to the operation of authorized water services.

- ***Idyllwild Water District, Pine Cove Water District, and Pinyon Pines County Water District*** are organized as County Water Districts. In general, the powers of these Districts include:

  - Furnishing sufficient water throughout the District for any present or future beneficial use, which includes the storage and conservation of water and water rights, and the operation of water works.

  - Generating and selling electric power in connection with a water conservation project.

  - Acquiring, constructing, and operating facilities for the collection, treatment, and disposal of sewage and storm water.

  - Draining and reclaiming lands within the District.

  - Providing fire protection.

  - Acquiring, constructing, maintaining, and operating facilities appropriate or related to the recreational use of water.

Facilities and Service Areas

All four water districts serving the REMAP area provide similar services. The general service area boundaries are described below. Agency Facilities and services are summarized in Table 9.AU.

- ***Idyllwild Water District*** covers the majority of the community of Idyllwild.

- ***Fern Valley Water District*** extends northeast of the Idyllwild Water District.

- ***Pine Cove Water District*** extends northwest of the Idyllwild Water District.

- ***Pinyon Pines Water District*** generally serves the easterly edge of the REMAP area west of the City of La Quinta.

Table 9.AU - REMAP Water Districts and Services

Agency	Agency Facilities and Service		
	Water Use	**Source**	**Comments**
Idyllwild Water District	Average daily demand is 270,000 gallons.	19 wells	District also provides wastewater treatment with a 250,000 gallon per day capacity.
Fern Valley Water District	District did not indicate current usage rate, but projects a future demand of 238 acre-feet/year.	Surface water and 13 groundwater wells	
Pine Cove Water District	District did not indicate current usage rates.	15 wells	District has over 3 million gallons of potable water storage and produces nearly 40 million gallons from wells.
Pinyon Pines Water District	Estimate 1 acre-foot per household per year.	1 well	District has a capacity of 65,000 gallons

Service Criteria/Growth Factors

The Districts that identified factors in determining the demands upon their systems include Idyllwild Water District and Fern Valley Water District. Their criteria are as follows:

- ***Idyllwild Water District***

  Water: 130 gallons per day per connection/service.
  Sewer: 100 gallons per day per connection/service.

- ***Fern Valley Water District***

  Water: 158 gallons per day per connection/service.

These water consumption are considerably lower than those of other water districts in the County. This is likely due to the use of natural landscaping and wetter weather conditions in many areas, as well as the fact that many of the residences are second homes which are not occupied all year round.

Ability to Meet the Needs of Future Growth

Each of the Districts serve a limited number of residents and businesses. Idyllwild, Pine Cove, and Fern Valley Water Districts each indicated their systems were in very good condition.

9.4.5.2 Solid Waste

Solid waste collection and disposal services are provided by franchise haulers. The County of Riverside operates the sanitary landfills.

Authority

Under the general operating authority of the County, franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout the County. The County of Riverside also operates and maintains open and closed landfills used by the waste collection companies.

Facilities and Service Areas

The franchise waste hauler collecting solid waste within the REMAP area is Waste Management. Riverside County does not mandate solid waste collection. Therefore, residents have a choice as to whether or not they receive service. Collection service is provided on a weekly basis. Green waste is not collected separately. The sanitary landfill to which solid wastes collected in REMAP are taken is the Lamb Canyon Sanitary Landfill.

Service Criteria/Growth Factors

The Lamb Canyon Sanitary Landfill has a capacity of 978,603 cubic yards within a disposal area of 788 acres. At present and projected use rates, the landfill is projected to be open until the year 2006. However, there is a proposed expansion to increase the capacity of the landfill which would add 354 acres of disposal area, and increase the capacity of the landfill by 20,833,000 cubic yards. This would extend the life expectancy of Lamb Canyon Sanitary Landfill to the year 2036.

Ability to Meet the Needs of Future Growth

Growth within REMAP is generally limited due to topography, availability of infrastructure, and the remote nature of the area. As such, the existing landfill should not be significantly affected by future demand. With the projected expansion of the Lamb Canyon Sanitary Landfill, there will be sufficient capacity to meet the solid waste disposal needs of REMAP and other areas served by the Lamb Canyon facility.

9.4.5.3 Schools

The Hemet Unified School District provides K-12 educational services. Advanced educational services are provided by the Mt. San Jacinto Community College District.

Facilities and Service Areas

The Hemet Unified School District generally extends from the west side of the City of Hemet to east of Idyllwild, and south to the San Diego County line. Within the District are 10 elementary schools (seven with grades K-5, and three with grades K-8), three middle schools (grades 6-8), two high schools (grades 9-12), and one continuation high school.

The Mt. San Jacinto Community College District covers most of the REMAP area, except for a small portion in the southeast corner of REMAP.

Service Criteria/Growth Factors

The student generation factors used by the Hemet Unified School District to estimate the impacts of new development are set forth in Table 9.AV. Projected increases in student enrollment, as reported by the Hemet Unified School District, are identified in Table 9.AW.

Table 9.AV - Student Generation Factors for the REMAP Area
(In students per household)

Housing Type	Grades			
	K - 5	6 - 8	9 - 12	All Students
Single Family	0.316	0.087	0.203	0.606
Multiple Family	0.194	0.028	0.056	0.278

Table 9.AW - Projected Student Enrollments for the Hemet Unified School District

Projected Student Enrollment			
Elementary School	**Middle School**	**High School**	**Total**
Current: 8,750 (Grades K-6, 1998) Projected: 9,462 (Grades K-6, 2003) Percent Change: +8%	Current: 2,467 Grades 7-8, 1998) Projected: 3,023 (Grades 7-8, 2003) Percentage Change: +22%	Current: 4,133 (Grades 9-12, 1998) Projected: 5,067 (Grades 9-12, 2003) Percent Change: +23%	Current: 15,350 (1998) Projected: 17,552 (2003) Percent Change: +14%

The Mt. San Jacinto Community College District enrollment is currently 5,860 full-time equivalent students. The District has a planned growth of at least 10 percent per year.

Ability to Meet Future Demand

The Hemet Unified School District has substantially exceeded its capacity, as calculated by the Education Code, for the elementary and middle school grades. However, the high school grades are under the identified capacity, as noted in Table 9.AX.

In general, school districts are lacking in revenue to expand existing school facilities s due to fiscal constraints. Adequate revenue can not be collected from the state nor from local developer fees to construct new facilities and upgrade existing ones. Reductions in class room size for lower grades has further constrained existing school facilities. For a more detailed discussion on school construction funding, see Appendix B.

Table 9.AX - School Capacity within the Hemet Unified School District

	Existing School Facilities Capacity and Enrollment		
Grade Level	**1998-99 Capacity**	**1998-99 Enrollment**	**Excess Capacity (Shortage)**
Elementary School (Grades K-6)	5,751	8,753	(3,002)
Middle School (Grades 7-8)	1,674	2,503	(829)
High School (Grades 9-12)	5,076	4,395	681
Total	***12,501***	***15,651***	***(3,150)***

9.4.5.4 Fire Protection District

The Idyllwild Fire Protection District provides fire protection services within the REMAP area.

Authority

Under the provisions of the Health and Safety Code fire protection districts have the ability to provide the following services:

- Fire protection services
- Rescue services
- Emergency medical services
- Hazardous material emergency response services
- Ambulance services.

Facilities and Service Areas

The Idyllwild Fire Protection District provides service to the following communities and has the following facilities

- ***Fire Protection***. The District has one (1) fire station, and is responsible for responding to fires within the Fern Valley and Idyllwild areas, covering a five square mile area. The District has two (2) fire engines and a mutual aid agreement with the Riverside County Fire Department/California Department of Forestry and Riverside County Emergency Medical Services. The District is staffed by eight (8) full-time fire personnel and 16 "paid call" fire personnel. Two (2) persons are on duty 24 hours per day and two (2) administrative staff during working hours.

- ***Ambulance***. Ambulance service is provided to the Pine Cove and Idyllwild areas through a cooperative agreement with the County Fire Department to provide service to Lake Fillmore. The District has three ambulances.

- ***Hazard Abatement*** The District has a joint hazard abatement program with the Riverside County Fire Department and U.S. Forest Service.

Service Criteria/Growth Factors

The Idyllwild Fire Protection District does not maintain specific factors to measure the impacts of new growth.

Ability to Meet the Needs of Future Growth

The District is located within a slow growing area, and reports that it is not currently at its service capacity. The District further reports that it does not expect to reach or exceed its capacity in the future.

9.4.6 Fiscal Analysis Area 6: Coachella Valley

The Coachella Valley is a desert region generally bounded by the Santa Rosa Mountains on the west and south, and the San Bernardino County line on the north. Within this area are the cities of Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage. Unincorporated communities include Bermuda Dunes, Garnet, Mecca, Thermal, Thousand Palms, and others. City services provided within the Coachella Valley are summarized in Table 9.AY.

Table 9.AY - City Services Provided within the Coachella Valley

	Type of City Services Provided								
Agency	Public Works	Parks and Recreation	Planning and Building	Library	Refuse Collection	Water And/or Sewer	Police	Fire	Other
Cathedral City	Yes	Yes	Yes	Contract	Contract		Yes	Yes	Animal Control
Coachella	Yes	Yes	Yes		Contract	Yes	Yes	Contract	Animal Control, Senior & Youth Center
Desert Hot Springs	Yes	Yes	Yes	Contract	Contract		Yes	Contract	Animal Control, Senior Center
Indian Wells	Yes		Yes		Contract		Contract	Contract	Contract Animal Control
Indio	Yes	Contract	Yes		Contract	Water	Yes	Contract	Animal Control, Senior Center
La Quinta	Yes	Yes	Yes	Contract	Contract		Contract	Contract	Animal Control, Senior Center
Palm Desert	Yes	Yes	Yes	Contract	Yes		Contract	Contract	Senior Center
Palm Springs	Yes	Yes	Yes	Yes	Contract	Sewer	Yes	Yes	Animal Control, Airport
Rancho Mirage	Yes	Yes	Yes	Yes	Contract		Contract	Contract	Contract Animal Control and Senior Centers

Some of the public services and facilities provided in the Coachella Valley are provided by special districts. Some of the more significant districts in this area are the Coachella Valley Water District (CVWD), which provides water and sewer service; Coachella Valley Recreation and Park District, which provides parks and open space uses, and covers an additional area beyond the Coachella Valley; and, the Desert Sands Unified School District, which provides K-12 educational services. Table 9.AZ summarizes special district services provided in the Coachella Valley.

Table 9.AZ - Special District Services in the Coachella Valley

	Type of Services Provided						
Agency	Water	Sewer	Schools	Park and Recreation	Solid Waste	Health Care	Other
Coachella Valley Water District	Yes	Yes					
Valley Sanitary District		Yes					
Desert Water Agency	Yes	Yes					
Mission Springs Water District	Yes	Yes					
Desert Valley Disposal					Yes		
Waste Managt.					Yes		
Coachella Valley Recreation and Park District				Yes			
Desert Sands Unified School District			Yes				
Palm Springs Unified School District			Yes				
Coachella Valley Unified School District			Yes				
Desert Comm. College			Yes				
Mt. San Jacinto Comm. College District			Yes				
Coachella Valley Resource District							Resource Conservation
Palm Springs Cemetery District							Cemetery

	Type of Services Provided						
Agency	Water	Sewer	Schools	Park and Recreation	Solid Waste	Health Care	Other
Coachella Valley Public Cemetery District							Cemetery
Summit Cemetery District							Cemetery
Coachella Valley Mosquito and Vector Control District							Vector Control
Imperial Irrigation District							Irrigation and electricity
Southern Coachella Valley Comm. Services District							Supplementary sheriff and refuse collection
Desert Health Care District						Yes	

9.4.6.1 Water and Sewer Districts

The principal water and sewer agencies serving the Coachella Valley are the Coachella Valley Water District (CVWD), Valley Sanitary District, and the Desert Water Agency. In addition, a number of other small water agencies having less than 200 connections serve portions of the Coachella Valley. These small agencies are identified in Appendix C.

Authority

Each of the Districts listed above operate under specific legislative authority. CVWD and Mission Springs Water District are organized as County Water Districts with authority granted under the California Water Code. In general, the powers of a County Water District include the following:

- Furnishing sufficient water throughout the District for any present or future beneficial use, which includes the storage and conservation of water and water rights, and the operation of water works.
- Generate and sell electric power in connection with a water conservation project.
- Acquire, construct, and operate facilities for the collection, treatment, and disposal of sewage, waste and storm water.
- Drain and reclaim lands within the District.

- Provide fire protection.

- Acquire, construct, maintain, and operate facilities appropriate or related to the recreational use of water.

The Valley Sanitary District provides wastewater collection and treatment to areas in and around the City of Indio. The District has a variety of specific powers under the Health and Safety Code that include:

- Sewers, drains, septic tanks, and sewerage collection and disposal systems, outfall treatment works, and other sanitary disposal systems;

- Garbage dump sites, garbage collection, and disposal systems;

- Storm water drains and storm water collection, outfall, and disposal systems, and water reclamation and distribution systems.

- Water recycling and distribution systems.

The Desert Water Agency provides water primarily in the Palm Springs area, and was created by the Legislature (Act No. 9097) to be a direct contractor to provide State Water Project water to customers. The District, through this act, is provided with all of the powers necessary to provide water to their customers.

Facilities and Service Areas

The three water districts serving the Coachella Valley provide similar services. The general service area boundaries these districts and the Valley Sanitary District are as follows.

- ***CVWD*** stretches from north of Palm Springs through all the cities in the Coachella Valley, except Desert Hot Springs. The southerly terminus of the District is on the east and west side of the Salton Sea, including the community of Salton City. CVWD's service area includes the Coachella Valley and parts of the desert area to the east.

- ***Mission Springs Water District*** includes the City of Desert Hot Springs and a small portion of Palm Springs, along with the communities of North Palm Springs, West Garnet, Desert City, Painted Hills, and other individual development projects.

- ***Desert Water Agency*** provides water primarily in the Palm Springs area.

- ***Valley Sanitary District*** provides service in and around the City of Indio.

The general services and function of each of these districts is delineated in Table 9.BA.

Table 9.BA - Water and Sewer Services in the Coachella Valley

Agency	Agency Services and Functions			
	Water		Sewer	
	Distribution	Storage	Collection	Treatment
CVWD	Yes	Yes	Yes	Yes, 6 plants
Mission Springs Water District	Yes	Yes	Yes	Yes, 2 plants
Valley Sanitary District	No	No	Yes	Yes, 1 plant
Desert Water Agency	Yes	Yes	Yes	No

Service Criteria/Growth Factors

Table 9.BB presents the factors used by various water districts in determining the demands upon their systems (Table 9.BB).

The sewer usage factors are generally within the range used and/or estimated by other districts in the County. However, the CVWD water consumption factor is substantially higher than other agencies. For example, the Metropolitan Water District of Southern California estimates a per unit water use of ½ acre per year. This equates to approximately 445 gallons per unit per day. The higher factor used by CVWD reflects local climatic conditions, and the need for large amounts of water for landscape irrigation.

Table 9.BB - Water Districts in the Coachella Valley

Agency	Agency Factors by Service		
	Water	Sewer	Comments
CVWD	2,592 gallons per day per residence	252 gallons per day per residence	Based upon a District study it is estimated that 1.8 gallons per minute are uses.
Mission Springs Water District	Criteria not identified	Criteria not identified	
Valley Sanitary Dist.	N/A	300 gallons per day per residence	
Desert Water Agency	Maximum Day Demands	N/A	No specific factor was identified.

Ability to Meet the Needs of Future Growth

Each of the water and sewer districts serving the Coachella Valley report that they have the current capacity to meet demand, as well as adequate capability to expand to meet projected demand. The districts reported that their current facilities and/or infrastructure are in very good shape.

CVWD and the Desert Water Agency were surveyed to obtain a general representation of conservation practices due to their size and scope of operations within this EDZ. Their conservation measures were of two types.

- ***Philosophy***. What approach does the district undertake to promote or attempt to effectuate water conservation; and

- ***Regulatory requirements***. What specific approaches or practices are undertaken to achieve water conservation.

Both districts comply with the California Urban Water Conservation Council, Best Management Practices (BMPs). These practices include 14 different programs intended to help districts promote and increase water conservation (see Section 9.4.1.1 for a listing of the programs). The Desert Water Agency is one of the signatories to the program and its associated BMPs. CVWD is not signatory to the Program due to philosophical differences, but still implements the programs, sometimes using stricter criteria.

The districts generally view the 14 BMPs as both philosophical ideals and regulatory programs to achieve water conservation. Neither district has a specific program to reduce water use. However, both districts undertake various actions to effectuate water conservation practices, including:

- Adopting an ordinance to prohibit water waste, such as that caused by broken irrigation systems or the operation of water recycling plants (Desert Water Agency).

- Contact property owner through correspondence or a site visit, if water usage seems excessive (CVWD).

- Utilize a lower or more restrictive evapo-transpiration parameter than the adopted BMPs for water use (CVWD).

- Adopt a water conservation program to undertake water audits and public school education programs (Desert Water Agency).

9.4.6.2 Solid Waste

Solid waste collection and disposal services are provided by franchise haulers. Riverside County operates the sanitary landfills. Although the Coachella Valley Community Services District provides solid waste collection, it uses the landfills and one of the haulers described below.

Authority

Under the general operating authority of the County, franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout the County. The County of Riverside also operates and maintains open and closed landfills used by the waste collection companies.

Facilities and Service Areas

Waste Management provides solid waste collection services to unincorporated residents throughout the Coachella Valley. Riverside County does not mandate solid waste collection. Therefore, residents have a choice as to whether or not they receive service. Waste Management provides serve to the unincorporated areas of the County in the Coachella Valley. Collection service is provided on a weekly basis. Green waste is not collected separately.

The landfill to which solid wastes collection in the Coachella Valley are taken is the Edom Hill facility located north of Cathedral City. It is estimated the landfill has capacity available until the year 2003. This figure may vary depending upon recycling efforts and development activity.

Service Criteria/Growth Factors

The Edom Hill facility accepts approximately 1,200 tons of solid waste daily, and operates 309 days per year. As late as the Spring of1995, the facility was estimated to have adequate capacity until the year 2006. However, by July 1999, the life expectancy of the Edom Hill Sanitary Landfill was reduced to 2003.

Ability to Meet the Needs of Future Growth

In addition to the Edom Hill Sanitary Landfill, the County also has the use of Lamb Canyon Sanitary Landfill, the Badlands Sanitary Landfill, and the El Sobrante Sanitary Landfill to provide additional capacity. Eventually, the Eagle Mountain Landfill should also be available, but its operational date is uncertain. Riverside County expects the Coachella/Indio Joint Powers Authority solid waste transfer facility to be open in the spring of 2000 for use in the eastern Coachella Valley, with a maximum transfer capacity of 1,100 tons per day (tpd). The current peak days at the landfill are close to 1,800 tpd, with averages ranging between 1,100 and 1,200 tpd.

Due to the broad availability of disposal sites in other areas of the County, and the fact that, with implementation of proposed expansions of these facilities, there will be adequate capacity to serve areas west of the Coachella Valley into the 2030's, adequate capacity is expected to be available to meet demands within the Coachella Valley through about 2020.

9.4.6.3 Recreation and Parks

Within the Coachella Valley, parks are provided by a variety of agencies including cities, Riverside County, and the Coachella Valley Recreation and Park District. Parks maintained by the County and the Coachella Valley Recreation and Park District are described in Section 4.7 of this report. Cities within the Coachella Valley currently maintain 44 parks, encompassing 433 acres. In addition, the City of La Quinta owns 330 acres of natural park land.

In addition to the 710-acre Lake Cahuilla County Regional Park and the undeveloped 208 acre park area known as the "Fish Traps," the Coachella Valley Recreation and Park District operates a number of park and recreational services throughout the Coachella Valley.

Authority

Recreation and Park Districts, such as the Coachella Valley Recreation and Park District, are authorized under the California Public Resources Code to plan, adopt, lay out, plant, develop, and otherwise improve, extend, control, operate, and maintain a system of public parks, playgrounds, golf courses, beaches, trails, natural areas, ecological and open space preserves, parkways, scenic drives, boulevards, and other facilities for public recreation.

Facilities and Service Areas

The Coachella Valley Recreation and Park District covers the Coachella Valley and parts of the desert areas to the east. It encompasses 1,836 square miles, and serves an estimated population of 150,000 permanent residents and up to 250,000 winter residents and visitors. The District's facilities include 28 night lighted parks, 2 community centers, 6 small community centers, and 6 swimming pools. Half of the community centers are located within parks. The District also uses Lighting and Landscape Maintenance Districts (L&LMDs) to assess property owners for the cost of illuminating street lights.

Service Criteria/Growth Factors

The District uses a factor of five (5) acres per 1,000 population. This factor is similar to at least several other cities in the Coachella Valley that identified their parkland criteria.

Ability to Meet the Needs of Future Growth

The Coachella Valley Recreation and Park District indicated their facilities are currently at capacity, and that they will not be adequate to meet future demand. The District has the ability to collect revenue to build new parks and upgrade existing parks through developer fees or obtaining grant funds. However, the District has a limited ability to make up for any current service level deficiencies since their tax revenue is fixed and developer fees can only be collected in an amount equal to the cost of new facilities, but not to alleviate past deficiencies.

9.4.6.4 Schools

The Desert Sands, Palm Springs, and Coachella Valley Unified School Districts provide K-12 educational services within the Coachella Valley. Desert Community College is the primary provider of advanced educational services. However, the Mt. San Jacinto Community College District has a portion of its boundaries within the Coachella Valley. Information on Mt. San Jacinto Community College is contained in Section 9.4.4.4.

Facilities and Service Areas

School facilities provided within the Coachella Valley are summarized in Table 9.BC.

Table 9.BC - School Facilities Serving the Coachella Valley

	School District Services			
District	**Elementary Schools**	**Middle Schools**	**High Schools**	**Area Served**
Desert Sands Unified School District	15, Grades K-6	5, Grades 7-8	3, Grades 9-12	In and around the cities of Rancho Mirage, Indian Wells, Palm Desert, La Quinta, and Indian Wells.
Palm Springs Unified School District	15, Grades K-5	4, Grades 6-8	3, Grades 9-12	Cities of Palm Springs, Cathedral City, Desert Hot Springs, Rancho Mirage, and the community of Thousand Palms.
Coachella Valley Unified School District	12, Grades K-6; 4, Grades K-8; 1, Grades 4-8	1, Grades 7-8	2, Grades 9-12	Cities of Indio and Coachella; lower Coachella Valley

Service Criteria/Growth Factors

The Desert Sands Unified School District was the only Coachella Valley school district to report student generation factors. These are summarized in Table 9.BD.

The Desert Sands Unified School District utilizes these figures to determine a reasonable "future build-out enrollment that may be expected based upon all vacant land being development under current zoning conditions."

Projected student enrollments reported by school districts serving the Coachella Valley are summarized in Table 9.BE.

Table 9.BD - Student Generation Factors used in the Coachella Valley (In students per household)

Housing Type	Grades			
	K - 6	7 - 8	9 - 12	All Students
Single Family Detached	0.294	0.084	0.173	0.551
Multiple Family	0.022	0.006	0.013	0.041
Apartments	0.201	0.041	0.073	0.315

Table 9.BE - Projected Student Enrollments in the Coachella Valley

School District	Projected Student Increase			
	Elementary School	Middle School	High School	Overall Projected Change
Desert Sands Unified School District	Current: 11,982 (1998/99) Projected: 13,642 (2003/04) Percent Change: +14%	Current: 3,181 (1998/99) Projected: 3,832 (2003/04) Percent Change: +20%	Current: 6,366 (1998/99) Projected: 7,246 (2003/04) Percent Change: +14%	Current: 21,529 (1998/99) Projected: 24,719 (2003/04) Percent Change: +15%
Palm Springs Unified School District	Current: 9,637 (1998/99) Projected: 10,179 (2003/04) Percent Change: +6%	Current: 4,037 (1998/99) Projected: 5,601 (2003/04) Percentage Change: +39%	Current: 4,859 (1998/99) Projected: 5,856 (2003/04) Percent Change: +20.5%	Current: 18,533 (1998/99) Projected: 21,606 (2003/04) Percent Change: +17%

Coachella Valley Unified School District	Current: 8,186 (1999) Projected: 8,889 (2004) Percent Change: +9%	Current: 839 (1999) Projected: 911 (2004) Percent Change: +9%	Current: 2953 (1999) Projected: 3206 (2004) Percent Change: +9%	Current: 11,978 (1999) Projected: 13,006 (2004) Percentage Change: +9%

College of the Desert enrollment is currently 8,300 full-time students (1999). The District has a projected five (5) year enrollment growth of 9,100 or approximately a 10 percent increase.

Ability to Meet the Needs of Future Growth

In general, school districts are lacking in revenue to expand existing school facilities s due to fiscal constraints. Adequate revenue can not be collected from the state nor from local developer fees to construct new facilities and upgrade existing ones. Reductions in class room size for lower grades has further constrained existing school facilities. For a more detailed discussion on school construction funding, see Appendix B.

9.4.6.5 Resource Conservation Districts

The Coachella Valley Resource Conservation District provides a variety of services within the Coachella Valley, including soil, water, and wildlife conservation for agriculture and urban areas.

Authority

Resource Conservation Districts are governed by the provisions in the Public Resources Code, Sections 9000 to 9978. A resource conservation district may be formed to provide the following services:

- Control of runoff.
- Prevention or control of soil erosion
- Development and distribution of water.
- Improvement of land capabilities.

Facilities and Service Areas

The Coachella Valley Resource Conservation District operates out of a 14,000 square foot building in the City of Indio. The District's service area covers a 2,400 square mile area, extending from the area west of Whitewater, along the I-10 Freeway to Eagle Mountain, about 36 miles east of Indio. As such, the District provides service to areas in the Coachella Valley and parts of desert to the east. The District was originally formed to help agricultural uses and "outdoor resources."

The District's operation primarily involves direct assistance, research, or monitoring of experiments. As such, the Districts facilities are limited, but the amount of involvement "in the field" can be extensive.

Service Criteria/Growth Factors

The Coachella Valley Resource Conservation District does not maintain a specific factor or ratio upon which they estimate impacts from new development.

Ability to Meet the Needs of Future Growth

The Coachella Valley Resource Conservation District indicated its current facilities are adequately sized to meet future demand, but noted that it had inadequate funding to maintain desired staffing levels. The District receives revenue from property taxes, rental income, interest, and governmental agencies, the latter of which represent the most significant portion of the budget.

9.4.6.6 Cemeteries

The cemetery districts that provide burial services within the Coachella Valley include the Summit Cemetery District, Palm Springs Cemetery District and the Coachella Valley Public Cemetery District.

Authority

Cemetery Districts are formed under the Health and Safety Code and allow for the maintenance of a cemetery(s) or acquire and maintain a mausoleum, if a mausoleum was built prior to May 1, 1937.

Facilities and Service Areas

The Coachella Valley Public Cemetery District provides service to the Coachella Valley and portions of the desert areas to the east. The Summit Cemetery District provides service primarily within the San Gorgonio Pass area, 5 but also to parts of the Coachella Valley. Both the Palm Springs and Coachella Districts serve unincorporated and incorporated residents. Cemetery facilities serving the Coachella Valley are identified in Table 9.BF.

The Coachella Valley Public Cemetery District covers the easterly end of the Coachella Valley, east to near the Blythe State Prison. The Summit Cemetery District covers the northerly portion of the Coachella Valley, and extends to Calimesa in the San Gorgonio Pass area.

Service Criteria/Growth Factors

Future needs are available on the number of available spaces within District facilities. The Districts did not indicate a specific numerical factor upon which to base future need. However, the Coachella Valley Public Cemetery District did note that they evaluate the population and the number of burials.

Table 9.BF - Public Cemeteries Serving the Coachella Valley

	Facilities	
Districts	Facility Location	Facility Size
Summit Cemetery District	Three facilities:	
	San Gorgonio Memorial Park, 2201 N. San Gorgonio, Banning;	27 acres
	Mt. View, 1325 Egdar Ave., Beaumont; Stuart	12 acres
	Sunnyslope, 40 S. Pennsylvania, Beaumont	16 acres
Coachella Valley Public Cemetery District	Intersection of Avenue 52nd and Jackson Street, Coachella	60 acres
Palm Springs Cemetery District	Two facilities:	
	Welwood Murray Cemetery, 471 Chino, Palm Springs; and,	1.5 acres
	Desert Memorial Park, 69920 E. Ramon, Cathedral City	100 acres

Ability to Meet the Needs of Future Growth

Each of the Districts indicated they have adequate ability to meet current and future burial needs.

9.4.6.7 Mosquito & Vector Control Districts

The Coachella Valley Mosquito and Vector Control District provides for the control of insects and related measures within the Coachella Valley.

Authority

Mosquito and Vector Control Districts operate under the authority of the California Health and Safety Code and have the following powers:

- The extermination of mosquitos, flies or other insects either inside or outside the district.
- The extermination of rates; and
- The undertaking or contracting for algae research, control, and monitoring projects.

Facilities and Service Areas

The Coachella Valley Mosquito and Vector Control District offices are located on five acres in Thermal. The District provides service to areas in the Coachella Valley and desert areas to the east, extending from Whitewater on the west to Chiriaco Summit on the east, and the San Bernardino County line on the north to the San Diego/Imperial County lines on the south. The District has plans to construct a new facility on nine acres in Indio.

Service Criteria/Growth Factors

The Coachella Valley Mosquito and Vector Control District did not note a specific factor or ratio upon which they estimate impacts from new development. Workloads are continually evaluated by the District to determine increase service needs which may be due to many reasons, including changes in land use.

Ability to Meet the Needs of Future Growth

The Coachella Valley Mosquito and Vector Control District uses tax revenue, and reports that is able to provide adequate services for current and projected needs.

9.4.6.8 Irrigation Districts

The Imperial Irrigation District (IID) provides irrigation water and electrical service within the Coachella Valley.

Authority

IID provides electrical service to the southerly end of the Coachella Valley. The District operates under specific legislative mandate, and is authorized to undertake the following services:

- Provide water for beneficial purposes.
- Provide any and all drainage made necessary by the irrigation provided by the district.
- Purchase or lease electric power; acquire, operate, and control plants for the generation and transmission of electric power.
- Acquire and operate an airport or aviation school.
- Provide, maintain, and operate flood control works.
- Reclaim wastewater for beneficial uses.
- Provide sewage disposal.
- Construct, maintain, and operate recreational facilities in connection with dams, reservoirs, or other works owned and constructed by the district.

Facilities and Service Areas

IID provides irrigation water and electricity. Services provided by IID to the Coachella Valley are limited to electricity. Within Riverside County, IID serves approximately 47,000 residential, commercial, and, industrial customers. IID provides service to the southern portion of the Coachella Valley.

Service Criteria/Growth Factors

IID did not provide any specific factors which are used to determine impacts of new development on the services they provide in the Coachella Valley.

Ability to Meet the Needs of Future Growth

IID indicated it can provide adequate service to meet an unlimited number of customers within its Riverside County service area.

9.4.6.9 Community Services Districts

The Southern Coachella Valley Community Services District provides various public services to the Coachella Valley.

Authority

Community services districts have the authority under State law to provide the following services.

- Supply inhabitants of the district with water for domestic, irrigation, sanitation, industrial, fire protection, and recreation use.
- Collect, treat, or dispose of sewage and storm water.
- Collect or dispose solid waste.
- Protect against fire.
- Provide public recreation and parks, playgrounds, golf courses, and related features.
- Provide street lighting.
- Provide mosquito abatement.
- Provide police protection and other security services.
- Provide library buildings and library services.
- Provide street improvement, maintenance, and repair.
- Construct and improve bridges, culverts, curbs, gutters, and drains.
- Convert overhead electric and communications facilities to underground locations when such facilities are owned and operated by a "public utility" or "public agency", subject to consent of the public utility or public agency responsible for such facilities.
- Contract for ambulance service.
- Provide and maintain public airports and landing places for aerial traffic.

- Provide transportation services.
- Abate graffiti.
- Construct, maintain, and operate flood control facilities.
- Establish improvement districts.

Facilities and Service Areas

The Southern Coachella Valley Community Services District contracts for supplemental refuse collection and four additional sheriff deputies within its service area. The additional deputies provide patrol, crime prevention, graffiti abatement, and school educational programs between the hours of 7:00 a.m. and 1:00 a.m., with two deputies on each shift during that period. The District also provides supplemental refuse collection on a regular basis for roadway debris. The District will soon begin mandatory solid waste collection.

The District covers the area generally from Thermal south of Indio to the Imperial County line.

Service Criteria/Growth Factors

No specific factors were provided by the Southern Coachella Valley Community Services District which are used to determine the impacts of new development on the services provided by the District.

Ability to Meet the Needs of Future Growth

The Southern Coachella Valley Community Services District did not indicate its ability or inability to support future growth within its boundaries.

9.4.6.10 Health Care Districts

The Desert Healthcare District operates within the Coachella Valley, but does not provide facilities or direct services. The District provides grant money to not-for-profit health care agencies.

9.4.7 Fiscal Analysis Area 7: Eastern Desert and the Palo Verde Valley

This area encompasses lands east of the Coachella Valley to the Colorado River, including the Palo Verde Valley. This is a vast area, which is largely in public ownership. The only City within this area is Blythe. The City of Blythe provides public works, parks and recreation, planning and building, refuse collection, water and sewer, police and fire protection, and animal control services.

Outside of the City and federal lands, public services and facilities are provided by the County and special districts. Some of the more significant special districts in the eastern desert and Palo Verde Valley area are the Palo Verde Health Care District, which provides hospital and health care service; Palo Verde Irrigation District, providing water for farming operations; the Palo Verde Unified School District, which provides K-12 educational services; and the Palo Verde Community College District, which provides junior college curriculum.

A summary of public services and facilities provided within the eastern desert and Palo Verde Valley area is presented in Table 9.BG.

Table BG - Services Provided to the Eastern Desert and Palo Verde Valley Area

Agency	Type of Services Provided							
	Water	Sewer	Library	Schools	Parks and Recreation	Solid Waste	Health Care	Other
City of Blythe	Yes	Yes						
Palo Verde Disposal						Yes		
Coachella Valley Rec. & Park Dist.					Yes			
Desert Center Unified School District				Yes				
Palo Verde Unified School District				Yes				
Palo Verde Comm. College				Yes				
Palo Verde Resource Conserv. District								Resource Conservation
Coachella Valley Public Cemetery District								Cemetery
Palo Verde Cemetery District								Cemetery

Agency	Type of Services Provided							
	Water	Sewer	Library	Schools	Parks and Recreation	Solid Waste	Health Care	Other
Palo Verde Library District			Yes					
Coachella Valley Mosquito & Vector Control District								Vector control
Palo Verde Irrigation District								Irrigation
Palo Verde Health Care							Yes	

9.4.7.1 Water and Sewer Service

No municipal or county water districts provide domestic water or sewer within unincorporated areas; however, the City of Blythe does provide water and sewer services for both the City some surrounding unincorporated areas.

Facilities and Service Areas

The City of Blythe currently provides domestic and wastewater collection and treatment for residents within the City limits. The City is also considering taking over several County Service Areas (CSAs), Nos. 122 and 162, that are located in the unincorporated area of the County to provide water and sewer services. These CSAs are located in Ripley and Mesa Verde Colonias.

The City currently operates one (1) secondary treatment plant with a capacity of 2.4 million gallons per day (mgd). Domestic water is obtained by 18 wells located in four (4) geographically separate water systems.

With the potential addition of areas outside of the City limits, the City of Blythe may start to be perceived as a regional water purveyor and wastewater treatment agency. At present a number of conflicts exist between the use of on-site wells and individual septic systems. For additional development to occur within unincorporated areas, a more centralized water and/or wastewater collection system will need to be employed.

Ability to Meet the Needs of Future Growth

The City facilities are currently adequate to meet current demand. However, to meet future growth in the City and surrounding unincorporated areas, additional facilities will be needed. The City is in the process of analyzing the needs and projecting potential demand using grant funding.

9.4.7.2 Solid Waste

Solid waste collection and disposal services are provided by franchise haulers. Riverside County operates the sanitary landfills to which solid waste is taken.

Authority

Under the general operating authority of the County, franchise solid waste collection companies have been permitted to collect commercial and residential waste throughout the County. Riverside County also operates and maintains open and closed landfills used by the waste collection companies.

Facilities and Service Areas

Palo Verde Disposal provides solid waste collection services to unincorporated residents where it is available in the eastern desert and Palo Verde Valley area. Riverside County does not mandate solid waste collection. Therefore, residents have a choice as to whether or not they receive service. Collection service is provided on a weekly basis. Green waste is not collected separately.

The landfill to which solid wastes generated in the eastern desert and Palo Verde Valley area are taken for disposal is primarily the Blythe Sanitary Landfill facility located north of the City of Blythe. The Blythe Sanitary Landfill facility accepts approximately 260 tons of solid waste daily and operates 309 days per year. It is estimated the landfill has capacity available through the year 2033.

Ability to Meet the Needs of Future Growth

Due to the significant number of years remaining for the operation of the Landfill it should have adequate capacity to meet future demand. The amount of solid waste brought to the facility is less than one-quarter that brought to the Edom Hill facility in the Coachella Valley.

9.4.7.3 Recreation and Parks

Parks and recreational services within the eastern desert and Palo Verde Valley area are provided by a variety of agencies including the City of Blythe, Riverside County, and the Coachella Valley Recreation and Park District. The County maintains six parks totaling 374 acres within the Palo Verde Valley area, primarily along the Colorado River. Facilities maintained by Riverside County and the Coachella Valley Recreation and Park District are described in Section 4.7.

Authority

The Coachella Valley Recreation and Park District is authorized under the California Public Resources Code to plan, adopt, lay out, plant, develop, and otherwise improve, extend, control, operate, and maintain a system of public parks, playgrounds, golf courses, beaches, trails, natural areas, ecological and open space preserves, parkways, scenic drives, boulevards, and other facilities for public recreation.

Facilities and Service Areas

A portion of the Coachella Valley Recreation and Park District lies within the desert areas between the Coachella and Palo Verde Valleys. The District encompasses 1,836 square miles and serves an estimated population of 150,000 permanent residents and up to 250,000 winter residents and visitors, primarily within the Coachella Valley.

Service Criteria/Growth Factors

The District uses a factor of 5.0 acres per 1,000 population.

Ability to Meet the Needs of Future Growth

As noted in Section 9.6.4.3, the Coachella Valley Recreation and Park District indicated their facilities are at capacity, and that they will not be adequate to meet future demand. The District has the ability to collect revenue to build new parks and upgrade existing parks through developer fees or obtaining grant funds. However, the District has a limited ability to make up for any current service level deficiencies since their tax revenue is fixed, and developer fees can only be collected in an amount equal to the cost of new facilities, but not to alleviate past deficiencies.

9.4.7.4 Schools

The Desert Center Unified School District and the Palo Verde Unified School District provide K-12 educational services within the eastern desert and Palo Verde Valley area. The Palo Verde Community College District provides advanced educational courses.

Facilities and Service Areas

School facilities maintained by the districts serving the eastern desert and Palo Verde Valley area are summarized in Table 9.BH. Projected student enrollment reported by the two districts are summarized in Table 9.BI.

