3.0 REGIONAL ENVIRONMENTAL SETTING/AFFECTED ENVIRONMENT

Introduction

The purpose of this section is to provide a useful description of the regional environmental setting in which the proposed MSHCP is located, with particular emphasis on the environmental constraints and resources most likely to be affected by implementation of the proposed Plan. Areas to be addressed include existing and planned land uses, topography, climate, soils and geology, water quality and resources, flooding and hydrology, biological and cultural resources, visual and air quality resources, noise, traffic and circulation, public facilities and services, and special socio-economic groups.

In accordance with Sections 15063, 15064, and 15065 of the State CEQA Guidelines, an Initial Study was completed to identify potentially significant impacts associated with the proposed MSHCP. The Initial Study and associated Addendum are included in Appendix A of this document. A Notice of Preparation (NOP) was prepared and transmitted to the State Clearinghouse, local and regional agencies, and posted at the Riverside County Clerk's office. Public notice was also published in a newspaper of local circulation. A Notice of Intent (NOI) was also published in the Federal Register in compliance with 40 C.F.R. 1501.7 and 40 C.F.R. 1508.22. Comments were received on both of these scoping documents. Where no significant impact or effect has been identified during the initial analysis or NOP/NOI comment period, or during subsequent meetings, less detailed analysis has been conducted. The NOP and NOI are also included in Appendix A.

3.1 Topography and Climate

3.1.1 Topography

Topographic or geomorphic conditions in the Coachella Valley have had a profound effect on and are an integral part of the diverse environments encompassed in the MSHCP Plan Area. The valley is located in the northwestern extreme of the Salton Trough, which is an extension of the same geological forces that created Gulf of California. The trough is a tectonic (fault controlled) depression that began forming about 5 million years ago and continues to extend, widen and in some areas lower the valley floor today. As a result of several millimeters of tectonic subsidence per year, and on-going erosion of sands and gravels from the surrounding mountains, the Coachella Valley is filled with as much as three miles of sediments, much of which bearing fresh and fossil marine waters.

The Salton Sea, located at the southeast end of the valley, occurs at a surface elevation of about 228 feet below mean sea level. The major mountain ranges surrounding, defining and being a part of the Plan Area include the San Bernardino, Little San Bernardino, San Jacinto and Santa Rosa Mountains, and the Orocopia and Chocolate Mountains, with peaks ranging in elevation from approximately 9,600 feet to 11,502 feet. Elevated terrain elsewhere in the Plan Area includes the Indio Hills and the Mecca Hills, which are artifacts of the compression and extension forces being generated by the San Andreas Fault Zone that passes through the Plan Area.

On the valley floor, terrain conditions include alluvial fans or cone, which issue from the mouth of major drainages and have created extensive and frequently intersecting deposition areas. These topographic features are essential to the fluvial erosion and sorting process that generates a wide range of sands and gravels. On the lower portions of the valley floor and following the northwest/southeast gradient of the valley, sand dunes, fields and sheets have formed. Deposits in these areas shift and move over time, with intervening areas scoured clean by prevailing winds.

3.1.2 Climate

The climate of the Coachella Valley is a continental, desert type, with hot summers, mild winters, and very little annual rainfall. Precipitation is less than 6 inches annually and occurs mostly in the winter months from active frontal systems and in the late summer months from thunderstorms. Temperatures exceed an average 100 degrees Fahrenheit for four months each year, with daily highs near 100 degrees Fahrenheit during July and August. Summer nights are very mild with minimum temperatures in the mid-70s. During the winter season, daytime highs are quite mild, although dry air is conducive to nocturnal radiational cooling, with early morning lows around 40 degrees.

The Coachella Valley is exposed to frequent gusty winds. The strongest and most persistent winds typically occur immediately to the east of Banning Pass, which is noted as a wind power generation resource area. Aside from this locale, the wind conditions in the remainder of the valley are geographically distinct. Stronger winds tend to occur in the open mid-portion of the valley, while lighter winds tend to occur closer to the foothills. Less frequently, widespread gusty winds occur over all areas of the valley.

Wind regimes in the Coachella Valley have and continue to play a significant role in shaping the valley floor and creating specialized habitats. Regional winds can vary in direction and intensity throughout the year. In the spring and early summer, winds in the northwestern portion of the Plan Area are the result of marine influences. As the desert floor heats up, cool ocean-modified

air masses from the west are drawn into the valley through the narrow San Gorgonio Pass. This draw effect generates strong and steady winds, which pass over the most erosive portions of the valley floor, transporting large quantities of sand and dust throughout the region. In the northern portions of the valley, the annualized wind pattern is from the west and northwest.[1] Santa Ana conditions, which result from large domes of high pressure over Nevada and Utah, result in hot and dry northerly and northeasterly winds, which play a very limited role in sand transport, although such conditions do contribute to locally high levels of fugitive dust (also see Section 3.13: Air Quality).

3.2 Existing Land Use and Surrounding Land Use

3.2.1 Existing Land Use

The Coachella Valley is a long, broad, northwest-southeast trending valley in the central portion of Riverside County, at the westernmost limits of the Sonoran Desert. It is characterized by extremes in topography, ranging from the Salton Sea, a sub-sea level geologic sink, to mountain peaks that rise two miles above sea level.

Prior to the twentieth century, settlement in the Coachella Valley was largely associated with Native American villages and trails. The arrival of Euro-American settlers began in earnest around the 1870s and was further induced by the construction of the Southern Pacific railroad and the opening of public lands for settlement under the Homestead and Desert Land Acts.

Farming became the dominant economic activity in the valley, followed by a new industry featuring equestrian camps, resort hotels and "weekend homes" beginning in the 1920s. The Coachella Valley experienced rapid growth during the 1940s and 1950s, with the construction of residential country clubs and other resort-style development. Since that time, it has expanded to become one of the premier destination resort areas in the country and features world-class resort hotels, golf clubs, and residential communities.

Plan Area Boundaries

The northerly boundary of the Plan Area is the jurisdictional line separating Riverside and San Bernardino counties, and the northeasterly boundary is defined by the ridgeline of the Little San Bernardino Mountains. The easterly boundary of the Plan Area is the range line common to Ranges 13 East and 14 East, excluding all but a small portion of the Chocolate Mountains Aerial

[1] Long-Term Sand Supply to Coachella Valley Fringe-Toed Lizard (*Uma inornata*) Habitat in the Northern Coachella Valley, California". Griffiths, P.G., Robert H. Webb, Nicholas Lancaster, et al. U.S. Geological Survey. August 29, 2002.

Gunnery Range. The southerly boundary is the jurisdictional line separating Riverside County from Imperial and San Diego counties, and the southwesterly boundary coincides with the ridgeline of the Santa Rosa and San Jacinto Mountains. The Plan Area extends westward to the range line common to Ranges 1 East and 2 East, and includes the community of Cabazon in the San Gorgonio Pass east of the San Gorgonio River.

The Plan Area encompasses a total of 1,205,311± acres or approximately 1,885 square miles. However, Indian Reservation lands and Tribal-owned lands within the Plan Area are excluded from the proposed Plan, and therefore, the actual Plan Area totals 1,136,400± acres. Lands within the Plan Area are under the jurisdiction of State and Federal agencies, and Riverside County and nine cities, including: Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage. Approximately 83.58% of lands in the Plan Area are unincorporated lands, and the remaining 16.42% occur within the boundaries of the cities listed above.

The MSHCP Plan Area encompasses the watershed of the Salton Trough, except for those portions located outside Riverside County or outside the jurisdictional boundaries of CVAG. It includes the low-lying desert floor of the Coachella Valley and extends up to the ridgeline of the surrounding mountains. The westernmost portion of the Plan Area is defined by the San Gorgonio Pass, a narrow corridor between the San Bernardino and San Jacinto Mountains.

The San Gorgonio Pass area includes the rural community of Cabazon and separates the interior valleys of Southern California from the arid desert of the Coachella Valley and lands to the east. The pass opens into the broad, northwest-southeast trending desert floor of the Coachella Valley, which is generally bounded on the northwest by the San Bernardino Mountains, on the north and northeast by the Little San Bernardino Mountains, on the south by the Santa Rosa Mountains, and on the west and southwest by the San Jacinto Mountains. The northernmost portion of the Salton Sea is located within and at the southerly edge of the Plan Area (the remainder is located within Imperial County and is not a part of the Plan Area).

The Coachella Valley is bisected by Interstate 10, which passes through the San Gorgonio Pass and connects the Plan Area with Los Angeles to the west and Arizona to the east. The valley includes nine incorporated cities, which generally lie in a linear pattern in the central portion of the Plan Area. The City of Desert Hot Springs is located in the northwesterly portion of the Plan Area, north of I-10, at the base of the Little San Bernardino Mountains, while the other cities originated southeast along "coves" created by the arms of the San Jacinto and Santa Rosa Mountains. The cities of Indio and Coachella have developed in the heart of rich agricultural lands in the southeast portions of the valley.

Urbanized areas of the cove communities cities lie south of I-10 and include Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and Coachella. Most other lands in the Plan Area are under the jurisdiction of the County of Riverside and the Bureau of Land Management.(BLM) Lands within the reservations of the Cabazon, Agua Caliente, Twenty-Nine Palms, Augustine, and Torres Martinez Indians account for approximately 69,578 acres of land within the boundaries of the Plan Area, but these lands are not considered a part of the proposed Plan.

Land Ownership

Approximately 42% of land within the Plan Area boundaries is privately held. The remaining 58% (excluding Indian Reservation land and Tribal-owned land) is public and quasi-public land managed by various State and Federal agencies and non-governmental organizations (private conservation groups), including those identified in the table below (*Table 3-1*).

TABLE 3-1
Land Ownership in the MSHCP Plan Area

Land Owner	No. of Acres	% of Total
Bureau of Land Management	296,600	27
Bureau of Reclamation	2,000	0
CA Dept. of Fish & Game	29,300	3
CA Dept. of Parks & Recreation	18,700	2
Caltrans	500	0
Imperial Irrigation District	1,200	0
Cities	6,100	1
Coachella Valley Association of Governments	1,600	0
Coachella Valley Mountains Conservancy	2,700	0
Coachella Valley Water District	8,400	1
Non-Permittee Public and Quasi-Public Entities	10,900	1
Riverside County	2,700	0
Riverside County Park and Open Space District	400	0
National Park Service	166,000	15
Private, Non-Conservation	428,800	39
Private, Conservation	28,300	3
Riverside County Flood Control District	400	0
State Lands Commission	4,800	0
The Nature Conservancy (TNC)	900	0
U.S. Fish & Wildlife Service	3,700	0
U.S. Forest Service	92,400	8
University of California NRS	6,400	1
Total Area Covered by Plan	1,112,800	100
Indian Reservation Lands (not part of Plan)	69,400	
Total Area within Plan Boundaries	1,182,200	

Source: Table 2.5, Coachella Valley MSHCP, prepared by the Coachella Valley Mountains Conservancy, October 2004.

As shown in the table above, about 42% of the land within the Plan Area is privately owned. Other significant landowners include the BLM, which owns and manages more than 27% of land in the Plan Area, including portions of the California Desert Conservation Area (CDCA), Santa Rosa Mountains Wilderness, Orocopia Mountains Wilderness, Mecca Hills Wilderness, and numerous other conservation areas. The National Park Service owns and manages portions of Joshua Tree National Park, which comprises almost 15% of land in the Plan Area. The U.S. Forest Service also owns and manages a substantial portion (more than 8% of the Plan Area, including lands in the San Jacinto Wilderness, Santa Rosa/San Jacinto National Monument, San Bernardino National Forest-San Jacinto District, and San Gorgonio Wilderness (joint ownership with BLM).

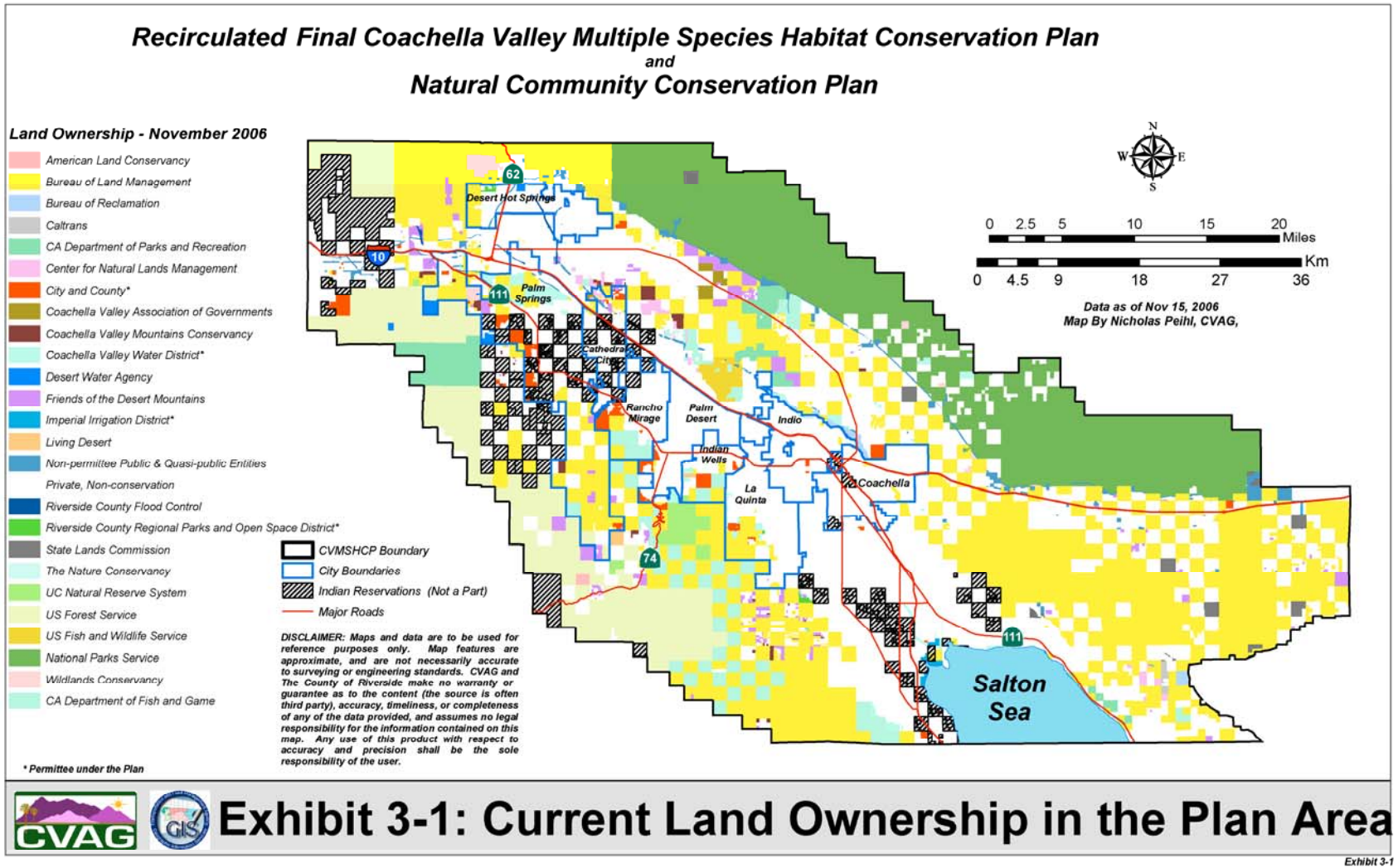
Land Use Designations

Future/potential land uses within the Plan Area are assigned and governed by each State-empowered jurisdiction's General Plan and associated Land Use Map, which are encompassed in their General Plan Land Use Elements. California Government Code Section 65300 requires every city and county to prepare and adopt a "comprehensive, long-term general plan for the physical development" of the community. The General Plan is further required to provide a land use element that describes and designates land uses by type, location, intensity and/or extent of use.

Each jurisdiction in the Coachella Valley, including Riverside County and the nine incorporated cities, has adopted its own General Plan Land Use Element, which assigns future, permitted land uses for lands within its jurisdictional boundaries. Riverside County's most recently approved General Plan utilized conservation planning and information under development for the proposed MSHCP.

The following table (*Table 3-2*) provides the number of acres designated by land use category within the Plan Area, whether developed or vacant. Additionally, the table provides a picture of how this area could develop in the future without the adoption of the proposed MSHCP. The data is based upon the recently adopted (2003) Riverside General Plan. Riverside County's General Plan Land Use Element includes four focused community plans that specifically address land use in the proposed MSHCP Plan Area, including the Eastern Coachella Valley Plan, Western Coachella Valley Plan, Cabazon Community Plan, and Riverside Extended Mountain Area Plan (REMAP). The General Plan land use plans developed by the participating eight incorporated cities have been consolidated into a single land use plan in CVAG's 1999 General Plan Land Use Map update.

The land use designations described in *Tables 3-2* and *3-3* and in *Exhibit 3-1* represent those assigned by each jurisdiction to guide the future development of land. *Exhibit 3-2* shows future land use in Coachella Valley without the Plan.


Recirculated Final Coachella Valley Multiple Species Habitat Conservation Plan
and
Natural Community Conservation Plan
Land Ownership - November 2006
American Land Conservancy
Bureau of Land Management
Bureau of Reclamation
Caltrans
CA Department of Parks and Recreation
Center for Natural Lands Management
City and County*
Coachella Valley Association of Governments
Coachella Valley Mountains Conservancy
Coachella Valley Water District*
Desert Water Agency
Friends of the Desert Mountains
Imperial Irrigation District*
Living Desert
Non-permittee Public & Quasi-public Entities
Private, Non-conservation
Riverside County Flood Control
Riverside County Regional Parks and Open Space District*
State Lands Commission
The Nature Conservancy
UC Natural Reserve System
US Forest Service
US Fish and Wildlife Service
National Parks Service
Wildlands Conservancy
CA Department of Fish and Game
* Permittee under the Plan
CVMSHCP Boundary
City Boundaries
Indian Reservations (Not a Part)
Major Roads
DISCLAIMER: Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. CVAG and The County of Riverside make no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.
Desert Hot Springs
Palm Springs
Cathedral City
Rancho Mirage
Palm Desert
Indio
Indian Wells
La Quinta
Coachella
Salton Sea
62
10
111
74
N
W
E
S
0 2.5 5 10 15 20 Miles
0 4.5 9 18 27 36 Km
Data as of Nov 15, 2006
Map By Nicholas Peihl, CVAG,
CVAG
GIS
Exhibit 3-1: Current Land Ownership in the Plan Area
Exhibit 3-1

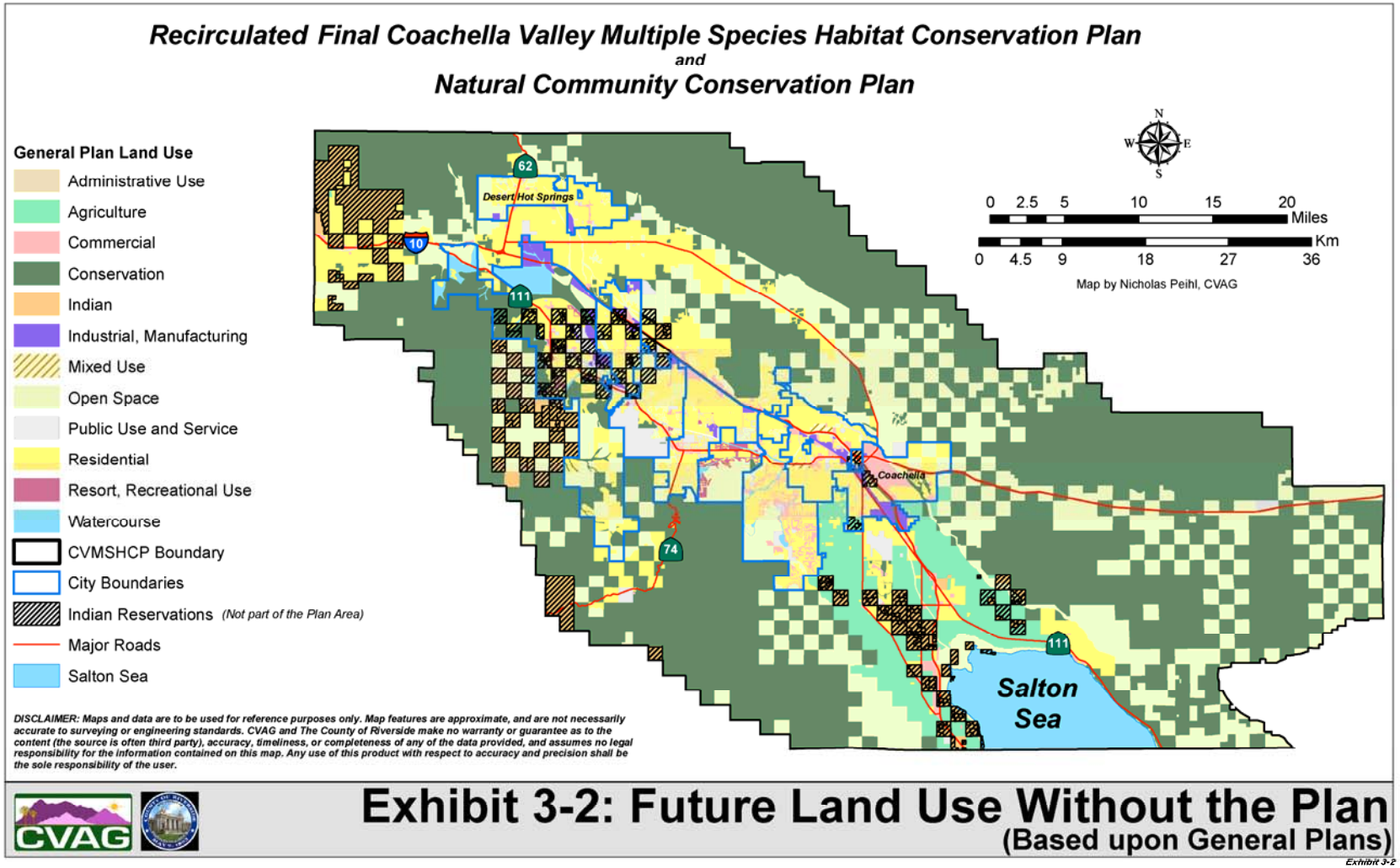

Recirculated Final Coachella Valley Multiple Species Habitat Conservation Plan
and
Natural Community Conservation Plan
General Plan Land Use
Administrative Use
Agriculture
Commercial
Conservation
Indian
Industrial, Manufacturing
Mixed Use
Open Space
Public Use and Service
Residential
Resort, Recreational Use
Watercourse
CVMSHCP Boundary
City Boundaries
Indian Reservations (Not part of the Plan Area)
Major Roads
Salton Sea
Desert Hot Springs
Coachella
Salton Sea
62
10
111
74
N
W
E
S
0 2.5 5 10 15 20
Miles
0 4.5 9 18 27 36
Km
Map by Nicholas Peihl, CVAG
DISCLAIMER: Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. CVAG and The County of Riverside make no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.
CVAG
Exhibit 3-2: Future Land Use Without the Plan
(Based upon General Plans)
Exhibit 3-2

TABLE 3-2
Land Use Designations in the Plan Area

Land Use	Total Acres Vac./Dev'd.	% of Plan Area
Urban and Rural Residential[1]		
Very Low Density (all jurisdictions RivCo)	30,344	2.79
Very Low Density, (3A) 0.5-2.5 acre min.	9,142	0.80
Very Low Density, (3A – SV) 1.25 – 2.5 acre min.	14,111	1.20
Very Low Density, (3B) 2.5-5 acre min.	5,266	0.50
Very Low Density, (4) 5 acres and larger	6,303	0.60
Low Density Residential, 3-6 du/acre	73,021	6.40
Medium Density Residential, 7-15 du/acre	13,150	1.20
High Density Residential, 16-21 du/acre	1,576	0.10
Very High Density Residential, 22+ du/acre	778	0.07
Tourist – Resort/Hotel	911	0.09
Parks, Golf Courses	9,270	0.80
General and Neighborhood Commercial	13,555	1.20
Public Facility	4,108	0.40
Government Buildings, Health Care, etc.	859	0.08
Light Industrial	11,794	1.00
Heavy Industrial	756	0.07
Transportation, Utilities	5,782	0.50
Schools	939	0.09
Agriculture	60,393	5.30
Watercourse, Water Resource	55,088	4.80
Open Space, Vacant Land[3]		
Open Space (public land)	604,148	53.20
Vacant, Undeveloped Land (private land)		
Desert Areas, 1 du/acre	109,762	9.70
Mountainous Areas, 1 du/10 acres	71,473	6.30
Open Space/Conservation (private)	19,632	1.70
Other Vacant Private Land	14,100	1.20
Total Area Covered by Plan	1,136,261	100.00
Indian Reservation Lands (not a part)	69,578	
Total Acres in Plan Area	1,205,839	

1 Includes only private lands within each listed land use category.

2 Includes public and private lands within this land use category

3 Includes private lands designated Parks/Forests, Wildlife/Vegetation, C Conservation, C Conservation (1 du/20 acres), C Conservation (S.P. PH-1), National Forest, BLM & State, Mountain Reserve, Conservation, OS Open Space and Conservation, Open Space and Conservation Areas – Scenic Corridor. Source: CVAG, Cities General Plan updates and Riverside County Community Plans (Cabazon, Eastern and Western Coachella Valley), as shown in Table 2.6 of the Draft, Coachella Valley MSHCP, prepared by the Coachella Valley Mountains Conservancy, October 2004.

TABLE 3-3
Land Use Planning Summary: Land Use Plans Encompassing the Plan Area

Land Use	Total Acres	% of Plan Area
Urban	67,364	5.90
Rural, Rural Residential	12,516	1.10
Agriculture	84,852	7.50
Lake (includes Salton Sea)[1]	43,460	3.80
Reservoir[2]	816	0.07
Wind Energy Uses	4,356	0.40
Quarry	928	0.09
Landfill	412	0.04
Public & Private Non-Conservation Lands[3]	320,566	28.20
Open Space – Pubic and Private Conservation Lands[4]	600,991	52.90
Total Area Covered by Plan	1,136,261	
Indian Reservation Lands (not a part)	69,578	100.00
Total Acres in Plan Area	1,205,839	

1 Includes Salton Sea and other naturally occurring bodies of water.

2 Includes Lake Cahuilla, Whitewater River groundwater recharge ponds, and other artificial water bodies.

3 Includes private lands which are primarily undeveloped, and public lands owned by Riverside County, Metropolitan Water District, the State Lands Commission, cities, the Army Corps of Engineers, Coachella Valley Water District, Bureau of Reclamation and the military, which are used for non-conservation purposes.

4. Includes public lands dedicated to open space and conservation purposes and private lands owned by land trusts or conservation organizations, or protected by a conservation easement or deed restriction.

Source: CVAG GIS, as shown in Table 2.4 of the Internal Draft Coachella Valley MSHCP, prepared by the Coachella Valley Mountains Conservancy, October 2004.

The tables above indicate that the greatest percentage (52.9% of the Plan Area) is publicly and privately owned land designated as Open Space. This includes the extensive public acreage contained within San Jacinto Wilderness, Santa Rosa and San Jacinto Mountains National Monument, Joshua Tree National Park, San Bernardino National Forest, and numerous other public and private conservation lands on the valley floor and in the surrounding mountains.

Nearly 1.1% of the Plan Area is privately owned land designated for very low-density residential development at a maximum density of one dwelling unit per 10 acres. Approximately 6.4% of the Plan Area is privately owned and designated for low-density residential development, with densities of 3 to 6 dwelling units per acre. A comparable amount of land (6.3%) is privately owned, vacant, and designated as Mountainous Areas, and may be developed at a maximum density of 1 dwelling unit per 10 acres. More than 5% of the Plan Area is designated for public use or private agricultural activity. Other land use designations individually account for less than 5% of the Plan Area.

Existing Land Uses

Over the past century, the Coachella Valley has evolved from an isolated but thriving rural agricultural region to an extended urban area stretching from Palm Springs to Coachella, and including the noncontiguous City of Desert Hot Springs (which is a non-participant in the MSHCP) and communities of Thousand Palms and those along the north shore of the Salton Sea. Over time, the area's economy has evolved into a tourist and vacation destination of resort hotels, vacation home developments, and the full range of urban land uses within an increasingly diversified economic base.

Lands in the Plan Area consist of mountainous and desert open space, agricultural uses, resorts, hotels and other components of the tourist industry, conventional residential neighborhoods and business districts, public and private conservation lands, land dedicated to the production of wind energy, and lakes, reservoirs, rivers and other bodies of water. *Table 3-1* above provides a description of actual, existing land uses in the Plan Area and their acreages by land use categories.

Approximately 19% (214,704 acres) of the Plan Area is considered "developed" for the purposes of the proposed Plan. The "developed" land use categories are based on 8 non-vegetation types described by Holland (1986), and were delineated from 1998 aerial photographs scaled at 1:1000. The categories include lands that are disturbed and/or without vegetation, including urban land, natural and man-made water bodies, agricultural land, land used for the production of wind energy, quarries, and landfills.

The remaining 81% (921,557 acres) of the Plan Area is considered "undeveloped." This includes private lands which are essentially undeveloped and public lands owned by Riverside County, Metropolitan Water District, the State Lands Commission, cities, the U.S. Army Corps of Engineers, Coachella Valley Water District, Bureau of Reclamation, and the U.S. military. Also included are public lands dedicated to open space and conservation purposes, and private lands owned by conservation land trusts.

Urban Development Pattern

The most intense urban development in the Plan Area is concentrated within the boundaries of the nine incorporated cities. The urban development pattern in the Coachella Valley has generally evolved from initial settlement in the Palm Springs area and expansion southeast along the coves and foothills of the Santa Rosa Mountains. Agricultural development has historically been centered in the Indio/Coachella area, although into the mid-20th Century extensive date and citrus cultivation extended as far northwest as present-day Cathedral City and Rancho Mirage. As urban development pushed away from the foothills, major roadways were extended north of

the Whitewater River and today urban development reaches north to Interstate 10. As with the cove communities, Desert Hot Springs has developed into an affordable spa-resort community somewhat geographically isolated from other urban development in the Plan Area.

Communities within the unincorporated lands of Riverside County are generally long-established and include Painted Hills, North Palm Springs, Thousand Palms, Mecca, and communities in the vicinity of the Salton Sea. Development in these areas has been largely limited to residential uses and local and highway-serving commercial uses.

Urban portions of the Plan Area can best be characterized as tourist and resort-residential communities dominated by low- and medium-density residential development, and supported by a full range of commercial services, light industrial, and hotel/resort development. Urban areas in the valley generally enjoy superior public services and infrastructure, including an extensive intra and intercommunity arterial roadways system and a variety of State highways and freeway facilities. Water resources are dependable and an extensive system of sanitary sewers and treatment facilities have been created to support development.

Existing residential development is predominantly a mix of low- and medium-density attached and detached single-family units within standard subdivisions, attached and detached multi-family units, mobile homes, and private and gated resort-residential communities. Areas of high-density residential development are dispersed throughout the Plan Area's urban core and within lower density neighborhoods.

The expansion of urban development in the Coachella Valley and the region has generated significant increases in traffic and increased use in regional highways, especially Interstate 10. Access to I-10 has become progressively important to supporting local development, and points of access (freeway interchanges) have become important nodes for commercial and industrial development. Other urban land uses include streets, railways, and airports; schools, government buildings, hospitals and other institutional facilities; utility infrastructure; flood control facilities; golf courses, parks, and improved open spaces; and hotels, motels and other resort-style development.

Rural Development

In the MSHCP Plan Area, rural development is primarily located on unincorporated Riverside County lands. These rural development areas include Painted Hills north of I-10 and west of Highway 62, northeastern Thousand Palms, Sky Valley east of Desert Hot Springs and north of the Indio Hills, Royal Carrizo and Pinyon Flats in the Santa Rosa Mountains off of Highway 74, and rural development in the vicinity of the Salton Sea. Other important areas of rural

development include Snow Creek Village and lands along the eastern front of the Santa Rosa Mountains south of Avenue 62. Some of these rural development areas are tightly clustered, but most are largely limited to low-density residential development, highly dispersed homesteads, and small mobile home and RV parks, some of which are supported by equally outlaying convenience commercial uses.

Agricultural Lands

The earliest land conversions in the Coachella Valley were associated with the development of agriculture primarily in the eastern portion of the valley where access to groundwater was easiest. Artesian wells once flowed in some places in the lower valley. Today the valley is most noted for its prime agricultural lands located in the eastern valley, generally extending from Washington Street southeast to the Salton Sea.

Historically, the center of agricultural development in the Plan Area has been centered in the Indio/Coachella area, although into the mid-20th Century large-scale date and citrus cultivation extended as far northwest as present-day Cathedral City and Rancho Mirage. Approximately 7.5% (84,852 acres) of the Plan Area is under agriculture, which focuses on the cultivation of dates, grapes, citrus, and other fruit and vegetable crops. Historically, agriculture constituted the largest conversion of wild lands. However, owners of agricultural lands have continued to sell marginally productive lands for urban development as land values increase with continuing development pressure and weak prices for agricultural commodities. Also see Section 3.6 below.

Watercourses and Water Resources

Watercourses account for nearly 4% (44,276 acres) of the Plan Area and include natural and man-made bodies of water. Among these are the Salton Sea in the southernmost portion of the Plan Area, Whitewater River/Coachella Valley Stormwater Channel, Lake Cahuilla in the City of La Quinta, San Gorgonio River, and Whitewater River recharge ponds in the Windy Point area near the San Gorgonio Pass.

Public and Private Non-Conservation Lands

As shown in *Table 3-1*, approximately 28% of land in the Plan Area consists of public and private non-conservation lands. These include largely undeveloped private lands as well as public lands owned by Riverside County, Metropolitan Water District, the State Lands Commission, cities, U.S. Army Corps of Engineers, Coachella Valley Water District, Desert Water Agency, the U.S. military, and the Bureau of Reclamation. These lands are used or are

planned for use for non-conservation purposes. Most of the lands in this category occur on the desert floor or within the San Jacinto and Santa Rosa Mountains.