Table 9.BH - School Facilities Serving the Eastern Desert and Palo Verde Valley Area

District	School Facilities			
	Elementary Schools	Middle Schools	High Schools	Area Served
Desert Center Unified School District	1, K-8 (Eagle Mountain School)	N/A	N/A	Between the Coachella and Palo Verde Valleys
Palo Verde Unified School District	2, Grades K-5 1, Grades K-6	1, Grades 6-8	1, Grades 9-12	Palo Verde Valley

Table 9.BI - Projected Student Enrollment in the Eastern Desert and Palo Verde Area

District	Projected Enrollment			
	Elementary School	Middle School	High School	Overall Projected Change
Desert Center Unified School District	Current: 55 (Grades K-8, 1998/99) Projected: Minimal increase	N/A	N/A	Current: 55 (Grades K-8, 1998/99) Projected: Minimal increase
Palo Verde Unified School District	Current: 2,198 (Grades K-6, 1997/98) Projected: 2,793 (Grades K-6, 2002/03) Percent Change: +27%	Current: 467 (Grades 7-8, 1997/98) Projected: 852 (Grades 7-8, 2002/03) Percent Change: +82%	Current: 1,142 (Grades 9-12, 1997/98)) Projected: 1,011 (Grades 9-12, 2002/03) Percent Change: -11%	Current: 3,807 (1997/98) Projected: 4,656 (2002/03) Percent Change: +22%

The Palo Verde Community College enrollment for the 1998/99 year was 2,300 and is projected to increase to 4,100 in 2003/04.

Service Criteria/Growth Factors

The Palo Verde Unified School District uses a student generation factor of 0.7 students per unit for grades K-12. This is not a locally generated figure, but one provided by the State Aid Building Fund. This figure is substantially higher than that estimated for the Desert Sands Unified School District to the west in the Coachella Valley.

Ability to Meet the Needs of Future Growth

The Desert Center Unified School District has indicated it does not expect growth within its boundaries, other than that related to the possible development of the Eagle Mountain Landfill. The Palo Verde Unified School District indicated its facilities are not at capacity, and they are projected to be adequate for the next five (5) years.

9.4.7.5 Cemeteries

The Coachella Valley Public Cemetery District and the Palo Verde Cemetery District provide burial services within the eastern desert and Palo Verde Valley area

Authority

Each of the Districts identified above operate under specific legislative authority. Cemetery Districts are formed under the Health and Safety Code and allow for the maintenance of a cemetery(s) or acquire and maintain a mausoleum, if a mausoleum was built prior to May 1, 1937.

Facilities and Service Areas

The Palo Verde Cemetery District serves the Palo Verde Valley, while the Coachella Valley Public Cemetery District serves the area between the Palo Verde and Coachella Valleys. Both districts serve unincorporated and incorporated residents.

Service Criteria/Growth Factors

Future needs are available on the number of available spaces within District facilities. The District did not indicate a specific numerical factor upon which to base future need.

Ability to Meet the Needs of Future Growth

The Coachella Valley Public Cemetery District has indicated that it has adequate capacity to meet future demand. The Palo Verde Cemetery District reports that it is currently at capacity. The Palo Verde Cemetery District currently uses a 13 acres site, and is in the process of expanding to utilize the 25 acre portion of the property that is across from its current facility. This increase will provide adequate capacity to meet future demand.

9.4.7.6 Resource Conservation Districts

The Palo Verde Resource Conservation District is the primary provider of conservation programs in the eastern desert and Palo Verde Valley area. The Coachella Valley Resource Conservation District also provides services within the area east of the Coachella Valley. These districts provide a variety of services, including soil, water, and wildlife conservation for agricultural and urban areas.

Authority

Resource Conservation Districts are governed by the provisions in the Public Resources Code, Sections 9000 to 9978. A resource conservation district may be formed for the control of runoff, the prevention or control or soil erosion, the development and distribution of water, and the improvement of land capabilities.

Facilities and Service Areas

The Coachella Valley Resource Conservation District operates out of a 14,000 square foot building in Indio. The District's service area covers a 2,400 square mile area extending from the area west of White Water, along the I-10 Freeway to Eagle Mountain, about 36 miles east of Indio. As such, the District provides service to areas in the Coachella Valley and to the east. The District was originally formed to help agricultural uses and "outdoor resources." The Coachella Valley RCD's operation primarily involves direct assistance, research, or monitoring of experiments. As such, the Districts facilities are limited, but the amount of involvement "in the field" can be extensive.

The Palo Verde Resource Conservation District abuts the Coachella Valley Resource Conservation District to the west, and covers the balance of the County to the Arizona border. The Palo Verde Resource Conservation District shares space with the U.S. Department of Agriculture in Blythe. The focus of the District's operation is the education of agricultural growers and water management.

Service Criteria/Growth Factors

Neither Resource Conservation District maintains a specific criteria or factor that is used to project future service demands based on new development.

Ability to Meet the Needs of Future Growth

The ability of both Resource Conservation Districts to provide service is limited by their financial resources. At present, the Coachella Valley RCD has adequate physical space for current and future operations, but inadequate staff resources. The same is true for the Palo Verde Resource Conservation District which has a much smaller budget, and must depend upon a significant level of volunteer effort. Neither district foresees an ability to meet future needs, unless increased revenue is provided.

9.4.7.7 Mosquito & Vector Control Districts

The Coachella Valley Mosquito and Vector Control District provides services to the eastern desert portion of Riverside County.

Authority

Mosquito and Vector Control Districts operate under the authority of the California Health and Safety Code and have the following powers:

- The extermination of mosquitos, flies or other insects either inside or outside the district.
- The extermination of rats.
- Undertaking or contracting for algae research, control, and monitoring projects.

Facilities and Service Areas

Coachella Valley Mosquito and Vector Control District offices are located on five acres in Thermal. The District provides service to the Coachella Valley and a portion of the eastern desert area, extending from Whitewater on the west to Chiriaco Summit on the east, and from the San Bernardino County line on the north to the San Diego/Imperial County lines on the south. The District has plans to construct a new facility on nine acres in Indio.

Service Criteria/Growth Factors

The Coachella Valley Mosquito and Vector Control District does not maintain a specific factor or ratio upon which they estimate future needs resulting from new development. The District monitors workloads to determine when services or facilities need to be expanded.

Ability to Meet the Needs of Future Growth The District uses tax revenue, and reports that it is able to provide adequate services for current and projected needs.

9.4.7.8 Irrigation Districts

The Palo Verde Irrigation District provides irrigation water to farms within the Palo Verde Valley area.

Authority

Irrigation districts in California are authorized to provide the following services:

- Provide water for beneficial purposes.
- Provide for any and all drainage made necessary by the irrigation provided by the district.
- Purchase or lease electric power and provide for the acquisition, operation, and control of plants for the generation and transmission of electric power.
- Acquire and operate an airport or aviation school.
- Provide, maintain, and operate flood control works in districts having 200,000 acres or more.
- Reclaim waste water for beneficial uses.
- Provide for sewage disposal.
- Construct, maintain, and operate recreational facilities in connection with dams, reservoirs, or other works owned and constructed by the district.

Facilities and Service Areas

The Palo Verde Irrigation District encompasses approximately 120,000 acres, and provides irrigation for farmers in the Palo Verde Valley. The District covers.

Service Criteria/Growth Factors

The Palo Verde Valley District did not indicated a specific factor it uses to determine future needs, but noted such a use factor was not applicable due to their type of operation. The District has fixed boundaries and a specific limit on the amount of Colorado River water that it can tale from the river.

Ability to Meet the Needs of Future Growth

The District indicated they were currently at capacity, but due to the constraints mentioned above, does not expect to experience an increase in future demand.

9.4.7.9 Health Care Districts

The Palo Verde Health Care District provides medical facilities and services to the eastern desert and Palo Verde Valley area.

Authority

The specific powers granted by State law to Health care districts authorize the districts to establish, maintain, and operate, or provide assistance in the operation of one or more health facilities or services, including but not limited to the following:

- Outpatient programs, services and facilities.
- Retirement programs.
- Chemical dependency programs, services and facilities.
- Other health care programs, services and facilities.
- Acquire, maintain, and operate ambulances, or ambulance services inside and outside the district.
- Establish a nurses' training school, or a child care facility or the benefit of employees of the hospital or residents of the district.

Facilities and Service Areas

The District operates and maintains one 55-bed acute care hospital serving the Palo Verde Valley.

Section 10.0 - Environmental Regulations Management

10.1 Endangered Species Act

10.1.1 Federal Endangered Species Act

The Federal Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.) is administered by the U. S. Fish and Wildlife Service (USFWS), and by the National Marine Fisheries Service in areas where marine habitats exist. Upon request, the USFWS will provide a 'species list', free of charge, for a particular area including species that are listed, proposed, or are candidates for listing under the ESA.

Section 7 of the ESA requires federal agencies to use their authorities to conserve threatened and endangered species. It also directs federal agencies to consult with USFWS (or NMFS) if any action they authorize, fund, or carry out "may affect" in either a beneficial or adverse manner, any species that is listed or proposed for listing, or any designated or proposed critical habitat. For example, if the issuance of a Clean Water Act section 404 permit by the U.S. Army Corps of Engineers for a private development project may affect any listed species, the Corps must consult with USFWS on the effects of the issuance of that permit. Species that are candidates for listing by the USFWS may also be addressed during federal interagency coordination. Section 7 also provides a mechanism for 'incidental take,' for actions that may affect a listed species, but which do not jeopardize its continued existence or destroy or adversely modify critical habitat.

Section 9 of the ESA prohibits 'take' (i.e., harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collecting, or the attempt to engage in any such conduct) of threatened and endangered species. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Under Section 10 of the ESA, non-federal entities can apply for a permit excepting them from the "take" prohibition for scientific purposes to aid the species recovery, or for "incidental take," when the project or activity does not involve a federal action and the take is incidental to, and not the purpose of, an otherwise lawful activity.

10.1.2 California Endangered Specifies Act

The California Endangered Species Act (CESA) (Fish & Game Code sections 2050, et seq.) is administered by the California Department of Fish and Game (CDFG), and generally parallels the federal ESA. CESA prohibits the "taking" of listed species, except as otherwise provided in State law. Unlike its federal counterpart, CESA applies the take prohibitions to species petitioned for listing (state candidates) during the one-year listing review period. 'Take' is defined as to 'hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill' a protected species. Under Section 2081 of the Fish & Game Code, the CDFG may authorize the take of a State endangered, threatened, or candidate species if the take is incidental to an otherwise lawful activity and any impacts to the species are minimized and fully mitigated.

A State lead agency (the agency which has principal responsibility for carrying out or approving a project) is required to consult with CDFG to ensure that any action it undertakes is not likely to jeopardize the continued existence of any State endangered, threatened, or candidate species or result in adverse modification of essential habitat. A lead agency may also determine that species listed or proposed as threatened or endangered under the federal ESA warrant special review and consideration in California Environmental Quality Act (CEQA) documents. CEQA Guidelines Section 15380d allows a lead agency to consider a species as a “de-facto” threatened or endangered species if information can be presented showing the species would qualify for listing. This can apply to proposed, candidate, or any other species not actually listed by the CDFG or USFWS as rare, threatened, or endangered.

The Natural Community Conservation Planning Act was added to CESA in 1991 (Fish & Game Code sections 2800-2840), and provides for voluntary cooperation among CDFG, landowners, and other interested parties to develop natural community conservation plans which provide for early coordination of efforts to protect listed species or species that are not yet listed. The primary purpose of the Act is to preserve species and their habitats, while allowing reasonable and appropriate development to occur on affected lands.

10.2 Water Resources

Water Resources are regulated at both the State and Federal level. Water rights in California are established through both State and case law. The California Water Code establishes the control of almost every aspect of water resource management within the state as a response to federal laws mandating state involvement. Counties must operate within the regulations established in the California Water Code in addition to other regulations.

The principal federal and state laws pertaining to the regulation of water quality are the 1972 Federal Water Pollution Control Act (also known as the Clean Water Act) and Division 7 of the 1969 California Water Code (Also known as the Porter- Cologne Water Quality Control Act. The purpose of both laws is to protect the beneficial uses of water. The Clean Water Act addresses surface water only whereas the Porter-Cologne Water Quality act addresses both ground and surface waters.

10.2.1 Federal Laws

The Clean Water Act is the principal federal law which addresses water quality. The primary objectives of the Clean Water Act are to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters,”and to make all surface waters “fishable” and “swimmable.” The implementation plan for these objectives includes the regulation of pollutant discharges to surface water, financial assistance for public wastewater treatment systems, technology development, and non-point source pollution prevention programs. The Clean Water Act also establishes that states adopt water quality standards to protect public health or welfare and enhance the quality of water.

The use and value of state waters for public water supplies, propagation of fish and wildlife, recreation, agriculture, industrial purposes, and navigation must also be considered by the states.

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps) regulates discharges of dredged or fill material into "Waters of the United States," including wetlands. "Waters of the United States" is defined 33 CFR 328.3 as:

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce...;

(2) All interstate waters including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams) ...the use, degradation or destruction of which could affect interstate or foreign commerce...;

(4) All impoundments of waters otherwise defined as waters of the United States under the definition; and

(5) Tributaries of waters defined in paragraphs (a) (1)-(4) of this section."

The Corps typically regulates as waters of the United States any body of water displaying an "ordinary high water mark" (OHWM). Corps jurisdiction over non-tidal waters of the United States extends laterally to the OHWM or beyond the OHWM to the limit of any adjacent wetlands, if they are present (33 CFR 328.4). The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area" (33 CFR 328.3). Jurisdiction typically extends upstream to the point where the OHWM is no longer perceptible.

The Corps and the U.S. Environmental Protection Agency (EPA) define wetlands as follows:

> "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions."

In order to be considered a "jurisdictional wetland" under Section 404, an area must possess three wetland characteristics: hydrophytic *vegetation*, hydric *soils*, and wetland *hydrology*. Each characteristic has a specific set of mandatory wetland criteria that must be satisfied in order for that particular wetland characteristic to be met. Several parameters may be analyzed to determine whether the criteria are satisfied.

The California Regional Water Quality Control Board (Regional Board) is responsible for the administration of Section 401 of the Clean Water Act. The project is within the jurisdiction of the Santa Ana Regional Board. Depending on the permitting requirements of the Corps, a water quality certification issued by the regional board may be necessary.

10.2.2 State Laws

The California Water Code is the principle state law regulating water quality in California. The Health and Safety Code, Fish and Game Code, Harbors and Navigation Code, and the Food and Agriculture Code all contain water quality provisions which must be complied with.

The California Water Code contains provisions which regulate water and its use. Division 7 covers water quality protection and management. This Division is known as the Porter-Cologne Act, and establishes a program to protect water quality and beneficial uses of the state water resources and includes both ground and surface waters. The State and Regional Water Quality Control Boards are the principal state agencies responsible for control of water quality. The State and Regional Water Quality Control Boards establish waste discharge requirements, water quality control planning and monitoring, enforcement of discharge permits, and ground and surface water quality objectives. They also prevent waste and unreasonable use of water and adjudicate water rights.

The Health and Safety Code, Fish and Game Code, Harbors and Navigation Code, and the Food and Agriculture Code all contain provisions concerning water quality. The Health and Safety Code provides for protection of ground and surface waters from hazardous waste and other toxic substances. The Harbors and Navigation Code provides regulations designed to prevent the unauthorized discharge of waste from vessels into surface waters. The Fish and Game Code has provisions to prevent unauthorized diversions of any surface water and discharge of any substance that may be deleterious to fish, plant, animal or bird life. The Food and Agriculture Code provides for the protection of groundwater which may be used for drinking water supplies.

The California Code of Regulations also contains administrative procedures for the State and Regional Water Quality Control Boards in Title 23 and for water quality for domestic uses, wastewater reclamation and hazardous waste management in Title 22.

The California Department of Fish and Game (CDFG), through provisions of the California Fish and Game Code (Sections 1601-1603), is empowered to issue agreements for any alteration of a river, stream, or lake where fish or wildlife resources may be adversely affected. Streams (and rivers) are defined by the presence of a channel bed and banks, and at least an intermittent flow of water. CDFG regulates wetland areas only to the extent that those wetlands are part of a river, stream, or lake as defined by CDFG.

10.2.3 Reclaimed Water Regulations

Reclaimed water is regulated by the EPA, Water Resources Control Board, Regional Water Quality Control Boards and the State Department of Health Services. The State Water Resources Control Board has adopted the Policy and Action Plan for Water Reclamation (Resolution No. 77-1). This policy recognizes the need for an increasing water supply in California in support of population growth. It requires Regional Boards to support reclamation in general and specific reclamation projects which comply with the letter and intent of the Clean Water Act and Porter-Cologne Act and for which there is a demonstrated need.

The Regional Water Quality Control Boards oversee the uses of reclaimed water in California. They issue waste discharge permits which set terms for the use of reclaimed water based on stringent water quality requirements and work with other regulatory agencies to ensure that all pertinent and applicable guidelines are followed in order to protect and enhance the beneficial uses of the waters of California.

The Department of Health Services develops policies protecting human health and comments and advises on Regional Water Quality Control Board permits.

The disposal constraints mandate the degree of treatment necessary before the reclaimed water can leave the treatment facility. They specify the amount and quality of flow and differ according to the groundwater basin into which the discharge will occur and/or the beneficial uses that are to be protected. In general, the discharge of wastes containing an average total dissolved solids (TDS) concentration which exceeds the average TDS concentration in the water supply by more than 250 mg/L is prohibited.

Protection of the public health regarding the use of reclaimed water is regulated with the authority of the California Administrative Code (Title 22, Division 4) through the Regional Water Quality Control Boards and the Department of Health Services. Options for reclaimed water use are determined by the level of coliform organisms present in the water and the level of treatment that the water has had (Table 10.A).

Generally, each project which utilizes reclaimed water is examined as a unique project by the Regional Water Quality Control Board and/or the Department of Health Services. The project is approved or denied based on its merit as well as part of the cumulative effects of other reclaimed water projects in the affected area.

Table 10.A - Title 22 Requirements

Use	Disinfected Tertiary Reclaimed Water 2.2 median coliform per 100 mL	Disinfected Secondary Reclaimed Water 2.2 median coliform per 100 mL	Disinfected Secondary Reclaimed Water 23 median coliform per 100 mL	Undisinfected Secondary Reclaimed Water
Food Crops	allowed for drip, surface or spray	allowed for drip or surface only	not allowed	not allowed

Use	Disinfected Tertiary Reclaimed Water 2.2 median coliform per 100 mL	Disinfected Secondary Reclaimed Water 2.2 median coliform per 100 mL	Disinfected Secondary Reclaimed Water 23 median coliform per 100 mL	Undisinfected Secondary Reclaimed Water
Processed Food Crops	allowed for drip, surface or spray	allowed for drip, surface or spray	allowed for drip, surface or spray	not allowed
Orchards and Vineyards Bearing Food Crops	allowed for drip, surface or spray	allowed for drip or surface only	allowed for drip or surface only	allowed for drip or surface only
Orchards and Vineyards not Bearing Food Crops during Irrigation	allowed for drip, Surface or spray	allowed for drip, surface or spray	allowed for drip, surface or spray	allowed for drip or surface only
Orchards or Vineyards Bearing Food Crops During Irrigation	allowed for drip, surface or spray	allowed for drip or surface only	allowed for drip or surface only	allowed for drip or surface only
Fodder, Fiber or Seed Crops	allowed for drip, surface or spray	allowed for drip, surface or spray	allowed for drip, surface or spray	allowed for drip or surface
Pasture for Milking Animals	allowed for drip, surface or spray	allowed for drip, surface or spray	allowed for drip, surface or spray	not allowed
Landscape - Restricted Access Irrigation (for golf courses, cemeteries, freeway landscape)	allowed for drip, surface or spray	allowed for drip, surface or spray	allowed for drip, surface or spray	not allowed
Landscape - Irrigation (for parks, playgrounds and schoolyards)	allowed for drip, surface or spray	not allowed	not allowed	not allowed
Nonrestricted Recreational Impoundments (allows swimming), Decorative Fountains	allowed	not allowed	not allowed	not allowed
Restricted Recreational Impoundment (allows boating and fishing)	allowed	allowed	not allowed	not allowed
Landscape Impoundment without Decorative Fountains	allowed	allowed	allowed	not allowed

General environmental concerns associated with using reclaimed water for groundwater recharge include:

- Liquefaction in recharge areas
- Erosion or unstable soil conditions
- Changes in absorption rates
- Change in quantity or quality of groundwater
- Changes in the direction or rate of flow of groundwater
- Reduction in the amount or quality of water otherwise available
- Impacts to plant or animal species
- The creation of any health hazard or potential health hazard
- Alteration of water treatment or transmission facilities
- Affect on local water supply
- Aesthetic effects.

10.3 Cultural Resource Management

10.3.1 Regulatory Framework

Cultural resources of the State of California are recognized as non-renewable resources that require management to assure their benefit to present and future Californians. In the protection and management of the cultural environment, CEQA guidelines provide definitions and standards for cultural resource management. The term "historical resource" is defined as follows:

> (1) A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in the California Register of Historical Resources.
>
> (2) A resource included in a local register of historical resources or identified as significant in an historical resource survey shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
>
> (3) Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources including the following:
>
> > (A) Is associated with events that have made a significant contribution to the broad patterns of California history and cultural heritage;

(B) Is associated with the lives of persons important in our past;

(C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

(D) Has yielded, or may be likely to yield, information important in prehistory or history

(4) The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources . . ., or identified in an historical resources survey . . . does not preclude a lead agency from determining that the resource may be an historical resource [Title 14 CCR Section 15064.5(1)].

The term “unique archaeological resource” has the following meaning under CEQA:

> An archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:
>
> (1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
> (2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.
> (3) Is directly associated with a scientifically recognized important prehistoric or historic event or person [Public Resources Code Section 21083.2(g)]

A project with an effect that may cause a substantive adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. Effects on cultural properties that qualify as historical resources or unique archaeological resources can be considered adverse if they involve physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.

10.3.2 Cultural Resource Management During Project Planning

Cultural resource management occurs during project planning, and includes three primary steps:

- Resource identification, commonly referred to as a Phase I investigation.
- Resource evaluation, commonly referred to as a Phase II investigation
- Mitigation of potential adverse effects, commonly referred to as a Phase III investigation.

The professional services of a qualified archaeologist, architectural historian, historic architect, and/or historian, depending on the types of resources in the project area, are required to complete these three cultural resource management steps.

The purpose of resource identification is to characterize the cultural environment of a project area by providing an inventory of the resources in the area. Resource identification is usually a two-step process involving archival records check and intensive field survey. The regional information center of the California Historical Resources Information System (CHRIS) is consulted for information on previously surveyed areas and previously recorded sites within the project area and in its vicinity. Due to the sensitive nature of site information, including locational data, access to CHRIS archives is limited to qualified professionals who adhere to an agreement of confidentiality and commit to provide the regional repository with site records and technical reports in a timely manner. The Eastern Information Center of CHRIS, located at the University of California, Riverside, Department of Anthropology, manages the site records, reports, maps, and archives for the three-county area of Riverside, Inyo, and Mono Counties.

The results of the archival records check is used to determine if field survey is required. Areas not previously surveyed or not adequately surveyed by previous investigations require intensive pedestrian survey and resource recordation. Permanent primary numbers are assigned by the information center to any newly recorded sites, buildings, or structures.

Resource evaluation is undertaken to determine if a recorded site, structure, or object qualifies as a "historical resource" or "unique archeological resource," as defined by CEQA and its implementing regulations (refer to Regulatory Framework section for definitions). For buildings or structures, this effort may involve intensive documentation and research. For prehistoric and historic archaeological sites, Phase II investigations typically require a field program of surface collection, excavation, and mapping, followed by laboratory analysis, to gather the data necessary to make an informed decision on whether the resource meets the eligibility requirements for listing on the California Register of Historical Resources or qualifies as a unique archaeological resource. For traditional cultural properties, important in the traditions, lifeways, or religions of living peoples, evaluation may involve intensive oral interviews and documentation that provides the appropriate cultural context for the evaluation of resource significance.

10.4 Hazardous Materials Management

Chapter 1504 of the Statutes of 1986 (Tanner Bill) requires each county to prepare a county-wide hazardous waste management plan. Each county plan is then to be incorporated into the general plans of all cities within the county's jurisdiction. Riverside County has complied with this requirement and maintains an adopted Hazardous Waste Management Plan.

All businesses that handle more than a specified amount of a hazardous material are regulated by the County of Riverside Department of Environmental Health, Hazardous Materials Division (DEH/HMD). Within this division three branches oversee hazardous material matters within the County. The Hazardous Waste Generator Section is responsible for monitoring establishments that generate hazardous waste. It enforces provisions of California Administrative Code Title 22 and the Health and Safety Code by the authority of Riverside County Ordinance 615 and a Memorandum of Understanding (MOU) with the State DHS. The Underground Storage Tank Section, under ordinance 617, is responsible for facilities which store hazardous materials in underground storage tanks. Specialists in this section work with the Regional Water Quality Control Board to enforce the California Underground Storage Tank Regulations (California Administrative Code Title 23, Subchapter 16).

The Program Development Section is responsible for monitoring the disclosure of hazardous materials under Ordinance 651. Established by Assembly Bills 2185 and

2187, this program calls for businesses and area plans for emergency response to hazardous materials incidents. Other responsibilities of the Program Development Section include reporting incidents in accordance with Proposition 65 and participation in the Planning Department's development of the County Hazardous Waste Management Plan. Hazardous Materials Specialists from all three sections are trained to respond to hazardous materials emergencies with the County Fire Department on a 24-hour basis. These specialists also investigate hazardous materials complaints for businesses, individuals, and anonymous sources.

Every handler of hazardous waste is required to submit a business plan and an inventory of hazardous substances and acutely hazardous materials to the County on a yearly basis. If the hazardous materials inventory of a business changes, a revised business plan must be submitted.

Most chemicals have their own unique and physical characteristics; an acceptable mitigation procedure for one chemical may be inadequate for another. Therefore, business plans should, for each hazardous and extremely hazardous material handled, have a description of the physical and chemical properties of the materials and the symptoms that result from contact with that material. A plan also includes a site map that shows where each hazardous material is stored and handled, where emergency response personnel may be contacted, and evacuation plans and procedures.

The DEH/HMD is responsible for the distribution of hazardous materials information to the appropriate fire departments and emergency response teams. Employees of facilities that use, store or manufacture hazardous materials should know where a copy of the business plan is kept, and how to implement the plan is put into operation should a hazardous material incident occur.

Through its membership in the Southern California Hazardous Waste Management Authority (SCHWMA), Riverside County has agreed to work on a regional level to solve problems involving hazardous waste. SCHWMA was formed through a joint powers agreement between Santa Barbara, Ventura, San Bernardino, Orange, San Diego, Imperial and Riverside Counties and the Cities of Los Angeles and San Diego. Working within the concept of "fair share," each SCHWMA member has agreed to take responsibility for the treatment and disposal of hazardous waste in an amount that is at least equal to the amount generated in that jurisdiction. This responsibility can be met by siting hazardous waste management facilities capable of processing an amount of waste equal to or larger than the amount generated within the jurisdiction or by creating intergovernmental agreements between jurisdictions.

Riverside County does not presently have any hazardous waste management facilities within its jurisdiction and therefore must rely on intergovernmental agreements to fulfill its fair share responsibility to SCHWMA.

The Riverside County Hazardous Waste Management Plan (CHWMP) was adopted by the Board of Supervisors on September 12, 1989, and incorporated into the General Plan. The CHWMP is a comprehensive document containing all County programs for managing both hazardous materials and hazardous waste.

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Section 12.0 - Definitions

Existing Setting Report

Revised March 2000

12.1 Abbreviations

ACEC	Areas of Critical Environmental Concern
AD	Assessment District
ADT	Average daily trips made by vehicles in a 24-hour period
AF	Acre feet
AMSL	Above mean sea level
APN	Assessor's Parcel Number
AQAP	Air Quality Attainment Plan
BIA	Bureau of Indian Affairs, Building Industry Association
BLM	U.S. Bureau of Land Management
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe Railroad
CC&Rs	Covenants, Conditions, and Restrictions
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CDBG	Community Development Block Grant
CDMG	California Division of Mines and Geology
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Compensation and Liability Act of 1980
CERFA	Community Environmental Response Facilitation Act
CESA	California Endangered Species Act
CETAP	Community Environmental and Transportation Acceptability Program
CFD	A Mello-Roos Community Facilities District
CFR	Code of Federal Regulations
CHFA	California Housing Finance Agency
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CHWMP	Riverside County Hazardous Waste Management Plan
CIP	Capital Improvements Program
CMP	(Riverside County) Congestion Management Plan
CNEL	Community Noise Equivalent Level
CNG	Compressed Natural Gas
COE	U.S. Army Corps of Engineers
COI	Community of Interest
CSA	County Service Area
CSD	Community Service District
CSTI	California Specialized Training Institute
CVAG	Coachella Valley Association of Governments
CVWD	Coachella Valley Water District
CTA	California Trucking Association
dB	Decibel(s)
dBA	"A-weighted" decibel

DEHS	Riverside County Department of Environmental Health Services
DTSC	California Department of Toxic Substances Control
DOT	U.S. Department of Transportation
du	Dwelling unit(s)
du/ac	Dwelling units per acre
DoD	U.S. Department of Defense
DWR	California Department of Water Resources
EBS	Environmental Baseline Survey
EIR	Environmental Impact Report (State)
EIS	Environmental Impact Statement (Federal)
EMWD	Eastern Municipal Water District
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ERNS	Emergency Response Notification System
ESA	Endangered Species Act (Federal)
FAR	Floor Area Ratio
FEMA	Federal Emergency Management Agency
FHWA	Federal Highways Administration
FIRM	Flood Insurance Rate Map
FMMP	California Department of Conservation, Farmland Mapping and Monitoring Program
FY	Fiscal year
GIS	Geographic Information System(s)
gpd	Gallons per day
gpm	Gallons per minute
GPS	Geo-Synchronous Positioning Satellite System
HCD	California Department of Housing and Community Development
HCM	Highway Capacity Manual
HOV	High Occupancy Vehicle
HUD	U.S. Department of Housing and Urban Development
IID	Imperial Irrigation District
IPZ	Ingestion Pathway Zone
JPA	Joint Powers Authority
kV	Kilovolt(s)
LAFCO	Local Agency Formation Commission
$\mathbf{L_{dn}}$	Day and Night Average Sound Level
$\mathbf{L_{eq}}$	Sound Energy Equivalent Level
LOS	Level of Service
LUSTIS	State Water Resources Control Board Leaking Underground Storage Tank Information System
maf	Million acre feet
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MF	Multi-family
MFD	Multi-family dwelling

MGD	Million gallons per day
MSHCP	Multi-species Habitat Conservation Plan
MWD	Metropolitan Water District of Southern California
MRAB	March Reserve air Base (formerly March Air Force Base)
MRZ	Mineral Resource Zone
NAAQS	National Ambient Air Quality Standards
NCCP	Natural Communities Conservation Plan
NPL	Superfund National Priorities List
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRS	University of California Natural Reserve System
OCTA	Orange County Transportation Agency
OES	California Office of Emergency Services
OHWM	Ordinary high water mark
OPR	Office of Planning and Research, State of California
PCBs	Polychlorinated biphenyls
PEZ	Public Education Zone
ppm	Parts per million
RCFCWCD	Riverside County Flood Control and Water Conservation District
RCFD	Riverside County Fire Department
RCHCA	Riverside County Habitat Conservation Agency
RCIP	Riverside County Integrated Plan
RCRA	Resource Conservation and Recovery Act
RCTC	Riverside County Transportation Commission
REMAP	Riverside Extended Mountain Area Plan
RTA	Riverside Transit Agency
RWQCB	Regional Water Quality Control Board
SANBAG	San Bernardino Associated Governments
SARA	Superfund Amendments and Reauthorization Act
SARI	Santa Ana Regional Interceptor
SARWQCB	Regional Water Quality Control Board, Santa Ana Region
SAWPA	Santa Ana Watershed Project Authority
SCAG	Southern California Association of Governments
SCAQMD	South coast Air Quality Management District
SCAQMP	South Coast Air Quality Management Plan
SCE	Southern California Edison
SCHWMA	Southern California Hazardous Waste Management Authority
SCS	U.S. Soil Conservation Service
SEDAB	Southeast Desert Air Basin
SF	Single Family
SFA	Single Family, Attached
SFD	Single Family, Detached
SIP	State Implementation Plan
SMARA	California Surface Mining and Reclamation Act
SMER	Santa Margarita Ecological Reserve
SMGB	State Mining and Geology Board

SoCAB	South Coast Air Basin
SP	Specific Plan
SSAB	Salton Sea Air Basin
SWAP	Southwest Area Plan
SWP	State Water Project
TAZ	Traffic Analysis Zone
TCE	Trichloroethylene
TDM	Transportation Demand Management
TDS	Total dissolved solids
TEA-21	Transportation Equity Act for the 21st Century
TRI	Toxic Release Inventory
TSM	Transportation Systems Management
UBC	Uniform Building Code
UP	Union Pacific Railroad
USDA	U.S. Department of Agriculture
USFS	United State Forest Service
USFWS	United States Fish and Wildlife Service
UC	Unincorporated Community
UCR	University of California, Riverside
UST	Underground storage tank
VC	Volume to capacity ratio
VFR	Visual Flight Rules
VMT	Vehicle Miles Traveled
WMWD	Western Municipal Water District
WRCOG	Western Riverside Council of Governments

12.2 General Land Use Types

12.2.1 Residential

Attached Dwelling Units

Include medium density single-family residential areas, duplexes, triplexes, and “low-rise” (one to two stories) apartments, condominiums and townhouses, and mixed residential areas where single-family detached and multi-family attached dwellings of any type occur together.

High Density Residential

Includes high-density apartments or condominiums (3+ stories, more than 24 du/ac).

Mobile Homes

Include mobile homes and trailer parks, low density trailer parks and mobile home courts, and low density mobile home subdivisions.

Rural Residential

Includes single family homes on large lots, at a density of less than 2 dwelling units per acre (du/ac). Isolated homes, including mobile homes in rural settings, are included in this category.

Single Family Dwellings

Include areas of low-density, single-family dwellings, at densities greater than 2 du/ac (including residential estates).

12.2.2 Commercial

Retail/Office

Includes areas of office buildings used for financial, personal, business, medical, and other professional services. Retail and commercial services including retail centers, regional malls, strip development, service stations, restaurants, offices, personal services, and associated facilities and parking areas are also included in this category. Public mini-storage, small commercial storage yards, and recreational vehicle storage areas are included in this category.

Tourist/Commercial Recreation

Includes all major hotels, motels, inns, and motor lodges. Commercial recreation facilities such as sports stadiums (not connected with schools), race tracks, drive-in theaters, amusement parks, ice and roller rinks, miniature golf courses, and fairgrounds, as well as stand-alone parking areas (those not associated with another use), attended parking areas or parking structures are included in this category.

12.2.3 Industrial

Heavy Industrial

Includes large-scale industrial and manufacturing activity involving the processing of raw materials. These industries are sometimes considered “dirty” since waste products such as smoke, slag, dust, and liquid effluent, as well as noise are often generated, often in significant quantities. Specific uses include packing houses and grain elevators, oil refineries, petrochemical plants, and metal and chemical processing plants and associated facilities (slag heaps, storage areas, and smoke stacks).

Light Industrial/Business Park

Includes design, assembly, finishing, packaging, and storing of products or materials which have usually been processed at least once. These activities are generally characterized as “clean,” since they produce relatively small amounts of smoke or other effluents, noise, and dust. Also included in this category are industrial areas devoted to the design, development, and research of products and/or technology. Areas with a mixture of commercial and industrial uses together or in close proximity where neither use predominates have been assigned to this category.

Mineral Extraction

Includes those areas devoted to the extraction of mineral and rock products, oil, and natural gas. All related above-ground quarries, pits, trailing piles, borrow areas, and equipment and storage facilities are identified within this category.

Warehouse

Includes storage or distribution warehousing or wholesale shipping centers other than those which are integral parts of airports or transportation centers. Wrecking yards, junk yards, heavy equipment storage yards, the outdoor storage of light or heavy industrial products, and salvage and recycling are included within this category.

12.2.4 Recreation and Open Space

Agriculture

Includes crop lands (irrigated and dry farmed), improved pasture land, orchards and vineyards, nurseries, dairy and poultry operations, horse ranches, and related agricultural uses.

- *Prime Farmland* is land which has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yield crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date. These lands are best suited for producing food, feed, forage, fiber and oilseed crops and have minimal management problems. Prime Farmland does not include publicly owned lands for which there is an adopted policy preventing agricultural use.

- *Farmland of Statewide Importance* is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for production of irrigated crops at some time during the two update cycles prior to the mapping date. Lands within this category may have associated management problems such as increased alkaline or salinity, and have a moderate erosion hazard. Farmland of Statewide Importance does not include publicly owned lands for which there is an adopted policy preventing agricultural use.

- *Unique Farmland* is land of lesser quality soils currently and specifically used for the production of some of the state's leading agricultural crops (as listed in *California Agriculture*, California Department of Food and Agriculture). It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Unique Farmland is usually irrigated, but may include non-irrigated orchards or vineyards found in some climatic zones in California. Examples of crops on Unique Farmland include oranges, olives, avocados, rice, grapes, and cut flowers. Land must have been cropped at some time during the two cycles prior to the mapping date. Unique Farmland does not include publicly owned lands for which there is and adopted policy preventing agricultural use.

- *Farmland of Local Importance* is determined by the County Board of Supervisors and a local advisory committee. These farmlands include agricultural areas with soils that would be classified as “Prime” and “Statewide Important” but lack available irrigation water, lands producing major (but not unique) crops, dairy lands (including corrals, pasture, milking facilities, etc.), lands identified by City or County ordinance as agricultural zones or contracts (including Riverside City “Proposition R” lands, and lands planted in jojoba which are under cultivation and are of producing age.

- *Grazing Land* includes land on which the existing vegetation is suited to the grazing of livestock.

Natural Open Space

Includes public and private lands which have not been developed and/or formerly disturbed lands in the process of returning to a pre-development, natural or naturalized state. This land use type may include wildlife preserves, sanctuaries, and areas formerly utilized for agricultural pursuits.

Recreation

Encompasses developed open areas within urban settings and non-urban areas developed for recreational activities. Recreation areas are those lands such as parks, golf courses, and driving ranges, open space, and beaches. All facilities within the park, such as campgrounds, marinas or boat launching facilities are included in this category. Camps, campgrounds, outdoor shooting ranges, ski areas, marinas, and maintained grasses areas not used as a local park are included within this land use category.

Water

Includes all perennially, open bodies of water greater than 5 acres in area, which are not associated with municipal water storage, as well as all water bodies associated with water storage that are greater than 10 acres in size.

12.2.5 Public Facilities

Public Facilities

Include government offices, police and fire facilities, correctional facilities, military installations, museums, convention centers, libraries, theater facilities, cemeteries, convalescent and rehabilitation facilities, short- and long-term custodial facilities (orphanages, mental health facilities), non-profit fraternal and community service organizations (YMCA, Salvation Army), and non-attended public parking facilities.

Schools

Encompass a wide-ranging assortment of educational institutions including preschools and day-care centers, K-12 schools, trade schools, and colleges and universities. Included in this category are the dormitories, athletic venues, parking areas, and other facilities ancillary to these uses.

Utilities

Include a wide variety of utility and transportation related structures and facilities. Examples of these facilities include (but are not limited to) air fields; railroads; freeways; waste disposal facilities; natural gas, petroleum and electrical generation and transmission facilities; small (less than 10 acres in area) reservoirs or water storage tanks; dams, aqueducts, and water transfer facilities; flood control channels; transportation terminals, park and ride lots, and the storage, maintenance, and ancillary facilities associated with such uses.

12.2.6 Other Land Use Types

This land use category includes vacant lands, areas which are under construction, abandoned orchards and vineyards (trees or vines must be present), and vacant land with limited improvements (areas where streets are laid in a subdivision pattern but no other development has occurred over time).

12.3 Roadway Classification Terms

Arterials and Mountain Arterials

Include routes intended to link urban and rural areas, as well as serve through traffic movements across the County. The County's current right-of-way standard for arterials and mountain arterials is 110 feet. Additional right-of-way may be required at some intersections.

Collectors and Local Roads

Include roads providing access to abutting property and activity nodes. The facilities also link properties to the secondary or major system. All County roads not shown on the Circulation Element Map are considered to be collectors or local roads.

Expressways

Include highways that carry large volumes of traffic relatively long distances within or through an urban or rural area. They also often serve considerable local traffic traveling over short distances. Along these facilities, priority is typically placed on through traffic mobility rather than access to fronting property. Direct access to individual fronting parcels is typically not allowed; fully controlled frontage access is required. Expressways should be continuous through the urban or rural community they serve and link to arterial routes. The designated right-of-way for Expressways in Riverside County is currently 142 feet. Additional right-of-way may be required at some intersections.

Freeway

A divided, limited access highway with access provided at grade separated interchanges. Other vehicular crossings of these facilities are provided at grade separations. Freeways are designed to carry large volumes of traffic traveling long distances, although localized use of freeways occurs in urban areas. The planned freeway right-of-way varies depending on the needs of the facility.

Major Highways

Normally include roadways linking smaller communities, and are sometimes used in place of arterials continuous over short distances. The County's current right-of-way standard for these facilities is 100 feet, and additional right-of-way at intersections may be required.

Secondary Highways

Includes highway that are intended to carry local traffic between the local street system and the arterial highway system. In urban areas, secondary highways may serve average daily traffic (ADT) volumes in excess of 10,000 although volumes are normally less. In rural areas, secondary highways generally serve less than 10,000 ADT. The County's current right-of-way standard for these facilities is 88 feet, and additional right-of-way may be required at some intersections.

Urban Arterials

Include roadways carrying moderately high volumes of long distance and local traffic. Although access to abutting property may be permitted, priority is typically given to through traffic mobility. The existing right-of-way standard in Riverside County for these facilities is 134 feet, and additional right-of-way at intersections may be required.

12.4 General Terms

Acceptable Risk

A hazard which is deemed to be a tolerable exposure to danger given the expected benefits to be obtained. Different levels of acceptable risk may be assigned according to the potential danger and the criticalness of the threatened structure. The levels may range from "near zero" for nuclear plants and natural gas transmission lines to "moderate" for open space, ranches and low-intensity warehouse uses.

Access, Ingress/Egress

The ability to enter a site from a roadway and exit a site onto a roadway by motorized vehicle.

Acres, Gross

The entire acreage of a site. Gross acreage is calculated to the centerline of proposed bounding streets, and to the edge of the right-of-way of existing or dedicated streets.

Acres, Net

The portion of a site that can actually be built upon following dedications. The following generally are not included in the net acreage of a site: public or private road rights-of-way, public open space, and flood ways.

Acres

Where gross or net acreage is not specific, acreage is calculated by measurement of the non-dedicated land within recorded property lines.

Adaptive Reuse

The conversion of obsolescent or historic buildings from their original or most recent use to a new use. For example, the conversion of former hospital or school buildings to residential use, or the conversion of an historic single-family home to office use.

Adverse Impact

A negative consequence for the physical, social, or economic environment resulting from an action or project.

Affordable Housing

Housing capable of being purchased or rented by a household with very low, low, or moderate income, based on a household's ability to make monthly payments necessary to obtain housing. Housing is considered affordable when a household pays less than 30 percent of its gross monthly income for housing including utilities.

Air Pollution

Concentrations of substances found in the atmosphere which exceed naturally occurring quantities and are undesirable or harmful in some way.

Alley

A narrow service way, either public or private, which provides a permanently reserved but secondary means of public access not intended for general traffic circulation. Alleys typically are located along rear property lines.

Alluvial

Soils deposited by stream action.

Ambient

Surrounding on all sides; used to describe measurements of existing conditions with respect to traffic, noise, air, and other environments.

Annex, v.

To incorporate a land area into an existing district or municipality, with a resulting change in the boundaries of the annexing jurisdiction.

Apartment

(1) One or more rooms of a building used as a place to live, in a building containing at least one other unit used for the same purpose. (2) A separate suite, not owner occupied, which includes kitchen facilities and is designed for and rented as the home, residence, or sleeping place of one or more persons living as a single housekeeping unit.

Appropriate

An act, condition, or state which is considered suitable, and is consistent with the provisions of the General Plan.

Aquifer

An underground, water-bearing layer of earth, porous rock, sand, or gravel, through which water can seep or be held in natural storage. Aquifers generally hold sufficient water to be used as a water supply.

Archaeological

Relating to the material remains of past human life, culture, or activities.

Architectural Control; Architectural Review

Regulations and procedures requiring the exterior design of structures to be suitable, harmonious, and in keeping with the general appearance, historic character, and/or style of surrounding areas. A process used to exercise control over the design of buildings and their settings. (See "Design Review.")

Area; Area Median Income

As used in State of California housing law with respect to income eligibility limits established by the U.S. Department of Housing and Urban Development, "area" means metropolitan area or non-metropolitan county. In non-metropolitan areas, the "area median income" is the higher of the county median family income or the statewide non-metropolitan median family income.

Article 34 Referendum

Article 34 of the Constitution of the State of California requires passage of a referendum within a city or county for approval of the development or acquisition of a publicly financed housing project where more than 49 percent of the units are set aside for low-income households.

Assessment District

(See "Benefit Assessment District.")

Assisted Housing

Generally multi-family rental housing, but sometimes single-family ownership units, whose construction, financing, sales prices, or rents have been subsidized by federal, state, or local housing programs including, but not limited to Federal Section 8 (new construction, substantial rehabilitation, and loan management set-asides), Federal Sections 213, 236, and 202, Federal Section 221(d)(3) (below-market interest rate program), Federal Section 101 (rent supplement assistance), CDBG, FmHA Section 515, multi-family mortgage revenue bond programs, local redevelopment and in lieu fee programs, and units developed pursuant to local inclusionary housing and density bonus programs. By January 1, 1992, all California Housing Elements are required to address the preservation or replacement of assisted housing that is eligible to change to market rate housing by 2002.

Auto Mall

A single location that provides sales space and centralized services for a number of automobile dealers, and which may include such related services as auto insurance dealers and credit institutions that provide financing opportunities.

Automobile-Intensive Use

A use of a retail area which depends on exposure to continuous auto traffic.

Base Flood

In any given year, a 100-year flood that has 1 percent likelihood of occurring, and is recognized as a standard for acceptable risk.

Below-Market-Rate Housing Unit

Any housing unit specifically priced to be sold or rented to low- or moderate-income households for an amount less than the fair-market value of the unit. The U.S. Department of Housing and Urban Development sets standards for determining which households qualify as "low income" or "moderate income."

Benefit Assessment District

An area within a public agency's boundaries which receives a special benefit from the construction of one or more public facilities. A Benefit Assessment District has no legal life of its own, and cannot act by itself; it is strictly a financing mechanism for providing public infrastructure. Bonds may be issued to finance the improvements, subject to repayment by assessments charged against the benefitting properties. Creation of a Benefit Assessment District enables property owners in a specific area to cause the construction of public facilities or to maintain them (for example, a downtown, or the grounds and landscaping of a specific area) by contributing their fair share of the construction and/or installation and operating costs.

Bicycle Path (Class I facility)

A paved route not on a street or roadway and expressly reserved for bicycles traversing an otherwise unpaved area. Bicycle paths may parallel roads but typically are separated from them by landscaping.

Bicycle Lane (Class II facility)

A corridor expressly reserved for bicycles, existing on a street or roadway in addition to any lanes for use by motorized vehicles.

Bicycle Route (Class III facility)

A facility shared with motorists and identified only by signs, a bicycle route has no pavement markings or lane stripes.

Bikeways

A term that encompasses bicycle lanes, bicycle paths, and bicycle routes.

Biomass

Plant material, used for the production of such things as fuel alcohol and non-chemical fertilizers. Biomass sources may be plants grown especially for that purpose or waste products from livestock, harvesting, milling, or from agricultural production or processing.

Biotic Community

A group of living organisms characterized by a distinctive combination of both animal and plant species in a particular habitat.

Buffer Zone

An area of land separating two distinct land uses which acts to soften or mitigate the effects of one land use on the other.

Build Out

Development of land to its full potential or theoretical capacity as permitted under the provisions of the General Plan.

California Environmental Quality Act (CEQA)

A State law requiring State and local agencies to regulate activities with consideration for environmental protection. If a proposed activity has the potential for a significant adverse environmental impact, an Environmental Impact Report (EIR) must be prepared and certified as to its adequacy before taking action on the proposed project. General Plans require the preparation of a "program EIR."

California Housing Finance Agency (CHFA)

A State agency, established by the Housing and Home Finance Act of 1975, which is authorized to sell revenue bonds and generate funds for the development, rehabilitation, and conservation of low-and moderate-income housing.

Caltrans

California Department of Transportation.

Capital Improvements Program (CIP)

A program, administered by a city or county government and reviewed by its planning commission, which schedules permanent improvements, usually for a minimum of five years in the future, to fit the projected fiscal capability of the local jurisdiction. The program generally is reviewed annually, for conformance to and consistency with the general plan.

Carrying Capacity

The level of land use, human activity, or development for a specific area that can be accommodated permanently without an irreversible change in the quality of air, water, land, or plant and animal habitats. Carrying capacity also refers to the upper limits beyond which the quality of human life, health, welfare, safety, or community character within an area will be impaired.

Census

The official decennial enumeration of the population conducted by the federal government.

Channelization

(1) The straightening and/or deepening of a watercourse for purposes of storm-runoff control or ease of navigation. Channelization often includes lining of stream banks with a retaining material such as concrete. (2) At the intersection of roadways, the directional separation of traffic lanes through the use of curbs or raised islands which limit the paths that vehicles may take through the intersection.

Clustered Development

Development in which a number of dwelling units are placed in closer proximity than usual, or are attached, with the purpose of retaining an open space area.

Cogeneration

The harnessing of heat energy, that normally would be wasted, to generate electricity--usually through the burning of waste.

Community Care Facility

Elderly housing licensed by the State Health and Welfare Agency, Department of Social Services, typically for residents who are frail and need supervision. Services normally include three meals daily, housekeeping, security and emergency response, a full activities program, supervision in the dispensing of medicine, personal services such as assistance in grooming and bathing, but no nursing care. Sometimes referred to as residential care or personal care. (See "Congregate Care.")

Community Child Care Agency

A non-profit agency established to organize community resources for the development and improvement of child care services.

Community Development Block Grant (CDBG)

A grant program administered by the U.S. Department of Housing and Urban Development (HUD) on a formula basis for entitlement communities, and by the State Department of Housing and Community Development (HCD) for non-entitled jurisdictions. This grant allots money to cities and counties for housing rehabilitation and community development, including public facilities and economic development.

Community Facilities District

Under the Mello-Roos Community Facilities Act of 1982 (Government Code Section 53311 *et. seq.*), a legislative body may create within its jurisdiction a special district that can issue tax-exempt bonds for the planning, design, acquisition, construction, and/or operation of public facilities, as well as provide public services to district residents. Special tax assessments levied by the district are used to repay the bonds.

Community Noise Equivalent Level (CNEL)

A 24-hour energy equivalent level derived from a variety of single-noise events, with weighting factors of 5 and 10 dBA applied to the evening (7 PM to 10 PM) and nighttime (10 PM to 7 AM) periods, respectively, to allow for the greater sensitivity to noise during these hours.

Compatible

Capable of existing together without conflict or ill effects.

Comparison Goods

Retail goods for which consumers will do comparison shopping before making a purchase. These goods tend to have a style factor and to be "larger ticket" items such as clothes, furniture, appliances and automobiles.

Condominium

A structure of two or more units, the interior spaces of which are individually owned; the balance of the property (both land and building) is owned in common by the owners of the individual units. (See "Townhouse.")

Congestion Management Plan (CMP)

A mechanism employing growth management techniques, including traffic level of service requirements, development mitigation programs, transportation systems management, and capital improvement programming, for the purpose of controlling and/or reducing the cumulative regional traffic impacts of development. AB 1791, effective August 1, 1990, requires all cities, and counties that include urbanized areas, to adopt and annually update a Congestion Management Plan.

Congregate Care

Apartment housing, usually for seniors, in a group setting that includes independent living and sleeping accommodations in conjunction with shared dining and recreational facilities. (See "Community Care Facility.")

Conservation

The management of natural resources to prevent waste, destruction, or neglect. The state mandates that a Conservation Element be included in the general plan.

Consistent

Free from variation or contradiction. Programs in the General Plan are intended to be consistent, not contradictory or preferential. State law requires consistency between a general plan and implementation measures such as the zoning ordinance.

Convenience Goods

Retail items generally necessary or desirable for everyday living, usually purchased at a convenient nearby location. Because these goods cost relatively little compared to income, they are often purchased without comparison shopping.

Covenants, Conditions, and Restrictions (CC&Rs)

A term used to describe restrictive limitations which may be placed on property and its use, and which usually are made a condition of holding title or lease.

Criterion; Criteria

The standard(s) upon which a judgment or decision may be based. (See "Standards.")

Critical Facility

Facilities housing or serving many people which are necessary in the event of an earthquake or flood, such as hospitals, fire, police, and emergency service facilities, utility "lifeline" facilities, such as water, electricity, and gas supply, sewage disposal, and communications and transportation facilities.

Cul-de-sac

A short street or alley with only a single means of ingress and egress at one end and with a large turnaround at its other end.

Cumulative Impact

As used in CEQA, the total impact resulting from the accumulated impacts of individual projects or programs over time.

dB

Decibel; a unit used to express the relative intensity of a sound as it is heard by the human ear.

dBA

The "A-weighted" scale for measuring sound in decibels; weighs or reduces the effects of low and high frequencies in order to simulate human hearing. Every increase of 10 dBA doubles the perceived loudness though the noise is actually ten times more intense.

Dedication

The turning over by an owner or developer of private land for public use, and the acceptance of land for such use by the governmental agency having jurisdiction over the public function for which it will be used. Dedications for roads, parks, school sites, or other public uses often are made conditions for approval of a development by the county or a city.

Dedication, In lieu of

Cash payments which may be required of an owner or developer as a substitute for a dedication of land, usually calculated in dollars per lot, and referred to as in lieu fees or in lieu contributions.

Defensible space

(1) In fire-fighting and prevention, a 30-foot area of non-combustible surfaces separating urban and wildland areas. (2) In urban areas, open spaces, entry points, and pathways configured to provide maximum opportunities to rightful

users and/or residents to defend themselves against intruders and criminal activity.

Density, Residential

The number of permanent residential dwelling units per acre of land. Densities specified in the General Plan may be expressed in units per acre.

Density Bonus

The allocation of development rights that allow a parcel to accommodate additional square footage or additional residential units beyond the maximum for which the parcel is zoned, usually in exchange for the provision or preservation of an amenity at the same site or at another location. Under California law, a housing development that provides 20 percent of its units for lower income households, or 10 percent of its units for very low-income households, or 50 percent of its units for seniors, is entitled to a density bonus. (See "Development Rights, Transfer of.")

Density, Control of

A limitation on the occupancy of land. Density can be controlled through zoning in the following ways: use restrictions, minimum lot-size requirements, floor area ratios, land use-intensity ratios, setback and yard requirements, minimum house-size requirements, ratios comparing number and types of housing units to land area, limits on units per acre, and other means. Allowable density often serves as the major distinction between residential districts.

Density, Employment

A measure of the number of employed persons per specific area (for example, employees/acre).

Design Review; Design Control

The comprehensive evaluation of a development and its impact on neighboring properties and the community as a whole, from the standpoint of site and landscape design, architecture, materials, colors, lighting, and signs, in accordance with a set of adopted criteria and standards. "Design Control" requires that certain specific things be done and that other things not be done. Design Control language is most often found within a zoning ordinance. "Design Review" usually refers to a system set up outside of the zoning ordinance, whereby projects are reviewed against certain standards and criteria by a specially established design review board or committee. (See "Architectural Control.")

Destination Retail

Retail businesses that generate a special purpose trip and which do not necessarily benefit from a high-volume pedestrian location.

Detention Dam/Basin/Pond

Dams may be classified according to the broad function they serve, such as storage, diversion, or detention. Detention dams are constructed to retard flood runoff and minimize the effect of sudden floods. Detention dams fall into two main types. In one type, the water is temporarily stored, and released through an outlet structure at a rate which will not exceed the carrying capacity of the channel downstream. Often, the basins are planted with grass and used for open space or recreation in periods of dry weather. In the other type, most often called a ***Retention Pond***, the water is held as long as possible and may or may not allow for the controlled release of water. In some cases, the water is allowed to seep into the permeable banks or gravel strata in the foundation. This latter type is sometimes called a ***Water-Spreading Dam*** or ***Dike*** because its main purpose is to recharge the underground water supply. Detention dams are also constructed to trap sediment. These are often called ***Debris Dams***.

Developable Land

Land which is suitable as a location for structures and which can be developed free of hazards to, and without disruption of, or significant impact on, natural resource areas.

Development

The physical extension and/or construction of urban or rural land uses. Development activities include: subdivision of land; construction or alteration of structures, roads, utilities, and other facilities; installation of septic systems; grading; deposit of refuse, debris, or fill materials; and clearing of natural vegetative cover (with the exception of agricultural activities). Routine repair and maintenance activities are not considered to be "development."

Development, New

A proposed development for which no legal entitlement or approval exists.

Development Project

An individual development, which has been approved, or which is currently proposed by an applicant or potential applicant for approval.

Development Rights

The right to develop land consistent with the provisions of local, State, and federal law and existing case law.

Discretionary Decision

As used in CEQA, an action taken by a governmental agency which calls for the exercise of judgment in deciding whether to approve and/or how to carry out a project.

Diversion

The direction of water in a stream away from its natural course (*i.e.*, as in a diversion that removes water from a stream for human use).

Duplex

A detached building under single ownership which is designed for occupation as the residence of two families living independently of each other.

Dwelling Unit

A room or group of rooms (including sleeping, eating, cooking, and sanitation facilities, but not more than one kitchen), which constitutes an independent housekeeping unit, occupied or intended for occupancy by one household on a long-term basis.

Easement

Usually the right to use property owned by another for specific purposes or to gain access to another property. For example, utility companies often have easements on the private property of individuals to be able to install and maintain utility facilities.

Easement, Conservation

A tool for acquiring open space with less than full-fee purchase, whereby a public agency buys only certain specific rights from the land owner. These may be positive rights (providing the public with the opportunity to hunt, fish, hike, or ride over the land), or they may be restrictive rights (limiting the uses to which the land owner may devote the land in the future.)

Easement, Scenic

A tool that allows a public agency to use an owner's land for scenic enhancement, such as roadside landscaping or vista preservation.

Elderly Housing

Typically one- and two-bedroom apartments or condominiums designed to meet the needs of persons 62 years of age and older or, if more than 150 units, persons 55 years of age and older, and restricted to occupancy by them. (See "Congregate Care.")

Emergency Shelter

A facility which provides immediate and short-term housing and supplemental services for the homeless. Shelters come in many sizes, but an optimum size is considered to be 20 to 40 beds. Supplemental services may include food, counseling, and access to other social programs. (See "Homeless" and "Transitional Housing.")

Eminent Domain

The right of a public entity to acquire private property for public use by condemnation, and the payment of just compensation.

Emission Standard

The maximum amount of pollutant legally permitted to be discharged from a single source, either mobile or stationary.

Environment

CEQA defines environment as "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, mineral, flora, fauna, noise, and objects of historic or aesthetic significance."

Environmental Impact Report (EIR)

A report required of general plans by the California Environmental Quality Act and which assesses all the environmental characteristics of an area and determines what effects or impacts will result if the area is altered or disturbed by a proposed action. (See "California Environmental Quality Act.")

Environmental Impact Statement (EIS)

Under the National Environmental Policy Act, a statement on the effect of development proposals and other major actions which significantly affect the environment.

Erosion

(1) The loosening and transportation of rock and soil debris by wind, rain, or running water. (2) The gradual wearing away of the upper layers of earth.

Exaction

A contribution or payment required as an authorized precondition for receiving a development permit; usually refers to mandatory dedication (or fee in lieu of dedication) requirements found in many subdivision regulations.

Expansive Soils

Soils which swell when they absorb water and shrink as they dry.

Fair Market Rent

The rent, including utility allowances, determined by the United States Department of Housing and Urban Development for purposes of administering the Section 8 Existing Housing Program.

Fault

A fracture in the earth's crust forming a boundary between rock masses that have shifted.

Finding(s)

The result(s) of an investigation and the basis upon which decisions are made. Findings are used by government agents and bodies to justify action taken by the entity.

Fire Hazard Zone

An area where, due to slope, fuel, weather, or other fire-related conditions, the potential loss of life and property from a fire necessitates special fire protection measures and planning before development occurs.

Fire-resistive

Able to withstand specified temperatures for a certain period of time, such as a one-hour fire wall; not fireproof.

Fiscal Impact Analysis

A projection of the direct public costs and revenues resulting from population or employment change to the local jurisdiction(s) in which the change is taking place. Enables local governments to evaluate relative fiscal merits of general plans, specific plans, or projects.

Fiscal Impact Report

A report projecting the public costs and revenues that will result from a proposed program or development.

Flood, 100-Year

The magnitude of a flood expected to occur on the average every 100 years, based on historical data. The 100-year flood has a 1/100, or one percent, chance of occurring in any given year.

Flood Insurance Rate Map (FIRM)

For each community, the official map on which the Federal Insurance Administration has delineated areas of special flood hazard and the risk premium zones applicable to that community.

Flood Plain

The relatively level land area on either side of the banks of a stream regularly subject to flooding. That part of the flood plain subject to a one percent chance of flooding in any given year is designated as an "area of special flood hazard" by the Federal Insurance Administration.

Flood Plain Fringe

All land between the floodway and the upper elevation of the 100-year flood.

Floodway

The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the "base flood" without cumulatively increasing the water surface elevation more than 1 foot. No development is allowed in floodways.

Floor Area Ratio (FAR)

The gross floor area permitted on a site divided by the total net area of the site, expressed in decimals to one or two places. For example, on a site with 10,000 net sq. ft. of land area, a Floor Area Ratio of 1.0 will allow a maximum of 10,000 gross sq. ft. of building floor area to be built. On the same site, a FAR of 1.5 would allow 15,000 sq. ft. of floor area; a FAR of 2.0 would allow 20,000 sq. ft.; and a FAR of 0.5 would allow only 5,000 sq. ft. Also commonly used in zoning, FARs typically are applied on a parcel-by-parcel basis as opposed to an average FAR for an entire land use or zoning district.

Footprint; Building Footprint

The outline of a building at all of those points where it meets the ground.

Gateway

A point along a roadway entering a community at which a motorist gains a sense of having left the environs and of having entered the community.

Geologic Review

The analysis of geologic hazards, including all potential seismic hazards, surface ruptures, liquefaction, landsliding, mudsliding, and the potential for erosion and sedimentation.

Geologic(al)

Pertaining to rock or solid matter.

Goal

A general, overall, and ultimate purpose, aim, or end toward which the County will direct effort.

Granny Flat

(See "Second Unit.")

Grasslands

Land in which grasses are the predominant vegetation.

Ground Settlement

(1) The drop in elevation of a ground surface caused by settling or compacting. (2) The gradual downward movement of an engineered structure due to compaction. Differential settlement is uneven settlement, where one part of a structure settles more or at a different rate than another part.

Groundwater

Water under the earth's surface, often confined to aquifers capable of supplying wells and springs.

Groundwater Recharge

The natural process of infiltration and percolation of rainwater from land areas or streams through permeable soils into water-holding rocks which provide underground storage ("aquifers").

Growth Management

The use by a community of a wide range of techniques in combination to determine the amount, type, and rate of development desired by the community and to channel that growth into designated areas. Growth management policies can be implemented through growth rates, zoning, capital improvement programs, public facilities ordinances, urban limit lines, standards for levels of service, and other programs. (See "Congestion Management Plan.")

Guidelines

General statements of policy direction around which specific details may be later established.

Habitat

The physical location or type of environment in which an organism or biological population lives or occurs.

Handicapped

A person determined to have a mobility impairment or mental disorder expected to be of long or indefinite duration. Many such impairments or disorders are of such a nature that a person's ability to live independently can be improved by appropriate housing conditions.

Hazardous Material

Any substance that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. The term includes, but is not limited to, hazardous substances and hazardous wastes.

High-Occupancy Structure

All pre-1935 buildings with over 25 occupants, and all pre-1976 buildings with more than 100 occupants.

Hillsides

Land which has an average percent of slope equal to or exceeding 10 percent.

Historic; Historical

A historic building or site is one which is noteworthy for its significance in local, state, or national history or culture, its architecture or design, or its works of art, memorabilia, or artifacts.

Historic Preservation

The preservation of historically significant structures and neighborhoods until such time as, and in order to facilitate, restoration and rehabilitation of the building(s) to a former condition.

Home Occupation

A commercial activity conducted solely by the occupants of a particular dwelling unit in a manner incidental to residential occupancy.

Homeless

Persons and families who lack a fixed, regular, and adequate nighttime residence. Includes those staying in temporary or emergency shelters or who are accommodated with friends or others with the understanding that shelter is being provided as a last resort. California Housing Element law, Section 65583(c)(1) requires all cities and counties to address the housing needs of the homeless. (See "Emergency Shelter" and "Transitional Housing.")

Households, Number of

The count of all year-round housing units occupied by one or more persons. The concept of *household* is important because the formation of new households generates the demand for housing. Each new household formed creates the need for one additional housing unit or requires that one existing housing unit be shared by two households. Thus, household formation can continue to take place even without an increase in population, thereby increasing the demand for housing.

Household Income

The cumulative income of all members of a household.

- *Very Low Income Households* are those with an annual income no greater than 50 percent of the County's median family income adjusted by household size, as determined by a survey of incomes conducted by a city or a county, or in the absence of such a survey, based on the latest available eligibility limits established by the U.S. Department of Housing and Urban Development (HUD) for the Section 8 housing program.
- *Low Income Households* are those with an annual income between 50 and 80 percent of the County's median family income adjusted by household size, as determined by a survey of incomes conducted by a city or a county, or in the absence of such a survey, based on the latest available eligibility limits established by the U.S. Department of Housing and Urban Development (HUD) for the Section 8 housing program.
- *Moderate Income Households* are those with an annual income between 80 and 120 percent of the County's median family income adjusted by household size, as determined by a survey of incomes conducted by a city or a county, or in the absence of such a survey, based on the latest available eligibility limits established by the U.S. Department of Housing and Urban Development (HUD) for the Section 8 housing program.
- *Above Moderate Households* are those with an annual income greater than 120 percent of the County's median family income adjusted by household size, as determined by a survey of incomes conducted by a city or a county, or in the absence of such a survey, based on the latest available eligibility limits established by the U.S. Department of Housing and Urban Development (HUD) for the Section 8 housing program.

Housing Unit

The place of permanent or customary abode of a person or family. A housing unit may be a single-family dwelling, a multi-family dwelling, a condominium, a modular home, a mobile home, a cooperative, or any other residential unit considered real property under State law. A housing unit has, at least, cooking facilities, a bathroom, and a place to sleep. It also is a dwelling that cannot be moved without substantial damage or unreasonable cost. (See "Dwelling Unit.")

Hydrocarbons

A family of compounds containing carbon and hydrogen in various combinations. They are emitted into the atmosphere from manufacturing, storage and handling, or combustion of petroleum products and through natural processes. Certain hydrocarbons interact with nitrogen oxides in the presence of intense sunlight to form photochemical air pollution.

Impact

The effect of any direct man-made actions or indirect repercussions of man-made actions on existing physical, social, or economic conditions.

Impact Fee

A fee, also called a development fee, levied on the developer of a project by a city, county, or other public agency as compensation for otherwise-unmitigated impacts the project will produce. California Government Code Section 66000, *et. seq*. specifies that development fees shall not exceed the estimated reasonable cost of providing the service for which the fee is charged. To lawfully impose a development fee, the public agency must verify its method of calculation and document proper restrictions on use of the fund.

Impervious Surface

Surface through which water cannot penetrate, such as roof, road, sidewalk, and paved parking lot. The amount of impervious surface increases with development and establishes the need for drainage facilities to carry the increased runoff.

Implementation

Actions, procedures, programs, or techniques that carry out policies.

Infill Development

Development of vacant land (usually individual lots or left-over properties) within areas which are already largely developed.

Infrastructure

Public services and facilities, such as sewage-disposal systems, water-supply systems, other utility systems, and roads.

Inhibit

An action which would inhibit achievement of some stated objective or condition is one which would serve to constrain or obstruct achievement of that objective or condition.

Inter-Agency, Intergovernmental

Indicates activities involving two or more discrete agencies in regard to a specific program.

Intermittent Stream

A stream that normally flows for at least thirty (30) days after the last major rain of the season and is dry a large part of the year.

Issues

Important unsettled community matters or problems that are identified in a community's general plan and dealt with by the plan's goals, objectives, policies, plan proposals, and implementation programs.

Jobs/Housing Balance; Jobs/Housing Ratio

The availability of affordable housing for employees. The jobs/housing ratio divides the number of jobs in an area by the number of employed residents. A ratio of 1.0 indicates a balance. A ratio greater than 1.0 indicates a net in-commute; less than 1.0 indicates a net out-commute.

Joint Powers Authority (JPA)

A legal arrangement that enables two or more units of government to share authority in order to plan and carry out a specific program or set of programs that serves both units.

Land Banking

The purchase of land by a local government for use or resale at a later date. "Banked lands" have been used for development of low- and moderate-income housing, expansion of parks, and development of industrial and commercial centers. Federal rail-banking law allows railroads to bank unused rail corridors for future rail use while allowing interim use as trails.

Landmark

Refers to a building, site, object, structure, or significant tree, having historical, architectural, social, or cultural significance and marked for preservation by the local, state, or federal government.

Landscaping

Planting--including trees, shrubs, and ground covers--suitably designed, selected, installed, and maintained as to enhance a site or roadway permanently.

Landslide

A general term for a falling mass of soil or rocks.

Land Use

The occupation or utilization of land or water area for any human activity, environmental preservation, or any other purpose defined in the RCIP.

L_{dn}

Day-Night Average Sound Level. The A-weighted average sound level for a given area (measured in decibels) during a 24-hour period with a 10 dB weighting applied to night-time sound levels. The Ldn is approximately numerically equal to the CNEL for most environmental settings.

L_{eq}

The energy equivalent level, defined as the average sound level on the basis of sound energy (or sound pressure squared). The L_{eq} is a "dosage" type measure and is the basis for the descriptors used in current standards, such as the 24-hour CNEL used by the State of California.

Level of Service (LOS)

(1) A scale that measures the amount of traffic a roadway may be capable of handling on a roadway or at the intersection of roadways. Levels range from A to F, with A representing the highest level of service, as follows:

- ***Level of Service A*** Indicates a relatively free flow of traffic, with little or no limitation on vehicle movement or speed.

- ***Level of Service B*** Describes a steady flow of traffic, with only slight delays in vehicle movement and speed. All queues clear in a single signal cycle.

- ***Level of Service C*** Denotes a reasonably steady, high-volume flow of traffic, with some limitations on movement and speed, and occasional backups on critical approaches.

- ***Level of Service D*** Denotes the level where traffic nears an unstable flow. Intersections still function, but short queues develop and cars may have to wait through one cycle during short peaks.

- ***Level of Service E*** Describes traffic characterized by slow movement and frequent (although momentary) stoppages. This type of congestion is considered severe, but is not uncommon at peak traffic hours, with frequent stopping, long-standing queues, and blocked intersections.

- ***Level of Service F*** Describes unsatisfactory stop-and-go traffic characterized by "traffic jams" and stoppages of long duration. Vehicles at signalized intersections usually have to wait through one or more signal changes, and "upstream" intersections may be blocked by the long queues.

(2) Some communities in California are developing standards for levels of service relating to municipal functions such as police, fire, and library service. These standards are incorporated in the General Plan or in separate "Level of Service Plans."

Linkage

With respect to jobs/housing balance, a program designed to offset the impact of employment on housing need within a community, whereby project approval is conditioned on the provision of housing units or the payment of an equivalent in-lieu fee. The linkage program must establish the cause-and-effect relationship between a new commercial or industrial development and the increased demand for housing.

Liquefaction

The transformation of loose water-saturated granular materials (such as sand or silt) from a solid into a liquid state. A type of ground failure that can occur during an earthquake.

Local Agency Formation Commission (LAFCO)

The five-member commission within each county that reviews and evaluates all proposals for formation of special districts, incorporation of cities, annexation to special districts or cities, consolidation of districts, and merger of districts with cities. Each county's LAFCo is empowered to approve, disapprove, or conditionally approve such proposals. The five LAFCo members generally include two county supervisors, two city council members, and one member representing the general public. Some LAFCos include members who are directors of special districts.

Lot of Record

A lot which is part of a recorded subdivision or a parcel of land which has been recorded at the county recorder's office containing property tax records, and which existed at the time of adoption of the any component of the RCIP.

L_{10}

A statistical descriptor indicating peak noise levels; the sound level exceeded 10 percent of the time. It is a commonly used descriptor of community noise, and has been used in Federal Highway Administration standards and the standards of some cities.

Manufactured Housing

Residential structures which are constructed entirely in the factory, and which since June 15, 1976, have been regulated by the federal Manufactured Home Construction and Safety Standards Act of 1974 under the administration of the U.S. Department of Housing and Urban Development (HUD). (See "Mobile Home" and "Modular Unit.")

Marsh

Any area designated as marsh or swamp on the largest scale United States Geologic Survey topographic map most recently published. A marsh usually is an area periodically or permanently covered with shallow water, either fresh or saline.

Median, Median Strip

The dividing area, either paved or landscaped, between opposing lanes of traffic on a roadway.

Mercalli Intensity Scale

A subjective measure of the observed effects (human reactions, structural damage, geologic effects) of an earthquake. Expressed in Roman numerals from I to XII.

Metropolitan

Of, relating to, or characteristic of the Los Angeles area in general.

Microclimate

The climate of a small, distinct area, such as a city street or a building's courtyard; can be favorably altered through functional landscaping, architecture, or other design features.

Mineral Resource

Land on which known deposits of commercially viable mineral or aggregate deposits exist. This designation is applied to sites determined by the State Division of Mines and Geology as being a resource of regional significance, and is intended to help maintain the quarrying operations and protect them from encroachment of incompatible land uses.

Mining

The act or process of extracting resources, such as coal, oil, or minerals, from the earth.

Ministerial (Administrative) Decision

An action taken by a governmental agency which follows established procedures and rules and does not call for the exercise of judgment in deciding whether to approve a project.

Mixed-Use

Properties on which various uses, such as office, commercial, institutional, and residential, are combined in a single building or on a single site in an integrated development project with significant functional interrelationships and a coherent physical design. A "single site" may include contiguous properties.

Mobile Home

A structure, transportable in one or more sections, built on a permanent chassis and designed for use as a single-family dwelling unit and which (1) has a minimum of 400 square feet of living space; (2) has a minimum width in excess of 102 inches; (3) is connected to all available permanent utilities; and (4) is tied down (a) to a permanent foundation on a lot either owned or leased by the homeowner or (b) is set on piers, with wheels removed and skirted, in a mobile home park under a lease with a minimum period of one year. (See "Manufactured Housing" and "Modular Unit.")

Modular Unit

A factory-fabricated, transportable building or major component designed for use by itself or for incorporation with similar units on-site into a structure for residential, commercial, educational, or industrial use. A modular unit does not have any chassis or permanent hitch to allow future movement. (See "Mobile Home" and "Manufactured Housing.")

Multiple Family Building

A detached building designed and used exclusively as a dwelling by three or more families occupying separate suites.

National Ambient Air Quality Standards (NAAQS)

The prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified geographical area.

National Environmental Policy Act (NEPA)

An act passed in 1974 establishing federal legislation for national environmental policy, a council on environmental quality, and the requirements for environmental impact statements.

National Flood Insurance Program

A federal program which authorizes the sale of federally subsidized flood insurance in communities where such flood insurance is not available privately.

National Historic Preservation Act

A 1966 federal law that established a National Register of Historic Places and the Advisory Council on Historic Preservation, and which authorized grants-in-aid for preserving historic properties.

National Register of Historic Places

The official list, established by the National Historic Preservation Act, of sites, districts, buildings, structures, and objects significant in the nation's history or whose artistic or architectural value is unique.

Natural State, natural Condition

The condition existing prior to development.

Necessary

That which is essential or required to achieve the desired result or condition.

Need

A condition requiring supply or relief. The County may act upon findings of need within or on behalf of the community.

Neighborhood

According to one widely-accepted concept of planning, the neighborhood unit should be the basic building block of a community. It is based on the elementary school, with other community facilities located at its center and arterial streets at its perimeter. The distance from the school to the perimeter should be a comfortable walking distance for a school-age child; there would be no through traffic uses. Limited industrial or commercial would occur on the perimeter where arterials intersect. This was the model for American suburban development after World War II.

Nitrogen Oxide(s)

A reddish brown gas that is a byproduct of combustion and ozone formation processes. Often referred to as NOX, this gas gives smog its "dirty air" appearance.

Noise

Any sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. Noise, simply, is "unwanted sound."

Noise Attenuation

Reduction of the level of a noise source using a substance, material, or surface, such as earth berms and/or solid concrete walls.

Noise Contour

A line connecting points of equal noise level as measured on the same scale. Noise levels greater than the 60 Ldn contour (measured in dBA) require noise attenuation in residential development.

Non-attainment

The condition of not achieving a desired or required level of performance. Frequently used in reference to air quality.

Objective

A specific statement of desired future condition toward which the County will expend effort in the context of striving to achieve a broader goal. An objective should be achievable and, where possible, should be measurable and time-specific. The State Government Code (Section 65302) requires that general plans spell out the "objectives," principles, standards, and proposals of the general plan. "The addition of 100 units of affordable housing by 1995" is an example of an objective.

Open Space, Open Space Land

Any parcel or area of land or water which is essentially in its natural condition, and is devoted to an open space use for the purposes of (1) the preservation of natural resources, (2) the managed production of resources, (3) outdoor recreation, or (4) public health and safety.

Ordinance

A law or regulation set forth and adopted by a governmental authority, usually a city or county.

Ozone

A tri-atomic form of oxygen (O_3) created naturally in the upper atmosphere by a photochemical reaction with solar ultraviolet radiation. In the lower atmosphere, ozone is a recognized air pollutant that is not emitted directly into the environment, but is formed by complex chemical reactions between oxides of nitrogen and reactive organic compounds in the presence of sunlight, and becomes a major agent in the formation of smog.

Parcel

A lot, or contiguous group of lots, in single ownership or under single control, usually considered a unit for purposes of development.