Public and Private Conservation Lands

As shown in *Table 3-1* above, public and private conservation/open space lands account for nearly 53% of land in the Plan Area. Included in this category are public lands dedicated to open space and conservation purposes and private lands owned by land trusts or conservation organizations (NGOs: Non-Governmental Organizations). These lands are owned and/or managed by NGOs and a variety of local, State, and Federal agencies, including the U.S. Bureau of Land Management who is responsible for the management of more than 25% of the entire Plan Area.

Other agencies include the U.S. Forest Service, National Park Service, California Department of Fish and Game, and the California Parks Department. Private interests, including the Nature Conservancy and the Center for Natural Lands Management, also own and manage open space/resource lands in the Plan Area. These lands are concentrated within the San Bernardino, Little San Bernardino, San Jacinto, Orocopia, and Santa Rosa Mountains, and the Mecca and Indio Hills. However, some areas (such as the Salton Sea State Recreation Area and the Coachella Valley Preserve) occur on the low-lying desert floor.

3.2.2 Surrounding Land Use

The Coachella Valley is an isolated arid, low desert valley largely surrounded by steep mountains and otherwise constraining terrain. The Plan Area shares two areas of connectivity with regions outside the Plan Area: lands in the western portion of the San Gorgonio Pass, and the northern portions of Imperial County. Surrounding land uses, therefore, fall into three categories: 1) surrounding lands that provide opportunities for urbanization; 2) lands with a natural comparative advantage for specific economic activities such as farming; and 3) lands constrained by topography, difficult access, and a lack of infrastructure and water resources.

Surrounding Existing and Potential Urban Lands

As noted above, there are limited opportunities for and limited evidence of significant urban growth on lands surrounding the Plan Area. The community of Cabazon, a portion of which is located within the Plan Area, has had a history of growth and incorporation followed by a loss of population and eventual dis-incorporation.

New development pressures are now building again in the Cabazon area spurred by large and highly successful factory outlet malls, the advent of Indian Gaming and the development of

casinos, hotels and commercial businesses on nearby lands of the Morongo Band of Cahuilla Indians, and recent completion of a large water bottling facility. For the present, however, the community of Cabazon continues to be an area of slow residential growth with limited infrastructure and significant development constraints, including potential for widespread flooding.

The other region of potential urban development peripheral to the Plan Area is that around the Salton Sea in the Coachella and Imperial Valleys. The area was an important recreation and sports fishery until the 1960 and 1970s when rising sea levels and salinity impacted surrounding lands and the sea's ecology. Wide-spread inundation of surrounding vacant and developed lands resulted in extensive litigation and eventual intervention by the U.S. Congress to settle claims associated with the uncontrolled rise of the sea. Agricultural activity has been historically important but somewhat limited along the sea, and has been adversely affected in some areas by the intrusion of saline sea water into the fresh groundwater. The potential for revived urban development in this area is uncertain due to the unchecked degradation of the sea and the lack of infrastructure.

3.3 Transportation, Traffic, and Circulation

The unique geography and linear distribution of communities in the Coachella Valley are the primary influences and constraints that have shaped the regional roadway network. The valley is a northwest-southeast trending geologic basin, bounded on the north, west, and south by the Little San Bernardino, San Bernardino, San Jacinto, and Santa Rosa Mountains. These mountains impose significant physical restrictions on roadway planning and construction opportunities in the valley, and have contributed to the convergence of high traffic volumes onto a limited number of roadways.

Among the earliest “roads” passing through the Coachella Valley was an Indian trade route known as the Cocomaricopa Trail (later renamed the Bradshaw Trail), which was one of the most important desert trails in southern California during the 1860s and 1870s. The course of the trail was largely influenced by regional topography. Throughout much of the valley, the Bradshaw Trail closely followed the toe of slope of the Santa Rosa Mountains. It took advantage of mountain spurs that project into the valley floor and naturally shield travelers from strong winds and blowing sand or dust. The logical placement of the Bradshaw Trail led to the establishment of permanent settlements within the coves of the Santa Rosa Mountains during the early twentieth century. The “cove communities” were strategically located where buildings and residents could be shielded from the harsh desert environment. The Bradshaw Trail was eventually replaced by State Highway 111, which provides limited connectivity between the cove communities.

Today, the communities of the Coachella Valley (with the exception of Desert Hot Springs) are largely distributed in a continuous and linear pattern across the southerly portion of the valley. They are connected by state and interstate highways, most notably Interstate 10 and State Highway 111, and a web of arterial roadways built on a north-south/east-west grid pattern. In many locations, the region's north-south/east-west trending land use patterns and roadway grid conflict with its northwest-southeast trending topography and the combination of these has created an intra-regional transportation challenge.

East-West Roadway Linkages

Given the conflict between regional topography and existing development patterns, east-west conveyance through the Coachella Valley can be problematic. The Santa Rosa Mountains are comprised of mountainous slopes and spurs that extend into the valley floor and disrupt the path of east-west trending roadways. The spurs then recede, forming isolated canyons and coves that have predominantly been developed. State Highway 111 provides the greatest connectivity between the communities at the base of the Santa Rosa Mountains. Continuous alternate routes are extremely limited due to disruptions by mountainous topography. As a result, Highway 111 has absorbed tremendous traffic volumes and is frequently congested. Descriptions of the valley's primary east-west trending roadways and the constraints they encounter are provided below.

Interstate 10

The Coachella Valley is bisected by Interstate 10, which connects the valley with the Los Angeles, Riverside, and San Bernardino metropolitan areas to the west and the Phoenix region to the east. I-10 is a critical component of the regional road network and provides intra-regional and inter-city access within the valley. It consists of a divided freeway accessed from diamond-shaped interchanges spaced a minimum of one mile apart. I-10 is an eight-lane divided freeway west of Cook Street in Palm Desert, narrowing to six lanes east of Cook Street.

Interstate 10 lies along the geographic center and northwest-southeast axis of the Coachella Valley. It occurs within the valley's central drainage area and lies parallel to the prevailing winds emanating from the San Gorgonio Pass. With the exception of the Thousand Palms community, land adjacent to I-10 remains largely undeveloped due to the presence of high winds and blowing sand and the potential for flooding. I-10 runs parallel with the Union Pacific Railroad, which also follows the central gradient of the valley. The railroad was built during the second half of the nineteenth century and is elevated above the surrounding terrain to protect from flooding and high levels of sand transport. Extensive windrows were planted adjacent to the railroad to provide some measure of protection from blowing sand. The I-10 roadbed is also elevated above the surrounding terrain and protected from the elements (to a limited extent) by windrows. Due

to high traffic volumes on local throughways (e.g., Highway 111), a portion of intra-valley traffic is forced onto Interstate-10, which has additional capacity, faster speeds, and reasonable access to locations throughout the valley.

State Highway 111

State Highway 111 (known as Palm Canyon Drive in Palm Springs and East Palm Canyon Drive in Cathedral City) is essentially an intra-valley roadway, connecting the Coachella Valley with communities of the Imperial Valley to the southeast. From its westerly terminus at I-10 in the San Gorgonio Pass, Highway 111 extends southeast through the City of Palm Springs, east along the toe of the Santa Rosa Mountains, and parallel to the Whitewater River. In the City of Indio, it proceeds southeast along the easterly edge of the Salton Sea. Highway 111 provides primary access to sensitive ecological areas associated with the Salton Sea, including the Salton Sea State Recreation Area, and proceeds into Imperial County.

Highway 111 provides a reasonably high level of connectivity between the cove communities and passes through the valley's primary commercial corridor. It consists of a four-lane highway in most locations, but has been improved to its ultimate six-lane divided design configuration in some locations, including in the City of Rancho Mirage. Highway 111 has served as the central intra-city connector for many years by carrying a high volume of local and regional traffic. Although traffic flows are controlled by traffic signals, Highway 111 is subject to conflicting turning movements, frequent congestion, and increased travel times.

In the early 1980s, local jurisdictions became concerned with increasing traffic volumes on Highway 111, and realized it was no longer adequate to serve regional development. It was determined that other major intra-valley linkages would be necessary to accommodate the region's growing population. The Coachella Valley Area Transportation System (CVATS) study was a multi-agency process that was launched to evaluate and improve the regional transportation network and to secure additional right-of-way for alternate intra-valley connectors. An important component of the CVATS model was the Mid-Valley Parkway, described below.

Mid-Valley Parkway

The Mid-Valley Parkway was conceived by the CVATS regional transportation study as an east-west, inter-city connector that would link the cities of the upper valley and serve as an alternate route to Highway 111. It was originally envisioned as a six-lane, high-speed, high-capacity restricted access roadway that would be located mid-way between Highway 111 and Interstate 10 and provide access to regional transportation hubs, including the Palm Springs International Airport. The implementation of the Mid-Valley Parkway was compromised by a number of factors, including existing urban development patterns that precluded the acquisition of necessary right-of-way and the construction of interchanges and flyovers. Cost constraints and

the reluctance of local jurisdictions to provide adequate right-of-way have reduced the parkway to a four-lane divided arterial.

Ramon Road

Ramon Road has traditionally served as a connector for local traffic from Palm Springs, Cathedral City, and Rancho Mirage, but it also provides important access to the Thousand Palms community and the Coachella Valley Preserve. Ramon Road extends from Palm Canyon Drive in Palm Springs on the west to its easterly terminus at Washington Street in the Indio Hills. It is directly connected to Interstate 10 by a diamond-shaped interchange. East of Thousand Palms, it passes through a sensitive ecological interface area associated with the Coachella Valley Preserve that is characterized by high winds and blowing sand. According to CVAG's 1999 Transportation Project Prioritization Study, Ramon Road requires widening from 2 to 6 lanes from Da Vall Drive (extended) to Bob Hope Drive to efficiently carry traffic anticipated from future development, including a new gaming casino.

Dillon Road

Dillon Road is a two-lane, northeast-southwest trending arterial that crosses the northern portion of the Coachella Valley. It extends from the Indio/Coachella city boundary at State Route 86, passes under Interstate-10, and continues northwest through the valley. It passes on the north side of the Indio Hills, through the Sky Valley community, to State Highway 62 in the southern portion of Desert Hot Springs. Dillon Road is significantly isolated from the rest of the Coachella Valley roadway network, particularly by the intervening Indio Hills. Over a span of approximately twenty miles, from its intersection with Interstate-10 on the east to its intersection with Mountain View Road on the west, Dillon Road is connected to the urban core of the valley by only one road (i.e., Thousand Palms Canyon Road).

Varner Road

Varner Road is a two-lane arterial that runs just north of and parallel to Interstate-10. It extends from Palm Drive on the west to the I-10/Jefferson Street interchange near Bermuda Dunes on the east. Segments of Varner Road follow the route of the historic Ocean-to-Ocean Highway, which is a link of the transcontinental highway. Although exact dates are unclear, archival sources trace the construction of the Ocean-to-Ocean Highway to the late 1930s. It primarily served as a route for crossing through the valley rather than one which accommodated intra-valley travel.

Although Varner Road provides important local access to the Thousand Palms community, its functionality west of Thousand Palms is limited. Most lands north of Varner Road in this vicinity are undeveloped lands in the Indio Hills, which are subject to high winds, blowsand, and flash flooding, and have limited potential for future development. East of Thousand Palms, the utility of Varner Road is limited to its role as a frontage road adjacent to I-10.

North-South Roadway Linkages

The Coachella Valley's north-south roadway network is less constrained than the east-west roadways described above. Most north-south trending roads in the urbanized portion of the valley extend north from the Santa Rosa Mountains to Interstate 10. They run roughly parallel to the spurs of the Santa Rosa Mountains that project into the valley floor. Therefore, their paths are not significantly impeded by mountainous terrain. However, other conditions in the valley (e.g., flooding, wind hazards) continue to impact the roadway network. These issues, as they relate to the valley's major north-south trending arterials, are addressed below.

Indian Avenue/Indian Canyon Drive

Indian Avenue/Indian Canyon Drive extends north from the Santa Rosa Mountains in Palm Springs to the Little San Bernardino Mountains northwest of Desert Hot Springs. This major arterial connects traffic from Interstate 10 with the City of Palm Springs to the south, and Desert Hot Springs and Highway 62 to the north. South of Interstate10, it crosses a broad 100-year floodplain, which is associated with the Whitewater River and is up to two miles wide in some locations. This segment of Indian Avenue is subject to occasional, high intensity flooding and may require a bridge or other all-weather crossing in the future. Given its proximity to the San Gorgonio Pass, the area is also a high wind and sand transport corridor.

Within the City of Palm Springs urban core, Indian Canyon Drive is a four-lane undivided arterial that operates in tandem with Palm Canyon Drive. However, it narrows to two lanes north of Racquet Club Drive. This segment of roadway and the Indian Avenue/Interstate 10 interchange support a large volume of vehicle trips and are in need of widening from two to four lanes. Widening of the I-10 interchange is considered the second highest priority project in CVAG's 1999 Transportation Project Prioritization Study, which ranks the region's proposed road improvement projects.

Gene Autry Trail/Palm Drive

The Gene Autry Trail/Palm Drive corridor serves as an important connector between the cities of Palm Springs, Cathedral City, and Desert Hot Springs. The roadway (named Gene Autry Trail south of I-10 and Palm Drive north of I-10) extends from Highway 111 on the south to Mission Lakes Boulevard on the north, and is connected to Interstate 10 with a diamond-shaped interchange. It provides important access to the Palm Springs International Airport and directly connects the airport with I-10 and SR 111. It also functions as a segment of the Mid-Valley Parkway between Vista Chino and Mesquite Avenue.

North and south of I-10, the roadway passes through a high wind and sand transport corridor. From Vista Chino to I-10, Gene Autry Trail crosses a broad 100-year floodplain associated with

the Whitewater River. This roadway segment is subject to occasional but severe flooding, and is in need of a bridge or all-weather crossing. The widening of this segment from 2 to 6 lanes between Salvia Road and the I-10 interchange is considered the highest priority regional roadway improvement project in CVAG's 1999 Transportation Project Prioritization Study. Palm Drive (north of I-10) was recently expanded from 2 to 4 lanes to help alleviate traffic congestion through Desert Hot Springs, and these improvements are expected to adequately accommodate future traffic levels.

Washington Street

Washington Street provides important north-south conveyance to cities in the eastern Coachella Valley. It extends from Avenue 52 in La Quinta on the south to Ramon Road on the north. It intersects Highway 111 and Interstate-10, and provides primary access to the Del Webb Sun City resort residential development. Recent improvements to Washington Street, including widening from Country Club Drive to Fred Waring Drive, have alleviated much of the congestion brought on by development pressures in the area.

North of I-10, Washington Street lies on the downwind side of the Coachella Valley Preserve within a critical ecological interface area that is subject to high winds and blowing sand. South of I-10, it is largely shielded from the elements by commercial and residential development or the mountainous slopes of the Santa Rosa Mountains. Bridges have been constructed where Washington Street crosses the Whitewater River Stormwater Channel and the La Quinta Evacuation Channel.

Thousand Palms Canyon Road

Although not considered a major regional arterial, Thousand Palms Canyon Road is an important two-lane roadway that provides the only north-south connection through the Indio Hills. It is located approximately two miles east of the community of Thousand Palms, extending from Ramon Road on the south to Dillon Road on the north. It provides primary access between the Sky Valley community north of the Indio Hills and Interstate 10 and urban development south of the Indio Hills. Thousand Palms Canyon Road passes through the heart of the Coachella Valley Preserve and the sensitive biological habitat contained therein.

Regional Roadway Linkages

The Coachella Valley is connected to surrounding desert and mountain regions by Interstate-10 and several state highways. State Highway 62 provides access to communities to the north in the high desert of San Bernardino County, including Joshua Tree National Park. Highway 74 serves mountain communities of southwestern Riverside and northern San Diego Counties, and

Highway 86 extends southeast into the Imperial Valley. These highways are discussed in more detail below.

State Highway 62

State Highway 62, a north-south trending four-lane divided highway, passes through the northwesterly portion of the Coachella Valley. It extends north from I-10, just east of the San Gorgonio Pass, to communities in the Morongo Basin and high desert in San Bernardino County. Highway 62 provides important regional access to Joshua Tree National Park and the Twentynine Palms Marine Corps Air Ground Combat Center, as well as the Colorado River and Mojave desert wilderness and recreation areas. Within the Coachella Valley, it passes through alluvial plain habitat associated with the Mission Creek Wash near the base of the San Bernardino Mountains. Signalization and grade changes may be needed to accommodate future traffic volumes as new development occurs in this area. However, the ultimate buildout of Highway 62 is not expected to occur for many years.

State Highway 74

State Highway 74 connects the Coachella Valley with communities in southwestern Riverside County and northern San Diego County. The construction of Highway 74 was undertaken during the 1930s and required extensive engineering (given its passage through steep and rugged mountainous terrain). It extends south from State Highway 111 in the City of Palm Desert, into the rocky terrain of the Santa Rosa Wilderness, through lands recently designated as critical habitat for the Peninsular bighorn sheep by the U.S. Fish and Wildlife Service. It proceeds west, then northwest, into the San Bernardino National Forest, to the mountain community of Mountain Center and the Hemet Valley. Highway 74 is connected to the central Coachella Valley by Monterey Avenue in the City of Palm Desert, which extends from Highway 111 to Interstate-10.