Parking, Shared

A public or private parking area used jointly by two or more uses.

Parking Area, Public

An open area, excluding a street or other public way, used for the parking of automobiles and available to the public, whether for free or for compensation.

Parking Management

An evolving TDM technique designed to obtain maximum utilization from a limited number of parking spaces. Can involve pricing and preferential treatment for HOVs, non-peak period users, and short-term users. (See "High Occupancy Vehicle" and "Transportation Demand Management.")

Parking Ratio

The number of parking spaces provided per 1,000 square of floor area, *e.g.*, 2:1 or "two per thousand."

Parks

Open space lands whose primary purpose is recreation. (See "Open Space Land," "Community Park," and "Neighborhood Park.")

Passive Solar System

A system that distributes collected heat via direct transfer from a thermal mass rather than mechanical power. Passive systems rely on building design and materials to collect and store heat and to create natural ventilation for cooling. (See "Active Solar System.")

Peak Hour/Peak Period

For any given roadway, a daily period during which traffic volume is highest, usually occurring in the morning and evening commute periods. Where "F" Levels of Service are encountered, the "peak hour" may stretch into a "peak period" of several hours' duration.

Performance Standards

Plan provisions that permit uses or regulate their intensity based on a particular set of standards of operation, rather than on particular type of use. Performance standards provide specific criteria limiting noise, air pollution, emissions, odors, vibration, dust, dirt, glare, heat, fire hazards, wastes, traffic impacts, and visual impact of a use.

Physical Diversity

A quality of a site, community, area, or region in which are found a variety of architectural styles, natural landscapes, and/or land uses.

Planning Area

The area addressed by the RCIP or any component thereof.

Policy

A specific statement of principle or of guiding actions which implies clear commitment but is not mandatory. A general direction that a governmental agency sets to follow, in order to meet its goals and objectives before undertaking an action program. (See "Program.")

Pollutant

Any introduced gas, liquid, or solid that makes a resource unfit for its normal or usual purpose.

Pollution

The presence of matter or energy whose nature, location, or quantity produces undesired environmental effects.

Pollution, Non-Point

Sources for pollution which are less definable and usually cover broad areas of land, such as agricultural land with fertilizers which are carried from the land by runoff, or automobiles.

Pollution, Point

In reference to water quality, a discrete source from which pollution is generated before it enters receiving waters, such as a sewer outfall, a smokestack, or an industrial waste pipe.

Preserve, n.

An area in which beneficial uses in their present condition are protected; for example, a nature preserve.

Principle

An assumption, fundamental rule, or doctrine that will guide general plan policies, proposals, standards, and implementation measures. The State Government Code (Section 65302) requires that general plans spell out the objectives, "principles," standards, and proposals of the general plan. "Adjacent land uses should be compatible with one another" is an example of a principle.

Program

An action, activity, or strategy carried out in response to adopted policy to achieve a specific goal or objective. Policies and programs establish the "who," "how" and "when" for carrying out the "what" and "where" of goals and objectives.

Pro Rata

Refers to the proportionate distribution of the cost of infrastructure improvements associated with new development to the users of the infrastructure on the basis of projected use.

Recreation, Active

A type of recreation or activity which requires the use of organized play areas including, but not limited to, softball, baseball, football and soccer fields, tennis and basketball courts and various forms of children's play equipment.

Recreation, Passive

Type of recreation or activity which does not require the use of organized play areas.

Recycle, v.

The process of extraction and reuse of materials from waste products.

Regional

Pertaining to activities or economies at a scale greater than that of an individual community, and affecting a broad homogeneous area.

Regulation

A rule or order prescribed for managing government.

Rehabilitation

The repair, preservation, and/or improvement of substandard housing.

Residential

Land designated or used for dwelling units. May be vacant or unimproved. (See "Dwelling Unit.")

Residential, Multiple Family

Usually three or more dwelling units on a single site, which may be in the same or separate buildings.

Residential, Single-family

A single dwelling unit on a building site.

Resources, Non-renewable

Refers to natural resources, such as fossil fuels and natural gas, which, once used, cannot be replaced and used again.

Retention Basin/Retention Pond

(See "Detention Basin/Detention Pond.")

Retrofit, v.

To add materials and/or devices to an existing building or system to improve its operation or efficiency.

Richter Scale

A measure of the size or energy release of an earthquake at its source. The scale is logarithmic; the wave amplitude of each number on the scale is 10 times greater than that of the previous whole number.

Rideshare

A travel mode other than driving alone, such as buses, rail transit, carpools, and vanpools.

Ridgeline

A line connecting the highest points along a ridge and separating drainage basins or small-scale drainage systems from one another.

Right-of-way

A strip of land occupied or intended to be occupied by certain transportation and public use facilities, such as roadways, railroads, and utility lines.

Riparian Lands

Riparian lands are comprised of the vegetative and wildlife areas adjacent to perennial and intermittent streams. Riparian areas are delineated by the existence of plant species normally found near freshwater.

Risk

The danger or degree of hazard or potential loss.

Runoff

That portion of rain or snow which does not percolate into the ground and is discharged into streams instead.

Scenic Highway Corridor

The area outside a highway's right-of-way that is generally visible to persons travelling on the highway.

Scenic Highway/Scenic Route

A highway, road, drive, or street which, in addition to its transportation function, provides opportunities for the enjoyment of natural and man-made scenic resources and access or direct views to areas or scenes of exceptional beauty or historic or cultural interest. The aesthetic values of scenic routes often are protected and enhanced by regulations governing the development of property or the placement of outdoor advertising.

Second Unit

A Self-contained living unit, either attached to or detached from, and in addition to, the primary residential unit on a single lot. Sometimes called "Granny Flat."

Section 8 Rental Assistance Program

A federal (HUD) rent-subsidy program which is the main source of federal housing assistance for low-income households. The program operates by providing "housing assistance payments" to owners, developers, and public housing agencies to make up the difference between the "Fair Market Rent" of a unit (set by HUD) and the household's contribution toward the rent, which is calculated at 30 percent of the household's adjusted gross monthly income.

"Section 8" includes programs for new construction, existing housing, and substantial or moderate housing rehabilitation.

Seiche

An earthquake-generated wave in an enclosed body of water such as a lake, reservoir, or bay.

Seismic

Caused by or subject to earthquakes or earth vibrations.

Senior Housing

(See "Elderly Housing.")

Seniors

Persons age 62 and older.

Setback

The horizontal distance between the property line and any structure.

Shared Living

The occupancy of a dwelling unit by persons of more than one family in order to reduce housing expenses and provide social contact, mutual support, and assistance. Shared living facilities serving six or fewer persons are permitted in all residential districts by Section 1566.3 of the California Health and Safety Code.

Sign

Any representation (written or pictorial) used to convey information, or to identify, announce, or otherwise direct attention to a business, profession, commodity, service, or entertainment, and placed on, suspended from, or in any way attached to, any structure, vehicle, or feature of the natural or manmade landscape.

Significant Effect

A beneficial or detrimental impact on the environment. May include, but is not limited to, significant changes in an area's air, water, and land resources.

Siltation

(1) The accumulating deposition of eroded material. (2) The gradual filling in of streams and other bodies of water with sand, silt, and clay.

Single-family Dwelling, Attached

A dwelling unit occupied or intended for occupancy by only one household that is structurally connected with at least one other such dwelling unit. (See "Townhouse.")

Single-family Dwelling, Detached

A dwelling unit occupied or intended for occupancy by only one household that is structurally independent from any other such dwelling unit or structure intended for residential or other use. (See "Family.")

Single Room Occupancy (SRO)

A single room, typically 80-250 square feet, with a sink and closet, but which requires the occupant to share a communal bathroom, shower, and kitchen.

Site

A parcel of land used or intended for one use or a group of uses and having frontage on a public or an approved private street. A lot. (See "Lot.")

Slope

Land gradient described as the vertical rise divided by the horizontal run, and expressed in percent.

Species, Candidate

Any species of plant or animal which has been identified by the appropriate state of federal agency for possible addition to the listing of threatened plants and animals.

Species, Endangered

Any species of plant or animal which is in danger of extinction throughout all or a significant portion of its range.

Species, Rare or Threatened

Any species of plant or animal which, although not endangered, is likely to become endangered in the foreseeable future.

Soil

The unconsolidated material on the immediate surface of the earth created by natural forces that serves as natural medium for growing land plants.

Solid Waste

General category that includes organic wastes, paper products, metals, glass, plastics, cloth, brick, rock, soil, leather, rubber, yard wastes, and wood. Organic wastes and paper products comprise about 75 percent of typical urban solid waste.

Specific Plan

Under Article 8 of the Government Code (Section 65450 *et seq*), a legal tool for detailed design and implementation of a defined portion of the area covered by a General Plan. A specific plan may include all detailed regulations, conditions, programs, and/or proposed legislation which may be necessary or convenient for the systematic implementation of any General Plan element(s).

Sphere of Influence

The probable ultimate physical boundaries and service area of a local agency (city or district) as determined by the Local Agency Formation Commission (LAFCO) of the County.

Standards

(1) A rule or measure establishing a level of quality or quantity that must be complied with or satisfied. The State Government Code (Section 65302) requires that general plans spell out the objectives, principles, "standards," and proposals of the general plan. Examples of standards might include the number of acres of park land per 1,000 population that the community will attempt to acquire and improve, or the "traffic Level of Service" (LOS) that the plan hopes to attain. (2) Requirements in a zoning ordinance that govern building and development as distinguished from use restrictions; for example, site-design regulations such as lot area, height limit, frontage, landscaping, and floor area ratio.

Storm Runoff

Surplus surface water generated by rainfall that does not seep into the earth but flows overland to flowing or stagnant bodies of water.

Structure

Anything constructed or erected which requires location on the ground (excluding swimming pools, fences, and walls used as fences).

Subdivision

The division of a tract of land into defined lots, either improved or unimproved, which can be separately conveyed by sale or lease, and which can be altered or developed. "Subdivision" includes a condominium project as defined in Section 1350 of the California Civil Code and a community apartment project as defined in Section 11004 of the Business and Professions Code.

Subdivision Map Act

Division 2 (Sections 66410 *et seq*) of the California Government code, this act vests in local legislative bodies the regulation and control of the design and improvement of subdivisions, including the requirement for tentative and final maps. (See "Subdivision.")

Subregional

Pertaining to a portion of a region. WRCOG and CVAG are subregional agencies.

Subsidence

The gradual settling or sinking of an area with little or no horizontal motion. (See "Ground Settlement.")

Subsidize

To assist by payment of a sum of money or by the granting of terms or favors that reduce the need for monetary expenditures. Housing subsidies may take the forms of mortgage interest deductions or tax credits from federal and/or state income taxes, sale or lease at less than market value of land to be used for the construction of housing, payments to supplement a minimum affordable rent, and the like.

Substandard Housing

Residential dwellings which, because of their physical condition, do not provide safe and sanitary housing.

Substantial

Considerable in importance, value, degree, or amount.

Topography

Configuration of a surface, including its relief and the position of natural and man-made features.

Townhouse; Townhome

A one-family dwelling in a row of at least three such units in which each unit has its own front and rear access to the outside, no unit is located over another unit, and each unit is separated from any other unit by one or more common and fire-resistant walls. Townhouses usually have separate utilities; however, in some condominium situations, common areas are serviced by utilities purchased by a homeowners association on behalf of all townhouse members of the association. (See "Condominium.")

Traffic Analysis Zone

In a mathematical traffic model the area to be studied is divided into zones, with each zone treated as producing and attracting trips. The production of trips by a zone is based on the number of trips to or from work or shopping, or other trips produced per dwelling unit.

Traffic Model

A mathematical representation of traffic movement within an area or region based on observed relationships between the kind and intensity of development in specific areas. Many traffic models operate on the theory that trips are produced by persons living in residential areas and are attracted by various non-residential land uses. (See "Trip.")

Transit

The conveyance of persons or goods from one place to another by means of a local, public transportation system.

Transit-dependent

Refers to persons unable to operate automobiles or other motorized vehicles, or those who do not own motorized vehicles. Transit-dependent citizens must rely on transit, para-transit, or owners of private vehicles for transportation. Transit-dependent citizens include the young, the handicapped, the elderly, the poor, and those with prior violations in motor vehicle laws.

Transit, Public

A system of regularly-scheduled buses and/or trains available to the public on a fee-per-ride basis. Also called "Mass Transit."

Transitional Housing

Shelter provided to the homeless for an extended period, often as long as 18 months, and generally integrated with other social services and counseling programs to assist in the transition to self-sufficiency through the acquisition of a stable income and permanent housing. (See "Homeless" and "Emergency Shelter.")

Transportation Demand Management (TDM)

A strategy for reducing demand on the road system by reducing the number of vehicles using the roadways and/or increasing the number of persons per vehicle. TDM attempts to reduce the number of persons who drive alone on the roadway during the commute period and to increase the number in carpools, vanpools, buses and trains, walking, and biking. TDM can be an element of TSM (see below).

Transportation Systems Management (TSM)

A comprehensive strategy developed to address the problems caused by additional development, increasing trips, and a shortfall in transportation capacity. Transportation Systems Management focuses on more efficiently utilizing existing highway and transit systems rather than expanding them. TSM measures are characterized by their low cost and quick implementation time frame, such as computerized traffic signals, metered freeway ramps, and one-way streets.

Trip

A one-way journey that proceeds from an origin to a destination via a single mode of transportation; the smallest unit of movement considered in transportation studies. Each trip has one "production end," (or origin--often from home, but not always), and one "attraction end," (destination). (See "Traffic Model.")

Trip Generation

The dynamics that account for people making trips in automobiles or by means of public transportation. Trip generation is the basis for estimating the level of use for a transportation system and the impact of additional development or transportation facilities on an existing, local transportation system. Trip generations of households are correlated with destinations that attract household members for specific purposes.

Tsunami

A large ocean wave generated by an earthquake in or near the ocean.

Undevelopable

Specific areas where topographic, geologic, and/or surficial soil conditions indicate a significant danger to future occupants and a liability to the agency are designated as “undevelopable” by the agency.

Undue

Improper, or more than necessary.

Uniform Building Code (UBC)

A national, standard building code which sets forth minimum standards for construction.

Urban Design

The attempt to give form, in terms of both beauty and function, to selected urban areas or to whole cities. Urban design is concerned with the location, mass, and design of various urban components and combines elements of urban planning, architecture, and landscape architecture.

Use

The purpose for which a lot or structure is or may be leased, occupied, maintained, arranged, designed, intended, constructed, erected, moved, altered, and/or enlarged in accordance with the City's zoning ordinance and General Plan land use designations.

Utility Corridors

Rights-of-way or easements for utility lines on either publicly or privately owned property. (See "Right-of-way" or "Easement.")

Vacant

Lands or buildings which are not actively used for any purpose.

Vehicle-Miles Travelled (VMT)

A key measure of overall street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve regional air quality goals.

View Corridor

The line of sight--identified as to height, width, and distance--of an observer looking toward an object of significance to the community (*e.g.*, ridgeline, river, historic building, etc.); the route that directs the viewers attention.

Viewshed

The area within view from a defined observation point.

Volume-to-Capacity Ratio

A measure of the operating capacity of a roadway or intersection, in terms of the number of vehicles passing through, divided by the number of vehicles that theoretically could pass through when the roadway or intersection is operating at its designed capacity. Abbreviated as "v/c." At a v/c ratio of 1.0, the roadway or intersection is operating at capacity. If the ratio is less than 1.0, the traffic facility has additional capacity. Although ratios slightly greater than 1.0 are possible, it is more likely that the peak hour will elongate into a "peak period." (See "Peak Hour" and "Level of Service.")

Watercourse

Natural or once natural flowing (perennially or intermittently) water including rivers, streams, and creeks. Includes natural waterways that have been channelized, but does not include manmade channels, ditches, and underground drainage and sewage systems.

Watershed

The total area above a given point on a watercourse that contributes water to its flow; the entire region drained by a waterway or watercourse which drains into a lake, or reservoir.

Wetlands

Transitional areas between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. Under a "unified" methodology now used by all federal agencies, wetlands are defined as "those areas meeting certain criteria for hydrology, vegetation, and soils."

Wildlife Refuge

An area maintained in a natural state for the preservation of both animal and plant life.

Zoning

The division of the County and cities by legislative regulations into areas, or zones, which specify allowable uses for real property and size restrictions for buildings within these areas; a program that implements policies of the General Plan.

Zoning Map

Government Code Section 65851 permits a legislative body to divide a county, a city, or portions thereof, into zones of the number, shape, and area it deems best suited to carry out the purposes of the zoning ordinance. These zones are delineated on a map or maps, called the Zoning Map.

Appendix A - Circulation

Existing Setting Report

Revised February 2000

Appendix A1 - County Road Design Standards

Existing Setting Report

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Appendix A2 - Tables and Default Values

Appendix A3 - Explanation of Florida Tables

Appendix A4 - Volumes and Lanes: Table of Existing LOS

Existing Setting Report

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Appendix A5 - Riverside Transit Agency System Map Brochure

Appendix B - School Finance

Existing Setting Report

Revised February 2000

Appendix C - Water Purveyors

Appendix D - Noise Level Analyses

Appendix E - Fault Data

Fault Descriptions

This section provides a summary of current technical data and professional views pertaining to surface fault rupture hazards in Riverside County. Most of the faults in Riverside County that are considered a seismic hazard are part of the San Andreas Fault System, which is composed of a number of major fault zones. These include the Elsinore, San Jacinto, San Gorgonio Pass, and San Andreas fault zones. Where applicable, the numerous faults that are collectively grouped within a major "fault zone" are described within the section for their respective zones. In addition, there are numerous faults and smaller scale fault zones within Riverside County that are located outside of the major fault zones, which have been described separately.

The fault information below emphasizes the faults associated with the San Andreas Fault System, and starts with the faults in the west and moves eastward.

CONVERSIONS: 1 mile ~ 1.7 km; 1 inch = 2.54 millimeters.

ELSINORE FAULT ZONE

<u>Classification (age)</u>: Historic/Active

<u>Type of fault zone</u>: Right-lateral strike-slip

<u>Total Length</u>: 250 km

<u>Width</u>: 1.5 to 15 km

<u>Dip</u>: Typically vertical- 90 degrees, except for the Whittier segment, which is a north-dipping thrust/reverse fault.

<u>Slip Rate</u>: ~5 mm/yr (Millman and Rockwell, 1986; Rockwell et al., 2000; Rockwell, 1990; Vaughan and Rockwell, 1986).

<u>Recurrence Time</u>: 240 to 760 years; average 400 years (WGCEP, 1995).

<u>Total Displacement</u>: 10 to 15 km (Hull, 1990; Morton and Miller, 1975; Webber, 1977; Woyski, 1998; Woyski et al., 1991)

<u>Alquist-Priolo quadrangles</u>:

Prado Dam, Corona South, Lake Mathews, Alberhill, Elsinore, Wildomar, Murrieta, Temecula, Pechanga, Pala.

<u>Fault Strands</u>:

Chino (Holocene)

Central Avenue Fault (Pre-Quaternary (?))
Fresno Fault (Holocene (?) to Late Pleistocene)
Tin Mine Fault (Holocene (?) to Late Pleistocene)
Eagle Mountain Fault (Holocene (?) to Late Pleistocene)
Joseph Canyon Fault (Pre-Quaternary)
Glen Ivy North (Holocene)
Glen Ivy South (Holocene)
Walker Fault (Late Quaternary (?))
Wildomar (Holocene)
Willard (Late Quaternary; Holocene (?))
Murrieta Hot Springs (Holocene)
Murrieta Creek (Holocene)
Wolf Valley (Holocene)
Aguanga (Late Pleistocene)
Agua Caliente (Late Pleistocene)
Lancaster/Hot Springs (age unknown; Quaternary (?))
Buck Mesa (Quaternary)
Pechanga Jeep Trail (Quaternary or older)
Agua Tibia Mtn. (age unknown)

The Elsinore Fault Zone is a major northwest-trending right lateral strike-slip fault, which accommodates approximately 10 to 25 % of the plate-boundary slip in southern California (Working Group, 1995). The fault zone strikes north westward and extends approximately 250 km from the Los Angeles basin area southeastward into northern Baja California in Mexico. Faults within the Elsinore Fault Zone, including those within Riverside County, are capable of producing events of magnitude 7 or greater. The Elsinore Fault Zone exists in the western-most portion of Riverside County for approximately 75 km along the eastern escarpment of the Santa Ana Mountains.

The Elsinore Fault Zone is divided into five segments (from north to south): Whittier, Glen Ivy, Temecula, Julian, and Coyote Mountain (WGCEP, 1995). The segments that reside in Riverside County include the southeastern end of the Whittier, the Glen Ivy, the Temecula, and the northwest end of the Julian. All of these segments are active and with the possible exceptions of the M~6 1910 Temescal Valley event on the Glen Ivy segment, the Elsinore Fault in Riverside County has not produced a major earthquake with surface rupture during the past 200 years (WGCEP, 1995).

One historical surface rupture earthquake has occurred on the Elsinore Fault Zone within Riverside County, which was the M ~ 6.0 Temescal Valley Earthquake in 1910, which occurred in the area of the Glen Ivy faults. For more information regarding these earthquakes, visit the Southern California Earthquake Center (SCEC) on the web: www.scecdc.scec.org/clickmap.html

SAN JACINTO FAULT ZONE

Classification (age): Historic/Active

Type of fault: Right-lateral strike-slip

Total Length: ~230 km

Width: 0.5 to 15 km

Dip: Typically vertical (90 degrees)

Slip Rate: 10 to 12 mm/yr (Rockwell et al., 1990; Sharp, 1981).

Recurrence Time: 140 to 250 years (WGCEP, 1995).

Total Displacement: 16 to 27 km (Powell, 1993; Sharp, 1967).

Alquist Priolo quadrangles:

Sunnymead, San Bernardino South, El Casco, San Jacinto, NE 1/4 Hemet, NW 1/4 Idyllwild, SW 1/4 and SE 1/4 Idyllwild, Bucksnort Mtn., Collins Valley, Clark Lake NE, Clark Lake, Fonts Point, SW 1/4 Palm Desert, Borrego, Palm Canyon, Borrego Sink, Borrego Mountain, Shell Reef, Borrego Mountain SE, Harpers Well.

Fault Strands:

Claremont (Holocene)
Casa Loma & Park Hill (Holocene)
Clark (Holocene)
Hot Springs (Late Quaternary; Holocene)
Thomas Mountain (Holocene)
Buck Ridge (Late Quaternary)
Coyote Creek (Holocene)
Potrero (Quaternary)
Mt. Eden (Quaternary)
Toro Peak (Late Quaternary)
Lost Valley (Pre-Quaternary); located west of SJFZ.
Terwilliger Valley (Quaternary ?); located west of SJFZ.

The northwest trending San Jacinto Fault Zone accommodates between 15 to 25% of the strike-slip motion between the Pacific and North American Plates in southern California (WGCEP, 1995). The fault zone is approximately 230 km long, strikes north westward, and extends from the southern San Gabriel Mountains in the northwest, to northern Baja California toward the southeast. It is capable of producing earthquakes of greater than 7.0, and is exposed for approximately 100 km in Riverside County. Within Riverside County, the San Jacinto Fault Zone is located on the west side of San Timoteo Canyon, and the San Jacinto and the Santa Rosa Mountains.

The slip rate on the San Jacinto Fault Zone is estimated in the range of 10 to 12 mm/yr. This value is second only to the San Andreas Fault in southern California, which exhibits slip rates in the range of 25-37 mm/yr. To assist in putting these numbers in perspective, a slip rate of 10 mm/yr produces 10 km of offset in 1 million years. The San Jacinto Fault Zone has the highest rate of microseismicity (small earthquakes) and historic (past 200 years) earthquakes of any other fault zone in southern California.

Based on fault geometry, historical seismicity, and slip rate the Working Group on California Earthquake Probabilities (WGCEP, 1995) divided the fault zone into 5 segments. The segments, include, from north to south, the San Bernardino Valley, San Jacinto Valley, Anza, Coyote Creek, Superstition Hills, and Superstition Mountain (WGCEP, 1995). All of these segments are active, and many have produced surface rupture during the past 200 years.

Notable historical earthquakes occurring in the San Jacinto Fault Zone in Riverside County include events in1899 (M ~ 6.5) and 1918 (M ~ 6.8) that occurred near San Jacinto-Hemet, an event in 1923 (M ~ 6.3) located near southern San Bernardino Valley, an event in1937 (M ~ 6.0) near Clark Valley, and an earthquake in1980 (M = 5.5) located near Anza. For more information regarding these earthquakes, visit the Southern California Earthquake Center (SCEC) on the web: www.scecdc.scec.org/clickmap.html

SAN ANDREAS FAULT ZONE

Classification: Historic/Active

Type of fault: Right-lateral strike-slip

Total Length: ~1000 km

Width: 0.5 to 15 km

Dip: Typically vertical- 90 degrees, possibly 75 degrees toward the northeast in the San Gorgonio Pass region where the fault may not reach the surface.

Slip Rate: ~12 - 28 mm/yr (Harden and Matti, 1989; Keller et al., 1982; Rasmussen, 1982; Seitz, 1999; Sieh, 1986). Best estimates are likely in the range of ~25 mm/yr.

Total Displacement: ~300 km during the past 10 to 15 million years in central California. The San Andreas Fault Zone in southern California has accrued approximately 150 km of right-lateral offset during the past 4.5 to 5 million years (Powell, 1993).

Alquist-Priolo quadrangles: SE 1/4 Morongo Valley, Desert Hot Springs, Seven Palms Valley, NE 1/4 Thousand Palms, Cathedral City, Myoma, SW 1/4 Lost Horse Mtn., Indio, Thermal Canyon, Mecca, Mortmar, Orocopia Canyon, Salton, Durmid, Frink NW.

Fault strands:

Garnet Hill (late Quaternary, possibly Holocene)
South Branch or Banning Fault (Holocene)
North Branch or Mission Creek Fault (Holocene)
Indio/Coachella Valley segment (Holocene)
Indio Hills (Holocene)
Hidden Springs (Late Quaternary)

Skeleton Canyon (Late Quaternary)
Eagle Canyon (Late Quaternary)
Platform (Late Quaternary)
Painted Canyon (Late Quaternary)
Salt Creek (Late Quaternary)
South Grotto (Late Quaternary)
North Grotto (Late Quaternary)
Dry Lake (Late Quaternary)
Sheephole (Late Quaternary)
Hot Springs (Holocene)

The northwest trending San Andreas Fault Zone (SAFZ) is over 1000 km long and extends from near Cape Mendocino in northern California, to the Salton Sea region in southern California. Like the Elsinore and San Jacinto Fault Zones, the SAFZ is a right-lateral strike-slip fault that typically dips greater than 80 degrees. The SAFZ accommodates approximately 55 - 70% of the relative motion between the North American and Pacific Plates. This fault has been mapped continuously on the surface along its entire length except for the structurally complex region near and just north of the San Gorgonio Pass Fault Zone (SGPFZ; Allen, 1957) in Riverside County. The SGPFZ trends nearly east-west and represents a series of northward dipping compressional (reverse) faults located between San Gorgonio Mountain in the San Bernardino Mountains, and the northern San Jacinto Mountains. In this region, the San Andreas Fault may connect between the southern San Bernardino and northern Coachella segments at depth beneath the north-dipping reverse faults in the SGPFZ (Allen, 1957; Seeber and Armbruster, 1995).

The SAFZ in southern California is composed of numerous segments: the Mojave segment resides north of Riverside County; however, most of the Coachella Valley segment, and the southern most portion of the San Bernardino segment exists within the county. The Coachella Valley segment comprises the southern 100 km of the SAFZ and extends from San Gorgonio Pass to the southeastern edge of the Salton Sea (WGCEP, 1995). The San Bernardino segment is located along the western escarpment of the San Bernardino Mountains and in the northwest region of the San Gorgornio Pass Fault Zone where appears to "die out" on the surface.

The WGCEP (1995) indicated that the Coachella Valley segment has experienced the longest elapsed time since its last surface rupturing earthquake of any on the fault zone, and last experienced a large event around 1680. The 1988 Working Group estimated a recurrence interval for this segment using paleoseismic records of 220 ±13 yr. This section of the fault zone is considered "overdue" for another earthquake.

Notable historical earthquakes on the southern San Andreas fault include the 1948 Desert Hot Springs (M=6.0), and the 1986 North Palm Springs (M=5.6). For more information regarding these earthquakes visit the Southern California Earthquake Center (SCEC) on the web: http://www.scecdc.scec.org/clickmap.html

SAN GORGONIO PASS FAULT ZONE

Classification: Active

Type of fault: Imbricate oblique-reverse and thrust faults possibly associated with high-angle strike-slip tear faults.

Length: ~ 30 km

Width: 3 to 7 km

Dip: The reverse and thrust faults dip northward

Slip Rate: unknown

Total Displacement: Unknown, however, displacement has been mostly vertical during the late Quaternary, and has accommodated only ~1-2 km of right lateral motion during this time (Allen, 1957).

Alquist Priolo quadrangles: Beaumont, Cabazon, Whitewater, Desert Hot Springs

Fault strands:

San Gorgonio Pass
Banning

The San Gorgonio Pass Fault Zone (SGPFZ) is approximately 30 km long, 3-5 km wide, east-west trending, and consists of a complex series of active north-dipping thrust and reverse faults which have been active during the Pleistocene (past 11,000 years). The SGPFZ represents a series of faults that accommodate compression across the San Andreas Fault Zone due to a restraining bend in the San Gorgonio Pass region. The restraining bend is referred to as the San Gorgonio Pass Knot, and has developed during the Pleistocene. This fault zone has created new faults to accommodate the Quaternary compression associated with the San Gorgonio Pass Knot, which we refer to as the San Gorgonio Fault(s), and has reactivated the Banning Fault, which accrued at least 16-25 km of late Cenozoic right slip in the San Gorgonio Pass region (see Allen, 1957, and Matti et al. 1992). As speculated by Allen (1957), and later supported by Seeber and Armbruster (1995), the San Andreas Fault may continue at depth below the north-dipping reverse (high angle dip) and thrust (low angle dip) faults of the SGPFZ. Allen (1957) indicated that recent displacements (Late Quaternary) on the SGPFZ have probably been largely vertical with less than 1 mile of strike-slip movement.

BEAUMONT FAULT ZONE

Matti et al. (1992) applied the name Beaumont Plain Fault Zone to a series of northwest-trending en-echelon fault scarps that traverse late Quaternary alluvial deposits in the vicinity of Beaumont. They indicate that most of the scarps face northwest that they appear to have formed by normal dip-slip displacements. The fault zone is approximately 11 km long, 3 km wide, and consists of approximately 3 to 4 sub-faults.

FAULTS IN THE SOUTHWESTERN MOJAVE DESERT

Late Cenozoic faults east of the San Andreas Fault in eastern Riverside County principally fall into two types: North to north-northwest trending high angle right lateral strike-slip, and east-west trending high angle left lateral.

The north to north-northwest trending high angle strike-slip faults consist of the Long Canyon, Burnt Mountain and Eureka Peak Faults, which are active (Holocene), and the Coxcomb Mountain, Sheep Hole, Palen Mountain, Iron Mountain, Little Maria Mountain Faults which are possibly Pliocene to Pleistocene in age. These faults are discussed below.

The east-west trending left lateral faults in this region very in activity, with the youngest unit's offset representing older alluvial units of Pleistocene age. Thus, these faults pose little seismic hazard to the sparse population in the region, however few specific studies for each of these faults have been conducted. The most active of these faults is the Blue Cut Fault.

These faults are discussed below:

LONG CANYON, BURNT MOUNTAIN, EUREKA PEAK FAULTS

The northern sections of the Burnt Mountain and Eureka Peak Faults were associated with the 1992 Landers earthquake (Historic; Jennings, 1994; Treiman, 1992). These faults pose a seismic threat to the communities of Yucca Valley and as far south as Desert Hot Springs.

Long Canyon: The long Canyon Fault is a north trending, high angle, right lateral strike-slip fault which is approximately 11 km long and located just north of the North Branch of the San Andreas Fault east of Desert Hot Springs. Jennings (1994) indicates that this fault has been active in the Holocene (Active; referenced work done by Mark Rymer, 1993).

Burnt Mountain: This fault is a north trending, high angle, right lateral strike-slip fault. As delineated by ground rupture during the 1992 Landers Earthquake in Yucca Valley, the Burnt Mountain Fault is approximately 7 km long and extends south from State Highway 62. The fault probably continues southward to the southern escarpment of the Little San Bernardino Mountains just north of the San Andreas Fault. Thus, the fault may be as long as 20 km.

Eureka Peak: The Eureka Peak Fault is a north trending, high angle, right lateral strike-slip fault, and extends to the southeast from near State Highway 62 following the Lower Covington Flat Wash area along much of its trace. The Landers earthquake ruptured the ground along this fault with maximum horizontal displacements of approximately eight inches (Treiman, 1993).

SHEEP HOLE, COXCOMB MOUNTAIN, PALEN MOUNTAIN, LITTLE MARIA MOUNTAIN, GRANITE MOUNTAIN, RICE VALLEY, DRY WASH, AND BLYTHE FAULTS

Powell (1981) indicated that a series of northwest-trending right-lateral faults likely exist in the southwestern Mojave Desert in eastern Riverside County that may exhibit between 60 to 140 km of cumulative displacement, however, this number is not well resolved. These types of faults probably continue toward the northwest, north of Riverside County and terminate near the Garlock Fault in the southern Sierra Nevada Mountains.

The age and total amount of displacement across these faults is not well understood at this time, however, none appear to have had Holocene displacement. Some of these faults are discussed below.

Sheep Hole and Coxcomb Mountain: Sheep Hole and Coxcomb Mountain Faults northwest have been proposed to reside along the western flank of the Coxcomb Mountains (Hope, 1966; Powell, 1981). These faults are mostly concealed beneath valley fill and are suggested primarily based on right-laterally offset basement rock units exposed in the local ranges; however, Hope (1966) indicated that at one locality, the Sheep Hole Fault offsets an olivine basalt capped by alluvium which may be Pleistocene in age. Hope (1966) indicated that the Sheep Hole Fault [and Coxcomb Mountain Fault] probably represents a major fault break which has right-laterally offset a pendant of metasediments approximately 0.8 miles.

Palen Mountain: Powell (1981) suggested that this fault exhibits about 3 kilometers of right-lateral separation based on offset crystalline basement rocks exposed in the Palen and McCoy Mountains.

BLUE CUT, PORCUPINE WASH-SUSBSTATION, SMOKE TREE WASH-VICTORY PASS, CHIRIACO, CORN SPRINGS, SHIP CREEK, AND SALT CREEK-AZTEC MINE WASH FAULTS

Other faults that pose a seismic hazard in eastern Riverside County include a series of parallel, east-west trending, left lateral strike-slip faults, which include from north to south, the Blue Cut, Porcupine Wash-Substation, Smoke Tree Wash-Victory Pass, Chiriaco, Corn Springs, Ship Creek, and Salton Creek-Aztec Mine Wash Faults (Powell, 1981; Treiman, J.A., 1992; Treiman, J.A., 1993; Jennings, 1994). These faults are described below:

Blue Cut Fault: The Blue Cut Fault has an approximately 80 km trace stretching from the western foot of the Little San Bernardino Mountains to the eastern edge of Pinto Basin, and terminates at both ends against northwest-trending faults (Hope, 1966; Powell, 1981). Where not buried by recent alluvium, the fault zone has a marked surface expression and is typically 90-300 meters wide (Hope, 1966). At the western Little San Bernardino Mountains and Hexie Mountains, the Blue Cut Fault exhibits left-lateral separation of nearly 6 km, and a small dip-slip component (Hope, 1966; also see Powell, 1981). At the eastern end in the Pinto and Eagle Mountain region, the

Blue Cut Fault exhibits ~8 km of left lateral separation (Hope, 1966). The fault terminates eastward prior to the Coxcomb Mountains because no trace of the fault occurs within the crystalline rocks of that range (Powell, 1981). Fault deformation features presented by Hope (1966), indicate that the Blue Cut Fault was active during the Pleistocene, and possibly in the Holocene depending on the upper age of deformed alluvial fans, which is uncertain.

Porcupine and Substation Faults: The east-west trending Porcupine Fault exhibits approximately 3 km of left lateral separation, and some small scarps in older alluvium which indicates slight Quaternary activity (Hope, 1966; also see Powell, 1981). The Porcupine Fault may extend eastward beneath sediments and connect with the Substation Fault. This is supported by the nearly identical left-slip separation of basement rock units of 3 km (Hope, 1966; Powell, 1981), and that the two faults line up in map view. However, Powell (1981), indicates that the lithologies and contacts between the two faults are not broken, suggesting that the two faults may not align.

Smoke Tree Wash and Victory Pass Faults: The Smoke Tree Wash fault offsets crystalline rock contacts about 1 km in a left lateral sense, and has produced scarps in all but the youngest alluvium (Powell, 1981). This fault may be as long as 25 km (Powell, 1981). The Victory Pass Fault resides east of the Smoke Tree Wash Fault in the southeastern Eagle Mountains, about 4 km south of the Substation Fault (Powell, 1981). The fault left laterally offsets a quartz latite dike swarm and a trace of the early Red Cloud thrust 1.5 km (Powell, 1981). At its eastern end, the fault passes beneath the alluvium of Chuckwalla Valley; at its western end, it dies out along the north margin of Big Wash (Powell, 1981). As with the Porcupine Wash and Substation Faults, the Victory Pass and Smoke Tree Wash Faults are not continuous at the surface (Powell, 1981).

Chiriaco Fault: The east-west trending Chiriaco Fault exhibits approximately 11 km of left lateral separation and 0.5 km of vertical separation determined by offset contacts and structures in the exposed basement rocks of the surrounding hills (Powell, 1975). No surface expression of the Chiriaco Fault has been found (Powell, 1981), however, the offset of basement rock features, the linearity of the valley and its bounding escarpments, and an east-west negative Bouguer gravity anomaly at the eastern end of the valley (Biehler et al., 1964; Rotstein et al., 1976), have been interpreted to reflect the presence of a fault in the subsurface. The fault is covered by undeformed Holocene sediments (Powell, 1975). The fault truncates Eocene Maniobra and lower Miocene Diligencia formations, and is covered by Pleistocene Ocotillo conglomerate west of Chiriaco Summit (Powell, 1975). Thus, the fault has not been active during the Holocene (10,000yrs), and possibly may not have been active during the Pleistocene (1.6 Ma to 10,000 years ago; Powell, 1975, 1981).

Corn Springs Wash Faults: The Corn Springs Wash Fault exhibits 2.5 to 3.0 km of left lateral offset of several contacts and lithologies associated with the Mesozoic batholithic rocks (Powell, 1981). The western end of the fault swings northwestward to disappear beneath alluvium, after which it may either merge with the Chiriaco Fault, or swing westward to connect with a fault along the north flank of the Orocopia Mountains (Powell, 1981). Fault activity postdates three geomorphic events: a colluvial unit a meter or two thick, deposition of caliche, and fluvial down cutting to the present stream level (Powell, 1981). These data indicate that the fault is older than Holocene.

Ship Creek Fault: The Ship Creek Fault is located in the Chuckalla Mountains and left laterally offsets Precambrian and Mesozoic lithologic units and contacts approximately 2 kilometers (Powell, 1981). Alluvial material is faulted against crystalline rock at least two localities, and at its west end, fault displacement dies out in a fold which left laterally bends steeply dipping lithologic units in older basement rocks (Powell, 1981). The east end of the fault disappears beneath alluvial material east of the Chuckwalla Mountains (1981).

Salton Creek (wash) and Aztec Mine Wash Faults: The Salton Creek Fault trends east-west and is located in the wash region south of the Orocopia Mountains and north of the northernmost Chocolate Mountains. Jennings (1994) indicates that this fault offsets Quaternary age units (< 1.6 Ma). No surface break in the alluvium has been recognized east of the Salton Creek Fault, however, a lineament visible from orbital photographs does occur (Powell, 1981).

The Aztec Mine Wash Fault (Powell, 1981) is located east of the Salton Creek Fault in the southern Chuckawalla Mountains. This fault offsets an intrusive contact in crystalline basement rocks left laterally approximately 8 km (Powell, 1981). The fault also truncates lower Miocene rocks which overlie the crystalline basement (Powell, 1981). The fault does not appear to significantly offset the relatively old alluvial unit exposed at the drainage divide southeast of Gulliday Wash, and does not offset younger alluvium (Holocene ?)(Powell, 1981).

PRE-QUATERNARY "BASEMENT" FAULTS THROUGHOUT RIVERSIDE COUNTY

Quite a few Pre-Quaternary faults exist in Riverside County that are no longer active and were involved in deformation with either earlier phases of the San Andreas Fault System or tectonics that pre-date the San Andreas Fault System. These faults are not considered a fault hazard in terms of producing an earthquake, however, they may require some consideration during development of a site. For example, an onsite fault may influence issues regarding slope stability, groundwater, or clay soils within the zone of shear.

Selected faults that fall into this category includes:

Palm Canyon (South of Palm Springs).
Deep Canyon Fault (South of Palm Springs).
Indio Mountain (SE of Palm Desert).
Martinez (Santa Rosa Mountains).
Santa Rosa Shear Zone (Santa Rosa Mountains).
Dillon (Parallel and east of San Andreas Fault).
Clemens Well (East of Mecca Hills).
Whipple Mountain Detachment (NE Riverside County).
Slaughter Tree Wash (NE Riverside County).
Orocopia Thrust/Detachment (Orocopia Mountains).

Numerous Unnamed faults contained in older crystalline basement rocks.

SOUTHERN CALIFORNIA EDISON

Geotechnical Investigation Report
Lakeview Substation

Nuevo, Riverside County, California

December 14, 2009
Project # 09-082

SOUTHERN CALIFORNIA EDISON

An EDISON INTERNATIONAL℠ Company

TDBU Civil/Structural & Geotechnical Engineering Group

December 14, 2009

Subject: **GEOTECHNICAL INVESTIGATION REPORT**
Lakeview Substation
Southwest of 10th Street and Reservoir Ave.
Nuevo
Riverside County, California
Project No. 09-082

Geotechnical Engineering Group TDBU has prepared this report to present the findings of the geotechnical investigation performed for the proposed Lakeview Substation located southwest of the intersection of 10th Street and Reservoir Avenue in Nuevo, Riverside County, California. The subject substation can be developed from a geotechnical standpoint to support the proposed structures, provided the findings, conclusions, and recommendations presented in this report are incorporated in the preparation of the final grading plan, foundation design, and construction of the project.

The recommendations contained herein are contingent upon adequate monitoring of the geotechnical aspects of the construction.

If you should have any questions, please feel free to contact the undersigned.

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APPENDICES

1.0 INTRODUCTION

This report presents the findings of the geotechnical investigation performed for the proposed Lakeview Substation located southwest of the intersection of 10th Street and Reservoir Avenue in Nuevo, Riverside County, California (see *Figure 1. Site Location Map).*

The purposes of this investigation were to determine the nature and engineering properties of the subsurface soils and to provide preliminary recommendations regarding general site-grading, foundation design and construction. The site plan is included in this report as *Figure 2. Approximate Boring Location Map.*

No site grading plan was available at the time this report was prepared. The site earthwork and design recommendations provided in this report should be considered preliminary. The final grading plan should be reviewed for compliance with the design recommendations.

2.0 PROJECT DESCRIPTION

2.1 Site Location Description

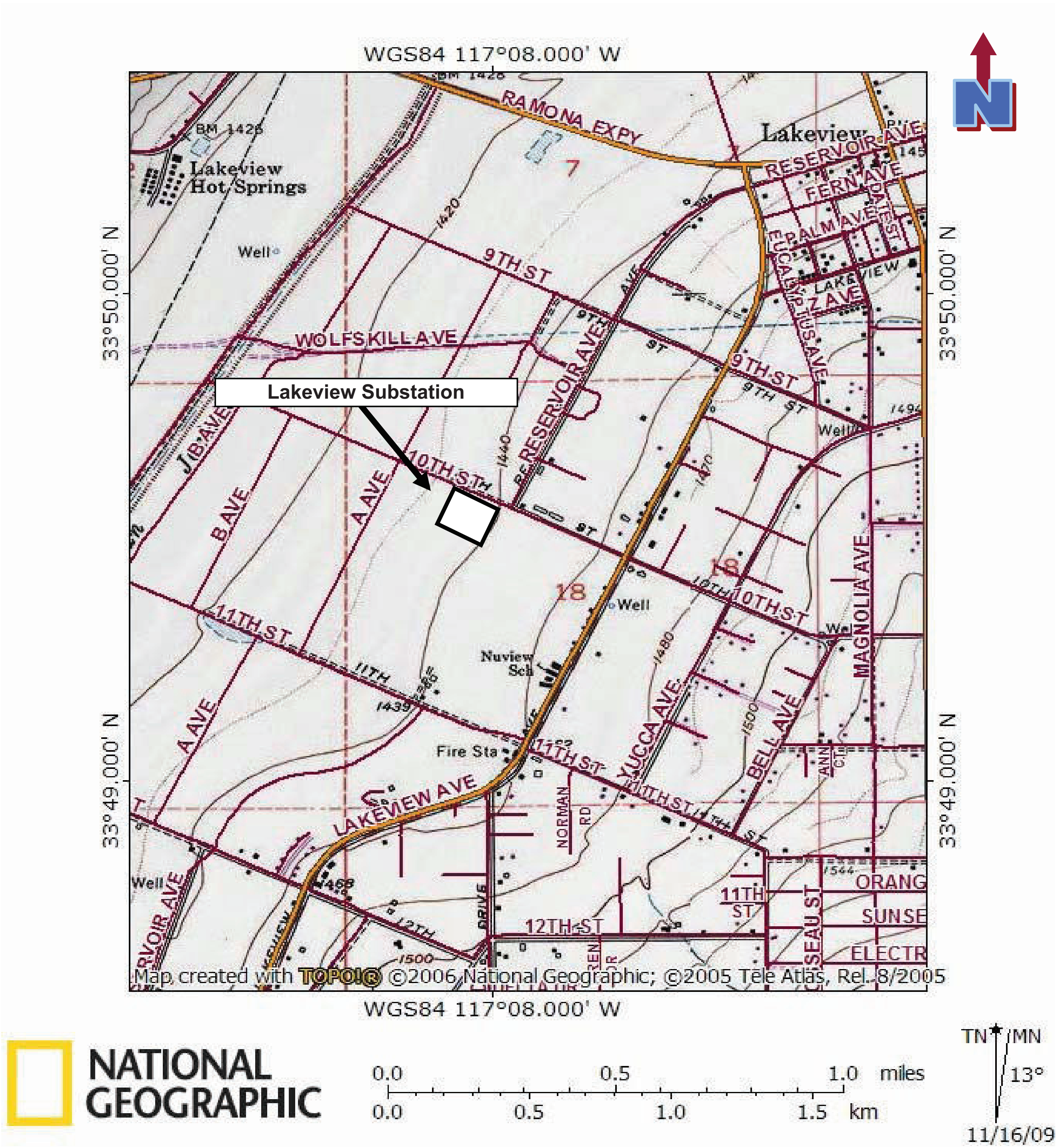
The proposed Lakeview Substation is a rectangular parcel measuring approximately 500 feet by 500 feet. The site comprises approximately 5 acres of flat farmland at an elevation of 1440 feet. The site drains to the northwest towards the San Jacinto River. A water well occurs near the northeast property corner outside the proposed substation. The water will is on a concrete pad covered by a steel plate and is not currently in use. The Perris Reservoir is approximately 2.75 miles northwest of the property and has a retained elevation of 1588 feet.

2.2 Proposed Development

The proposed Lakeview Substation is shown on *Figure 2, Approximately Boring Location Map*. The site is to be graded to accommodate the substation pad.

3.0 FIELD EXPLORATION & LABORATORY TESTING

The scope of the field investigation and the laboratory testing included a review of existing information, site reconnaissance and a subsurface exploration for geotechnical soil sampling.



Site Location Map

Project Name: Lakeview Substation

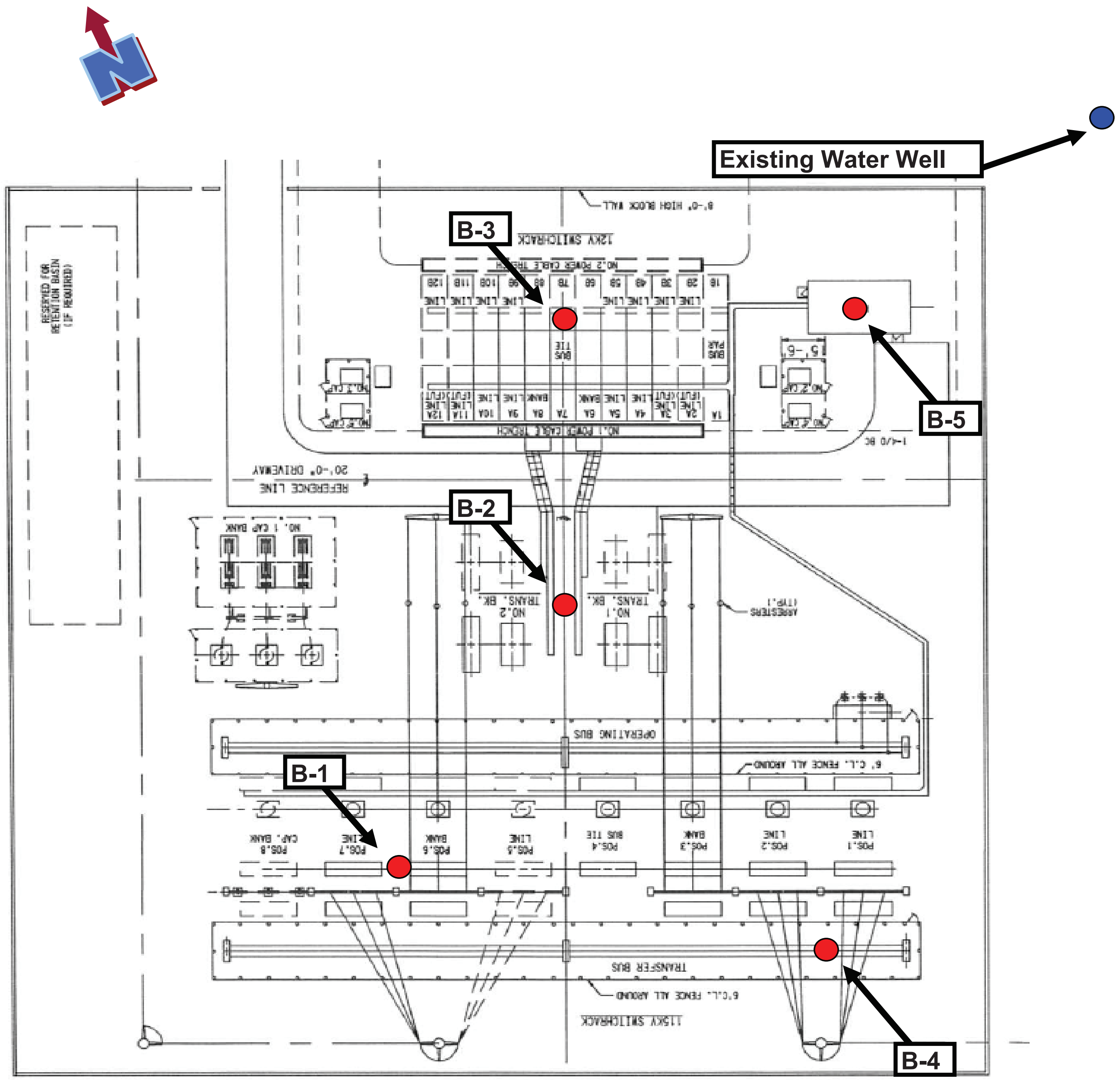
Source: NAT GEO

Location: Riverside, CA

TDBU Civil/Structural & Geotechnical Engineering Group

Figure No.

1



Approximate Boring Locations

Project Name: Lakeview Substation

Source: SCE drawing

Location: Riverside, CA

TDBU Civil/Structural & Geotechnical Engineering Group

Figure No. 2

3.1 Field Exploration

A total of five (5) soil borings were drilled on September 4, 2009. These borings were completed under the observation of a representative of Southern California Edison Geotechnical Engineering Group. The approximate soil boring locations are shown in *Figure 2, Approximate Boring Location Map*.

The borings (BH-1 to BH-5) were drilled within the project site using a truck mounted drill rig equipped with 8-inch diameter hollow-stem augers for soil sampling. The boring depths ranged from 25.5 to 51.5 feet below the existing ground surface (bgs).

Relatively undisturbed thin-walled ring and bulk samples of representative subsurface materials were obtained from the borings for laboratory testing. Standard Penetration Tests (SPTs) were performed starting at 7 feet bgs using a standard split-barrel sampler (1.4 inches inside diameter and 2.0 inches outside diameter).

Boring logs are presented in *Appendix A, Field Exploration* and laboratory test results are presented in *Appendix B, Laboratory Testing Program*.

3.2 Geotechnical Laboratory Testing

Representative samples of the site soils were tested in the laboratory to aid in the soil classification and to evaluate relevant engineering properties of the site soils. These tests included:

- *In situ moisture contents and dry densities (ASTM Standard D2216)*
- *Expansion Index (ASTM Standard D4829)*
- *Soil corrosivity tests (Caltrans 643, 422, 417, and 532)*
- *R-value (ASTM Standard D244, Caltrans 301G)*
- *Grain size distribution (ASTM Standard C136)*
- *Maximum dry density and optimum-moisture content relationship (ASTM Standard D1557)*
- *Direct shear (ASTM Standard D3080)*

For *in situ* moisture content, see the Logs of Borings in *Appendix A*, *Field Exploration*. For laboratory test results, see *Appendix B*, *Laboratory Testing Program.*

4.0 GEOLOGIC SETTING

The project site is in the central portion of the Peninsular Ranges geomorphic province. This province extends northwesterly from Baja California into the Los Angeles Basin. The province is bounded by the Transverse Ranges to the north and the Colorado

Desert to the east. The Peninsular Ranges province is characterized by northwest trending mountains and intervening basins parallel to the major faults and folds in the region. The northwest trending San Jacinto fault zone is approximately 3.5 miles to the northeast.

The site is within Quaternary alluvium of the San Jacinto River (Dibblee, 2003). These materials consist primarily of silty sand and sandy silt with some clay. Bedrock exposed in the hillsides adjacent to the San Jacinto river valley are comprised of quartz diorite.

Faults have not been mapped on or near the project and the site is not within a State of California Alquist-Priolo Earthquake Fault Zone (California Geologic Survey, 2007). The nearest designated Alquist-Priolo Earthquake Fault Zone is associated with the San Jacinto fault, approximately 7.9 kilometers northeast of the site.

5.0 SITE CONDITIONS

5.1 General

This section contains a general description of the subsurface conditions and various materials encountered at the site during the field exploration and a discussion of site-specific geology.

5.2 Subsurface Conditions

The subsurface conditions encountered at the site are discussed below. For additional information on the subsurface conditions, see *Appendix A*, *Field Exploration*. Based on the field observations and site exploration data, the site for the proposed substation is underlain by alluvial deposits consisting of mainly silty sand and sandy silt with some clay to the maximum depth explored of 51.5 feet bgs.

5.3 Groundwater

The site is within the Lakeview Basin of the West San Jacinto River watershed (Metropolitan Water District, 2007). Groundwater occurrence in the Lakeview Basin is within unconfined alluvium with depths greater than 1,000 feet. Producing intervals within the basin range from 300 feet to 1,000 feet. Based on the groundwater contour map for the basin, groundwater is approximately 160 feet below the ground surface. The groundwater gradient near the site is to the northeast.

Groundwater was not encountered in any of the borings drilled to the maximum depth of 51.5 feet bgs. Therefore, groundwater does not need to be considered for design and construction.

It should be noted that the groundwater level could vary depending upon the seasonal precipitation, agriculture irrigation and possible groundwater pumping activity in the site vicinity.

A water well occurs near the northeast corner of the substation property. The well is on a concrete pad covered with a steel plate. The well is not currently being used and is outside the footprint of the current substation. No well records were requested by our geotechnical team. It is our understanding that if there is not a need for the well, Corporate Real Estate (CRE) will take the lead in ensuring the well is properly abandoned and removed from the site (Contact Justin Larson at 714-895-0539).

5.4 Flooding

Based on a review of the Flood Insurance Rate Map (FIRM), the site is in Zone X – areas determined to be outside the 0.2% annual chance floodplain (FEMA, 2008). Based on a review of County of Riverside Flood Zones Maps, the site is not within an area requiring a flood plain review.

5.5 Geotechnical Laboratory Testing Results

Laboratory testing was performed to determine the physical characteristics and engineering properties of the subsurface soils. Results of *in situ* moisture and dry density tests are presented on the Logs of Borings in *Appendix A*, *Field Exploration,* and remaining test results are presented in *Appendix B*, *Laboratory Testing Program.* Discussion on the various test results is presented below:

- *In situ* Moisture and Dry Density – *In situ* dry density at the upper 5 feet ranged from 106 to 121 pcf with corresponding moisture content ranged from 9 to 14 percent, respectively.

- Expansion Index – A representative sample from the upper 5 feet of the site soils was tested to evaluate Expansion Index (EI) in accordance with the ASTM Standard D4829. The value of the measured EI within the upper 5 feet of site soils was 0. These values of EI indicate that the site soils have “Very Low” expansion potential.

- Soil Corrosivity – One representative sample of the site soils were tested to determine soil corrosivity with respect to common construction materials such as concrete and steel. Evaluation of soil corrosivity is presented in Section 8.6, Soil Corrosivity Evaluation.

- Gradation Analysis – Results of three (3) tests indicated the soils tested are silty sand (SM).

- Maximum Dry Density and Optimum Moisture Content – A typical moisture-density relationship of the representative surficial soils are presented in Table 1.

Table 1, Moisture-Density Relationship of Surficial Soil.

Sample Location	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
BH-1 @ 0'-5'	133.0	8.0
BH-2 @ 0'-5'	126.5	9.0
BH-3 @ 0'-5'	134.5	10.0
BH-4 @ 0'-5"	124.5	10.0

- Direct Shear – Eight (8) direct shear tests were performed on representative samples. Tests were performed on relatively undisturbed samples in soaked moisture conditions. Direct shear tests were performed on three ring samples collected at the same depth with a range of normal loads. Results of direct shear tests indicate the soil tested has moderate shear strength.

- R-value Test – An R-value test was performed on a representative bulk soil sample. Based on the test result, the R-value of near surface site soils is 47. This value indicates that the subgrade soil have moderate resistance to traffic loading.

6.0 FAULTING

Based on the available geologic data, the site is not in the Alquist-Priolo Earthquake Fault Zone. The potential for surface rupture at the site due to fault plane displacement propagating to the ground surface during the design life of the project is considered low. An active fault is defined as one that has had surface displacement within Holocene time (about the last 11,000 years). Table No. 2 presents a few major regional active faults near the site.

Table No. 2, Summary of Regional Faults

Fault Name and Section	Approximate Distance (kilometers)	Source Type (A, B, C)	Maximum Magnitude (M_w)	Slip Rate (mm/yr)
SAN JACINTO-SAN JACINTO VALLEY	7.9	B	6.9	12.0
SAN JACINTO-ANZA	22.2	A	7.2	12.0
SAN JACINTO-SAN BERNARDINO	23.3	B	6.7	12.0
ELSINORE-TEMECULA	28.4	B	6.8	5.0
ELSINORE-GLEN IVY	28.4	B	6.8	5.0
SAN ANDREAS - Southern	29.6	A	7.4	24.0
CHINO-CENTRAL AVE. (Elsinore)	40.1	B	6.7	1.0

Although the site could be subjected to strong ground shaking in the event of an earthquake, this hazard is common in Southern California and the effects of ground shaking on the structures can be mitigated by proper engineering design and construction in conformance with 2007 CBC, current building codes and engineering practices.

6.1 Seismic Coefficients

The project site is situated in a seismically active region. As is the case for most areas of Southern California, ground shaking may occur resulting from earthquakes associated with nearby and distant faults. During the life of the project, seismic activity associated with active faults in the area may generate moderate to strong ground shaking at the site.

The seismic site coefficients are determined in accordance with the 2007 California Building Code and ASCE 7-05 Standard (ASCE, 2005) using the United States Geological Survey (USGS, 2007) Earthquake Motion Parameters, Version 5.0.9, program. The site location used was Latitude 33.8259°N and Longitude 117.1339°W with a Site Class "D." The seismic site coefficients under the new code are presented in the following table:

Table 1613.5.2	Site Class Definitions	D
Maximum Considered Earthquake (MCE) Ground Motion		
Figure 1613.5	0.2 second Sort Period Spectral Response, S_s	1.500 g
Figure 1613.5	1 second Spectral Response, S_1	0.600 g
Table 1613.5.3(1)	Site Coefficient, F_a	1.00
Table 1613.5.3(2)	Site Coefficient, F_v	1.50
Design Earthquake Ground Motion		
Short Period Spectral Response, SD_S		1.000 g
1 second Spectral Response, SD_1		0.600 g

6.2 Secondary Effects of Seismic Activity

Secondary effects of seismic activity include surface fault rupture, soil liquefaction, differential settlement and ground lurching, lateral spreading, landslides, earthquake-induced flooding, and seiches. Site-specific potential for each of these seismic hazards is discussed in the following sections.

Surface Fault Rupture*:* The site is not located within a currently designated State of California Earthquake Fault Zone. Based on review of existing geologic information, no known active fault zone crosses the site. The potential for surface rupture resulting from the movement of the nearby major faults is unknown with certainty but is considered low.

Liquefaction: Liquefaction is defined as the phenomenon in which a soil mass due to the development of excess pore pressures, soil mass suffers a substantial reduction in its shear strength. During earthquakes, excess pore pressures may develop in saturated soil deposits as a result of induced cyclic shear stresses, resulting in liquefaction. Soil liquefaction occurs in submerged granular soils during or after strong ground shaking. Due to the absence of shallow groundwater, the project site is not considered susceptible to liquefaction.

Differential Settlement and Ground Lurching: The potential of significant differential settlement at the site during earthquakes is considered to be low. The potential for ground lurching during earthquakes cannot be quantified; however, the potential for the ground lurching is considered to be minimal, and should not be an issue for the project.

Lateral Spreading: Seismically induced lateral spreading involves lateral movement of earth materials due to ground shaking. It differs from a slope failure in that ground failure involving a large movement does not occur due to the flatter slope of the initial ground surface. Lateral spreading is characterized by near-vertical cracks with predominantly horizontal movement of the soil mass involved over the liquefied soils towards and open face. The potential for lateral spreading at subject site is considered low.

Landslides: Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. The site topography is relatively level and the absence of nearby slopes precludes any slope stability hazards. The potential for seismically induced landslides is considered low.

Earthquake-Induced Flooding: This is flooding caused by failure of dams or other water-retaining structures as a result of earthquakes. The Perris Reservoir is approximately 2.75 miles northwest of the project site. The water elevation within the reservoir can be as high as 1588 feet, approximately 148 feet above the site. The site is not downstream from the dam, however. Should a dam failure occur, water flow would be to the southwest away from the site. Therefore, the potential of earthquake-induced flooding of the subject site is considered to be low.

Seiches: Seiches are large waves generated in enclosed bodies of water in response to ground shaking. The Perris Reservoir is approximately 2.75 miles northwest of the project site. The water elevation within the reservoir can be as high as 1588 feet, approximately 148 feet above the site. In the event of an earthquake, a seiche generated from this reservoir could overtop the retention basin, however, based on the distance from the reservoir and the occurrence of the San Jacinto River between the reservoir and the site, it is considered unlikely that a seiche would pose a hazard to the site.

7.0 EARTHWORK/SITE GRADING RECOMMENDATIONS

7.1 General

This section contains the general recommendations regarding earthwork and site grading for the proposed development. These recommendations are based on the results of the field exploration, laboratory testing, and data evaluation as presented in the preceding sections. These recommendations may need to be modified based on observation of the actual field conditions during grading.

Prior to the start of any earthwork, the site should be cleared of all vegetation and debris. The materials resulting from the clearing and grubbing operations should be removed from the site.

The final bottom surfaces of all excavations should be observed and approved by the project soils engineer prior to placing any fill and/or structures. Based on observations, removal of localized areas deeper than those documented may be required during grading. Some variations in the depth and lateral extent of over-excavation recommended in this report should be anticipated.

7.2 Over-excavation/Removal for Proposed Substation Structures

As a minimum, the upper two (2) to three (3) feet of surficial soils over the entire site should be overexcavated, moisture-conditioned, and compacted to at least 90 percent of the maximum dry density to produce a firm and unyielding surface.

- Continuous or isolated footings should be placed on at least 3.5 feet of compacted fill.
- Over-excavation should provide as a minimum of 3.5 feet of structural fill below the bottom of mat foundations and slab-on-grade.
- Over-excavations should extend at least three feet outside foundation footprints.
- The bottom of the foundation excavation should be scarified an additional six inches and compacted to at least 95 percent of the maximum dry density in accordance with ASTM D1557.

The foundation excavations should be backfilled with approved granular materials which should be placed in eight inch lifts or less and compacted to at least 95 percent of the laboratory maximum dry density in accordance with ASTM D1557.

Liquefaction: Liquefaction is defined as the phenomenon in which a soil mass due to the development of excess pore pressures, soil mass suffers a substantial reduction in its shear strength. During earthquakes, excess pore pressures may develop in saturated soil deposits as a result of induced cyclic shear stresses, resulting in liquefaction. Soil liquefaction occurs in submerged granular soils during or after strong ground shaking. Due to the absence of shallow groundwater, the project site is not considered susceptible to liquefaction.

Differential Settlement and Ground Lurching: The potential of significant differential settlement at the site during earthquakes is considered to be low. The potential for ground lurching during earthquakes cannot be quantified; however, the potential for the ground lurching is considered to be minimal, and should not be an issue for the project.

Lateral Spreading: Seismically induced lateral spreading involves lateral movement of earth materials due to ground shaking. It differs from a slope failure in that ground failure involving a large movement does not occur due to the flatter slope of the initial ground surface. Lateral spreading is characterized by near-vertical cracks with predominantly horizontal movement of the soil mass involved over the liquefied soils towards and open face. The potential for lateral spreading at subject site is considered low.

Landslides: Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. The site topography is relatively level and the absence of nearby slopes precludes any slope stability hazards. The potential for seismically induced landslides is considered low.

Earthquake-Induced Flooding: This is flooding caused by failure of dams or other water-retaining structures as a result of earthquakes. The Perris Reservoir is approximately 2.75 miles northwest of the project site. The water elevation within the reservoir can be as high as 1588 feet, approximately 148 feet above the site. The site is not downstream from the dam, however. Should a dam failure occur, water flow would be to the southwest away from the site. Therefore, the potential of earthquake-induced flooding of the subject site is considered to be low.

Seiches: Seiches are large waves generated in enclosed bodies of water in response to ground shaking. The Perris Reservoir is approximately 2.75 miles northwest of the project site. The water elevation within the reservoir can be as high as 1588 feet, approximately 148 feet above the site. In the event of an earthquake, a seiche generated from this reservoir could overtop the retention basin, however, based on the distance from the reservoir and the occurrence of the San Jacinto River between the reservoir and the site, it is considered unlikely that a seiche would pose a hazard to the site.

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Prior to the start of any earthwork, the site should be cleared of all vegetation and debris. The materials resulting from the clearing and grubbing operations should be removed from the site.

The final bottom surfaces of all excavations should be observed and approved by the project soils engineer prior to placing any fill and/or structures. Based on observations, removal of localized areas deeper than those documented may be required during grading. Some variations in the depth and lateral extent of over-excavation recommended in this report should be anticipated.

7.2 Over-excavation/Removal for Proposed Substation Structures

As a minimum, the upper two (2) to three (3) feet of surficial soils over the entire site should be overexcavated, moisture-conditioned, and compacted to at least 90 percent of the maximum dry density to produce a firm and unyielding surface.

- Continuous or isolated footings should be placed on at least 3.5 feet of compacted fill.
- Over-excavation should provide as a minimum of 3.5 feet of structural fill below the bottom of mat foundations and slab-on-grade.
- Over-excavations should extend at least three feet outside foundation footprints.
- The bottom of the foundation excavation should be scarified an additional six inches and compacted to at least 95 percent of the maximum dry density in accordance with ASTM D1557.

The foundation excavations should be backfilled with approved granular materials which should be placed in eight inch lifts or less and compacted to at least 95 percent of the laboratory maximum dry density in accordance with ASTM D1557.

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The foundation excavations should be backfilled with approved granular materials which should be placed in eight inch lifts or less and compacted to at least 95 percent of the laboratory maximum dry density in accordance with ASTM D1557.

7.3 Over-Excavation/Removal for Pavement Areas

In areas receiving asphalt concrete or Portland cement concrete paving, including driveways, street areas, sidewalks, curbs and gutters and other flatwork, the upper two feet of native surficial soils should be excavated. Such over-excavation should extend at least two feet beyond the pavement edges. The pavement sections should be placed on at least one foot of non-expansive fill, moisture conditioned if necessary, and recompacted to at least 95 percent of the laboratory maximum dry density.

7.4 Structural Fill

The approved bottom of the excavations should be scarified to a depth of at least six inches. The scarified soils should be moisture conditioned to within three percent of optimum moisture content for granular soils and above optimum for fine-grained soils and compacted to at least 90 percent of the laboratory maximum dry density if not specified elsewhere in this report to produce a firm and unyielding surface.

All structural fill should be placed on competent, scarified and compacted native materials as determined by the project engineer and in accordance with the specifications presented in this section.

Excavated site soils, free of deleterious materials and rock particles larger than three inches in the largest dimension, should be suitable for placement as compacted fill except where non-expansive soils are specified. The import fill should be non-expansive (expansion potential less than 20). The imported materials should contain sufficient fines (binder material) so as to be relatively impermeable and result in a stable subgrade when compacted. Any import fill should be tested and approved by the project engineer.

Prior to compaction, fill materials should be thoroughly mixed and moisture conditioned where necessary, to within three percent of optimum moisture content for sandy soils and above optimum for fine-grained soils. All fill, if not specified otherwise elsewhere in this report, should be compacted to at least 90 percent of the laboratory maximum dry density in accordance with the ASTM Standard D1557 test method.

- The upper 3.5 feet of fill under structure foundations and at least four feet outside of foundation perimeter should be compacted to at least 95 percent of the laboratory maximum dry density.
- The upper two feet of fill under perimeter wall footings and at least two feet outside of footings should be compacted to at least 95 percent of the laboratory maximum dry density.
- All other fill should be compacted to at least 90 percent of the laboratory maximum dry density in accordance with the ASTM Standard D1557 test method.

At the time of the field investigation, in-situ moisture content of the upper five feet of native soils ranged from 9.0% to 14.0%. The optimum moisture contents range from 8.0% to 10.0%. Therefore, some moisture conditioning/drying may be necessary prior to the material being placed as compacted fill. The amount of processing required for proper moisture conditioning at the site will depend on the seasonal variations in the in-situ moisture conditions, the depth of over-excavation, the equipment, and the processing method.

7.5 Shrinkage and Subsidence

The shrinkage and/or bulkage would depend on, among other factors, the depth of cut and/or fill, and the grading method and equipment utilized. For preliminary estimation, shrinkage factors for various units of earth material at the site may be taken as presented below:

- In computing fill quantities, the approximate shrinkage factor for the upper five feet of alluvial soils is estimated to range from 2% to 7% when excavating and compacting the soils to 90% as recommended.
- Subsidence would depend on the construction methods including type of equipment utilized. For estimation purposes, ground subsidence may be taken as 0.10 feet.

Although these values are only approximate, they represent our best estimates of the factors to be used to calculate volume loss that may occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field-testing using the actual equipment and grading techniques be conducted.

7.6 Excavations and Temporary Slopes

Where excavations are deeper than about 4 feet, the sides of the excavations should be sloped back at 2:1 (horizontal to vertical) or shored for safety. Unshored excavations should not extend below a plane drawn at 1½:1 (horizontal to vertical) extending downward from adjacent existing footings. All applicable safety requirements and regulations, including OSHA regulations, should be met.

7.7 Site Drainage

Adequate positive drainage should be provided away from graded areas to prevent ponding and to reduce percolation of water into the foundation soils. Surface drainage should be directed to suitable non-erosive devices. Any slope should be planted as soon as possible after construction.

7.3 Over-Excavation/Removal for Pavement Areas

In areas receiving asphalt concrete or Portland cement concrete paving, including driveways, street areas, sidewalks, curbs and gutters and other flatwork, the upper two feet of native surficial soils should be excavated. Such over-excavation should extend at least two feet beyond the pavement edges. The pavement sections should be placed on at least one foot of non-expansive fill, moisture conditioned if necessary, and recompacted to at least 95 percent of the laboratory maximum dry density.

7.4 Structural Fill

The approved bottom of the excavations should be scarified to a depth of at least six inches. The scarified soils should be moisture conditioned to within three percent of optimum moisture content for granular soils and above optimum for fine-grained soils and compacted to at least 90 percent of the laboratory maximum dry density if not specified elsewhere in this report to produce a firm and unyielding surface.

All structural fill should be placed on competent, scarified and compacted native materials as determined by the project engineer and in accordance with the specifications presented in this section.

Excavated site soils, free of deleterious materials and rock particles larger than three inches in the largest dimension, should be suitable for placement as compacted fill except where non-expansive soils are specified. The import fill should be non-expansive (expansion potential less than 20). The imported materials should contain sufficient fines (binder material) so as to be relatively impermeable and result in a stable subgrade when compacted. Any import fill should be tested and approved by the project engineer.

Prior to compaction, fill materials should be thoroughly mixed and moisture conditioned where necessary, to within three percent of optimum moisture content for sandy soils and above optimum for fine-grained soils. All fill, if not specified otherwise elsewhere in this report, should be compacted to at least 90 percent of the laboratory maximum dry density in accordance with the ASTM Standard D1557 test method.

- The upper 3.5 feet of fill under structure foundations and at least four feet outside of foundation perimeter should be compacted to at least 95 percent of the laboratory maximum dry density.
- The upper two feet of fill under perimeter wall footings and at least two feet outside of footings should be compacted to at least 95 percent of the laboratory maximum dry density.
- All other fill should be compacted to at least 90 percent of the laboratory maximum dry density in accordance with the ASTM Standard D1557 test method.

At the time of the field investigation, in-situ moisture content of the upper five feet of native soils ranged from 9.0% to 14.0%. The optimum moisture contents range from 8.0% to 10.0%. Therefore, some moisture conditioning/drying may be necessary prior to the material being placed as compacted fill. The amount of processing required for proper moisture conditioning at the site will depend on the seasonal variations in the in-situ moisture conditions, the depth of over-excavation, the equipment, and the processing method.

7.5 Shrinkage and Subsidence

The shrinkage and/or bulkage would depend on, among other factors, the depth of cut and/or fill, and the grading method and equipment utilized. For preliminary estimation, shrinkage factors for various units of earth material at the site may be taken as presented below:

- In computing fill quantities, the approximate shrinkage factor for the upper five feet of alluvial soils is estimated to range from 2% to 7% when excavating and compacting the soils to 90% as recommended.
- Subsidence would depend on the construction methods including type of equipment utilized. For estimation purposes, ground subsidence may be taken as 0.10 feet.

Although these values are only approximate, they represent our best estimates of the factors to be used to calculate volume loss that may occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field-testing using the actual equipment and grading techniques be conducted.

7.6 Excavations and Temporary Slopes

Where excavations are deeper than about 4 feet, the sides of the excavations should be sloped back at 2:1 (horizontal to vertical) or shored for safety. Unshored excavations should not extend below a plane drawn at 1½:1 (horizontal to vertical) extending downward from adjacent existing footings. All applicable safety requirements and regulations, including OSHA regulations, should be met.

7.7 Site Drainage

Adequate positive drainage should be provided away from graded areas to prevent ponding and to reduce percolation of water into the foundation soils. Surface drainage should be directed to suitable non-erosive devices. Any slope should be planted as soon as possible after construction.

7.0 EARTHWORK/SITE GRADING RECOMMENDATIONS

7.1 General

This section contains the general recommendations regarding earthwork and site grading for the proposed development. These recommendations are based on the results of the field exploration, laboratory testing, and data evaluation as presented in the preceding sections. These recommendations may need to be modified based on observation of the actual field conditions during grading.

Prior to the start of any earthwork, the site should be cleared of all vegetation and debris. The materials resulting from the clearing and grubbing operations should be removed from the site.

The final bottom surfaces of all excavations should be observed and approved by the project soils engineer prior to placing any fill and/or structures. Based on observations, removal of localized areas deeper than those documented may be required during grading. Some variations in the depth and lateral extent of over-excavation recommended in this report should be anticipated.

7.2 Over-excavation/Removal for Proposed Substation Structures

As a minimum, the upper two (2) to three (3) feet of surficial soils over the entire site should be overexcavated, moisture-conditioned, and compacted to at least 90 percent of the maximum dry density to produce a firm and unyielding surface.

- Continuous or isolated footings should be placed on at least 3.5 feet of compacted fill.
- Over-excavation should provide as a minimum of 3.5 feet of structural fill below the bottom of mat foundations and slab-on-grade.
- Over-excavations should extend at least three feet outside foundation footprints.
- The bottom of the foundation excavation should be scarified an additional six inches and compacted to at least 95 percent of the maximum dry density in accordance with ASTM D1557.

The foundation excavations should be backfilled with approved granular materials which should be placed in eight inch lifts or less and compacted to at least 95 percent of the laboratory maximum dry density in accordance with ASTM D1557.

7.3 Over-Excavation/Removal for Pavement Areas

In areas receiving asphalt concrete or Portland cement concrete paving, including driveways, street areas, sidewalks, curbs and gutters and other flatwork, the upper two feet of native surficial soils should be excavated. Such over-excavation should extend at least two feet beyond the pavement edges. The pavement sections should be placed on at least one foot of non-expansive fill, moisture conditioned if necessary, and recompacted to at least 95 percent of the laboratory maximum dry density.

7.4 Structural Fill

The approved bottom of the excavations should be scarified to a depth of at least six inches. The scarified soils should be moisture conditioned to within three percent of optimum moisture content for granular soils and above optimum for fine-grained soils and compacted to at least 90 percent of the laboratory maximum dry density if not specified elsewhere in this report to produce a firm and unyielding surface.

All structural fill should be placed on competent, scarified and compacted native materials as determined by the project engineer and in accordance with the specifications presented in this section.