State Highway 86

State Highway 86 connects the Coachella Valley with the Imperial Valley to the southeast. It extends southeast from Highway 111 in the City of Coachella, along the westerly edge of the Salton Sea, into Imperial County. Highway 86 provides primary access to the Oasis community and conservation areas associated with the Salton Sea, including the Salton Sea National Wildlife Refuge in Imperial County.

Public Transportation

Sunline Transit Agency provides public transit service within the Coachella Valley, currently operating a fleet of 50 fixed-route buses that can accommodate 60 passengers each. Approximately 38 buses are on the road each day. Sunline has more than 800 active bus stops

and approximately 100 inactive stops which may be reactivated in the future. Sun-Dial service, which is offered to approved disabled riders, consists of a fleet of 25 buses, each with a capacity of 12 passengers.

Sunline has made a concentrated effort to reduce local and regional air pollutant emissions and to encourage alternative modes of transportation. Its fleet of buses is powered by compressed natural gas (CNG), and each fixed route bus has been outfitted with two bicycle racks. The Shopper Hopper Trolley system (owned by the City of Palm Desert and operated by Sunline) consists of electric trolleys that provide free shuttle service to shoppers along the Highway 111 commercial corridor in the City of Palm Desert. Sunline currently operates 14 bus routes throughout the Coachella Valley and serves most cities and major communities in the region. However, limited services are provided to Desert Hot Springs, Del Webb Sun City, Mecca, Thermal, and Oasis. Services to these areas have been reduced or discontinued due to a wide range of constraints, including limited funding, low ridership, and a lack of approval/ coordination with the host city or county.

Airports

Air travel represents an important component of the transportation network in the Coachella Valley. The primary regional air link is Palm Springs International Airport, which accommodates commercial air traffic and most tourists visiting the valley. The Desert Resorts Airport and Bermuda Dunes Airport serve the general aviation needs of the eastern valley and accommodate private and chartered flights.

Palm Springs International Airport

The Palm Springs International Airport is the largest and busiest airport serving the Coachella Valley. Located in eastern Palm Springs, it is classified in the National Plan of Integrated Airport Systems (NPIAS) as a long-haul commercial service airport, and is capable of supporting non-stop commercial service to destinations over 1,500 miles away. Air carriers serving the airport include Alaska, America West Express, American, American Eagle, Canada 3000, Northwest, Skywest/Delta, United, United Express, and U.S. Air Express.

As a measure of activity, the airport tracks “enplanements” and “deplanements” each fiscal year (July 1 to June 30). During the 1998-1999 fiscal year, 625,322 passengers were enplaned, and 628,784 passengers were deplaned. Commercial traffic is clearly seasonal, with the peak season extending from November through April. During the peak season, an average of 70,582 enplanements and 70,202 deplanements occur each month. The busiest month is March, with an average of 94,108 enplanements, and 92,575 deplanements. The slowest period occurs during the

summer months. Commercial operations are expected to continue to grow, with passenger enplanements reaching 809,256 by 2015.

Desert Resorts Airport

Located in the unincorporated community of Thermal, the Desert Resorts Airport serves the aviation needs of the eastern Coachella Valley. The airport accommodates general aviation and charter planes traveling to/from Las Vegas and other short- and mid-range destinations. During 2000, 108,100 operations (takeoffs and landings) occurred at the airport, although it can accommodate a maximum of 210,000 operations annually. The airport is used most heavily from mid-October through May. During special events (e.g., golf tournaments and festivals), an average of 20 planes either arrive or depart per day. Airport activity is growing, and operations are expected to increase to 140,000 annually by 2010.

Bermuda Dunes Airport

The Bermuda Dunes Airport is located in the central portion of the Coachella Valley immediately south of Interstate 10 in the unincorporated community of Bermuda Dunes. This general aviation airport accommodates approximately 120 planes per day during the winter season, and approximately 20 planes per day during the summer (off-peak) months. Annual operations number approximately 25,500, with a total capacity of 26,852 operations. The future growth of the airport is significantly constrained by surrounding urban development.

Rail Service

Freight and passenger rail services are offered along the Union Pacific Railroad, which was built in the second half of the nineteenth century. The railroad originally was part of the transcontinental railroad which connected the Pacific coast with Yuma, Arizona. It enters the Coachella Valley from the west through the San Gorgonio Pass and proceeds east, parallel to Interstate 10. In the City of Indio, it turns southeast and parallels the East Valley Parkway/Highway 111, until it passes into Imperial County.

Freight rail service is provided by Union Pacific Railroad, with freight transfer facilities in the cities of Indio and Coachella. Amtrak provides passenger rail services, with stations in Palm Springs and Indio. Although facilities associated with local train stations are limited, Amtrak passengers can travel to and from destinations nationwide. Passenger service is also available through Metrolink, a rail service which transports passengers between the Palm Springs station and the Los Angeles metropolitan area. As described above, passenger rail service is limited to destinations outside the Coachella Valley. Local residents do not utilize rail service for intra-valley travel. The development of a valley-wide light rail system has been suggested in recent

years, but its implementation is significantly constrained by existing development patterns and the difficulty of acquiring necessary right-of-way within each jurisdiction.

3.4 Soils and Geology

The Coachella Valley and MSHCP Plan Area are located in the northwestern portion of a broad, tectonic depression known as the Salton Trough. The trough is approximately 130 miles long and 70 miles wide and extends from the Gulf of California to the San Gorgonio Pass. The valley is the northern portion of the Gulf of California, a rift basin formed by oblique strike-slip motion between the North American and Pacific plates, which are sliding past one another at a rate of about 50 millimeters per year.[2]

Approximately 70% of the movement between these plates is accommodated by the San Andreas fault, which crosses the easterly portion of the Coachella Valley.[3] The region is highly susceptible to seismic and other geologic forces given its proximity to this and other active and potentially active faults, the composition of underlying soils, the presence of strong sustained winds, and steep and rugged mountains. These issues are further addressed below and in the background Geotechnical Report of Appendix D.

Regional Soils and Surficial Rocks

The Plan Area consists of a diverse range of rocks and sediments, which were formed or deposited over millions of years and provide important details about the geologic history of the region. The geologic units in the Coachella Valley (which are typically described in terms of their age) range from recently deposited gravels and sands to granitic and metamorphic rocks formed hundreds of millions of years ago. *Table 3-4* describes the various geologic units of the Coachella Valley and the periods during which they were formed.

Basement Rocks

The oldest rock formations in the Coachella Valley are basement rocks that compose the mountain ranges bordering the valley. Mountains of the Peninsular Range geologic province, including the San Jacinto and Santa Rosa Mountains, are composed of fairly old (Mesozoic) granitic rock, which has intruded into even older metasedimentary rock of Mesozoic and Paleozoic age.[4]

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2 "Technical Background Report to the Safety Element of the General Plan for Cathedral City," Earth Consultants International, Inc., June 1999.

3 Ibid.

4 "Emerging Perspectives of the Salton Through Region with an Emphasis on Extensional Faulting and its Implications for Later San Andreas Deformation," Eric G. Frost, Steve C. Suitt, Mitra Fattahipour.

TABLE 3-4
Geologic Units in the Coachella Valley

Geologic Period	Age (Years)	Formation Name and Description
Quaternary		
Recent	0 to 11,000	• Active Stream Channel Deposits: layered well-sorted sand and gravel • Alluvial Fran Deposits: poorly sorted sand and gravel • Alluvial Plain Deposits: fine-grained sand, silt, and clay • Sand Dune Deposits: fine-grained sand, silty sand, and sandy silt • Stream Terrace Deposits: layered gravelly sand, sand with cobbles and boulders
Upper Pleistocene	11,000 to 400,000	• Pleistocene Alluvial Fan Deposits, also known as Ocotillo Conglomerate and/or Cabazon Fanglomerate: pebbly to cobbly conglomerate with sandstone
Tertiary		
Lower Pleistocene	400,000 to 1.6 million	• Palm Spring Formation: siltstone and claystone with sandstone layers
Middle & Upper Pliocene	1.6 million to 3.4 million	
Lower Pliocene	3.4 million to 5 million	• Imperial Formation: friable sandstone and poorly indurated shale; marine fossils in the sandstone section
Upper Miocene	5 million to 11 million	• Split Mountain Formation: Conglomeratic sandstone with Andesitic flows 400 to 700 feet thick near base of unit
Cretaceous	80 million to 120 million	• Rocks of Southern California Batholith: granite, quartz diorite, and gabbro
Paleozoic to Precambrian	More than 215 million	• Metamorphic rocks: schists, limestone, gneisses
Precambrian	More than 570 million	• San Gorgonio Complex (also known as Chuckawalla Complex): amphibolite and migmatic paragneisses

Note: Ages are approximate, as the ages of many of these units are not well constrained.
Source: "Technical Background Report to the Safety Element of the General Plan for Cathedral City," Earth Consultants International, Inc., June 1999.

Basement rock forming the mountains of the Transverse Range province, including the San Bernardino, Little San Bernardino and Orocopia Mountains, consist of a pre-Cenozoic crystalline basement complex primarily composed of batholithic granite that has intruded numerous pendants of metamorphic rock.[5] Relatively homogenous basement rock units, such as those of the Santa Rosa Mountains, are strong, thick, and highly resistant to erosion and seismic deformation.

Sedimentary Rocks

Over millions of years, the Salton Trough has been filled with sedimentary deposits up to 20,000 feet thick. Various sedimentary layers, or formations, are exposed throughout the Coachella Valley, particularly in the low-lying Indio and Mecca Hills that occur along the length of the San Andreas fault. The oldest sedimentary formation in the Plan Area is known as Coachella

[5] "Geology of the Southeastern San Andreas Fault Zone in the Coachella Valley Area, Southern California," Thomas W. Dibblee, Jr.

Fanglomerate and is composed of debris-flow and stream-laid deposits of gneiss, granite, and volcanic rock.[6] This unit is exposed on the east side of Whitewater Canyon and may be up to 4,900 feet thick. A thin layer of basalt flow near the top has been dated to about 10 million years ago. The Mecca Hills Formation, which may correlate to the Coachella Fanglomerate, is exposed in Painted Canyon and is about 400 feet thick.[7]

The Imperial Formation, which is probably of early Pleistocene age, was deposited when the Gulf of California extended into the northern reaches of the Coachella Valley and contains marine fossils in its sandstone layer. It is exposed in Whitewater Canyon near the north end of Indio Hills and at Thousand Palms Spring.

The Palm Springs Formation is extensively exposed in the Indio and Mecca Hills and, to a lesser degree, in the vicinity of Whitewater Canyon. Its thickness ranges from about 2,000 feet in the northwestern Indio Hills to about 4,800 feet in the Mecca Hills.[8] Then Ocotillo Formation is also extensively exposed in the Indio and Mecca Hills, and is largely composed of cobble, gravel, and sand containing granite and metamorphic units.

The most recently laid sediments in the Plan Area are alluvial (stream-deposited) and aeolian (wind-deposited) sediments. Alluvial sediments typically consist of gravel, sand, and clay. They are deposited by mountain streams and found within alluvial fans and the lower reaches of mountains canyons. In the vicinity of the Salton Sea, they consist of fine clay that is probably lacustrine (lake) in origin. Aeolian deposits are silty sand and fine and medium-grained sand fractions that are transported by strong, sustained winds.

Soils and Wind Erosion

The winds predominantly enter the Coachella Valley from the northwest and are funneled through the narrow San Gorgonio Pass. They generally blow in a southeasterly direction along the central axis of the valley and across the most erosive zones of the valley, resulting in the transport and re-deposition of sand along the length of the valley. The continual transport of sand in this vicinity has resulted in the formation and migration of extensive sand dunes, fields, and sheets across the valley. One prominent feature of this process is the stabilized Palm Springs Sand Ridge (Big Dune), which is a thick accumulation of windblown sand that covers a significant portion of the valley floor south of Interstate 10 and rises as much as 100 to 120 feet above the valley floor.[9]

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6 Ibid.
7 Ibid.
8 Ibid.
9 "Technical Background Report to the Safety Element of the General Plan for the City of Cathedral City," Earth Consultants International, Inc., June 1999.

Geologic Hazards

Each of the geologic units that occur at or near the surface of the Plan Area have played a role in shaping the characteristics and diversity of plants and wildlife that have adapted to these equally diverse conditions. With regard for their potential for development, these geologic units also pose unique geotechnical and engineering constraints and opportunities that render many of these areas susceptible to numerous geologic hazards.

Slope Instability

The potential for landslides, rock falls, debris falls, and slumps to occur within and/or adjacent to the slopes of the mountains and hillsides in the Plan Area is moderate to high. In the Coachella Valley, slope stability areas are typically associated with the slopes and foothills of the surrounding mountains, as well as poorly consolidated areas of the Indio and Mecca Hills. Although the slopes of the mountains are composed of relatively well-cemented rock outcrops, they contain many joints, fractures, and intrusive dikes that can act as planes of weakness fragmenting the exposed bedrock and accelerating erosion. Manufactured cut slopes, which are incorporated into urban development projects, may also contain potentially hazardous fractures that could be susceptible to slope instability. The most effective mitigation for reducing these hazards is to avoid development within and/or adjacent to steep slopes and hillsides, particularly on slopes that exceed 30 degrees in steepness.[10]

Collapsible Soils

Hydroconsolidation, or soil collapse, is another potential geologic hazard in the Coachella Valley. This phenomenon typically affects areas with recently deposited soils. These soils experience a loss of cementation and a rearrangement of their grains when saturated, a process that results in the collapse of minute pores and voids between the soil grains.

When combined with the weight of a structure, this occurrence can result in rapid ground settlement and cause the cracking of walls and foundations, and the tilting or sagging of floors. Soil collapse is typically initiated by the infiltration of water from irrigation or a rising groundwater table. This hazard is most prevalent in alluvial and aeolian sediments, including a significant portion of the Coachella Valley floor and alluvial fans, washes, and unlined drainage channels.

[10] Chapter 2: Geologic Hazards, "Technical Background Report, General Plan Update for the County of Riverside," Prepared by Earth Consultants International.

Expansive Soils

Expansive soils are those that contain significant amounts of clay particles, and therefore, have the ability to give up (shrink) or take on (swell) water. When swelling occurs, the soils can exert significant pressure on buildings and other structures built upon them. Within the Plan Area, expansive soils typically occur within older alluvial fan deposits that emanate from mountainous areas and within claystone layers of the Imperial Formation. The clay is usually concentrated in the upper ten feet of the ground surface.[11]

Subsidence

Ground subsidence is the gradual settling or sinking of the ground surface with little or no horizontal movement. During this process, water contained in subsurface clay layers is squeezed out and the clay is compacted by the weight of overlying sediments. Subsidence can result in structural damage to structures that are sensitive to slight changes in elevation, such as larger buildings, canals, and wells. Subsidence can also result in changes to surface drainage, reductions in aquifer storage capacity, and the formation of earth fissures.

In the Coachella Valley, subsidence is primarily associated with long-term groundwater extraction, although it may also be induced by strong seismic groundshaking. Regional subsidence is most likely to occur in the central and southeasterly portions of the Coachella Valley, which are underlain by numerous clay layers that separate water-producing zones.[12] Land at or near the valley margins is also particularly susceptible to subsidence. Land fissures occurred in 1948 just east of the City of La Quinta after a significant decline in groundwater levels over a 30-year period. These fissures are believed to have been the result of subsidence, although their true origin is unknown.[13] A recent study conducted by the U.S. Geological Survey (USGS) and the Coachella Valley Water District (CVWD) in 1996 monitored land subsidence in the lower Coachella Valley (La Quinta and land to the east and southeast) and found that from 0.2 to 0.5 feet of subsidence occurred in this region from the 1930s to 1996.[14] Another study performed by CVWD indicated that as much as 7 centimeters of subsidence occurred between 1996 and 1998 in the City of Palm Desert.[15]

Continued monitoring of well water levels would help in assessing the relationship between regional subsidence and groundwater overdraft. Mitigation of this hazard would require a regional approach to groundwater conservation and recharge. Since 1973, CVWD and the Desert Water Agency have operated a successful groundwater recharge program near Whitewater and

11 "Technical Background Report, General Plan Update, City of Desert Hot Springs," Earth Consultants International, Inc., May 28, 1997.
12 "Coachella Valley Water Management Plan," Coachella Valley Water District, November 2002.
13 Ibid.
14 Ibid.
15 Ibid.

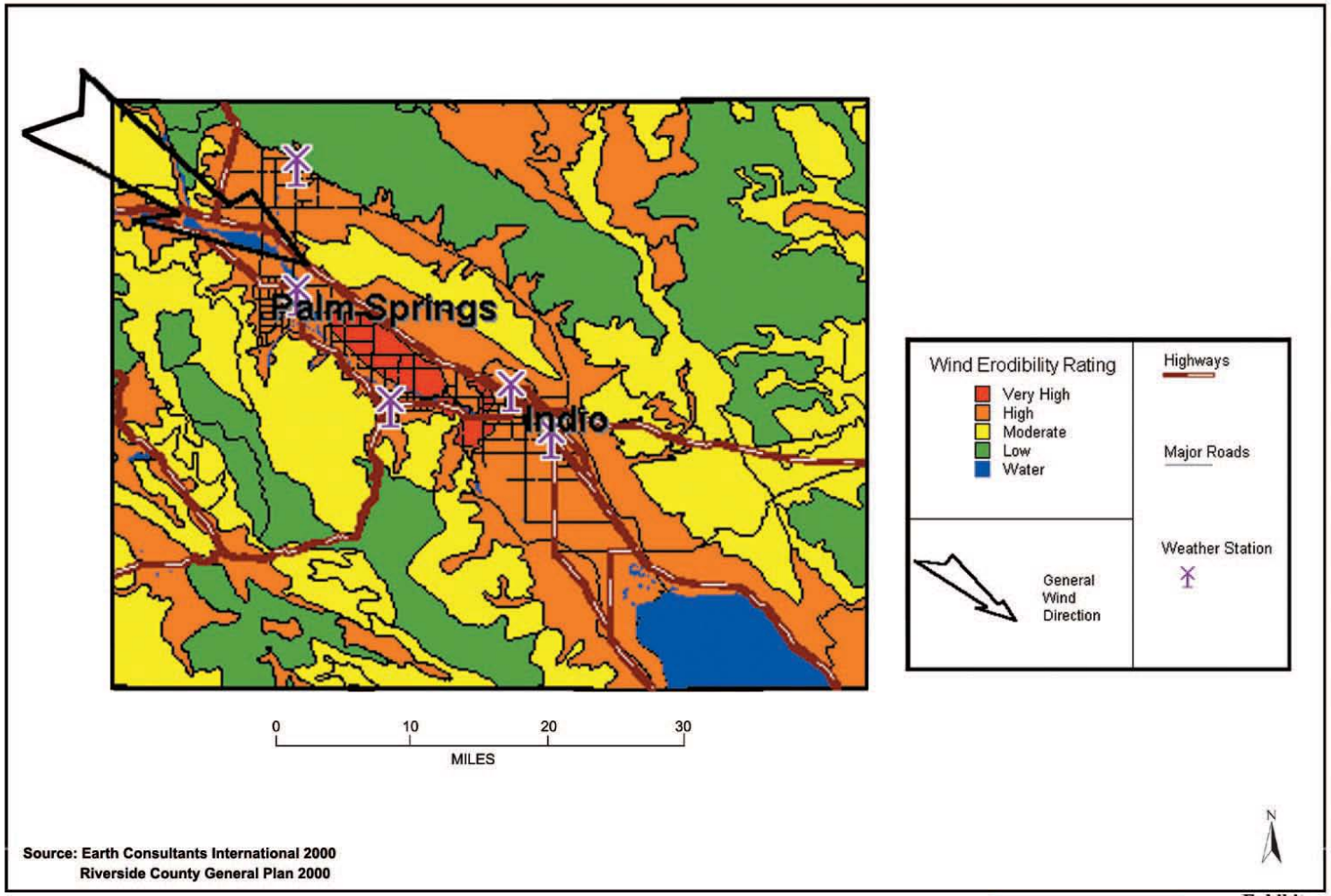
Windy Point in the upper valley. In recent years, CVWD has also operated a pilot groundwater recharge facility south of Lake Cahuilla in La Quinta, and has demonstrated that long-term recharge is feasible at this location. The USGS plans to take precise elevation measurements every 2 to 3 years to determine the extent and magnitude of subsidence in the valley.

Wind Erosion and Sand Transport

Much of the central floor of the Coachella Valley is highly susceptible to wind erosion and the transport of sand and dust. Wind erosion is initiated by wind forces exerted against the ground and results in the transport and re-deposition of dry, sandy, finely granulated soils exposed to the wind regime. This sand erosion and transport system has been a primary force in shaping unique and shifting habitats for specialized sand-adapted plant and wildlife species, as well as directing urban development to the more protected areas of the valley. The movement of abrasive, sandy soils can also pose a serious public health hazard, reduce visibility, damage buildings and vehicles, and contribute to nutrient losses in plants. Blowing sand that collects on streets, driveways, parking lots, and yards is removed at considerable expense.

As illustrated in *Exhibit 3-3,* wind erosion is most severe along the central axis of the Coachella Valley where the low-lying desert floor (which slopes to the southeast and is largely void of vegetation or intervening topographical features) lies unprotected from strong, predominant northwesterly winds emanating from the San Gorgonio Pass. Soils in this vicinity are predominantly fine-grained sands and silts eroded from the surrounding mountains and sorted by their transport across the extensive alluvial plains surrounding the valley floor. These sands and silts can be easily picked up and transported by the wind. Episodic flooding of the Whitewater River, Mission Creek Big and Little Morongo Washes, and other major drainages in the northwest and northcentral portions of the Plan Area results in the deposition of large quantities of sand and gravel on the valley floor, which replenishes the regional sources of sand supporting the valley's system of dunes, sand fields, and sand sheets.

Mitigation of the blowsand and wind erosion hazard to a degree that permits urban development is challenging. In areas with high rates of sand transport, impoundment and periodic removal has been the common practice. However, such measures do little to address human health threats associated fugitive dust. As noted throughout the proposed MSHCP and this EIR/EIS, these regions of sand deposition and wind transport are critical to the habitat for and survival of numerous sand-dependent plant and wildlife species, several of which are proposed as Covered Species under the proposed MSHCP.



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Coachella Valley MSHCP
Wind Erosion Susceptibility Map
Coachella Valley

CVAG

Exhibit
3-3

Efforts continue to mitigate the blowsand hazard while maintaining the natural transport of sand upon which numerous species depend. Mitigation of the blowsand hazard often involves significant monetary expense and considerable environmental alterations, such as planting vegetation to buffer the wind and stabilize soils, covering soils with impervious surfaces and/or chemical stabilizers, installing wind breaks and fencing, or watering soils during grading and construction. Frequently, wind erosion and blowsand control also implies the redirection and channelization of floodwaters, which are essential to the generation and deposition of fresh sources of sand.

Areas where fluvial and aeolian sand transport and deposition are important to the MSHCP are extensive, ranging from the Whitewater and San Gorgonio Rivers and flood plains to the canyons and washes that discharge storm flows from the San Bernardino and Little San Bernardino Mountains, and from the Indio Hills and their associated alluvial fans. Issues associated with sand generation, deposition, and transport, which are directly associated with the viability of the proposed MSHCP, are included in Section 4.8 of this EIR/EIS.

Much of the valley floor habitat is characterized by relatively flat and low-lying terrain, with regions of shifting and blowing sands that generally support only sparse vegetation. Within the Plan Area this habitat can be further divided into three sub-communities: active sand dunes, active sand fields, and stabilized and partially stabilized desert sand fields. These blowsand habitats are characterized by low perennial plant diversity, but very high annual or ephemeral plant diversity. They also support a very diverse array of invertebrates.

Many of the species that are endemic to the valley floor's natural communities have declined. Furthermore, the State and Federal governments have listed a number of plant and wildlife species as threatened or endangered, including the Coachella Valley fringe-toed lizard and the Coachella Valley milkvetch. Others could become listed if their numbers and remaining habitat continue to decline.

Seismic Activity in the Coachella Valley

The Coachella Valley is the northwestern-most extension of a tectonic depression known as the Salton Trough, which is highly susceptible to seismic activity and associated geologic hazards. The San Andreas Fault Zone, which accommodates the majority of movement between the Pacific and North American plates, crosses through and along the central axis of the Coachella Valley and MSHCP Plan Area. The remaining tectonic movement is distributed among other faults and fault zones, many of which are in proximity to the Plan Area, including the San Jacinto, Whittier-Elsinore, Newport-Inglewood, and Palos Verdes faults to the west, and the Mojave Shear Zone to the north.

The severity of an earthquake is determined by its magnitude and seismic intensity. "Magnitude" is the measure of the amount of energy released when a fault ruptures. The Richter Scale is the most widely known magnitude scale and is based on whole numbers and decimals. Each whole number step in magnitude represents a ten-fold increase in the amplitude of the waves on a seismograph and about a 31-fold increase in the amount of energy released. Alternatively, the strength of an earthquake's "Seismic Intensity" is a qualitative estimate of the damage caused by an earthquake at a given location. It is typically measured on the Modified Mercalli Intensity (MMI) Scale that includes twelve levels of intensity ranging from I (tremor not felt) to XII (total damage).

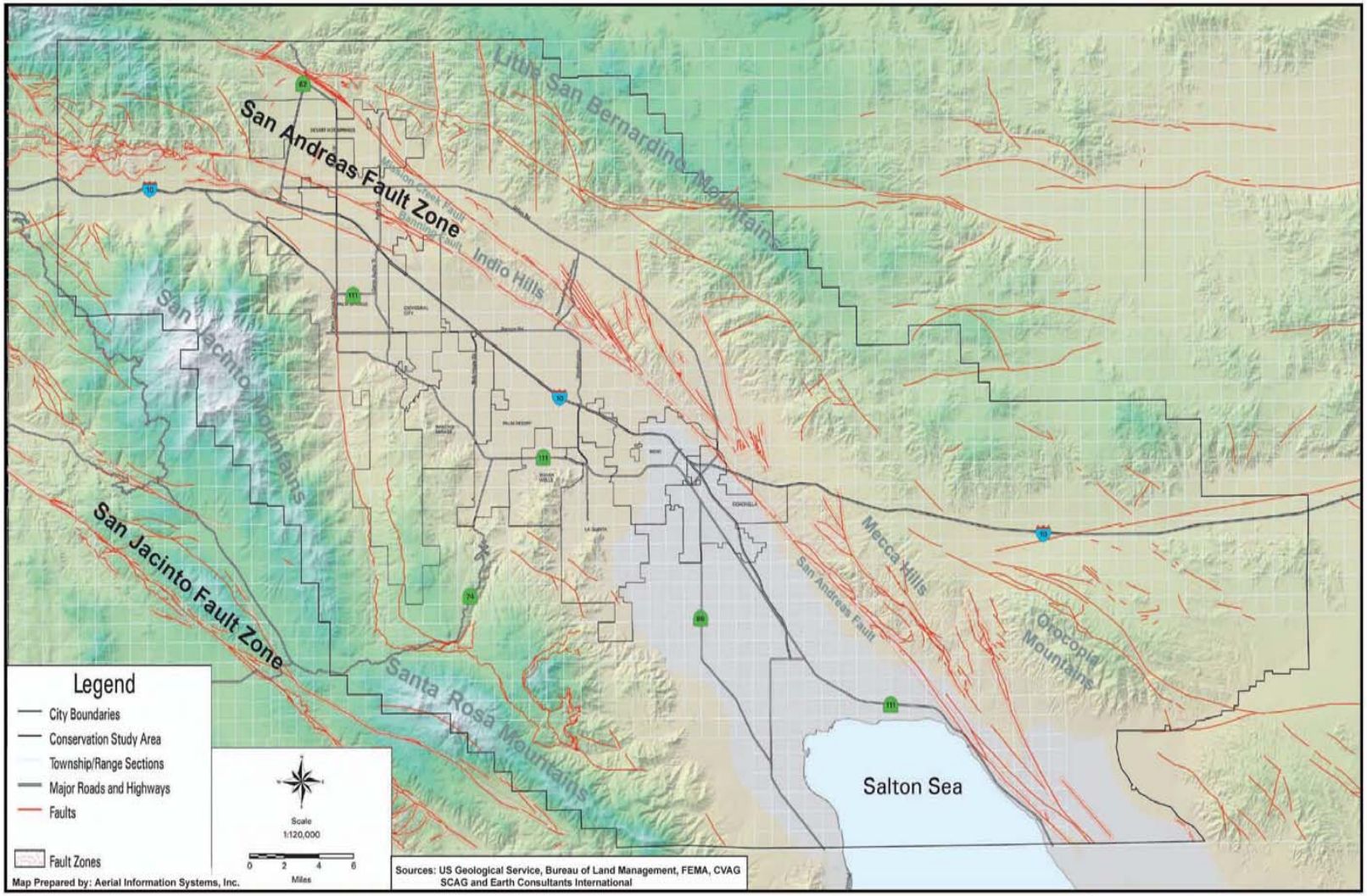
"Maximum probable earthquake" (MPE) is a term used by seismologists, engineers, and planners to describe the largest earthquake a fault is predicted to be capable of generating within a specific time period, such as 50 or 100 years. "Maximum credible earthquake" (MCE) represents the largest earthquake a fault is believed capable of generating, without regard to a specific time period. MCE represents a worst-case scenario and is often considered in emergency planning and the design of critical facilities, such as fire stations and hospitals.

Faults in the Plan Area

As illustrated on *Exhibit 3-4*, several faults cross through the MSHCP Plan Area. The San Andreas Fault Zone is considered the "master fault" because it is the principal boundary between the Pacific and North American plates and accommodates about 70% of the movement between them. It is comprised of three segments in southern California: 1) Mojave Desert segment, 2) San Bernardino Mountains segment, and 3) Coachella Valley segment. Only the San Bernardino Mountains and Coachella Valley segments occur within the Plan Area.

The San Bernardino Mountains segment extends from the Cajon Pass area east-southeast to its terminus at the northwestern city limits of Desert Hot Springs, near the northwesterly edge of the MSHCP Plan Area. Its strike slip rate is estimated at 22 mm/year ± 5 mm/year, and the most recent surface-rupturing earthquake on this segment is believed to have occurred in 1812.[16] In 1995, the Working Group on California Earthquake Probabilities (WGCEP) estimated that this segment has a 28% probability of rupturing between 1994 and 2024.[17]

[16] "Technical Background Report to the Safety Element for the General Plan of Cathedral City," Earth Consultants International, Inc., June 1999.
[17] Ibid.



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Coachella Valley MSHCP
Alquist-Priolo Earthquake Fault Zone

CVAG

3-4

The Coachella Valley segment of the San Andreas Fault Zone crosses through the northern portion of the Plan Area. The segment is creeping at a rate of about 2 to 4 mm/year, with a long-term slip rate of about 25 mm/year ± 5 mm/year.[18] The WGCEP estimates that the segment has more than a 22% probability of rupturing between 1994 and 2024.[19]

The Coachella Valley segment consists of two strands: 1) the Mission Creek Fault (also known as the North Branch or San Andreas Fault strand), and 2) the Banning Fault (also known as the South Branch fault). These strands run roughly parallel to one another in the northern portion of the Plan Area and converge into a single strand in the southeastern Indio Hills. The single strand continues southeast as the Indio segment along the northeast side of the Salton Sea. It has been suggested that the San Andreas Fault continues southward to join the presently active Brawley and Imperial seismic zones; however, the fault is not recognizable on the surface or subsurface beyond the Durmid Hills/Salton Sea area.[20]

The Mission Creek and Banning Faults are believed to be capable of generating magnitude 7.1 and 7.4 earthquakes, respectively.[21] They also have the potential to rupture simultaneously. The Banning Fault is believed to have been the source of the 1986 North Palm Springs earthquake (magnitude 5.9) that resulted in extensive ground fracturing between Whitewater Canyon and State Highway 62. The Indio segment of the San Andreas Fault has not ruptured with a major earthquake in historic times, but has shown evidence of sympathetic slip with magnitude 6 and greater earthquakes on the Imperial Fault and the southern section of the San Jacinto Fault.[22]

The Garnet Hill Fault extends roughly from Whitewater Canyon to the vicinity of Edom Hill, although it is mapped as an inferred and concealed fault as it approaches Edom Hill. The fault may be associated with (and may be an ancestral branch of) the San Andreas Fault, but it is not considered an "active" fault by the California Department of Conservation, Division of Mines and Geology. Although it may not be capable of generating a strong earthquake, it has the potential to move co-seismically during an earthquake on another nearby fault. In fact, ground fractures associated with the 1986 North Palm Springs earthquake were observed along this fault.

Several other faults of relatively short length have been documented in the vicinity of Desert Hot Springs. They include the Devers Hill Fault, White House Canyon Fault, Blind Canyon Fault, Long Canyon Fault, and two unnamed faults at the base of the San Bernardino Mountains. The

18 Ibid.
19 Ibid.
20 "Geology of the Southeastern San Andreas Fault Zone in the Coachella Valley Area, Southern California," Thomas W. Dibblee, Jr.
21 "Technical Background Report to the Safety Element for the General Plan of Cathedral City," Earth Consultants International, Inc., June 1999.
22 "Seismicity, 1980-86," David P. Hill, Jerry P. Eaton, and Lucile M. Jones, from the U.S. Geological Survey Professional Paper 1515, 1990.

Devers Hill Fault appears to be a secondary fault that ruptures in response to earthquakes on the San Andreas Fault.

The White House Canyon Fault closely coincides with the San Andreas Fault Zone, lying parallel with and only 300 feet north of the Mission Creek Fault. The Blind Canyon Fault in the same area may actually merge with the Mission Creek Fault. Although the Blind Canyon Fault's level of activity or inactivity is not yet fully understood, it has the potential to move in sympathy with movement on the San Andreas Fault. Each of these faults is discussed in greater detail in the background Geotechnical Report (Appendix D).