Excavated site soils, free of deleterious materials and rock particles larger than three inches in the largest dimension, should be suitable for placement as compacted fill except where non-expansive soils are specified. The import fill should be non-expansive (expansion potential less than 20). The imported materials should contain sufficient fines (binder material) so as to be relatively impermeable and result in a stable subgrade when compacted. Any import fill should be tested and approved by the project engineer.

Prior to compaction, fill materials should be thoroughly mixed and moisture conditioned where necessary, to within three percent of optimum moisture content for sandy soils and above optimum for fine-grained soils. All fill, if not specified otherwise elsewhere in this report, should be compacted to at least 90 percent of the laboratory maximum dry density in accordance with the ASTM Standard D1557 test method.

- The upper 3.5 feet of fill under structure foundations and at least four feet outside of foundation perimeter should be compacted to at least 95 percent of the laboratory maximum dry density.
- The upper two feet of fill under perimeter wall footings and at least two feet outside of footings should be compacted to at least 95 percent of the laboratory maximum dry density.
- All other fill should be compacted to at least 90 percent of the laboratory maximum dry density in accordance with the ASTM Standard D1557 test method.

At the time of the field investigation, in-situ moisture content of the upper five feet of native soils ranged from 9.0% to 14.0%. The optimum moisture contents range from 8.0% to 10.0%. Therefore, some moisture conditioning/drying may be necessary prior to the material being placed as compacted fill. The amount of processing required for proper moisture conditioning at the site will depend on the seasonal variations in the in-situ moisture conditions, the depth of over-excavation, the equipment, and the processing method.

7.5 Shrinkage and Subsidence

The shrinkage and/or bulkage would depend on, among other factors, the depth of cut and/or fill, and the grading method and equipment utilized. For preliminary estimation, shrinkage factors for various units of earth material at the site may be taken as presented below:

- In computing fill quantities, the approximate shrinkage factor for the upper five feet of alluvial soils is estimated to range from 2% to 7% when excavating and compacting the soils to 90% as recommended.
- Subsidence would depend on the construction methods including type of equipment utilized. For estimation purposes, ground subsidence may be taken as 0.10 feet.

Although these values are only approximate, they represent our best estimates of the factors to be used to calculate volume loss that may occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field-testing using the actual equipment and grading techniques be conducted.

7.6 Excavations and Temporary Slopes

Where excavations are deeper than about 4 feet, the sides of the excavations should be sloped back at 2:1 (horizontal to vertical) or shored for safety. Unshored excavations should not extend below a plane drawn at 1½:1 (horizontal to vertical) extending downward from adjacent existing footings. All applicable safety requirements and regulations, including OSHA regulations, should be met.

7.7 Site Drainage

Adequate positive drainage should be provided away from graded areas to prevent ponding and to reduce percolation of water into the foundation soils. Surface drainage should be directed to suitable non-erosive devices. Any slope should be planted as soon as possible after construction.

8.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

8.1 General Evaluation

The various design recommendations provided in this section are based on the assumption that the earthwork and grading recommendations will be implemented in preparing the site.

8.2 Foundation Types and Bearing Pressures

The proposed substation structure(s) may be supported by shallow spread footings, mat foundations or drilled piers. Design recommendations for various types of foundations are presented below.

8.2.1 Shallow Spread Footing Design Parameters

Continuous and isolated shallow spread footings should be at least 18 and 24 inches wide, respectively, and embedded at least 18 inches below lowest adjacent soil grade.

Footings should be placed on at least two feet of structural fill below the bottom of the footings, compacted as recommended in the grading section, and extending at least three feet beyond the edge of the footings. An allowable net vertical bearing pressure for 18 inches wide footing with minimum embedment of 18 inches below adjacent grade is 1,000 pounds per square foot. The allowable bearing capacity may be increased by 500 psf for each additional foot of embedment depth and 150 psf for each additional foot of width to a maximum value of 3,000 psf. The net allowable bearing values indicated above are for the dead loads and frequently applied live loads and are obtained by applying a factor of safety of 3.0 to the net ultimate bearing capacity. If normal code requirements are applied for design, the above vertical bearing value may be increased by 33 percent for short duration loadings, which will include loadings induced by wind or seismic forces.

8.2.2 Mat Foundations

For design of mat foundations founded on native soil or compacted fill, the following equation may be used to calculate the modulus of subgrade reaction, k:

$k = 200[(B+1)/2B]^2$
k = modulus of subgrade reaction, kips per cubic feet
B = foundation width, feet

8.3 Drilled Cast-In-Place Friction Piles

8.3.1 Vertical Capacity

The minimum center-to-center spacing between piles should be no less than three pile diameters. No group efficiency factors are considered necessary. Pile group efficiencies at other pile spacing should be evaluated on a case-by-case basis.

Vertical uplift capacities for intermittent loads can be calculated from the friction capacities.

8.3.2 Pile Construction

Pile drilling and concrete placement should be performed in accordance with the recommendations presented in the Standards and Specifications of ADSC, *An International Association of Foundation Drilling Contractors.*

8.4 Lateral Earth Pressures and Resistance to Lateral Loads

The lateral earth pressures of 40 psf and resistance to lateral loads of 270 psf are estimated by using on-site native soils compacted to an average of 92 percent of the laboratory maximum dry density.

8.5 Slabs-On-Grade

The design of the slabs-on-grade will depend on, among other factors, the expansive potential of the pad soils. Based on the soil classification the expansive potential of the pad soils is expected to be very low.

The slabs-on-grade should be at least four inches thick. Care should be taken to avoid slab curling if slabs are poured in hot weather. Moisture sensitive slabs-on-grade should be protected by polyethylene vapor barriers. The barrier should be overlain by two inches of sand to minimize punctures and to aid in the concrete curing.

Subgrade for slabs-on-grade should be firm and uniform. All slab subgrade should be moisture-conditioned between optimum and two percent above optimum at subgrade soils prior to the placement of concrete. All loose or disturbed soils including under slab utility trench backfills should be recompacted prior to the placement of clean sand underneath the moisture barrier.

8.6 Soil Corrosivity Evaluation

A soil corrosivity study was conducted by Schiff Associates. The study included testing of a bulk soil sample obtained from the site and a resistivity for electrical grounding study. The test includes normal electrical resistivity, pH, soluble sulfates, and chloride content. The results are included in Appendix C, *Soil Corrosivity Sutdy*.

The sulfate content of the samples tested was 98 mg/kg or 0.0098 percent by weight, which indicated that site soils are not deleterious to concrete. Type II Portland Cement may be used for the construction of the foundations or slabs.

The chloride content was 72 ppm by weight. The pH value of the site soil was 7.1. The measured value of the electrical resistivity was 2,360 Ohm-cm, saturated. These soils are considered “moderately corrosive” to ferrous metals. Therefore, corrosion control measures may be necessary for ferrous metals in contact with soil.

8.7 Asphalt Concrete Pavement

Asphalt concrete pavement sections corresponding to Traffic Indices (TIs) ranging from 5 to 8 and an R-value of 47 (an R-Value of 47 was determined in the laboratory), are presented for preliminary design. Analysis was based on Caltrans' design procedure for flexible pavement structural sections. The results of our analysis are presented in Table No. 3.

Table No. 3, Pavement Design.

R-Value	Traffic Index (TI)	Pavement Sections	
		Asphalt Concrete (inches)	Aggregate Base (inches)
47	5.0	3.0	4.0
	6.0	4.0	5.0
	7.0	5.0	6.0
	8.0	6.0	8.0

At or near the completion of grading, subgrade samples should be tested to evaluate the actual subgrade for final pavement design.

Prior to placement of aggregate base, at least the two feet of subgrade soils should be scarified, moisture-conditioned, if necessary, and recompacted to at least 95 percent of the laboratory maximum dry density as defined by ASTM Standard D1557 test method.

Base materials should conform with Section 200-2.2, "*Crushed Aggregate Base*," of the current Standard Specifications for Public Works Construction (SSPWC) and should be placed in accordance with Section 301.2 of the SSPWC.

Asphaltic concrete materials should conform to Section 203 of the SSPWC and should be placed in accordance with Section 302.5 of the SSPWC.

8.8 Settlement

Total settlement of the proposed structures placed on compacted fill, designed as recommended above, from structural load-induced settlements should be 1-inch or less. The differential settlement can be taken as equal to one half of the total settlement over a distance of 50 feet.

8.9 Geotechnical Observation

Prior to construction, the TDBU Geotechnical Group should be contacted to coordinate field observations during construction at (626) 302-9108.

The removal of deleterious materials, roots and the re-working of the upper soils, observation of removal bottoms, fill compaction and testing, foundation excavations and well abandonment/destruction should be observed by a representative of the TDBU Geotechnical Group. Footing excavations should be observed by TDBU Geotechnical Group representative prior to placement of reinforcing steel and concrete.

The governmental agencies having jurisdiction over the project should be notified prior to commencement of grading so that the necessary grading and well abandonment/destruction permits can be obtained and arrangements can be made for required inspection(s). The contractor should be familiar with the inspection requirements of the reviewing agencies and the content of this report. Records of well abandonment/destruction permits and procedures should be provided to the TDBU Geotechnical Group.

9.0 CLOSURE

This report has been prepared to aid in the evaluation of the site, prepare site grading recommendations and to assist the civil and structural engineers in the design of the proposed substation structures and associated foundations.

Recommendations presented herein, are based upon the assumption that adequate earthwork monitoring will be provided. Excavation bottoms should be observed, any imported fill materials should be tested and approved by TDBU Geotechnical Engineer/Engineering Geologist prior to the delivery to the site. Structural fill and backfill should be placed and compacted during continuous observation and testing. Footing excavations and drilling for drilled pier foundations should be observed by TDBU Geotechnical Engineer/Engineering Geologist prior to placement of steel and concrete so that footings are founded on satisfactory materials and excavations are free of loose and disturbed materials.

The findings and recommendations of this report were prepared in accordance with the generally accepted professional engineering and engineering geologic principles and practice within our profession in effect at this time in Southern California.

10.0 REFERENCES

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APPENDIX A

FIELD EXPLORATION

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING LOG SYMBOLS

SAMPLE TYPE

- STANDARD PENETRATION TEST — Split barrel sampler in accordance with ASTM D-1586-84 Standard Test Method
- DRIVE SAMPLE — 2.42" I.D. sampler
- DRIVE SAMPLE — No recovery
- BULK SAMPLE
- GROUNDWATER WHILE DRILLING
- GROUNDWATER AFTER DRILLING

LABORATORY TESTING ABBREVIATIONS

TEST TYPE

(Results shown in Appendix B)

CLASSIFICATION

Test	Abbreviation
Plasticity	pi
Grain Size Analysis	ma
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	max
Hydrometer	h

STRENGTH

Test	Abbreviation
Pocket Penetrometer	p
Direct Shear	ds
Direct Shear (single point)	ds*
Unconfined Compression	uc
Triaxial Compression	tx
Vane Shear	vs
Consolidation	c
Collapse Test	col
Resistance (R) Value	r
Chemical Analysis	ca
Electrical Resistivity	er

UNIFIED SOIL CLASSIFICATION AND KEY TO BORING LOG SYMBOLS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 | Drawing No. A - 1

Log of Boring No. BH - 1

Dates Drilled: 9/4/2009 | Logged by: CG | Checked By: JG

Equipment: CME75 / 8" HSA | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1439 | Depth to Water (ft): NOT ENCOUNTERED

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Depth (ft)	Summary of Subsurface Conditions	Blows/ 6"	Moisture (%)	Dry Unit Wt. (pcf)	Laboratory Test
	ALLUVIUM (Qal): **SILTY SAND (SM):** fine- to coarse-grained, brown.	2/2/3	11	112	
		2/3/6	10	121	max,ma
5		3/3/4	10	114	ds
		2/2/4			
10		3/7/10	9	108	ds
15		5/9/9			
20	**SANDY SILT (ML):** fine-grained sand, trace clay, light brown.	7/15/22	22	102	
25	**SILTY SAND (SM):** fine- to coarse-grained, brown.	3/6/7			
30	**CLAYEY SAND (SC):** fine- to coarse-grained, red-brown.	5/22/33	12	124	

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 | Drawing No. A - 2a

Log of Boring No. BH - 1

Dates Drilled: 9/4/2009 Logged by: CG Checked By: JG

Equipment: CME75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1439 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
		CLAYEY SAND (SC): fine- to coarse-grained, red-brown.	X		9/13/14			
		End of boring at 36.5 feet. No groundwater encountered during drilling. Borehole backfilled loose with soil cuttings on 9-4-2009.						

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 Drawing No. A - 2b

Log of Boring No. BH - 2

Dates Drilled: 9/4/2009 | Logged by: CG | Checked By: JG

Equipment: CME75 / 8" HSA | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1441 | Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
		ALLUVIUM (Qal): **SILTY SAND (SM):** fine- to coarse-grained, brown.			3/3/3	12	112	
					3/3/3	10	117	max,ei,ma ca,er
5		- trace to little clay			5/10/9	13	123	ds
		SANDY SILT (ML): fine-grained sand, brown.			6/8/6	18	102	ds
10					3/4/7			
15					15/21/35	13	114	
20					5/13/18			
25		**CLAYEY SAND (SC):** fine- to coarse-grained, brown.			10/19/24	12	126	
30					6/13/15			

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 | Drawing No. A - 3a

Log of Boring No. BH - 2

Dates Drilled: 9/4/2009 Logged by: CG Checked By: JG

Equipment: CME75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1441 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
		SAND TO SILTY SAND (SP-SM): fine- to coarse-grained, brown.	■		8/14/28	6	109	
40		**SILTY SAND (SM):** fine- to coarse-grained, brown.	☒		7/13/17			
45			■		10/16/35	14	122	
50			☒		7/11/15			
		End of boring at 51.5 feet. No groundwater encountered during drilling. Borehole backfilled loose with soil cuttings on 9-4-2009.						

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 Drawing No. A - 3b

Log of Boring No. BH - 3

Dates Drilled: 9/4/2009 Logged by: CG Checked By: JG

Equipment: CME75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1440 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
		ALLUVIUM (Qal): **SILTY SAND (SM):** fine- to coarse-grained, brown.			1/1/2	9	106	
					2/4/5	14	115	r
5					7/14/19	12	126	
					2/5/6			
10					5/7/19	10	99	ds
15					4/5/7			
20		**SANDY SILT (ML):** fine-grained sand, brown.			7/18/21	18	110	
25					2/2/3			
30		**SILTY SAND (SM):** fine- to coarse-grained, trace clay, brown.			6/19/20	11	126	

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 Drawing No. A - 4a

Log of Boring No. BH - 3

Dates Drilled: 9/4/2009 Logged by: CG Checked By: JG

Equipment: CME75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1440 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
		SILTY SAND (SM): fine- to coarse-grained, brown.	X		10/13/13			
		End of boring at 36.5 feet. No groundwater encountered during drilling. Borehole backfilled loose with soil cuttings on 9-4-2009.						

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 Drawing No. A - 4b

Log of Boring No. BH - 4

Dates Drilled: 9/4/2009 Logged by: CG Checked By: JG

Equipment: CME75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1442 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
0	**ALLUVIUM (Qal):** **SILTY SAND (SM):** fine- to coarse-grained, brown.	4/6/5	11	107	
		2/2/3	12	119	max
5		2/5/8	12	122	
		5/11/10	20	100	ds
10		3/2/3			
15	**SANDY SILT (ML):** fine-grained sand, trace little clay, brown.	11/21/28	24	100	
20		6/8/12			
25	**SILTY SAND (SM):** fine- to coarse-grained, brown.	11/23/28	16	120	ds
30		4/5/5			

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 Drawing No. A - 5a

Log of Boring No. BH - 4

Dates Drilled: 9/4/2009 Logged by: CG Checked By: JG

Equipment: CME75 / 8" HSA Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1442 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
		SAND TO SILTY SAND (SP-SM): fine- to coarse-grained, brown.	■		7/16/26	7	116	
		End of boring at 36.5 feet. No groundwater encountered during drilling. Borehole backfilled loose with soil cuttings on 9-4-2009.						

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Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 Drawing No. A - 5b

Log of Boring No. BH - 5

Dates Drilled: 9/4/2009 | Logged by: CG | Checked By: JG

Equipment: CME75 / 8" HSA | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): ±1442 | Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS/ 6"	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TEST
		ALLUVIUM (Qal): **SILTY SAND (SM):** fine- to coarse-grained, brown.			3/4/4	10	109	
					2/2/2	9	118	ds max,ma
5					2/5/11	11	130	
					2/5/6			
10		**SAND TO SILTY SAND (SP-SM):** fine- to coarse-grained, brown.			4/4/7	6	110	
15		**SANDY SILT (ML):** fine-grained sand, brown.			6/9/11			
20		**SILTY SAND (SM):** fine- to coarse-grained, brown.			10/18/31	14	122	
25					6/14/20			

End of boring at 26.5 feet.
No groundwater encountered during drilling.
Borehole backfilled loose with soil cuttings on 9-4-2009.

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 | Drawing No. A - 6

APPENDIX B

LABORATORY TESTING PROGRAM

APPENDIX B

LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein and on the Logs of Borings in Appendix A, *Field Exploration*. The following is a summary of the various laboratory tests conducted for this project.

Moisture Content and Dry Density

Results of these tests performed on relatively undisturbed samples, were used to aid in the classification and correlation of the soils and to provide qualitative information regarding soil strength and compressibility. For test results, see the Logs of Borings in Appendix A, *Field Exploration*.

Expansion Index Test

One (1) representative bulk sample was tested to evaluate the expansion potential of materials encountered at the site. The test was conducted in accordance with ASTM Standard D4829. The test result is presented in the following table.

Table No. B-1, Expansion Index Test Results

Boring No.	Depth (feet)	Description	Expansion Index	Expansion Potential
BH-2 / 0-5	0-5	Silty Sand (SM)	0	Very low

Soil Corrosivity

One (1) representative soil sample was tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests is to determine the corrosion potential of soils when placed in contact with common construction materials. These tests were performed by Schiff Associates, Claremont, California. For test results, see the following table.

Table No. B-2, Soil Corrosivity Test Results

Location / Depth (feet)	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Min. Saturated Resistivity (Ohm-cm)
BH-2/0-5	7.5	38	43	2,076

Grain-Size Analysis

To assist in classification of soils, mechanical grain-size analyses were performed on three (3) selected samples. Testing was performed in general accordance with the ASTM Standard C136 test method. Grain-size curves are shown in Drawing No. B-1, *Grain Size Distribution Results*.

Laboratory Maximum Density and Optimum Moisture Tests

Four (4) representative samples were tested to determine the maximum density optimum-moisture content relationships. This test was conducted in accordance with ASTM Standard D1557 laboratory procedure. Test results are presented in Drawing No. B-2, *Moisture Density Relationship Results.*

Direct Shear Test

Eight (8) direct shear tests were performed on undisturbed ring samples at soaked moisture conditions. For each test, three (3) samples contained in brass sampler rings were placed one at a time directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. Each sample was then sheared at a constant strain rate of 0.01 inch/minute. Shear deformation was recorded until a maximum of about 0.25-inch shear displacement was achieved. Both ultimate and peak strengths were selected from the shear-stress deformation data and plotted to determine the shear strength parameters. Test data, including sample density and moisture content are presented in the following table and test results are graphically presented in Drawing Nos. B-3 through B-10, *Direct Shear Test Results.*

Table No. B-3, Direct Shear Test Results

Boring No.	Depth (feet)	Soil Classification	Test Conditions	Friction Angle (degrees)	Cohesion (psf)
BH-1	5.0-6.5	Silty Sand (SM)	Saturated	31	150
BH-1	10.0-11.5	Silty Sand (SM)	Saturated	34	100
BH-2	5.0-6.5	Silty Sand (SM)	Saturated	33	100
BH-2	7.0-8.5	Sandy Silt (ML)	Saturated	34	150
BH-3	10.0-11.5	Silty Sand (SM)	Saturated	32	150
BH-4	7.0-8.5	Sandy Silt (ML)	Saturated	33	50
BH-4	25.0-26.5	Silty Sand (SM)	Saturated	31	250
BH-5	2.0-3.5	Silty Sand (SM)	Saturated	34	100

R-value Test

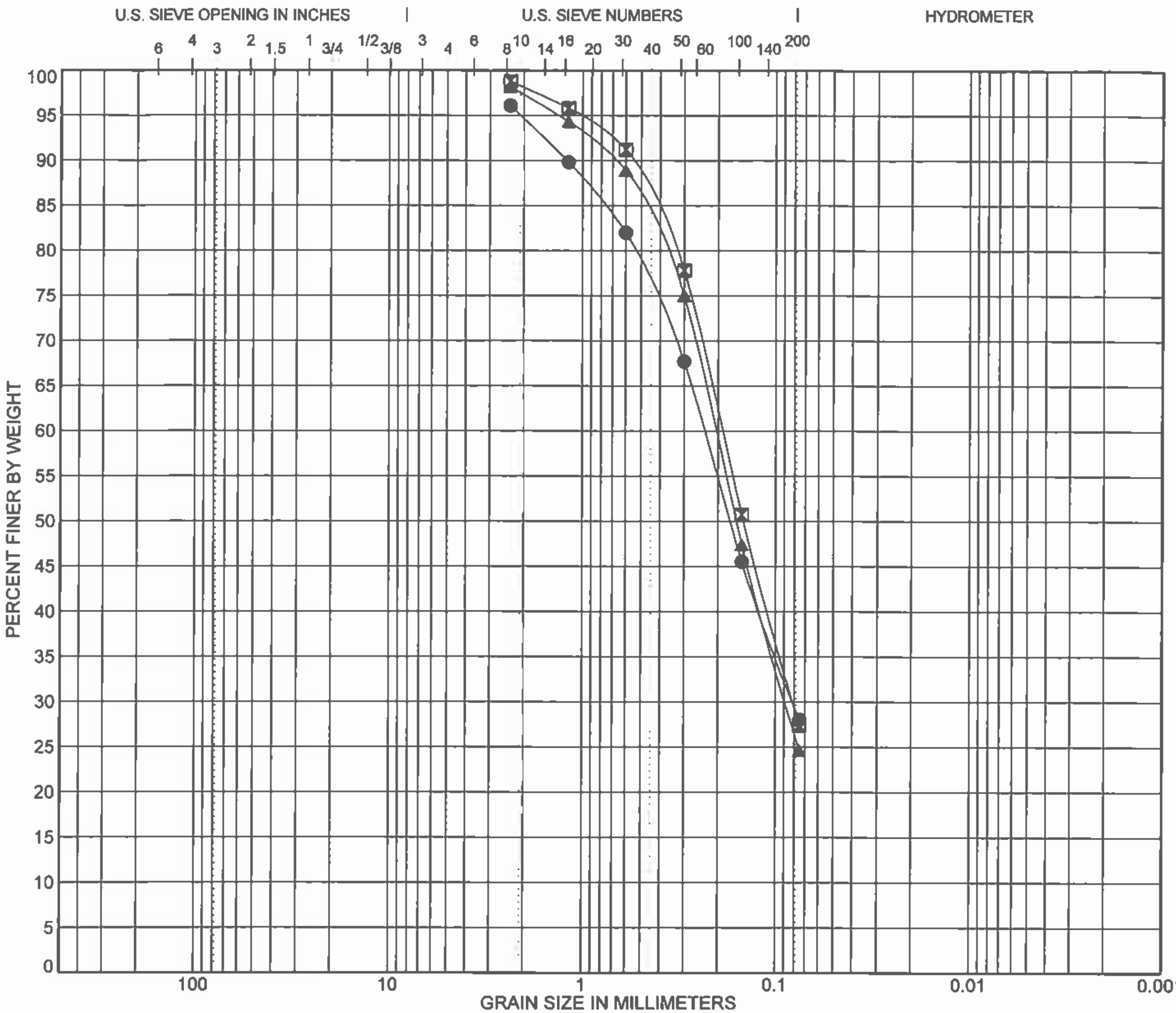
A representative bulk soil sample was tested for resistance value (R-value) in accordance with ASTM Standard D2844 test method. This test is designed to provide a relative measure of soil strength for use in pavement design. The test result is indicated in the following table.

Table No. B-4, R-value Test Result

Boring No.	Depth (feet)	Soil Type	R-value
BH-3	0-5	Silty Sand (SM)	47

Sample Storage

Soil samples were discarded 30 days after the date of the initial report.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	BH - 1	0-5	SILTY SAND (SM)					
⊠	BH - 2	0-5	SILTY SAND (SM)					
▲	BH - 5	0-5	SILTY SAND (SM)					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH - 1	0-5	2.36	0.236	0.081		0.0	68.1	28.0	
⊠	BH - 2	0-5	2.36	0.19	0.081		0.0	71.4	27.4	
▲	BH - 5	0-5	2.36	0.206	0.088		0.0	73.6	24.6	

GRAIN SIZE DISTRIBUTION RESULTS

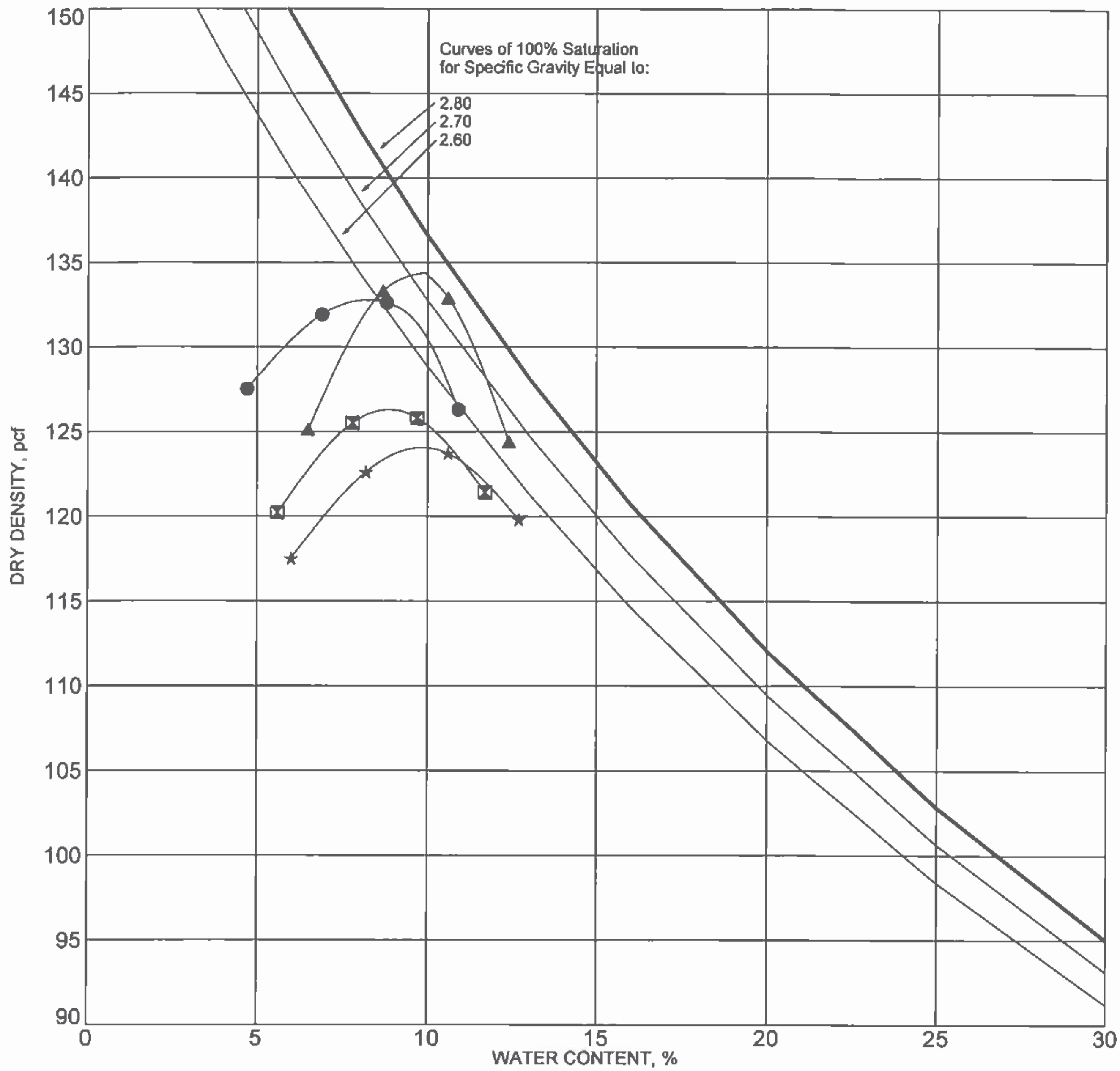
Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01

Drawing No. B - 1

Project ID: 09-81-272-01 GPJ; Template: GRAIN SIZE



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	BH - 1	0-5	SILTY SAND (SM), brown	D1557 - A	8.0	133.0
⊠	BH - 2	0-5	SILTY SAND (SM), brown	D1557 - A	9.0	126.5
▲	BH - 4	0-5	SILTY SAND (SM), brown	D1557 - A	10.0	134.5
★	BH - 5	0-5	SILTY SAND (SM), brown	D1557 - A	10.0	124.5

MOISTURE-DENSITY RELATIONSHIP RESULTS

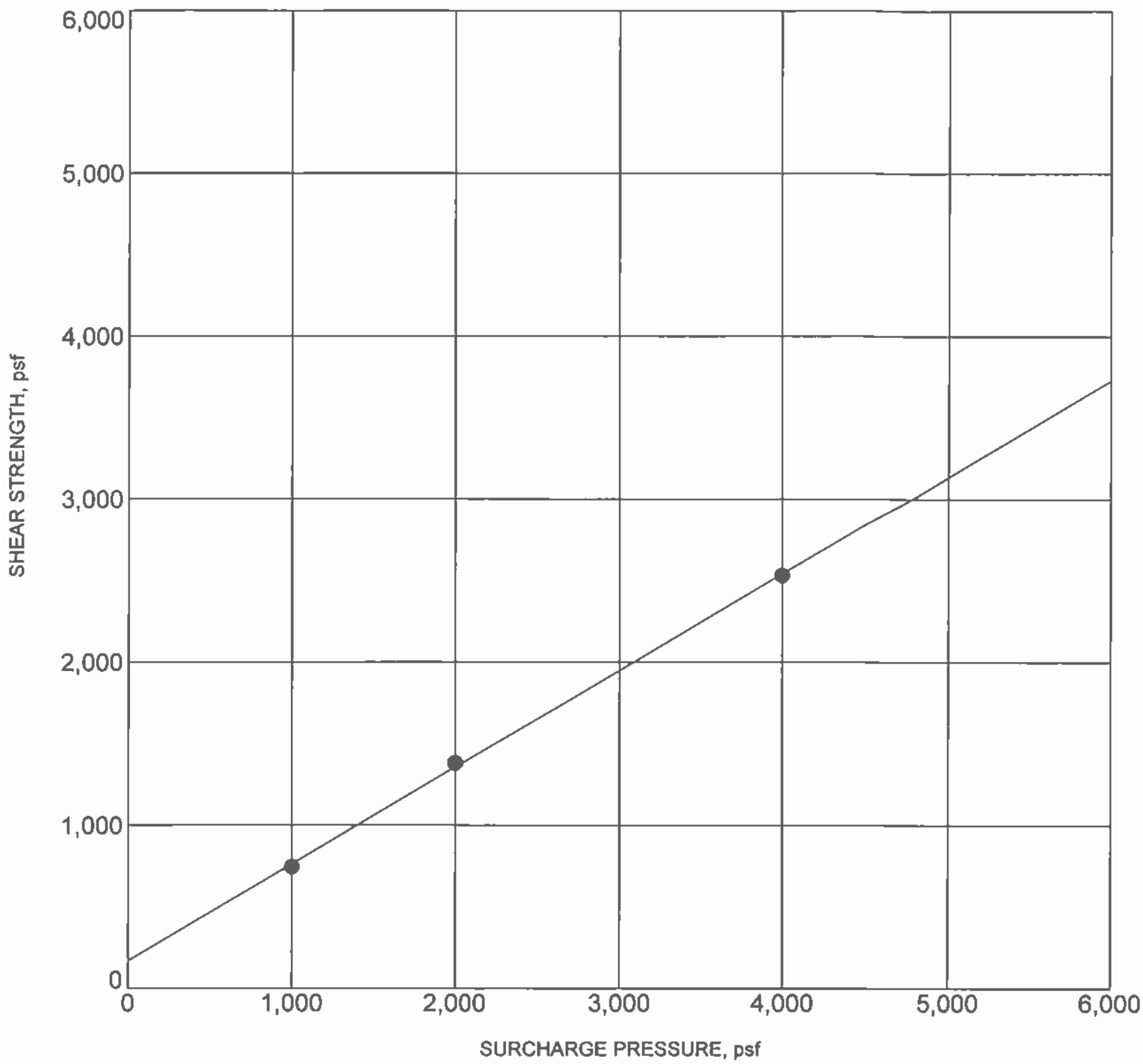
Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01

Drawing No. B - 2

Project ID: 09-81-272-01.GPJ, Template: COMPACTION



BORING NO. :	BH - 1	DEPTH (ft) :	5.0-6.5
DESCRIPTION :	SILTY SAND (SM)		
COHESION (psf) :	150	FRICTION ANGLE (degrees):	31
MOISTURE CONTENT (%) :	9.6	DRY DENSITY (pcf) :	114.1

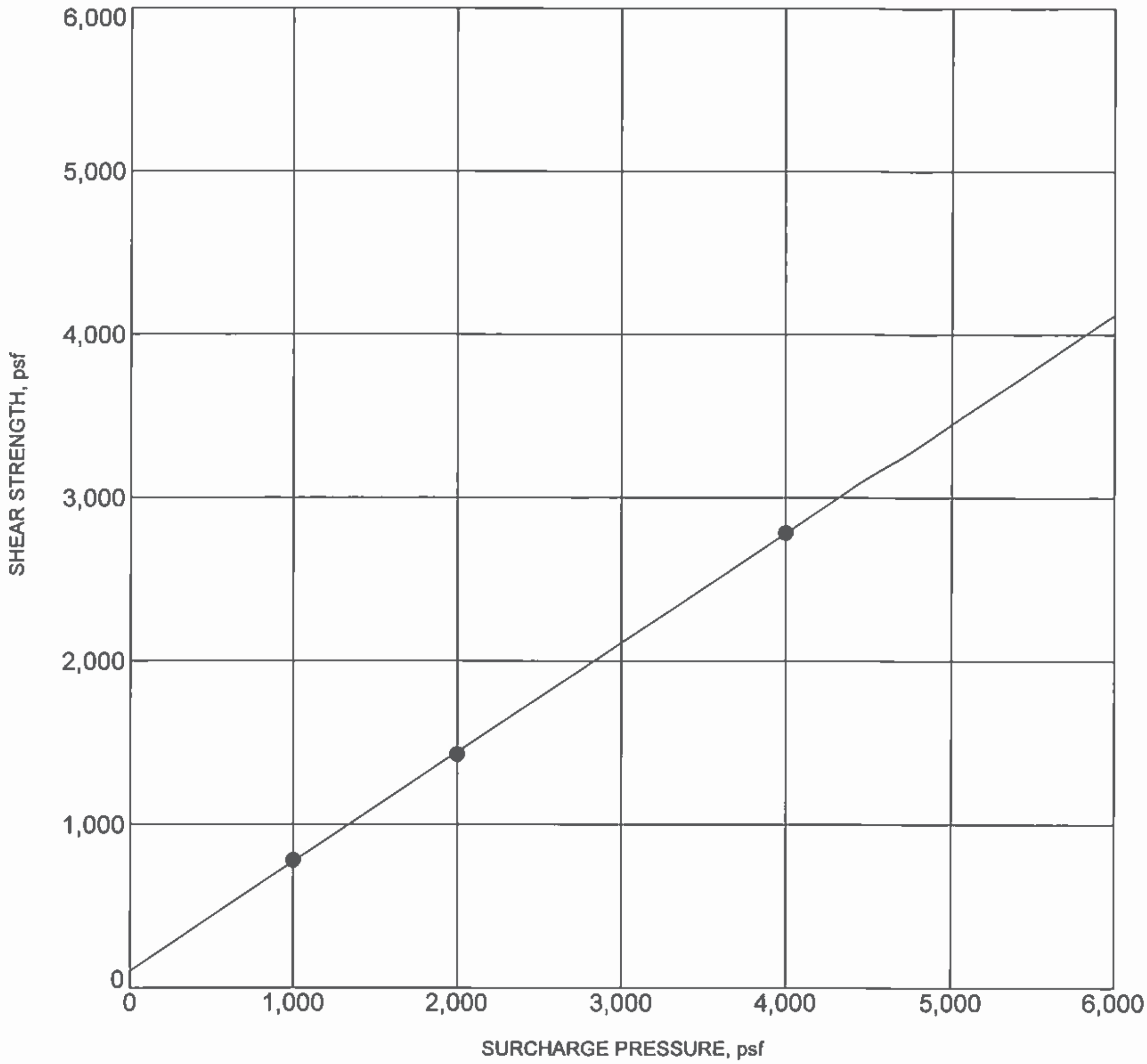
NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No.	Drawing No.
09-81-272-01	B - 3



BORING NO. :	BH - 1	DEPTH (ft) :	10.0-11.5
DESCRIPTION :	SILTY SAND (SM)		
COHESION (psf) :	100	FRICTION ANGLE (degrees):	34
MOISTURE CONTENT (%) :	8.7	DRY DENSITY (pcf) :	107.9

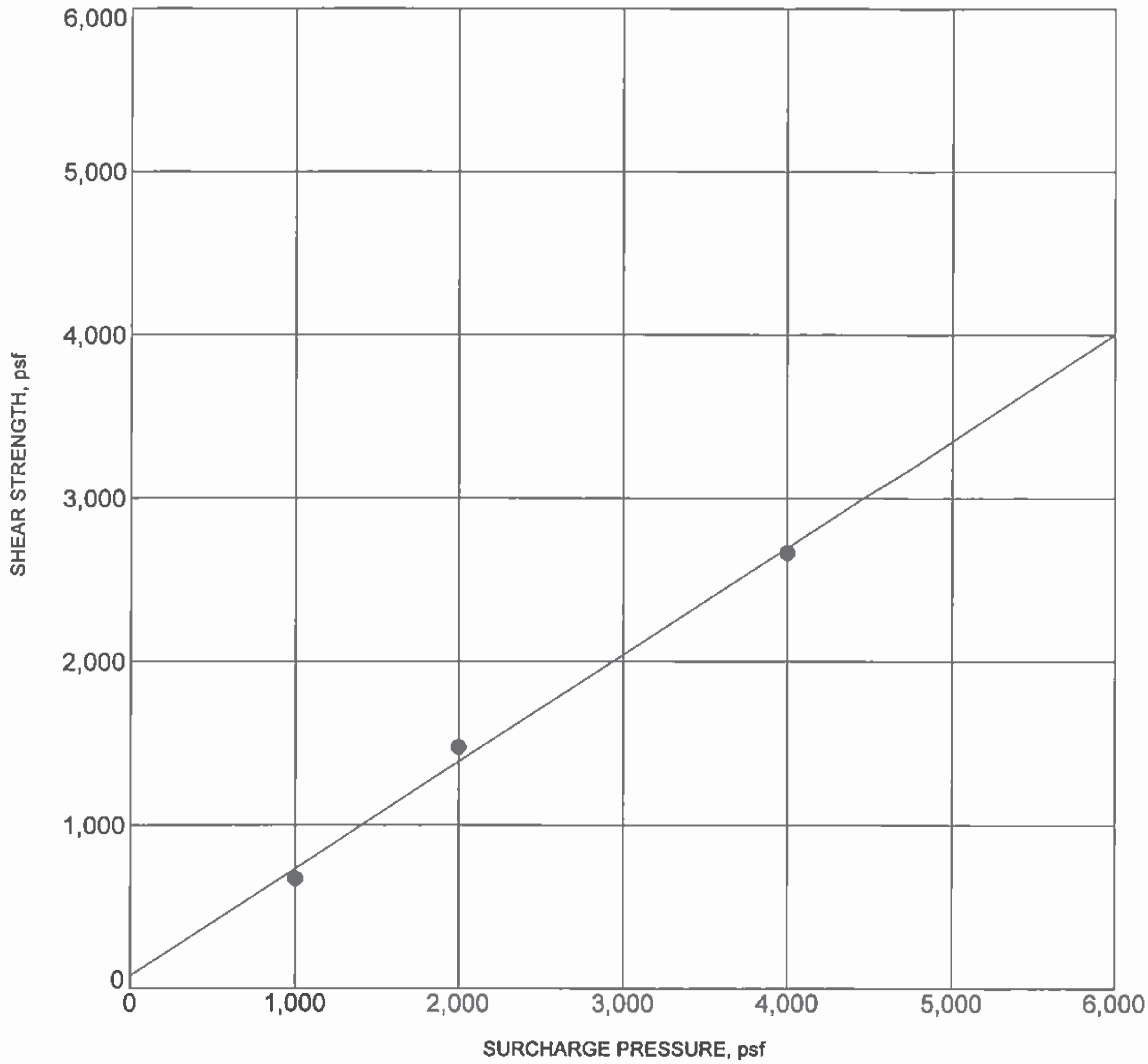
NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No.	Drawing No.
09-81-272-01	B - 4



BORING NO.	:	BH - 2	DEPTH (ft)	:	5.0-6.5
DESCRIPTION	:	SILTY SAND (SM)			
COHESION (psf)	:	100	FRICTION ANGLE (degrees):		33
MOISTURE CONTENT (%)	:	13.4	DRY DENSITY (pcf)	:	122.7

NOTE: Ultimate Strength.