The Blue Cut Fault is located at the northeastern extreme of the MSHCP Plan Area along the northern flank of the Eagle Mountains. It is unclear whether the fault has been active in historic times. Additional studies are necessary to determine whether and to what extent it poses a seismic threat within the Coachella Valley.[23]

The Mecca Hills have been significantly uplifted and folded by seismic activity along the San Andreas and four other faults in the vicinity, including Painted Canyon, northern Painted Canyon, Eagle Canyon, and Grotto/Hidden Spring Faults. However, the only documented historic fault movement in the Mecca Hills was associated with the magnitude 6.4 Borrego Mountain earthquake of 1968, when minor creep was triggered on the San Andreas Fault adjacent to the Mecca Hills.[24]

The Coachella Valley may experience numerous earthquakes over the proposed 75-year permit term because of the faults that bisect that Plan Area. A sequence of large magnitude earthquakes occurred in the Mojave Desert in the 1990s in proximity to the southern San Andreas Fault, inducing stress changes on the San Bernardino Mountain segment of the southern San Andreas Fault.[25, 26] Although the last rupture was more than 190 years ago, the historical stresses are predicted to bring the San Bernardino Mountain segment of the fault (near the Plan Area) closer in time to a potentially major rupture and large earthquake.[27]

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23 "Technical Background Report to the Safety Element of the General Plan of Desert Hot Springs," Earth Consultants International, Inc., May 28, 1997.

24 "Tectonic Transpression and Basement-Controlled Deformation in San Andreas Fault Zone, Salton Trough, California," Arthur Q. Sylvester and Robert R. Smith, The American Association of Petroleum Geologists Bulletin, Volume 60, Number 12, December 1976.

25 R.S. Stein, G.C. King and J. Lin "Change in Failure Stress on the Southern San Andreas Fault System caused by the 1992 Magnitude = 7.4 Landers earthquake," *Science* 258 (,19920 pp. 1328-1332.

26 A.M. Freed, J. Lin, "Accelerated Stress Buildup on the Southern San Andreas Fault and Surrounding Regions caused by Mojave Desert earthquakes," *Geology* (, June 2002).

27 Ibid.

Major Faults in the Vicinity of the Plan Area

Other major faults and fault zones are located outside the Plan Area, but have the potential to generate strong groundshaking and other seismic hazards within the Plan Area boundary. The San Jacinto Fault Zone lies along the western margin of the San Jacinto Mountains, approximately 10 to 15 miles southwest of the Coachella Valley. It extends from its junction with the San Andreas Fault at Cajon Canyon to the Brawley area, and continues south into Mexico as the Imperial Fault. The San Jacinto Fault Zone was responsible for at least ten moderate earthquakes (ranging between magnitude 6 and 7 on the Richter scale) from 1890 to 1986.[28,29] According to the WGCEP, the San Bernardino and San Jacinto Valley segments of this fault zone have a 37% and 43% probability, respectively, of rupturing between 1994 and 2024.[30]

The Elsinore Fault Zone, located about 30 miles southwest of the Coachella Valley, is one of southern California's largest fault zones (over 140 miles in length) and is capable of generating magnitude 6.5 to 7.5 earthquakes. However, it has been one of the region's quietest fault zones in recent history. It last ruptured in 1910 (magnitude 6.0) near Temescal Valley.[31]

The Pinto Mountain Fault is traceable for approximately 47 miles, from its junction with the Mission Creek branch of the San Andreas Fault to just east of the City of Twentynine Palms. Given that Holocene (within 0 to 11,000 years) movement along this fault was documented in 1986, and sympathetic ground ruptures associated with the Landers earthquake were reported in 1993, this fault is considered to be active.

The Mojave Shear Zone (also known as the Eastern California Shear Zone) is located in the southern Mojave Desert, north of the MSHCP Plan Area. It consists of several northwest-southeast trending faults that collectively appear to be accommodating between 9% and 23% of the movement between the North American and Pacific plates.[32] The 1992 Landers earthquake occurred on one of these faults (Johnson Valley Fault), and several others moved co-seismically during this event. Trenching studies have indicated additional activity during the Holocene, and therefore, the fault zone is considered active.

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28 Federal Emergency Management Agency (FEMA), *Strong Quake Predicted by California Scientists to Hit Desert by September 5, 2004; National Situation Update* (, April 2, 2004).

29 "Technical Background Report to the Safety Element of the General Plan for Cathedral City," Earth Consultants International, Inc., June 1999.

30 Ibid.

31 "Technical Background Report to the Safety Element of the General Plan of Palm Desert," Earth Consultants International, Inc., January 17, 2002.

32 "Technical Background Report to the Safety Element of the General Plan for Cathedral City," Earth Consultants International, Inc., June 1999.

Seismically-Induced Geologic Hazards

Given that the Plan Area is traversed by, or in close proximity to, numerous active and potentially active faults, it is highly susceptible to seismically-induced geologic hazards. Among these are strong ground shaking, surface fault rupture, liquefaction, slope instability, and seismically- induced settlement.

Ground Shaking

Strong ground shaking is undoubtedly the most significant seismic hazard facing the Coachella Valley. According to the USGS National Seismic Hazard Mapping system, which generates maps describing probabilistic groundshaking zones, the Coachella Valley is separated into several northwest-southeast trending groundshaking zones. *Table 3-5* gives an abridged modified Mercalli intensity scale.

As illustrated in *Exhibit 3-4*, the northeasterly portion of the valley, generally extending from Desert Hot Springs to the northeast Salton Sea, can be expected to experience "extremely high" peak horizontal accelerations of greater than 40% the force of gravity (>0.4g), with a 10% probability of being exceeded in 50 years. The zones immediately east and west of this zone are expected to experience "very high" peak horizontal ground accelerations between 0.3g and 0.4g, with a 10% probability of being exceeded in 50 years. The potential ground motions likely to occur in these zones are among the highest in southern California.

Strong groundshaking can result in extensive property damage, injuries, and/or death. Larger earthquakes and those of longer duration can be expected to result in more structural damage. Damages may include impairment of a building's walls and frames, broken windows, collapsed or rotated chimneys, rupturing of pipelines, fallen utility poles and towers, cracking or pulverization of paved surfaces, and collapse of bridges and overpasses. The Uniform Building Code (UBC) requires that near-source construction factors be incorporated into the design of new buildings in the Coachella Valley. The retrofitting or rehabilitation of older and structurally weak structures to current building and fire codes is also critical to reducing seismically-induced damage and preventing injuries and deaths.

Surface Fault Rupture

Surface fault rupture refers to the fracturing or displacement of the earth's surface along the trace of a fault. Such an occurrence can result in serious damage to structures built along or in close proximity to the trace of the fault, as well as injuries and/or loss of life to those occupying such structures. A major ground-rupturing earthquake can also trigger smaller, secondary surface displacements on nearby faults or ground surfaces. According to the California Department of

TABLE 3-5
Abridged Modified Mercalli Intensity Scale

	Intensity Value and Description	Average Peak Velocity (cm/sec)	Average Peak Acceleration (g = gravity)
I.	Not felt except by a very few under especially favorable circumstances (I Rossi-Forel scale). Damage potential: None.	<0.1	<0.0017
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). Damage potential: None.	0.1 – 1.1	0.0017 – 0.014
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). Damage potential: None	0.1 – 1.1	0.0017 – 0.014
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). Damage potential: None. Perceived shaking: Light.	1.1 – 3.4	0.014 - 0.039
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). Damage potential: Very light. Perceived shaking: Moderate.	3.4 – 8.1	0.039-0.092
VI.	Felt by all; many frightened and run outdoors. Some heavy furniture moved, few instances of fallen plaster and damaged chimneys. Damage slight. (VI to VII Rossi-Forel scale). Damage potential: Light. Perceived shaking: Strong.	8.1 - 16	0.092 -0.18
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). Damage potential: Moderate. Perceived shaking: Very strong.	16 - 31	0.18 - 0.34
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). Damage potential: Moderate to heavy. Perceived shaking: Severe.	31 - 60	0.34 - 0.65
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). Damage potential: Heavy. Perceived shaking: Violent.	60 - 116	0.65 – 1.24
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed; 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). Damage potential: Very heavy. Perceived shaking: Extreme.	> 116	> 1.24
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.		

Source: Earth Consultants International, Inc., June 19, 2003. Modified from Bolt (1999); Wald et al. (1999)

Conservation, Division of Mines and Geology, surface displacements occurred at an average rate of 1.1 events per year in California from 1974 to 1994.[33] The 1986 North Palm Springs earthquake resulted in a maximum displacement of approximately 7 centimeters and triggered minor slip along the Garnet Hill and more distant faults.[34] The 1992 Landers earthquake resulted in approximately 460 to 600 centimeters of surface rupture displacement, which connected several separate faults and triggered slip on at least 10 other faults.[35]

Continued implementation of the Alquist-Priolo Earthquake Fault Zoning Act is the most important method of mitigating the direct hazards of surface fault rupture. The Alquist-Priolo Earthquake Fault Zoning Act prohibits the location of most structures for human occupancy across the trace of an active fault, and requires cities and counties to withhold development permits for sites within potentially hazardous rupture zones until geologic investigation can demonstrate the sites are not threatened by surface displacement from future faulting.

Liquefaction

Liquefaction is the substantial or total loss of shear strength of loose, sandy, saturated sediments. When liquefaction occurs, soils behave like a liquid or fluid-like substance and may roil or settle, resulting structural damage or failure, lateral spreading, the buoyant rise of buried structures, and/or ground oscillation. Liquefaction is not a random phenomenon, but requires the simultaneous occurrence of three geologic and hydrologic conditions.[36] First, the site must be subjected to strong groundshaking (usually ground accelerations greater than 0.2g) of relatively long duration. Second, on-site soils must be composed of loose or recently deposited, unconsolidated sediments, such as sand or silty sand. Third, groundwater must occur within 50± feet of the ground surface to adequately saturate overlying soils.

The potential for liquefaction to occur within the Plan Area ranges from none to high, depending upon location and site-specific soil and hydrologic characteristics. The three conditions described above generally could occur only on the low-lying desert floor and areas underlain by recently-deposited alluvium, such as active drainage channels, where the groundwater table is within 50 feet of the ground surface. In the western portion of the Plan Area, potential liquefaction hazard areas are limited to areas of elevated groundwater caused by diking of groundwater movement along the faults defining boundaries of groundwater subbasins. Therefore, the most extensive areas most prone to liquefaction are those on the desert floor in the eastern valley (generally east of La Quinta), and those adjacent to faults that act as barriers to groundwater.

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33 "Fault Hazard Zones in California: Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Map," Earl W. Hart, California Dept. of Conservation, Division of Mines and Geology, revised 1994.

34 Ibid.

35 Ibid.

36 "Technical Background Report to the Safety Element of the General Plan for Cathedral City," Earth Consultants International, Inc., June 1999.

Seismically-Induced Slope Instability

As described earlier, land within or down gradient of the steep slopes surrounding the Coachella Valley is moderately to highly susceptible to rock falls and landslides, many of which can be induced by seismic groundshaking. Ground accelerations of 0.10g are typically required to trigger slope instability.[37] The 1986 North Palm Springs earthquake triggered landslides along the sides of steep-walled canyons, and debris and rock falls in fractured basement rock of the San Jacinto, San Bernardino, and Little San Bernardino Mountains.[38] Such hazards can be expected to occur in the future, especially where bedrock is extensively jointed or fractured and where boulders are precariously perched on hillsides and slopes, as is common along the toe of slopes of the San Jacinto and Santa Rosa Mountains. Ridge top shattering may occur on the crests of Painted Hill, Edom Hill, and other steep, narrow ridges that can focus or amplify seismic energy.[39]

Mitigation of this hazard is best achieved by avoiding development within steep-walled canyons and within, adjacent to, or down gradient of steep slopes and ridges. Development proposed in these areas requires site-specific geotechnical studies to gauge rockfall and landslide hazards, and feasibility and the extent of necessary mitigation measures. Development on or near unstable slopes typically requires engineered cut and fill slopes that resist slope instability through the use of overexcavation techniques, higher levels of fill compaction, post-tensioned foundations, and/or other costly and disruptive measures.

Seismically-Induced Settlement

Strong seismic groundshaking can also cause the compaction or densification of soils, resulting in local settlement and damage to structures, foundations, subsurface pipelines, and other gradient-sensitive infrastructure. Loose, recently deposited sediments, such as windblown sand and young alluvium, and artificial fills that have been insufficiently compacted are most susceptible to settlement. Groundshaking triggers the collapse of pores and voids between the soil grains and results in an overall reduction in the thickness of the soil column. Those portions of the Plan Area most susceptible to seismically-induced settlement include floodplains and drainages underlain by recently deposited alluvial sediments, valley margins (the base of natural hills), and those portions of the low-lying valley floor composed of windblown sands. The implementation of specialized grading techniques, such as overexcavation and recompaction of surface and near-surface soils, are among the most commonly employed mitigation measures.

37 Technical Background Report to the Safety Element for the General Plan of Desert Hot Springs," Earth Consultants International, Inc., May 28, 1997.
38 Ibid.
39 Ibid.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act, enacted in 1972, prohibits the location of most structures for human occupancy across the trace of active faults. This Act is perhaps the single most important method of mitigating the direct hazards of surface fault rupture in California. The Act requires the State Geologist (Chief of the Division of Mines and Geology) to delineate wide "earthquake fault zones" along sufficiently active and well-defined faults. A "sufficiently active" fault shows evidence of observable or inferred surface displacement within Holocene time (about the last 11,000 years). "Well-defined" means that the trace of the fault is clearly detectable by a trained geologist as a physical feature at or just below the ground surface.

Zone boundaries are straight-line segments that extend about 500 feet from major active faults and 200 to 300 feet from well-defined minor faults.[40] Cities and counties in which the zones are located must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by future surface displacement. *Exhibit 3-4* shows the location of Alquist-Priolo Earthquake Fault Zones in the Plan Area.

Other Applicable Legislation

In recognition of the significant potential impacts associated with development in seismically active and otherwise geotechnically challenging areas, a number of other Federal and State laws have been enacted for the purpose of protecting public health and safety from these hazards. Local regulation is also directed by the Uniform Building Code (UBC), which is the primary tool used to ensure structural integrity in communities nationwide. In reference to seismic safety, the UBC describes the minimum lateral forces needed to resist groundshaking based on the area's seismic zone, the building's structural configuration and height, and the soil profile of the structure and site in question. The UBC was last updated in 1997, but efforts are underway to replace it with the International Building Code (IBC). It is anticipated that the State of California would adopt the IBC within the next several years; however, until it does so, cities and counties in California are precluded from adopting or implementing it.

The State of California has taken a proactive approach to mapping potential geologic hazards in the State and requiring property owners and local jurisdictions to disclose the locations of hazardous sites. The Seismic Hazards Mapping Act (SHMA), enacted in 1990, requires the California Division of Mines and Geology to provide local governments with maps that identify areas susceptible to seismically induced ground failure, including groundshaking, liquefaction, and slope instability.

[40] "Fault Hazard Zones in California: Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Map," Earl W. Hart, California Dept. of Conservation, Division of Mines and Geology, revised 1994.

Where development is proposed within identified hazard areas, a site-specific geologic hazard investigation must be performed and appropriate mitigation measures implemented. Mapping of these hazards within the MSHCP Plan Area has not yet been completed. However, a variety of current (1996-2003) geotechnical studies prepared for the Riverside County Integrated Plan and several Coachella Valley cities provides substantial data, information and mapping on geotechnical conditions in the Plan Area. Please see *Exhibit 3-4* showing active faults as delineated by the State per the Alquist-Priolo Earthquake Fault Zoning Act

The California Building Code (CBC) is a modified version of the UBC that is tailored for California geologic and seismic conditions and includes stringent earthquake provisions for critical structures, including schools and hospitals. It was last amended in 1998. CEQA requires local governments to consider and disclose to the public the potential environmental impacts of development projects proposed within their jurisdiction. The California Natural Hazards Disclosure Act, which became effective June 1, 1998, requires all sellers of real property and their real estate brokers to disclose prospective buyers whether their parcel is located within one or more State-mapped hazard areas, including geologic, flooding, and fire hazard areas.

3.5 Mineral, Energy, and Timber Resources

3.5.1 Mineral Resources

Mineral resources in the MSHCP Plan Area are largely limited to aggregate (sand, gravel, and crushed stone), which is a major component of concrete, plaster, stucco, road base, and fill and is essential to the construction industry. Important deposits of these materials occur within the region and are actively being developed. Other mineral deposits occurring in the region include copper, limestone, specialty sands, and tungsten. These deposits are limited to rocky outcroppings within the Little San Bernardino and Santa Rosa Mountains and have not been mined.

In 1988, the California Department of Conservation Division of Mines and Geology (DMG) released a report identifying aggregate materials in the Palm Springs Production-Consumption Region. The region includes 629 square miles in the Coachella Valley, generally extending from Cabazon in the west to Mecca in the east. The study found that 3.2 billion tons of aggregate resources have been identified in the region. It assigned Mineral Resource Zone (MRZ) classifications to all lands within the region, which describe the location of significant PCC-grade aggregate deposits:

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence. Includes Quaternary alluvial deposits of the central upper Coachella Valley, the Imperial Formation of the Indio

Hills, Garnet Hill, the hills west of Whitewater River Canyon, and the Borrego Formation of the southeastern Coachella Valley.

MRZ-2: Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists. Includes the following areas: 1) Whitewater River floodplain extending from the Whitewater River Trout Farm to the City of Palm Springs, 2) San Gorgonio River floodplain from Cabazon to its confluence with the Whitewater River, 3) the river channel in the lower part of Little Morongo Canyon, 4) a small alluvial wash north of Thousand Palms, 5) the confluent alluvial fans of Berdoo and West Berdoo Canyons, 6) the alluvial fan of Fargo Canyon, 7) an alluvial fan north of Indio, and 8) an alluvial fan east of Thermal.

MRZ-3: Areas containing mineral deposits, the significance of which cannot be evaluated from available data. Includes lands composed of Cabazon Fanglomerate, Ocotillo Conglomerate, Painted Hills Formation, Palm Springs Formation, Mecca Formation, and metamorphic rocks of the San Jacinto Mountains and the San Gorgonio Complex.

The 2002 amendment to the BLM 1980 California Desert and Conservation Area (CDCA) Plan permits the development of mineral resources on BLM-administered lands in a manner, which satisfies national and local needs in an economically and environmentally sound manner. All mineral exploration and mining operations on BLM lands are subject to the Bureau's surface mining regulations under 43 CFR 3802 and 43 CFR 3809, which prohibit "undue degradation" of public lands. Currently, all BLM actions pertaining to realty and leasable minerals are considered on a case-by-case basis in accordance with the CDCA Plan (2002).

Mineral resources in the Coachella Valley consist mainly of construction aggregate (sand, gravel, and crushed stone). Construction aggregate is important in a variety of construction materials, including Portland cement concrete, asphaltic concrete, stucco, road base, railroad ballast, specialty sands, and fill. Construction aggregate is a low-value, high bulk weight commodity, meaning that a major part of its cost to the consumer is for transportation. Aggregate resources that are unavailable locally must be brought in from more distant sources, often at greater transportation costs. Thus, locally available, high quality construction aggregate deposits are vitally important to the construction industry and development in the Coachella Valley.

Other mineral deposits occurring in the region include limited and/or small deposits of copper, limestone, gold and tungsten within the Mecca Hills, Little San Bernardino Mountains and the Santa Rosa Mountains surrounding the Coachella Valley; these resources are not being currently mined. Decorative stone is mined on public land in the Painted Hills area west of Desert Hot Springs. Clay deposits exist at the base of the Mecca Hills on public and private land, east of Thermal. Some of these deposits have been permitted for mining and may be used as an impermeable layer for lining landfills, ponds, and similar construction applications.

Aggregate resources in the Coachella Valley were evaluated by the California Department of Conservation, Division of Mines and Geology (DMG), now known as the California Geological Survey, (CGS) in a 1988 report entitled, "Aggregate Land Classification: Aggregate Materials in the Palm Springs Production-Consumption Region."[41] The report was part of a state-wide program to geologically delineate/classify aggregate resources in rapidly urbanizing areas, determine quantities of available aggregate resources, and to evaluate the adequacy of permitted aggregate reserves for meeting the future needs of each region.

The second part of the State's program was to designate mineral resource deposits that are of regional significance. Designated mineral resource deposits are generally those that are either currently used for mineral extraction or deposits that are open and accessible for future extraction. In the 1988 report, the State classified a number of aggregate deposits that were being mined and other areas that were potentially available for future mining in the Palm Springs Production-Consumption Region. Subsequently, the State designated these deposits as regionally significant to the Coachella Valley. Local governments affected by these classifications and designations are required to develop mineral resource management policies and incorporate the classification/designation areas into their General Plans to ensure this information is considered in local land-use planning decisions.

The 1988 CGS report determined that the Palm Springs Production-Consumption Region has an average annual per capita consumption rate of approximately 10 tons of construction aggregate materials per year. Based on this rate and population projections made in 1985, approximately 156 million tons of aggregate materials would be needed to supply the Coachella Valley area through the year 2035 (50 year projection from 1985). Of this amount, approximately 54% or 84.4 million tons must be of Portland Cement Concrete (PCC) quality (the highest grade of construction aggregate). The remainder (46% or 71.6 million tons) would be lower grade construction aggregate materials, such as road base, asphalt, and fill.

The State determined that the total volume of PCC quality aggregate resources (permitted and non-permitted aggregate deposits) in the Coachella Valley was approximately 3 billion tons. Approximately 67 million tons of this total was permitted for mining in 1985. Based on the projected 50-year demand for construction aggregate in the Valley, the State concluded that these permitted deposits would be depleted in approximately 26 years (2011) from the date of analysis (1985).

41 "Mineral Land Classification: Aggregate Materials in the Palm Springs Production-Consumption Region.," prepared by the California Department of Conservation Division of Mines and Geology, 1988.

In 1985, the main sources of construction aggregate that served the Coachella Valley were from alluvial fan and riverbed deposits (including the Whitewater River near Palm Springs) on a small, unnamed wash north of Thousand Palms, in west Berdoo Canyon near Indio, in the Indio Hills near Indio, and a small, unnamed canyon east of Thermal. Since 1985, deposits on the Whitewater River are no longer being mined. Other active sources identified in 1985 and still producing include the small, unnamed wash and adjacent hillsides north of Thousand Palms, west Berdoo Canyon near Indio, the south flank of the Indio Hills near Indio, and the unnamed canyon east of Thermal.

New aggregate sources permitted after 1985 and currently producing are located on the Fargo Canyon alluvial fan near Indio. Minor amounts of aggregate are also being transported into the Valley from the Banning/Cabazon area. Sand and gravel mining operations on public land managed by the BLM in the Coachella Valley are located in the west Berdoo Canyon area near Indio (James E. Simon Co. and A-1 Aggregates) and in the unnamed canyon east of Thermal (Valley Rock and Sand/West Coast). The CVWD has operated an intermittent rip rap mine in the west Berdoo Canyon area under a free use permit with the BLM.

Current permitted reserves in the Valley are estimated at 236.8 million tons (based on Riverside County and BLM permit files) on both public and private land. Approximately 10% of the total is located on public land managed by the BLM, with the remainder on private land. The 236.8 million tons of permitted reserves is a significant increase over the 1985 permitted reserve figure of 67 million tons; and is due to recent permit approvals of a large, new mine on the Fargo Canyon alluvial fan near Indio (private land), significant expansion of an existing mine in the Indio Hills also near Indio (private land),[42] and permitting of a number of smaller operations in Thousand Palms and west Berdoo Canyon (private and public land). Total aggregate production during 2001 in the Coachella Valley was approximately 2 million tons, of which approximately 661,000 tons were mined on BLM land.

Sand and gravel mining on BLM land in the Coachella Valley is regulated as a salable mineral in accordance with the Materials Act of 1947, as amended, the Federal Land Policy and Management Policy Act of 1976, and implementing mineral materials disposal regulations in 43 CFR part 3600. A basic goal of the mineral materials program is to make mineral materials, such as sand and gravel, available by sale or free use permit when it would not be detrimental to the public interest, provided adequate measures are taken to protect the environment and that damage to public health and safety is minimized. BLM does not dispose of mineral materials in wilderness areas, locations where it is expressly prohibited by law (such as national monuments),

[42] "Final Subsequent Environmental Impact report for Riverside County Surface Mining Permit No. 176, Amd. No. 1" Permit approved and SEIR certified March 2002. Prepared by Terra Nova Planning & Research, Inc. March 2002. This approval expanded mining to increase permitted aggregate extraction by approximately 46.8 million tons beyond levels identified in 1985.

and areas identified in land use plans as not appropriate for mineral materials disposal. All other BLM land containing construction aggregate deposits is open to mineral material disposal provided the appropriate regulations and resource management plans are followed.

Sand and gravel mining operations on non-Federal lands in the Coachella Valley are permitted by Riverside County and are subject to the regulations and provisions set forth by the Surface Mining and Reclamation Act (SMARA) and related County ordinances. The purpose and intent of SMARA is to regulate all mining operations, ensure that demands for mineral resources would be met, and mitigate for significant adverse impacts of mining. Riverside County Ordinance adopted No. 555 to enforce SMARA. All mining operations on BLM land in the valley are also required to obtain reclamation plan and reclamation bond approval from Riverside County, the lead agency for implementing the California Surface Mining and Reclamation Act (SMARA).

3.5.2 Energy Resources

Energy resources discussed below include both production and transmission facilities, including those associated with the movement of petroleum products, natural gas, and electricity from their points of production to those of use. Each of the major energy sectors associated with and having facilities within the MSHCP Plan Area are discussed below.

Electrical Power

Southern California Edison (SCE) and the Imperial Irrigation District (IID) provide electric power services to the Coachella Valley. These companies utilize a combination of wind, hydroelectric, thermal, diesel, and geothermal power sources, most of which are located outside the valley. Electricity is distributed to the Coachella Valley via high-voltage (up to 500 kilovolts) transmission lines, which cross the valley along an east-west trending utility corridor north of Interstate 10. Portions of these electricity transmission corridors pass directly through or in proximity to the various Conservation Areas.

Natural Gas

Natural gas is found in association with petroleum crude oil deposits and is generally considered a clean and efficient fuel. The Southern California Gas Company (Sempra Energy) provides natural gas services to much of the Coachella Valley. The fuel is transported from Texas to the Coachella Valley through three east-west trending gas lines, which cross the valley just north of Interstate 10 and continue west to Los Angeles. The pipelines include one 30-inch line and two 24-inch lines, with pressures of 2,000 pounds per square inch (psi). Portions of the pipeline utility corridor pass directly through or in proximity to the various Conservation Areas.

Wind Energy

The Coachella Valley's wind energy industry has proven to be an important renewable energy resource. According to the American Wind Energy Association, there were 19 different wind energy projects in the San Gorgonio Pass area as of January 2002, with a combined installed power capacity of 421.1 megawatts. In 1998 (the last year for which data are available), they generated an annual energy output of 805 million kWh. Another 5 wind energy projects, with a combined power capacity of 163.5 megawatts, were proposed for construction during 2002.

Both the approved BLM CDCA Plan (2002) and the proposed MSHCP allow for the Development of windfarms in an environmentally sound manner on non-Conservation Area lands. Project review and approval is conducted on a case-by-case basis by Local Permittees and the BLM. The Plan also provides coverage for the ground disturbance associated with operation, maintenance, and turbine retrofitting of existing windfarms.

Wind Energy Resource Areas/Facilities

Viable wind resource areas occur in the western Coachella Valley and as far east as Edom Hill, where strong, sustained winds emanate from the San Gorgonio Pass and cross the valley in a southeasterly direction. Large areas within and immediately east of the San Gorgonio Pass under the jurisdiction of either Riverside County, Desert Hot Springs, or Palm Springs, are already developed with Wind Energy Conversion Systems (WECS) wind farms or designated for future energy-related industrial development.

Many turbines have been constructed within or in the vicinity of lands proposed for conservation under the MSHCP. In 1995 according to the California Energy Commission, there were approximately 2,898 wind turbines in the San Gorgonio Pass area that produced 662.6 million kilowatts/hours of electricity. Typical wind turbines being installed in the Coachella Valley are rated at between 750 kilowatts and 1.25 megawatts.[43] Most turbines are three-blade, horizontal axis machines with galvanized steel or painted towers that may be up to 300 feet in overall height. The following map shows the wind resource area in the San Gorgonio Pass and upper Coachella Valley.

Solar Energy

Solar thermal systems are widely applied in the Coachella Valley for heating domestic water and swimming pools. However, such uses are largely limited to private lands.

[43] Chris Copeland, Wintec Energy, personal communication, April 10, 2000.

Geothermal Energy
Geothermal resources are plentiful in the northwestern portion of the Coachella Valley. Geothermal hot springs in Desert Hot Springs are the result of and are structurally controlled by faults; they are largely focused along the Mission Creek Fault. The geothermal energy produced in Desert Hot Springs, which is primarily used for commercial spas and therapeutic pools, is harnessed on private land and is not used for energy production.

3.5.3 Timber Resources

The boundaries of the MSHCP Plan Area extend into and include portions of the surrounding San Jacinto, Santa Rosa, San Bernardino and Little Mountains, which include private lands but is primarily comprised of large tracts of public land (State Parks, Bureau of Land Management U.S. Forest Service, etc.). The mountainous areas of the MSHCP Plan Area occur within the Santa Rosa and San Jacinto Mountains National Monument. The Monument includes a total of 150,800 acres of Federal land, including 86,400 acres of BLM land and 64,400 acres of National Forest land.

Also included within the boundary of the Plan Area, but not affected by the Federal designation, are 31,400 acres of Agua Caliente Band of Cahuilla Indians land, 8,500 acres of California Department of Parks and Recreation land, 34,500 acres of other State lands (University of California, California Department of Fish and Game, Coachella Valley Mountains Conservancy), and 55,200 acres of private land. The BLM lands are classified as Class "L," Limited, in the CDCA Plan. None of the subject private and public lands constitute permitted existing or planned timber harvesting areas.

3.6 Agricultural Lands and Activities

As noted in Section 3.2, above, agriculture was the first large scale land use to occur in the Coachella Valley. With a large aquifer of high quality ground water particularly accessible in the eastern portions of the valley, extensive land conversion and crop production was underway well before outside sources of water were imported into the valley. While dates and citrus and even cotton were early crops favored by farmers, cultivation has since expanded to make the Coachella Valley a major producer of table grapes and truck crops. Beginning in the late 1970s, large areas of courser soils on alluvial fans were converted to table grape production and extended agricultural activity above the valley floor. While agriculture constituted the largest conversion of wild lands in the valley, over time land values have increased with continuing development pressure. Weak commodity prices have induced owners of agricultural lands to sell marginally productive lands for urban development.

For purposes of analysis in this EIR/EIS, the definition for the term "agriculture" may come from a variety of sources. Those definitions as defined by the California Department of Conservation are outlined in Section 3.0; however, in some instances agricultural lands were identified based on local jurisdictions' land use plans or were identified as such due to existing land uses.

From 1948 to 1999, the number of irrigated acres increased from about 23,000 to 72,800 acres.[44] The growth in agriculture was, at least in part, facilitated by the completion of the Coachella Branch of the All-American Canal by the U.S. Bureau of Reclamation in 1949. The canal delivered imported Colorado River water to the eastern Coachella Valley for irrigation purposes, and this supplemental water source made additional agricultural activity possible and relieved pressure on the lower valley aquifer. In 1999, agriculture in the Coachella Valley used 333,300 acre-feet of water for crop irrigation and other agricultural purposes.

Agriculture remains the third largest employment sector in the region and represents a mainstay of the broader Riverside County economy. In fact, in 1999, Riverside County ranked ninth among California counties for total value of agricultural production. Its agricultural production was valued at approximately $1.2 billion and represented 4.2% of the State's total production.[45] The number of farms in Riverside County decreased by about 21.3% from 1987 to 1997, while acreage being farmed increased by 3.6% during the same period, and the number of cropland acres harvested increased by 12.6%. During this ten-year period, the market value of agricultural products sold by Riverside County farms increased by $320 million or 44.1%.

The County's leading agricultural products are fruit and nut crops, livestock products, and vegetable products.[46] Major Coachella Valley products include dates, grapes, citrus fruits, and a variety of other fruits and vegetables. Regional agricultural lands are designated as "prime farmland," "statewide important farmland," "unique farmland," and "local important farmland," based on their soil characteristics, climatic conditions, water supplies, and suitability for production.[47] Large packinghouses and transportation/distribution centers are major employers in this vicinity. Coachella and Indio, in particular, are key transportation hubs that are situated near Union Pacific Railroad lines and facilities, Desert Resorts Airport, and the junction of Interstate 10 and State Route 86, all of which can facilitate the transport of agricultural products nationwide.

44 "Coachella Valley Water Management Plan," Coachella Valley Water District, November 2002.

45 :Resource Directory 1999 and 2000,California Department of Food and Agriculture.

46 Summary of County Agricultural Commissioners' Reports, Gross Values by Commodity Groups, California 1995-2000, as compiled and tabulated by the Southern California Association of Governments (SCAG). Does not include all crops/products produced.

47 Exhibit VI.34, "Riverside County Comprehensive General Plan," adopted March 6, 1984 and revised June 3, 1993.

Farmland Classification

The California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) produces maps and statistical data used for analyzing impacts on California's agricultural resources. Agricultural land is rated according to soil quality and irrigation status. The best quality land is called Prime Farmland. The maps are updated every two years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance. The goal of the FMMP is to provide consistent and impartial data to decision makers for use in assessing present status, reviewing trends, and planning for the future of California's agricultural land resources.

For Prime Farmland or Farmland of Statewide Importance, the soil must meet the physical and chemical criteria as determined by the U.S. Department of Agriculture National Resources Conservation Service (NRCS). NRCS compiles lists of which soils in each survey area meet the quality criteria. Factors considered in qualification of a soil by NRCS include:

- Water moisture regimes, available water capacity, and developed irrigation supply
- Soil temperature range
- Acid-alkali balance
- Water table
- Soil sodium content
- Flooding (uncontrolled runoff from natural precipitation)
- Erodibility
- Permeability rate
- Rock fragment content
- Soil rooting depth.

Prime Farmland, Farmland of Statewide Importance, and Unique Farmland are collectively defined as "Important Farmland." Grazing lands are also considered farmland though are not included as Important Farmland. The use of grazing lands for ranching activities is discussed below. The following identification of the farmland classifications is excerpted from the California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program (2004).