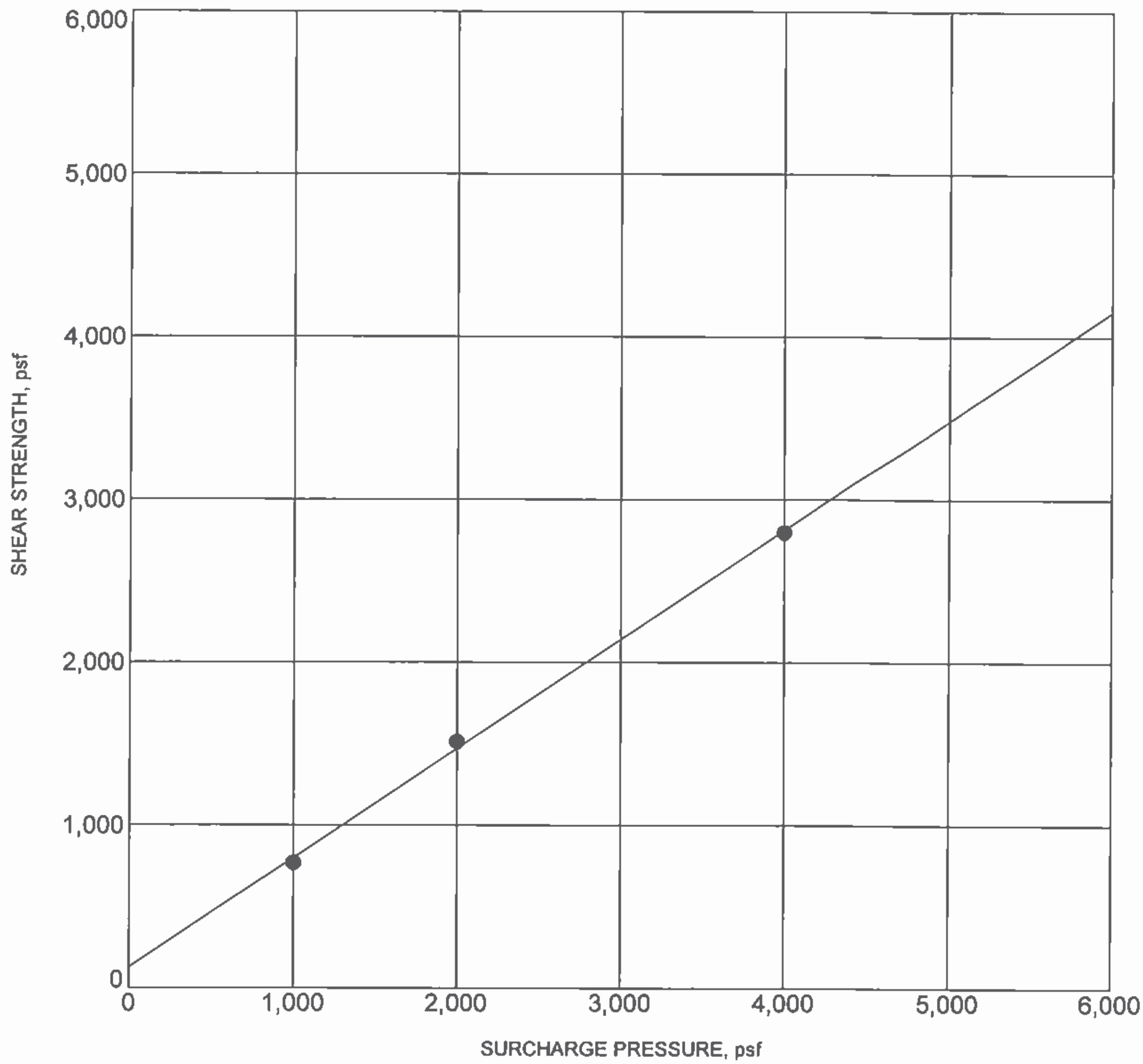
DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01

Drawing No. B - 5



BORING NO. :	BH - 2	DEPTH (ft) :	7.0-8.5
DESCRIPTION :	SANDY SILT (ML)		
COHESION (psf) :	150	FRICTION ANGLE (degrees):	34
MOISTURE CONTENT (%) :	18.0	DRY DENSITY (pcf) :	102.1

NOTE: Ultimate Strength.

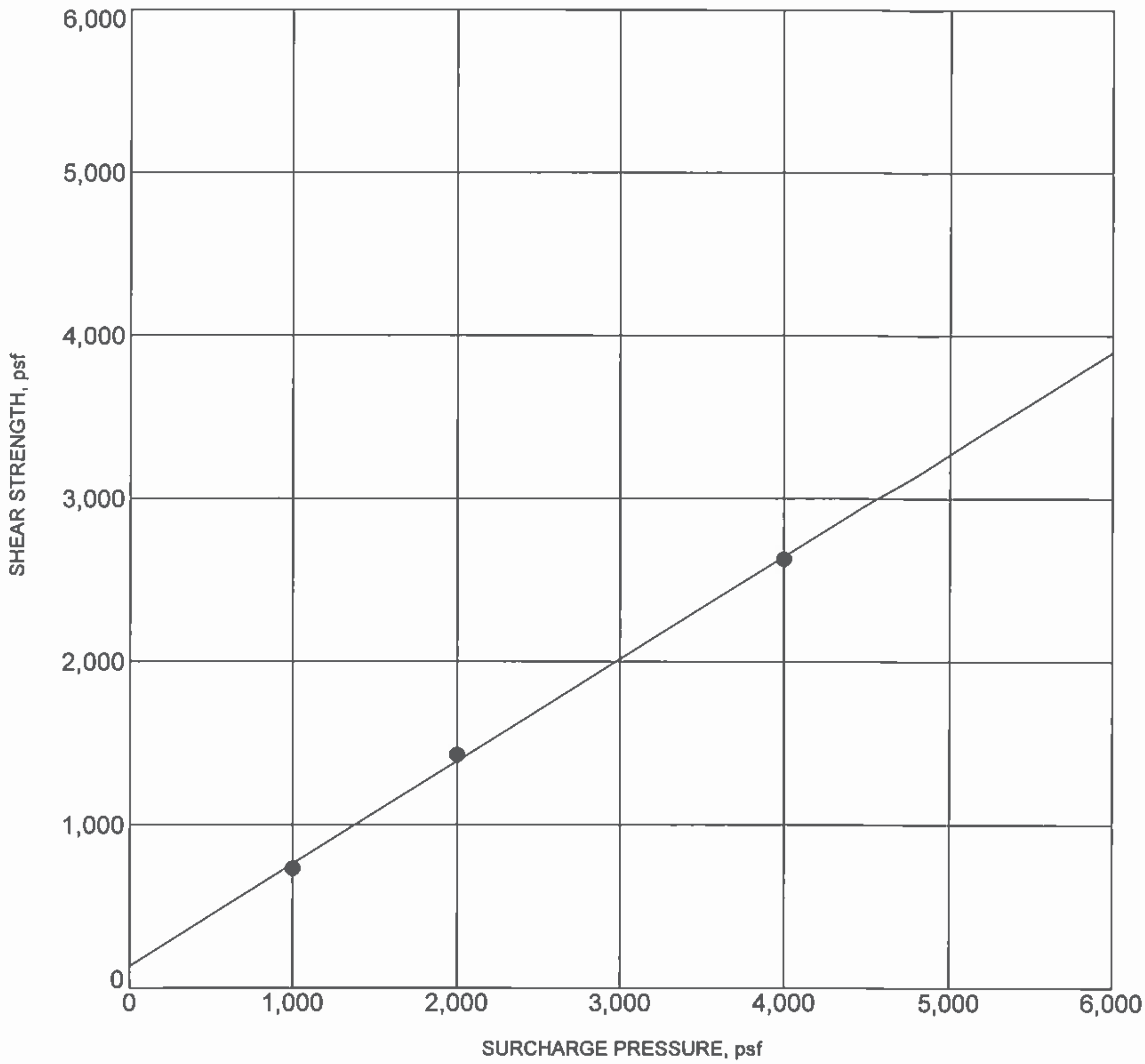
DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No.	Drawing No.
09-81-272-01	B - 6

Project ID: 09-81-272-01.GPJ; Template: DIRECT SHEAR



BORING NO.	:	BH - 3	DEPTH (ft)	:	10.0-11.5
DESCRIPTION	:	SILTY SAND (SM)			
COHESION (psf)	:	150	FRICTION ANGLE (degrees):		32
MOISTURE CONTENT (%)	:	10.3	DRY DENSITY (pcf)	:	98.9

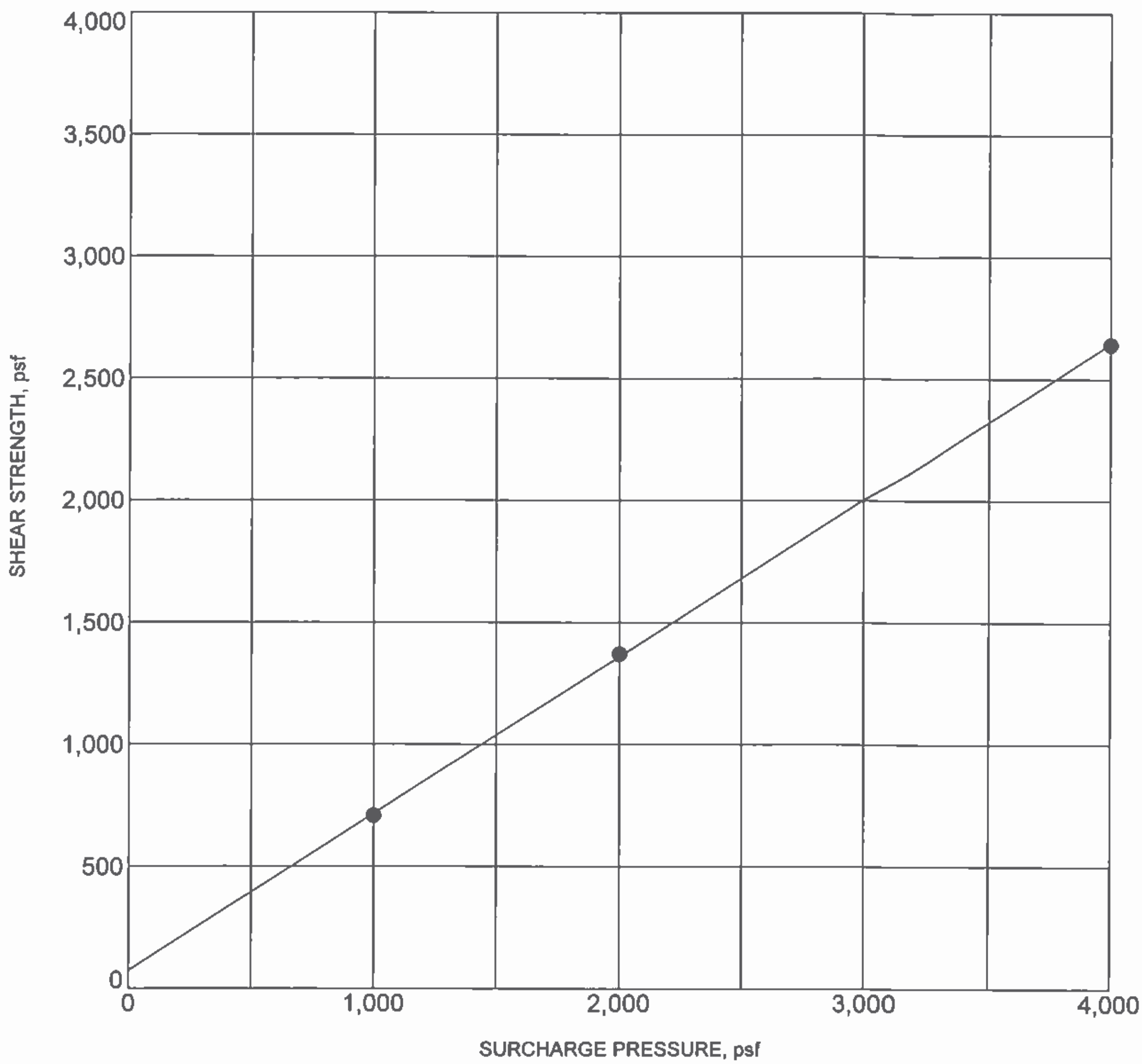
NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No.	Drawing No.
09-81-272-01	B - 7



BORING NO. :	BH - 4	DEPTH (ft) :	7.0-8.5
DESCRIPTION :	SANDY SILT (ML)		
COHESION (psf) :	50	FRICTION ANGLE (degrees):	33
MOISTURE CONTENT (%) :	20.1	DRY DENSITY (pcf) :	100.2

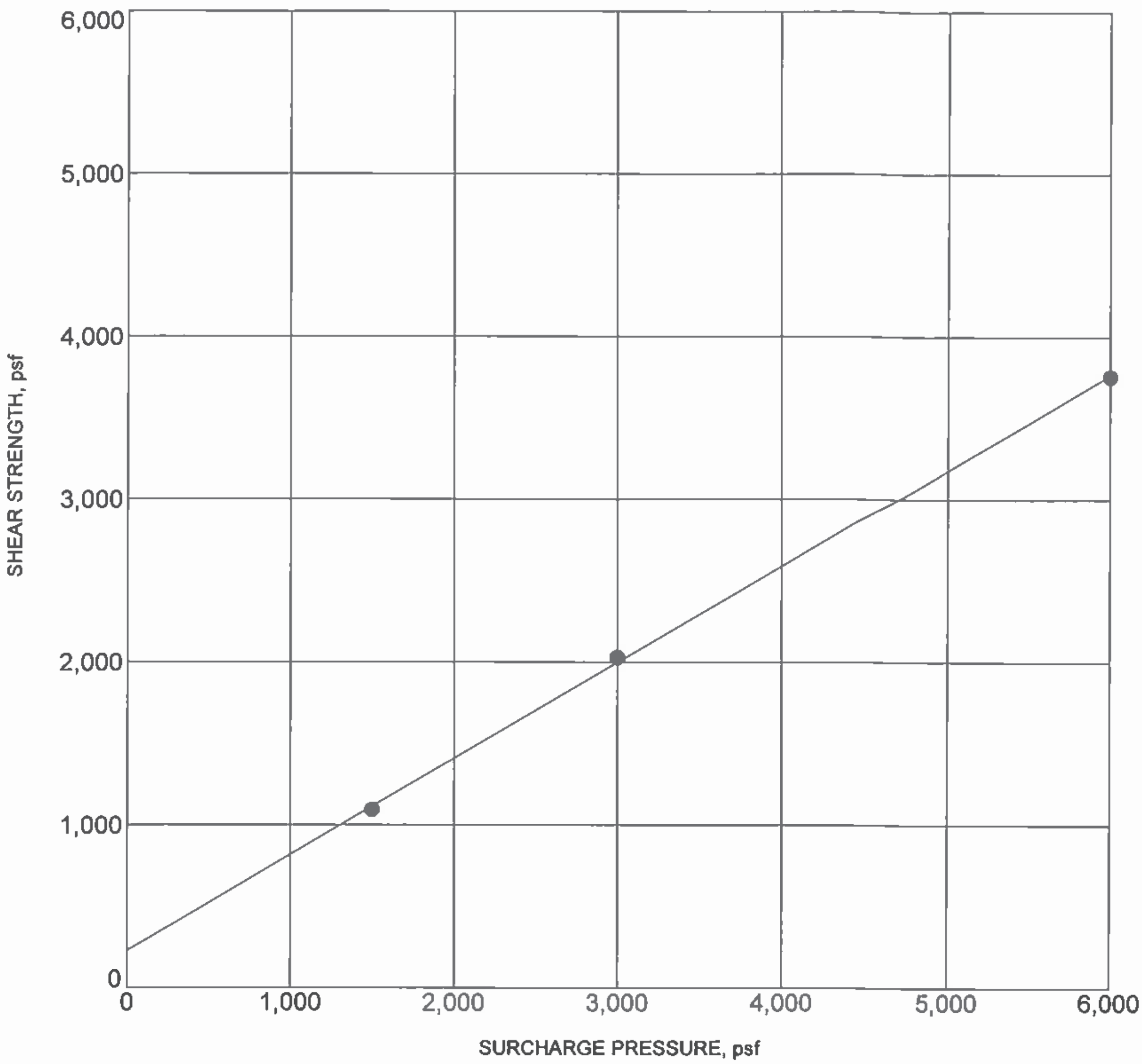
NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No.	Drawing No.
09-81-272-01	B - 8



BORING NO. :	BH - 4	DEPTH (ft) :	25.0-26.5
DESCRIPTION :	SILTY SAND (SM)		
COHESION (psf) :	250	FRICTION ANGLE (degrees):	31
MOISTURE CONTENT (%) :	15.6	DRY DENSITY (pcf) :	119.8

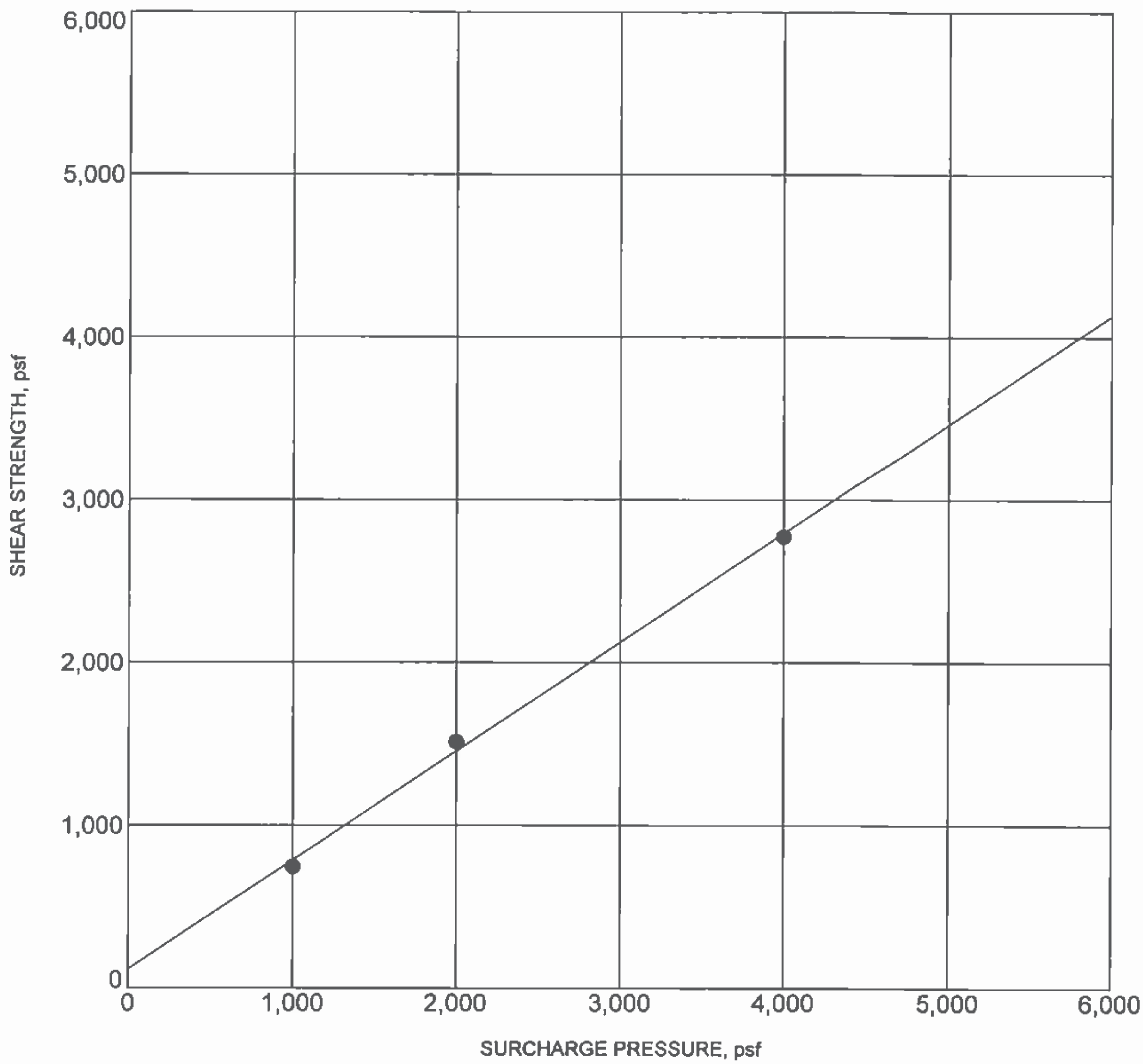
NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01
Drawing No. B - 9



BORING NO. :	BH - 5	DEPTH (ft) :	2.0-3.5
DESCRIPTION :	SILTY SAND (SM)		
COHESION (psf) :	100	FRICTION ANGLE (degrees):	34
MOISTURE CONTENT (%) :	9.4	DRY DENSITY (pcf) :	117.5

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Lakeview Substation
Southwest of the Intersection of 10th Street and Reservoir Avenue
Nuevo, Riverside County, California
For: Southern California Edison

Project No. 09-81-272-01 | Drawing No. B - 10

APPENDIX C

SOIL CORROSIVITY STUDY

SCHIFF ASSOCIATES
FIFTY YEARS OF PROFESSIONALISM

lsolis@schiffassociates.com
www.schiffassociates.com
Consulting Corrosion Engineers – Since 1959

December 10, 2009 via email: Esam.Abraham@sce.com

SOUTHERN CALIFORNIA EDISON
2131 Walnut Grove Avenue
Rosemead, CA 91770

Attention: Mr. Esam Abraham, P.E.

Re: Soil Corrosivity Study
Lakeview Substation
Nuevo, California
SA #09-0982SCSP

INTRODUCTION

Field and laboratory tests have been completed for the subject project. Laboratory tests have been completed on one soil sample provided for the referenced project. Schiff Associates assumes that the sample provided is representative of the most corrosive soil at the site. The purpose of these tests was to determine the electrical resistivity of the soil for grounding design and to determine if the soil might have deleterious effects on underground utility piping and concrete structures.

This report will address the latter. For grounding design, soil electrical resistivities are provided as 'data only' in order to aid other engineers in their design.

The proposed construction consists of an electrical substation. The site is located at the intersection of Reservoir Avenue and 10th Street in Nuevo, California. The water table depth was not provided; therefore, its effect on site corrosivity could not be accounted for in this analysis and report.

The scope of this study is limited to a determination of soil corrosivity and general corrosion control recommendations for materials likely to be used for construction. Our recommendations do not constitute, and are not meant as a substitute for, design documents for the purpose of construction. If the architects and/or engineers desire more specific information, designs, specifications, or review of design, Schiff Associates will be happy to work with them as a separate phase of this project.

TEST PROCEDURES

The electrical resistivity of the soil was measured in-situ at one location with two orientations using the Wenner Four Pin Method in accordance with the EDSL 33-90-00 Soil Test Requirements. This procedure gives the average resistivity to a depth equal to the spacing between the pins. Pin spacings of 1, 1.5, 2.5, 5, 7, 10, 15, 25, 50, 75, 100, and 150 feet were used so that variations with depth could be evaluated. In addition to the EDSL 33-90-00 Soil Test Requirements, strata resistivities were calculated from resistance data using the Barnes Procedure. Test results are shown in Table 1. A sketch of the site map where the tests were performed is provided in the Appendix.

The electrical resistivity of the soil sample was measured in a soil box per ASTM G187 in its as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. The pH of the saturated sample was measured per CTM 643. A 5:1 water:soil extract from the sample was chemically analyzed for the major soluble salts commonly found in soil per ASTM D4327 and D513. Test results are shown in Table 2.

SOIL CORROSIVITY

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:[1]

Soil Resistivity in ohm-centimeters	Corrosivity Category
Greater than 10,000	Mildly Corrosive
2,000 to 10,000	Moderately Corrosive
1,000 to 2,000	Corrosive
0 to 1,000	Severely Corrosive

Other soil characteristics that may influence corrosivity towards metals are pH, soluble salt content, soil types, aeration, anaerobic conditions, and site drainage.

The average and stratum resistivities measured in the field within the upper 15-foot soil strata were in the moderately corrosive category.

[1] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, pp. 166–167.*

The electrical resistivity measured in the laboratory was in the mildly corrosive category with as-received moisture. When saturated, the resistivity was in the moderately corrosive category. The resistivity dropped considerably with added moisture because the sample was dry as-received.

The soil pH value was 7.1. This is neutral alkaline[2] and does not particularly increase soil corrosivity.

The soluble salt content of the sample was moderate.

Ammonium was detected in a low concentration. Nitrate was detected in a concentration high enough to be deleterious to copper.

Tests were not made for sulfide and negative oxidation-reduction (redox) potential because the sample did not exhibit characteristics typically associated with anaerobic conditions.

This soil is classified as moderately corrosive to ferrous metals and aggressive to copper.

CORROSION CONTROL RECOMMENDATIONS

The life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc., in addition to soil corrosivity, and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

The following recommendations are based on the soil conditions discussed in the Soil Corrosivity section above. Unless otherwise indicated, these recommendations apply to the entire site or alignment.

Steel Pipe

Implement *all* the following measures:

1. Underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints should be bonded for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.
2. Install corrosion monitoring test stations to facilitate corrosion monitoring and the application of cathodic protection:
    a. At each end of the pipeline.
    b. At each end of all casings.
    c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.

[2] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, p. 8.*

3. To prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection, electrically isolate each buried steel pipeline per NACE Standard SP0286 from:
   a. Dissimilar metals.
   b. Dissimilarly coated piping (cement-mortar vs. dielectric).
   c. Above ground steel pipe.
   d. All existing piping.
4. Choose one of the following corrosion control options:

   OPTION 1

   a. Apply a suitable dielectric coating intended for underground use such as:
      i. Polyurethane per AWWA C222 *or*
      ii. Extruded polyethylene per AWWA C215 *or*
      iii. A tape coating system per AWWA C214 *or*
      iv. Hot applied coal tar enamel per AWWA C203 *or*
      v. Fusion bonded epoxy per AWWA C213.
   b. Apply cathodic protection to steel piping as per NACE Standard SP0169.

   OPTION 2

   a. As an alternative to dielectric coating and cathodic protection, apply a ¾-inch cement mortar coating per AWWA C205 or encase in concrete 3 inches thick, using any type of cement. Joint bonds, test stations, and insulated joints are still required for these alternatives.

NOTE: Some steel piping systems, such as for oil, gas, and high-pressure piping systems, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Iron Pipe

Implement *all* the following measures:

1. Electrically insulate underground iron pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE Standard SP0286.
2. Bond all nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.
3. Install corrosion monitoring test stations to facilitate corrosion monitoring and the application of cathodic protection:
   a. At each end of the pipeline.
   b. At each end of any casings.
   c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.
4. Choose one of the following corrosion control options:

OPTION 1

a. Apply a suitable coating intended for underground use such as:
    i. Polyethylene encasement per AWWA C105; *or*
    ii. Epoxy coating; *or*
    iii. Polyurethane; *or*
    iv. Wax tape.

    NOTE: The thin factory-applied asphaltic coating applied to ductile iron pipe for transportation and aesthetic purposes does not constitute a corrosion control coating.

b. Apply cathodic protection to cast and ductile iron piping as per NACE Standard SP0169.

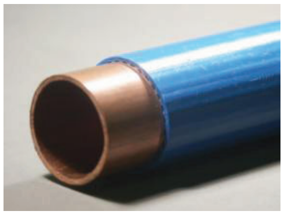
OPTION 2

a. As an alternative to dielectric coating and cathodic protection, concrete encase all buried portions of metallic piping so that there is a minimum of 3 inches of concrete cover provided over and around surfaces of pipe, fittings, and valves using any type of cement.

Copper Tubing

Protect buried copper tubing by *one* of the following measures:

1. Prevention of soil contact. Soil contact may be prevented by placing the tubing above ground or encasing the tubing using PVC pipe with solvent-welded joints.
2. Installation of a factory-coated copper pipe with a minimum 25-mil thickness such as Kamco's Aqua Shield™, Mueller's Streamline Protec™, or equal. The coating must be continuous with no cuts or defects.



3. Installation of 12-mil polyethylene pipe wrapping tape with butyl rubber mastic over a suitable primer. Protect wrapped copper tubing by applying cathodic protection per NACE Standard SP0169.

Plastic and Vitrified Clay Pipe

1. No special precautions are required for plastic and vitrified clay piping placed underground from a corrosion viewpoint.

2. Protect all metallic fittings and valves with wax tape per AWWA C217 or epoxy.

All Pipe

1. On all pipes, appurtenances, and fittings not protected by cathodic protection, coat bare metal such as valves, bolts, flange joints, joint harnesses, and flexible couplings with wax tape per AWWA C217 after assembly.

2. Where metallic pipelines penetrate concrete structures such as building floors, vault walls, and thrust blocks use plastic sleeves, rubber seals, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

Concrete

1. From a corrosion standpoint, any type of cement may be used for concrete structures and pipe because the sulfate concentration is negligible, 0 to 0.1 percent.[3,4,5,6]
2. Standard concrete cover over reinforcing steel may be used for concrete structures and pipe in contact with these soils due to the low chloride concentration[7] found onsite.

Resistivity for Electrical Grounding System

1. Refer to Table 1 for average soil resistivity values to depth for design of electrical ground grids and ground rods for the proposed site.

---

[3] *1997 Uniform Building Code (UBC) Table 19-A-4*
[4] *2006 International Building Code (IBC) which refers to American Concrete Institute (ACI-318) Table 4.3.1*
[5] *2006 International Residential Code (IRC) which refers to American Concrete Institute (ACI-318) Table 4.3.1*
[6] *2007 California Building Code (CBC) which refers to American Concrete Institute (ACI-318) Table 4.3.1*
[7] *Design Manual 303: Concrete Cylinder Pipe. Ameron. p.65*

CLOSURE

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,
SCHIFF ASSOCIATES

Leobardo Solis

Brien L. Clark, P.E.

LICENSED PROFESSIONAL ENGINEER
BRIEN L. CLARK
CH 6291
EXP. 12/31/09
CHEMICAL
STATE OF CALIFORNIA

12-10-09

Enc: Table 1-Soil Resistivity Field Tests
Table 2-Laboratory Tests on Soil Samples
Site Map

09-0982SCSP RPT LS Rev00

Table 1 - Soil Resistivity Field Tests

Southern California Edison
Lakeview Substation
SA #09-0982SCSP
30-Nov-09

LOCATION	DEPTH (feet)	MEASURED RESISTANCE (ohms)	AVERAGE RESISTIVITY TO DEPTH (ohm-cm)	STRATUM RESISTIVITY (ohm-cm)
R1				3,447
NE Corner of Site	1.0	18	3,447	
N/S orientation				8,618
	1.5	15	4,309	
				7,900
	2.5	11	5,267	
				4,389
	5.0	5.0	4,788	
				4,070
	7.0	3.4	4,558	
				2,791
	10	2.0	3,830	
				2,341
	15	1.1	3,160	
				1,572
	25	0.47	2,250	
				1,275
	50	0.17	1,628	
				1,953
	75	0.12	1,724	
				1,193
	100	0.08	1,551	
				456
	150	0.03	862	

Table 1 - Soil Resistivity Field Tests

Southern California Edison
Lakeview Substation
SA #09-0982SCSP
30-Nov-09

LOCATION	DEPTH (feet)	MEASURED RESISTANCE (ohms)	AVERAGE RESISTIVITY TO DEPTH (ohm-cm)	STRATUM RESISTIVITY (ohm-cm)
R2				3,639
NE Corner of Site	1.0	19	3,639	
E/W orientation				9,703
	1.5	16	4,596	
				5,107
	2.5	10	4,788	
				3,467
	5.0	4.2	4,022	
				3,589
	7.0	2.9	3,888	
				2,360
	10	1.7	3,256	
				1,920
	15	0.92	2,643	
				1,082
	25	0.35	1,676	
				670
	50	0.10	958	
				5,506
	75	0.09	1,321	
				4,625
	100	0.08	1,609	
				1,275
	150	0.05	1,479	

Table 2 - Laboratory Tests on Soil Samples

Southern California Edison
Lakeview Substation
SA #09-0982SCSP
1-Dec-09

Sample ID			
			Soil
Resistivity		**Units**	
as-received		ohm-cm	33,600
saturated		ohm-cm	2,360
pH			7.1
Electrical Conductivity		mS/cm	0.21
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	91
magnesium	Mg^{2+}	mg/kg	16
sodium	Na^{1+}	mg/kg	111
potassium	K^{1+}	mg/kg	36
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	168
flouride	F^{1-}	mg/kg	0.6
chloride	Cl^{1-}	mg/kg	72
sulfate	SO_4^{2-}	mg/kg	98
phosphate	PO_4^{3-}	mg/kg	35
Other Tests			
ammonium	NH_4^{1+}	mg/kg	7.6
nitrate	NO_3^{1-}	mg/kg	50
sulfide	S^{2-}	qual	na
Redox		mV	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

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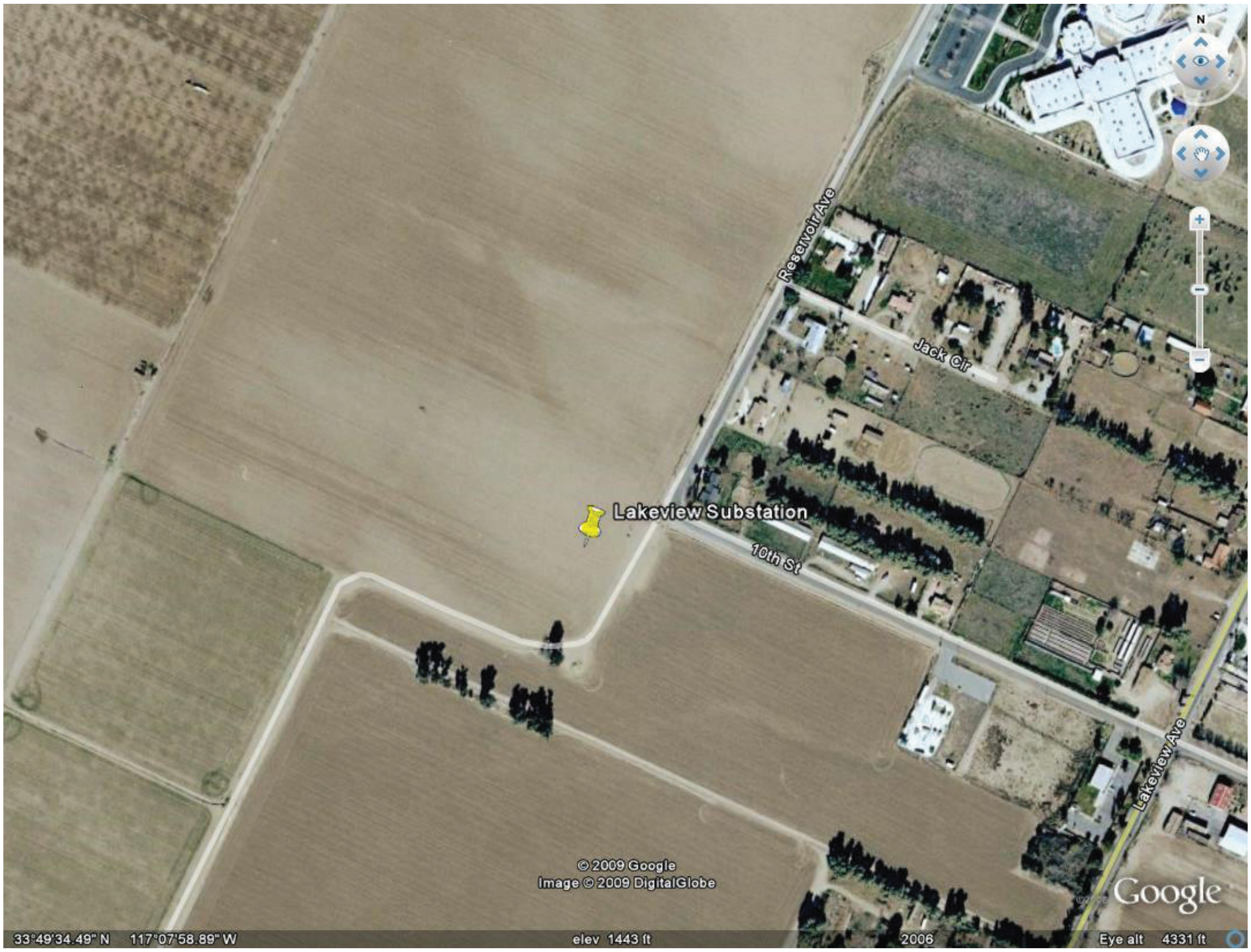

Site Map: Lakeview Substation

APPENDIX G

LAKEVIEW SUBSTATION NOISE MEASUREMENTS

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Appendix E

Project-Generated Construction Source Noise Prediction Model

Lakeview PEA

AECOM

Location	Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold*	852	55.0
	50	85.8
	100	77.9
	150	73.2
	200	69.9
	250	67.4
	300	65.3
	350	63.5
	400	62.0
	450	60.7
	500	59.5
	550	58.4
	600	57.4

Assumptions:	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Excavator	85	0.4
Dozer	85	0.4
Grader	85	0.4

Ground Type	Soft
Source Height	8
Receiver Height	5
Ground Factor	0.63

Predicted Noise Level [2]	L_{eq} dBA at 50 feet[2]
Excavator	81.0
Dozer	81.0
Grader	81.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
85.8

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006.

[2] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Appendix E

Project-Generated Construction Source Vibration Prediction Model

Lakeview Substation

Location	Distance to Nearest Receiver in feet	Predicted Vibration Level (PPV)		Predicted Vibration Level (VdB)		Equipment	Reference Distance	PPV at 25 feet (in/sec)[1]	Approximate Lv (VdB) at 25 feet[2]
		Bulldozer	Trucks	Bulldozer	Trucks				
CA Threshold (0.08 PPV)	**70**	**0.019**	**0.016**			Bulldozer	25	0.089	87
CA Threshold (80VdB)	**70**			**74**	**72**	Trucks	25	0.076	86

Notes:

[1] Where PPV is the peak particle velocity

[2] Where Lv is the RMS velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.

Source: Caltrans 2002, FTA 2006

USGS
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CGS California Geological Survey
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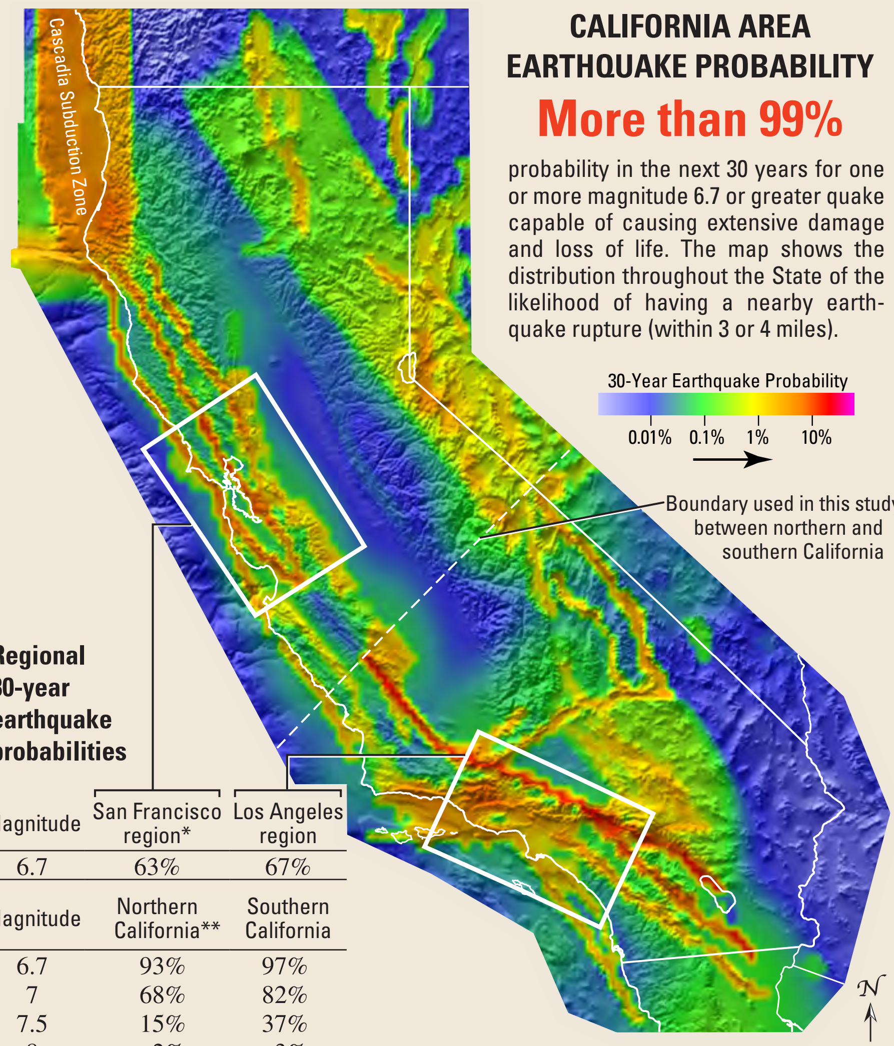
Forecasting California's Earthquakes—What Can We Expect in the Next 30 Years?

In a new comprehensive study, scientists have determined that the chance of having one or more magnitude 6.7 or larger earthquakes in the California area over the next 30 years is greater than 99%. Such quakes can be deadly, as shown by the 1989 magnitude 6.9 Loma Prieta and the 1994 magnitude 6.7 Northridge earthquakes. The likelihood of at least one even more powerful quake of magnitude 7.5 or greater in the next 30 years is 46%—such a quake is most likely to occur in the southern half of the State. Building codes, earthquake insurance, and emergency planning will be affected by these new results, which highlight the urgency to prepare now for the powerful quakes that are inevitable in California's future.

CALIFORNIA AREA EARTHQUAKE PROBABILITY

More than 99%

probability in the next 30 years for one or more magnitude 6.7 or greater quake capable of causing extensive damage and loss of life. The map shows the distribution throughout the State of the likelihood of having a nearby earthquake rupture (within 3 or 4 miles).



Regional 30-year earthquake probabilities

Magnitude	San Francisco region*	Los Angeles region
6.7	63%	67%

Magnitude	Northern California**	Southern California
6.7	93%	97%
7	68%	82%
7.5	15%	37%
8	2%	3%

*Probabilities from UCERF for the San Francisco region are nearly identical to the previous results from WGCEP 2003.
**These probabilities do not include the Cascadia Subduction Zone

What Is an Earthquake Rupture Forecast?

Californians know that their State is subject to frequent—and sometimes very destructive—earthquakes. Accurate forecasts of the likelihood of quakes can help people prepare for these inevitable events. Because scientists cannot yet make precise predictions of the date, time, and place of future quakes, forecasts are in the form of the probabilities that quakes of certain sizes will occur during specified periods of time.

In our daily lives, we are used to making decisions based on probabilities—from weather forecasts (such as a 30% chance of rain) to the annual chance of being killed by lightning (about 0.0003%). Similarly, earthquake probabilities derived by scientists can help us plan and prepare for future quakes.

Earthquake forecasts for California have been developed in the past by multidisciplinary groups of scientists and engineers, each known as a "Working Group on California Earthquake Probabilities" (WGCEP 1988, 1990, 1995, 2003). However, those forecasts were limited to particular regions of California. Because of this, WGCEP 2007 was commissioned to develop an updated, statewide forecast, the latest result of which is the Uniform California Earthquake Rupture Forecast, Version 2, or "UCERF" (U.S. Geological Survey (USGS) Open-File Report 2007-1437, http://pubs.usgs.gov/of/2007/1437/). Organizations sponsoring WGCEP 2007 include the USGS, California Geological Survey, and the Southern California Earthquake Center. The comprehensive new forecast builds on previous studies and also incorporates abundant new data and improved scientific understanding of earthquakes.

When an earthquake occurs, two things happen—a fault ruptures (a crack in the Earth's crust gives way and slips under tectonic pressure) and seismic waves, caused by this sudden fault motion, radiate out like ripples from a pebble tossed into a pond. The shaking that occurs as seismic waves pass by causes most quake damage. The strength of the waves depends partly on the quake's magnitude, which is a function of the size of the fault that moves and the amount of slip.

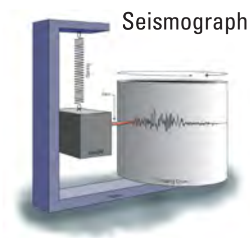
The UCERF study's goal was to determine probabilities for different parts of California of earthquake ruptures of various magnitudes, but not to estimate the likelihood of shaking ("seismic hazard") that will be caused by these quakes. This distinction is important, because even areas in the State with a low probability of fault rupture can experience shaking and damage from distant, powerful quakes.

How Did Scientists Make This Forecast?

California sits on the boundary between two of the Earth's major tectonic plates—the Pacific and North American Plates—which move inexorably past each other at a rate of about 2 inches per year. Much of this motion is accommodated from time to time by sudden slip on faults, producing earthquakes. Although the San Andreas Fault is the main locus of slip, hundreds, if not thousands, of other faults splay out from the plate boundary, spreading the threat of large earthquake ruptures through most of the State.

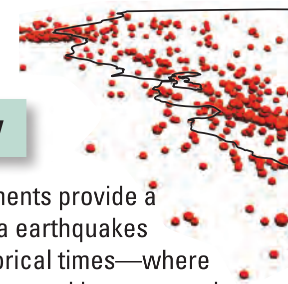
The new Uniform California Earthquake Rupture Forecast (UCERF) combines information from **geodesy** (precise data on the slow relative movement of the Earth's tectonic plates), **geology** (mapped locations of faults and documented offsets on them), **seismology** (occurrence patterns of past earthquakes), and **paleoseismology** (data from trenches across faults documenting the dates and offsets of past earthquakes on them). The first three kinds of data are shown here as layers in the diagram. All four kinds of data are combined mathematically to produce the final probability values for future ruptures in the California area, in regions of the State, and on individual faults.

Building on several previous studies and decades of data collection, UCERF was developed by a multidisciplinary group of scientists and engineers, known as the 2007 Working Group on California Earthquake Probabilities. Advice and comment was sought regularly from the broader community of earthquake scientists and engineers through open meetings and workshops. Where experts disagreed on aspects of the forecast, alternative options were accounted for in calculations to reflect these uncertainties. The final forecast is a sophisticated integration of scientific fact and expert opinion.



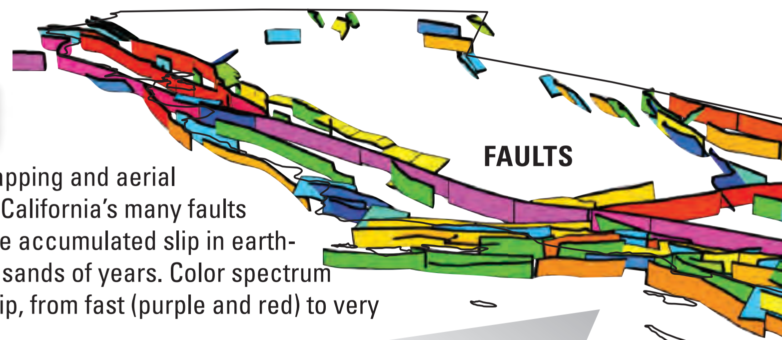
Seismology

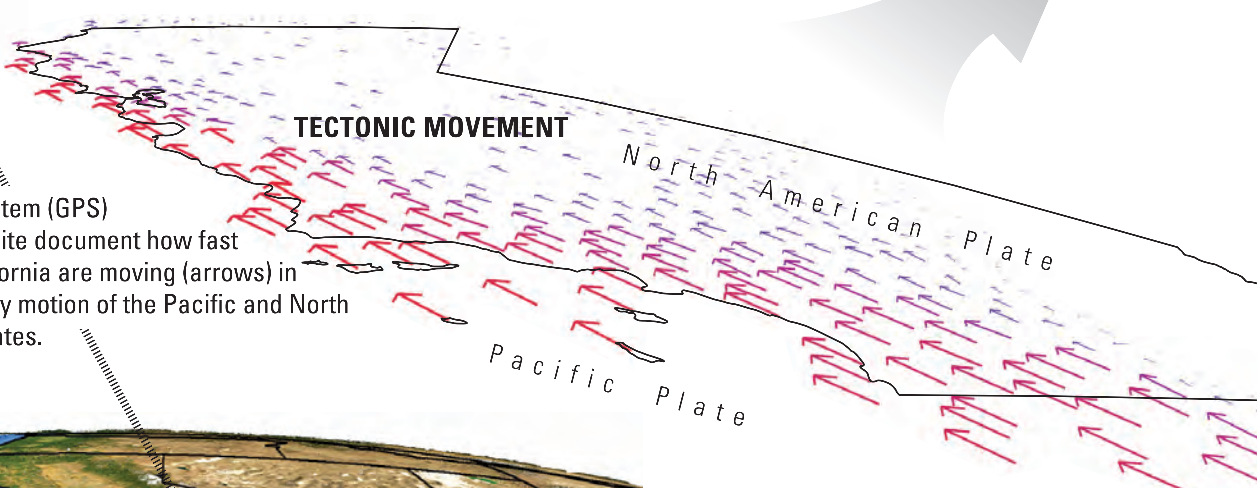
Monitoring instruments provide a record of California earthquakes during recent historical times—where and when they occur and how strong they are



Geology

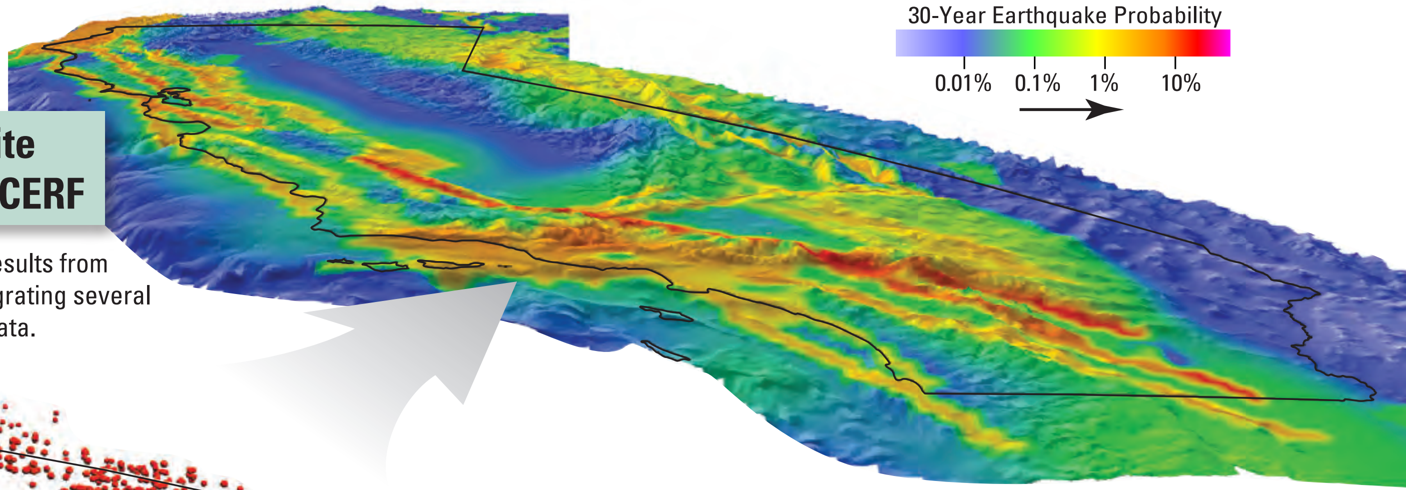
Geologic field mapping and aerial photos trace out California's many faults and document the accumulated slip in earthquakes over thousands of years. Color spectrum shows rates of slip, from fast (purple and red) to very slow (dark blue).





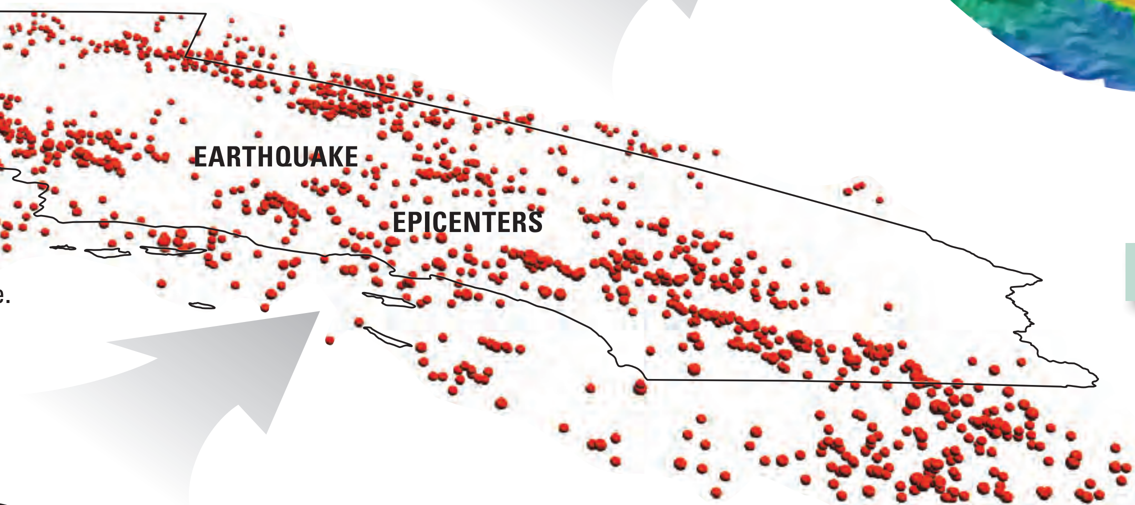
Geodesy

Global positioning system (GPS) observations by satellite document how fast various points in California are moving (arrows) in response to the steady motion of the Pacific and North American tectonic plates.



The Composite Forecast—UCERF

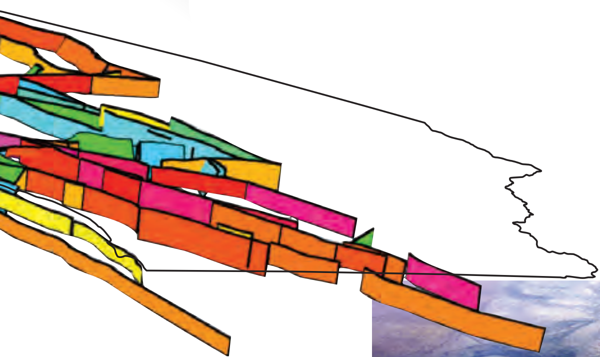
The final forecast results from evaluating and integrating several types of scientific data.

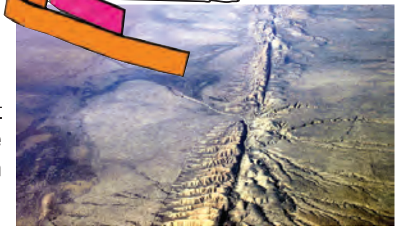


Paleoseismology

By analyzing the evidence for dates and amounts of slip of past earthquakes in the walls of a trench dug across a fault, scientists can extend the fault's earthquake record into prehistoric time.

Trenching across the Hayward Fault in Fremont



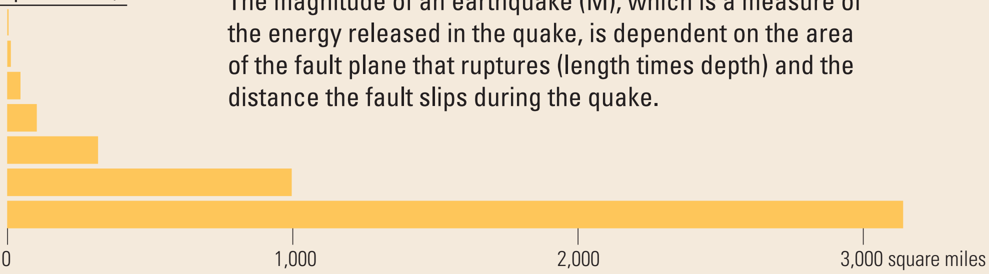


The San Andreas Fault passes through the Carrizo Plain

Earthquake Magnitudes and the Areas of Fault Rupture

The magnitude of an earthquake (M), which is a measure of the energy released in the quake, is dependent on the area of the fault plane that ruptures (length times depth) and the distance the fault slips during the quake.

M	Fault Plane Ruptured			
	Length (miles)	Depth (miles)	Average slip (feet)	Area (square miles)
5.0	1.8	1.8	0.5	
5.5	3.1	3.1	0.8	
6.0	5.6	5.6	1.5	
6.5	13	7.5	2.7	
7.0	42	7.5	4.8	
7.5	133	7.5	8.5	
8.0	420	7.5	15	



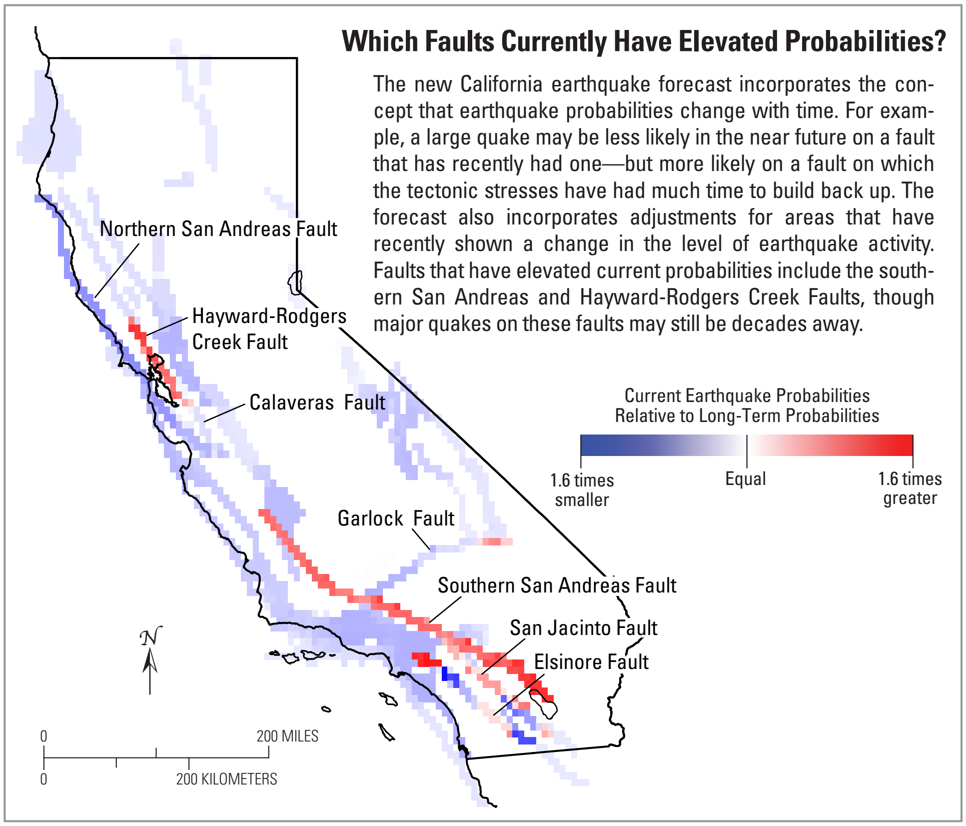
How Likely is a Damaging Quake in the Next 30 Years?

California straddles the boundary between two of the Earth's tectonic plates—as a result, it is broken by numerous earthquake faults. Taking into account the earthquake histories and relative rates of motion on these many faults, the UCERF study concludes that there is a probability of more than 99% that in the next 30 years Californians will experience one or more magnitude 6.7 or greater quakes, potentially capable of causing extensive damage and loss of life. For powerful quakes of magnitude 7.5 or greater, there is a 46% chance of one or more in the next 30 years—such a quake is twice as likely to occur (37%) in the southern half of the State than in the northern half (15%).

Smaller magnitude earthquakes are more frequent than larger quakes. According to the new forecast, about 3 magnitude 5 or greater quakes will occur in the California region per year, and a magnitude 6 or greater quake about every 1.5 years. These numbers do not include aftershocks that follow larger quakes—including them would roughly double the expected number of magnitude 5 or greater quakes.

Which Faults Currently Have Elevated Probabilities?

The new California earthquake forecast incorporates the concept that earthquake probabilities change with time. For example, a large quake may be less likely in the near future on a fault that has recently had one—but more likely on a fault on which the tectonic stresses have had much time to build back up. The forecast also incorporates adjustments for areas that have recently shown a change in the level of earthquake activity. Faults that have elevated current probabilities include the southern San Andreas and Hayward-Rodgers Creek Faults, though major quakes on these faults may still be decades away.



STATEWIDE EARTHQUAKE PROBABILITIES

The numbers represent current best estimates. As earthquake science progresses, these probabilities will change. Actual repeat times vary considerably and only rarely will be exactly as listed in the table.

Magnitude	30-year probability of one or more events greater than or equal to the magnitude	Average repeat time (years)
6.7	>99%	5
7	94%	11
7.5	46%	48
8	4%	650

*Not including Cascadia Subduction Zone

For the entire California region, the fault with the highest probability of generating at least one magnitude 6.7 or larger earthquake is the southern San Andreas (59% in the next 30 years). For northern California, the most likely source of such a quake is the Hayward-Rodgers Creek Fault (31% in next 30 years)—see USGS Fact Sheet 2008-3019. Quake probabilities for many parts of the State are similar to those in previous studies, but the new probabilities for the Elsinore and San Jacinto Faults in southern California are about half those previously determined. For the far northwestern part of the State, a major source of quakes is the offshore 750-mile-long "Cascadia Subduction Zone," which extends south about 150 miles into California. For the next 30 years there is a 10% probability of a magnitude 8 to 9 quake somewhere along the zone—such quakes occur about every 500 years.

The UCERF forecast was evaluated by an independent scientific review panel, as well as by both the California and National Earthquake Prediction Evaluation Councils, making it one of the most extensively reviewed earthquake forecasts ever produced. Uncertainties remain because the new quake probabilities are the result of evaluating and accommodating several earthquake theories. As scientific understanding of quakes improves, the probabilities will change.

The results of the UCERF study are a reminder that all Californians live in earthquake country and should therefore be prepared (see Putting Down Roots in Earthquake Country at http://www.earthquakecountry.info/roots/). The USGS has already used the UCERF to estimate California's seismic hazard, which in turn will be used to update building codes. Other subsequent studies will add information on the vulnerability of manmade structures to estimate expected losses ("seismic risk"). In these ways, UCERF will help to increase public safety and community resilience to earthquake hazards.

INDIVIDUAL FAULT PROBABILITIES

The UCERF report assigns individual probabilities to specific known major faults. Below are 30-year probabilities for seven of the faults for which scientists have the most data. Many other faults also have significant probabilities—in fact, the next big quake in California is just as likely to occur on one of the other faults in the State.

Fault	Probability of one or more magnitude 6.7 or greater quake
Southern San Andreas	59%
Hayward-Rodgers Creek	31%
San Jacinto	31%
Northern San Andreas	21%
Elsinore	11%
Calaveras	7%
Garlock	6%

Earthquakes cannot be prevented, but the damage they do can be greatly reduced through prudent planning and preparedness. The ongoing work of USGS, California Geological Survey, Southern California Earthquake Center, and other scientists in evaluating quake probabilities is part of the National Earthquake Hazard Reduction Program's efforts to safeguard lives and property from the future quakes that are certain to strike in California and elsewhere in our Nation.

Edward H. Field, Kevin R. Milner, and the 2007 Working Group on California Earthquake Probabilities

Edited by Peter H. Stauffer and James W. Hendley II
Layout by David R. Jones

COOPERATING ORGANIZATIONS
Southern California Earthquake Center (SCEC)
California Geological Survey (CGS)
California Earthquake Authority

For more information contact:
Earthquake Information Hotline (650) 329-4085
U.S. Geological Survey, Mail Stop 977
345 Middlefield Road, Menlo Park, CA 94025
http://earthquake.usgs.gov/
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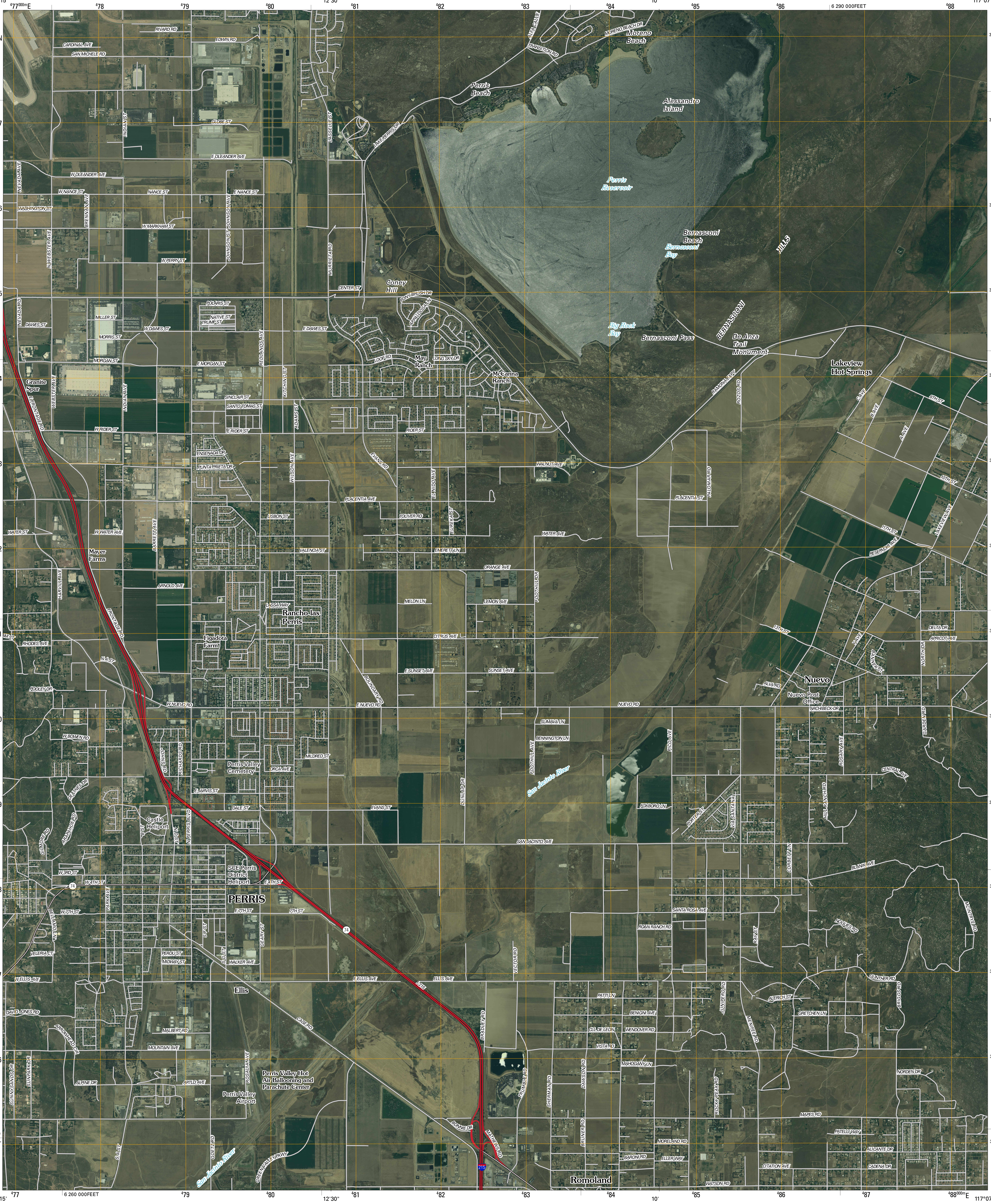
PERRIS QUADRANGLE
CALIFORNIA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 11S
10 000-foot ticks: California Coordinate System of 1983
(zone 6)

Imagery....................NAIP, June 2005
Roads....................National Transportation Dataset, 2008
Names....................GNIS, 2008

UTM GRID AND 2009 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
0° 6´ 2 MILS; 12° 34´ 224 MILS

U.S. National Grid
100,000-m Square ID: MT
Grid Zone Designation: 11S

SCALE 1:24 000

This map was produced to conform with version 0.0.25 of the draft USGS Standards for 7.5-Minute Quadrangle Maps.
A metadata file associated with this product is also draft version 0.0.25

QUADRANGLE LOCATION

Riverside East	Sunnymead	El Casco
Steele Peak	Perris	Lakeview
Lake Elsinore	Romoland	Winchester

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION
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PERRIS, CA
2009

Earthquake Hazards Program

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Complete Report for San Jacinto fault, San Jacinto Valley section (Class A) No. 125b

Brief Report ||Partial Report

Compiled in cooperation with the California Geological Survey

citation for this record: **Treiman, J.A., and Lundberg, M.Matthew, compilers, 1999, Fault number 125b, San Jacinto fault, San Jacinto Valley section, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, http://earthquakes.usgs.gov/regional/qfaults, accessed 06/17/2011 06:24 PM.**

Synopsis **General:** This is the most seismically active fault in southern California, with significant earthquakes (>M5.5), including surface rupturing earthquakes in 1968 (M6.6 Borrego Mountain earthquake) and 1987 (M6.6 Superstition Hills and M6.2 Elmore Ranch earthquakes), and numerous smaller shocks within each of its main sections. The fault zone in this compilation is divided from north to south into: San Bernardino section [125a], San Jacinto Valley section [125b], Anza section [125c], Coyote Creek section [125d], Borrego Mountain section [125e], Superstition Hills section [125f], and Superstition Mountain section [125g]. Slip rates in the northern half of the fault system are around 12 mm/yr but are only around 4 mm/yr for faults in the southern half where strands overlap or are sub-parallel.

Sections: This fault has 7 sections. Sections taken from segments defined by Working Group on California Earthquake Probabilities (1995 #4945) and by Petersen and others (1996 #4860); Sanders and Magistrale (1997 #6396) defined 18 segments based on inferred and observed historic ruptures and bends or steps in the continuity of the faults (these "segments" are listed under the seven sections described herein). Wesnousky (1986 #5305) divided the fault zone into nine segments, including the entire Claremont fault in the northern segment, including the Casa Loma fault with the Clark fault, and distinguishing the Hot Springs, Thomas Mountain and Buck Ridge faults as separate segments, in addition to the Coyote Creek, Borrego Mountain, Superstition Hills and Superstition Mountain sections as used by Working Group on California Earthquake Probabilities (1995 #4945).

Name comments **General:**
San Jacinto fault named by Lawson and others (1908 #4969). Later mapping of major parts of zone by Fraser (1931 #6379), Dibblee (1954 #6376) and Sharp (1967 #6397). Major named faults within the zone include the Claremont, Casa Loma, Clark, Buck Ridge, Coyote Creek, Superstition Mountain, and Superstition Hills faults. See section discussions for more detail.

Section:
Section represented herein includes San Jacinto Valley portion of Claremont fault (no. 447), Hot Springs fault (no. 458), and Casa Loma fault (no. 457) of Jennings (1994 #2878); also Park Hill fault. Preceding faults correspond to four segments of Sanders and Magistrale (1997 #6396). Claremont fault named by Fraser (1931 #6379), but the name has been applied both to the Holocene fault at the southwest margin of the San Timoteo badlands (Fraser, 1931 #6379; Jennings, 1994 #2878) and to an older sub-parallel fault strand roughly 0.5-1.0 km to the northeast (Department of Water Resources, 1959 #6377; Rogers, 1965 #505; Shuler,1953 #6881). However, current usage of the name is for the Holocene main strand of the fault zone in the San Bernardino-San Jacinto Valley area (Hart, 1977 #6381; Kahle, 1987 #6880; Morton, D.M., personal commun., 1999); Hot Springs fault named and diagrammatically mapped by R.T. Hill (as shown by Arnold, 1918 #6373) and later remapped by Fraser (1931 #6379); Casa Loma fault named by (Department of Water Resources, 1959 #6377); Park Hill fault named by (Department of Water Resources, 1959 #6377); the southeastern part of the Casa Loma fault has also been called the Bautista Creek fault (Department of Water Resources, 1959 #6377). The southern end of the main part of this section is at the concealed juncture where the Casa Loma and Claremont faults join to form the Clark fault (Working Group on California Earthquake Probabilities, 1995 #4945); although the subsidiary Hot Springs fault continues further to the southeast, overlapping the northern Anza section.

Fault ID Comments:
Refers to numbers 400 (Lytle Creek fault), 401 (San Jacinto fault), 402 (Glen Helen fault), 429 (Rialto-Colton fault), 447 (Claremont fault), 457 (Casa Loma fault), 458 (Hot Springs fault), 459 (Clark fault), 471 (Buck Ridge fault), 478 (Coyote Mountain fault), 479 & 480 (Coyote Creek fault), 504 (Superstition Hills fault), 505 (Superstition Mountain fault) and 506 (Wienert fault) of Jennings (1994 #2878); numbers 2 (Glen Helen fault), 3 (San Jacinto fault), 4 (Lytle Creek fault), 5 (Claremont fault), 6 (Casa Loma fault), 7 (Hot Springs fault), and 8 Clark fault) of Ziony and Yerkes (1985 #5931).

County(s) and RIVERSIDE COUNTY, CALIFORNIA

State(s)

AMS sheet(s)

Physiographic province(s) PACIFIC BORDER

Reliability of location Good
Compiled at 1:24,000 scale.

Comments: Traces based on State of California Alquist-Priolo Earthquake Fault Zone maps.

Geologic setting The San Jacinto fault zone is a major element of the San Andreas fault system in southern California, with historic earthquakes (if not ground rupture) associated with most of its sections. This dextral fault zone branches off from the San Andreas near Cajon pass and extends southeastward through the Peninsular Ranges for 240 km into southwestern Imperial Valley. Sharp (1967 #6397) believes that this is currently the most active strand of the San Andreas system in southern California, but is relatively young, with only about 24 km of total dextral offset. The fault zone may be divided into four principal sections: the Claremont, Clark, Coyote Creek and Superstition sections which are separated by major discontinuities (Sanders and Magistrale, 1997 #6396). The fault zone is further subdivided for seismic-hazard modeling purposes into from 5 to as many as 20 "segments" by various authors. The principal faults within the zone overlap in a right-stepping fashion, with a major overlap (50 km in length) occurring between the Clark and Coyote Creek faults.

Length (km) This section is 59 km of a total fault length of 244 km.

Average strike (for section) versus N58°W (for whole fault)

Sense of movement

Comments: Claremont fault is principally dextral with perhaps some reverse (Proctor, 1962 #6392); Casa Loma appears to be mainly normal (Department of Water Resources, 1959 #6377), but Rasmussen (1981 #6393) reports evidence of dextral component.

Dip 70° NE.

Comments: San Jacinto [Claremont] fault measured in aqueduct tunnel (Department of Water Resources, 1959 #6377); Casa Loma fault dips 35°-53° NE.

Paleoseismology studies

Geomorphic expression Claremont fault marked by faceted ridges, notches, scarps, linear gullies and ponded alluvium. Casa Loma fault marked by sinuous scarps, linear gullies and ponded alluvium. Hot Springs fault marked by scarps. Area between Claremont and Casa Loma faults is a sediment filled graben and area between Casa Loma and Park Hill faults is a pressure ridge.

Age of faulted surficial deposits Fault offsets Holocene younger alluvium in San Jacinto Valley (Morton, 1972 #6387, 1978 #6388); Plio-Pleistocene Bautista beds of Fraser (1931 #6379).

Historic earthquake

Most recent prehistoric deformation Latest Quaternary (<15 ka)

Comments: Historic pre-instrumental events include M6.8 or 6.9 on the Claremont fault (04/21/1918) and M6.4 on the Casa Loma (12/25/1899).

Recurrence interval 65-98 yr

Comments: Estimate for Casa Loma fault (Rasmussen, 1981 #6393).

Slip-rate category Greater than 5.0 mm/yr

Comments: Reported slip rates include Working Group on California Earthquake Probabilities (1988 #5494) estimate of 12.0±6.0 mm/yr based on data from the Clark fault, to the south, 8-12 mm/yr (Sharp, 1981 #6398); 13-26 mm/yr, between 43-67 ka and 7-13 mm/yr between 305-700 ka (Kendrick and others, 1994 #6383); Wesnousky (1986 #5305) assigned 10 mm/yr. Slip rate assigned by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 12.0 mm/yr (with minimum and maximum assigned slip rates of 6.0 mm/yr and 18.0 mm/yr, respectively).

Date and Compiler(s) 1999
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