Prime Farmland (P). 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 yields of 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. It does not include publicly-owned lands for which there is an adopted policy preventing agricultural use.

Farmland of Statewide Importance (S). Farmland of Statewide Importance excludes Prime Farmland and has a good combination of physical and chemical characteristics for the production of crops. It must have been used for the production of irrigated crops within the last three years. It does not include publicly owned lands for which there is an adopted policy preventing agricultural use.

Unique Farmland (U). Unique Farmland is land that does not meet the criteria for Prime Farmland or Farmland of Statewide Importance. It must be currently used for the production of specific high economic value crops (as listed in the last three years of California Agriculture produced by the 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. Examples of such crops may include oranges, olives, avocados, rice, grapes, and cut flowers. It does not include publicly-owned lands for which there is an adopted policy preventing agriculture use.

Farmland of Local Importance (L). Farmland of Local Importance is either currently producing crops or has the capability of production. Farmland of Local Importance excludes those lands designated as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. This land may be important to the local economy due to its productivity.

Grazing Land (G). Grazing Land is land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock. The minimum mapping unit for Grazing Land is 40 acres. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.

Urban and Built-Up Land (D). Urban and Built-Up Land is used for residential, industrial, commercial, construction, institutional, public administrative process, railroad yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment plants, water control structures, and other development purposes. Highways, railroads, and other transportation facilities are mapped as part of Urban and Built-Up Land, even though they are associated with agriculture.

Land (X). Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, and riparian areas not suitable for livestock grazing; confined livestock, poultry, or aquaculture facilities; strip mines; borrow pits; and water bodies

smaller than 40 acres. Additionally, this Land category includes all vacant and nonagricultural land that is greater than 40 acres and is surrounded on all sides by urban development.

Williamson Act

In 1965, the State enacted the California Land Conservation Act, more commonly known as the Williamson Act (Government Code Section 51230 et seq.). The Williamson Act was adopted as a means of encouraging the preservation of the State's agricultural lands. As a means to implement the act, a land contract is established, whereby the County Board of Supervisors or City Council stabilizes the taxes on qualifying lands in return for an owner's guarantee to keep the land in agricultural preserve status for a 10-year length of time. The contract is automatically renewed each year on its anniversary unless a notice of non-renewal is filed.

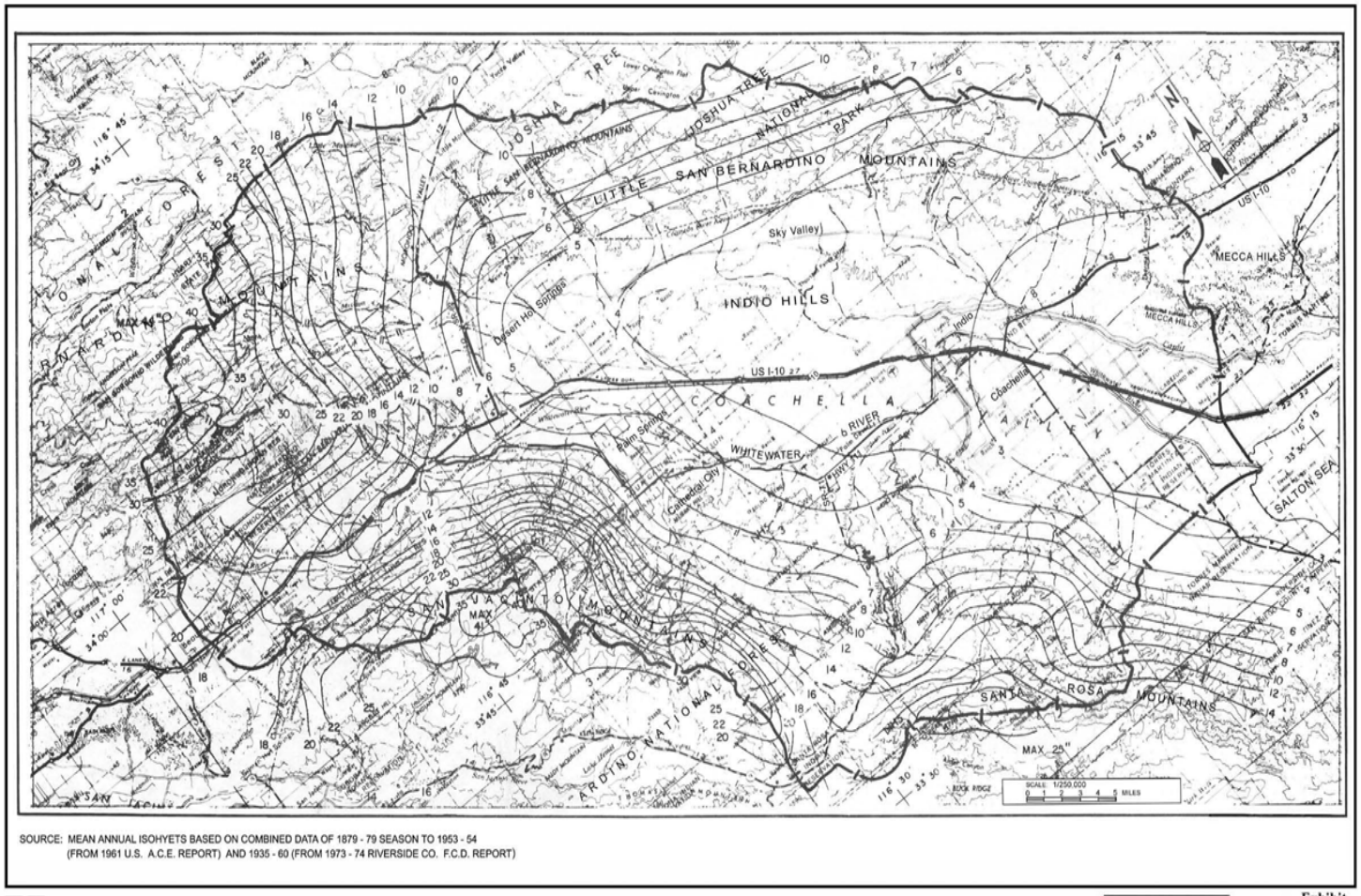
3.7 Hydrology and Water Resources

3.7.1 Flooding and Hydrology

Climatic conditions in most of the Coachella Valley can be characterized as that of a subtropical desert. Within the Plan Area, the slopes of the San Jacinto, Santa Rosa, San Bernardino, and Little San Bernardino Mountains are subject to moderate conditions, with a general increase in precipitation and a decrease in mean annual temperatures with increases in elevation. Mean annual rainfall is very low from the desert floor into the foothills, ranging from 4 to 6 inches per year and averaging about 5 to 6 inches along the Little San Bernardino foothills. *Exhibit 3-5* shows mean annual rainfall for the Coachella Valley.

In some years no measurable rainfall has been reported within the Plan Area. Most rainfall occurs during the cooler months of November through March, although occasional high-intensity thunderstorms and tropical storms can occur in late summer and early fall. Although the ground may be generally dry at the beginning of a storm, sufficient amounts and intensities of rainfall can saturate the surface, substantially reducing percolation and increasing runoff. Summer daytime temperatures can occasionally exceed 125°F and winter temperatures rarely fall below freezing. The surrounding mountain slopes generally receive rainfall that increases with elevation. The mountains and upper elevations of the Plan Area are also generally cooler, with an approximate 5 degree Fahrenheit drop with every 1,000-foot increase in elevation.

Floods that impact the Plan Area can be attributed to three different types of storm events: general winter storms, combining high-intensity rainfall and rapid melting of the mountain snowpack; tropical storms out of the southern Pacific Ocean; and summer thunderstorms. Summer storms pose a greater threat of flooding to the valley than winter storms because of their high intensity and short duration of rainfall.



SOURCE: MEAN ANNUAL ISOHYETS BASED ON COMBINED DATA OF 1879 - 79 SEASON TO 1953 - 54 (FROM 1961 U.S. A.C.E. REPORT) AND 1935 - 60 (FROM 1973 - 74 RIVERSIDE CO. F.C.D. REPORT)

TERRA NOVA®
Planning & Research, Inc.

Coachella Valley MSHCP
Mean Annual Rainfall

CVAG

Exhibit
3-5

Stormwater runoff can be attributed to three types of storm events: (1) general winter storms that combine high-intensity rainfall and rapid melting of the mountain snowpack; (2) tropical storms out of the southern Pacific Ocean; and (3) summer thunderstorms. A summer storm poses greater chance of flooding to the valley than a winter storm because of its high intensity and short duration of rainfall.

Although the ground may be generally dry at the beginning of a storm, sufficient amounts and intensities of rainfall can saturate the surface, substantially reducing percolation and increasing runoff and associated sediment transport. During September 9 to 11, 1976, very heavy general rainfall was generated over a 3-county area, with portions of the valley receiving 6.81 inches of rain. The surrounding hills and mountains received as much as 14 inches, with rainfalls generally increasing with elevation. The valley's benchmark storm occurred on September 24, 1939, which generated 6.45 inches of rain in a 6-hour period, with the most intense rainfall measuring 1.75 inches within one 45-minute period.

Major historic storm events are used to gauge the potential for future flooding. Benchmark storms used by the U.S. Army Corps of Engineers to calculate the most intense credible storm include the storm of September 24, 1939. It was centered over Indio and consisted of a thunderstorm that preceded a major storm off the west coast of Mexico. This intense storm generated 6.45 inches of rain in a period of 6 hours. Tropical storm Kathleen is another example of the storm runoff potential in the area. During September 9–11, 1976, very heavy general rainfall was generated over a 3-county area, with Palm Desert receiving 6.81 inches of rain. The surrounding hills and mountains received as much as 14 inches, with rainfalls generally increasing with elevation.

Plan Area Flood Control Levee System

A variety of flood control dikes and levees have been constructed and others are planned within the MSHCP Plan Area. These dikes and levees are generally under the jurisdiction of CVWD and the Riverside County Flood Control District. Other dikes and levees have been constructed under the auspices of the US Army Corps of Engineers and the US Bureau of Reclamation and are managed by CVWD and County Flood Control District.

These stormwater levees and dikes serve a variety of purposes, including the diversion of runoff and discharges from the Colorado River Aqueduct into the Whitewater River groundwater recharge basins. Levees have also been constructed to divert sheet flows and direct these into channels and retention and detention basins. Other dikes and levees have been constructed to contain channel flows and to delineate 100-year and Standard Project Flood (SPF) floodways. In some cases, dikes and levees have been constructed to impound mountain and alluvial fan runoff to protect farm and development lands in such areas as along the eastern front of the Santa Rosa

Mountains, or to protect water delivery facilities such as the protective levees upstream of the Coachella Branch of the All-American Canal. Levees have also been constructed upstream of major highways to consolidate and direct sheet flows to culverts passing under these roadways.

The various dikes and levees in the Plan Area intercept and train surface flows in a variety of ways. In some instances, levees are oriented at an oblique angle to sheet flows and thereby turn and focus these flows in the direction of channels, culverts and detention facilities. Others are constructed to contain channelized flows and take large areas out of flood zones.

Dikes and levees can affect the type of vegetation that occurs down stream, including removing areas from periodic sheet flow and reducing the occurrence of associated vegetation such as palo verde and smoke tree. Areas where flows are concentrated may develop increases in riparian vegetation species. Dikes and levees can also affect the sorting of sands and gravels and the transport of sediments. This is especially true on alluvial fans, which serve to sort and differential grains sizes and distribute and deposit sands and gravels over a broad area. By contrast, channelized flows tend to erode and carry larger rocks and boulders, as well as large amounts of sands and gravels, and deposit these in a somewhat less sorted and differentiated manner.

Local and Regional Flood Control

The generation and management of stormwater runoff are typically divided into two separate categories (i.e., local and regional drainage) which are ultimately interrelated. Local drainage is either defined by the limited size of the drainage or the generation of runoff and facilities capturing and conveying runoff from over a larger geographic area. Regional drainage ultimately picks up and conveys local drainage through the careful integration of these two systems.

Regional Flood Control: Coachella Valley Water District and Riverside County Flood Control and Water Conservation District

The CVWD and the Riverside County Flood Control and Water Conservation District (RCFC) are responsible for the management of regional drainage within the MSHCP Plan Area, including rivers, major streams and their tributaries, and areas of significant sheet flooding. Both Districts are empowered with broad management functions, including development review and conditioning, flood control planning, construction, operation and maintenance of regional drainage improvements, as well as watershed and watercourse protection related to those facilities. To carry out their mandates, the Districts also have powers of taxation, bonded indebtedness, land and water rights acquisition, and cooperative partnerships with local, State,

and Federal agencies. An elected Board acts as the official decision-making body of CVWD, while the RCFC is governed by the Riverside County Board of Supervisors.

FEMA and the Federal Flood Rate Maps

Many of the areas of the United States subject to flooding from 100-year storms have been mapped by the Federal Emergency Management Agency (FEMA). The resulting documents are the FEMA Flood Insurance Rate Maps (FIRMs), which serve as the basis for determining the need for and availability of Federal flood insurance. The FEMA maps for the MSHCP Plan Area designate lands within the 100-year flood plain (Zone A). These areas include washes, channels ,and areas subject to sheet flow flooding. However, FEMA maps do not cover large portions of the Plan Area. Each of the applicable FEMA flood zones is briefly described below.

A: Areas of 100-year flood: base flood elevations have not been determined.

AE: Areas of 100-year flood inundation; base flood elevations not determined.

AF: Floodway areas in Zone AE (mostly contained by levees).

A?: Estimated continuation of Zone A not mapped by FEMA.

X: Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas of less than 1 square mile; and areas protected by levees from 100-year flood.

Major Drainages within MSHCP Plan Area

Drainages within the MSHCP Plan Area are important for the variety of habitats they help create, including wetlands, riparian areas, desert dry wash woodlands, and broad areas of creosote scrub habitat. A wide range of wildlife and plant species utilize these drainage-related habitats, including rare plants, small mammals, several species of birds, reptiles, and amphibians. Drainages are also essential in creating conditions for other habitat features, including providing Essential Ecological Processes of erosion, fluvial transport (see below), and the sorting and deposition of sands and gravels. Those major drainages in the northwestern and central portions of the Plan Area are essential to the production and transport of sand to the limited habitat that remains for sand-adapted species such as the Coachella Valley fringe-toed lizard and Coachella Valley milk-vetch.

Major drainages of particular relevance to the MSHCP are listed in *Table 3-6*.

TABLE 3-6
Important Major Drainages
MSHCP Plan Area

Drainage	Drainage Area[1] (in Sq. Miles)	100-Year Storm Discharge (cfs)[3]	Sediment Transport[2] Potential (10^6 – ft^3/Yr)
San Gorgonio River	132	30,000	2.5
Whitewater River	60	50,000	1.5
Mission Creek	38	13,170	1.18
Big/Little/Dry Morongo Washes	54	27,430[4]	2.14
Long Canyon	26	7,800	0.94

Notes:
1 Drainage area to discharge points in the northern Coachella Valley.
2. Based upon the flood-frequency method for modern era. Yields higher values than alternative (Renard) method.
3. Data provided by Riverside County Flood Control & Water Conservation District, 2003.
4. Data reflects combined flows of the three drainages and should not be interpreted as projected 100-year discharge below confluence of these drainages, which is calculated at 11,560 cfs at Pierson Boulevard.

Fluvial Systems in the Coachella Valley

The movement by stormwater of sands, gravels, and debris is referred to as fluvial transport, which is an essential process of erosion and soil formation and deposition. Streamflow is the most common sediment transport process in the Coachella Valley, with typical sediment concentrations of less than 40% by weight.[48] Other fluvial conditions include "hyperconcentrated flow" and debris flows, which also occur in the Coachella Valley and particularly in the surrounding mountains. Hyperconcentrated flows can contain from 40% to 70% sediment by weight, while debris flows consist of slurries of clay to boulder-sized sediment with an accompanying volume of water of 10% to 30%.

The generation of sediment for fluvial transport occurs primarily in the headwater areas of drainage basins. Within the western and northwestern portions of the Plan Area, important sediment generation occurs within the San Jacinto, San Bernardino, and Little San Bernardino Mountains. In the central portions of the valley, important sediment generation occurs within the Little San Bernardino Mountains and the Indio Hills. During periods of storm runoff, sediments in headwater areas are suspended in storm flows, carried downslope in channels, and deposited and stored on terraces and alluvial fans. Major fluvial deposition areas include the Whitewater River floodplain, the Mission Creek and Morongo Wash floodplains, Long Canyon floodplain, Sky Valley, and lands between the Indio Hills and I-10.

A deposition area of concern is the Whitewater River floodplain in proximity to and downstream of groundwater recharge basins constructed and operated by CVWD east of the confluence of the

48 "Long-Term Sand Supply to Coachella Valley Fringe-Toed Lizard (*uma inornata*) habitat in the Northern Coachella Valley, California." Griffiths, P.G., Robert H. Webb, Nicholas Lancaster, et al. US Geological Survey. August 29, 2002.

San Gorgonio and Whitewater Rivers. The recharge basins are formed by a series of dikes arranged perpendicular to the flow of the river, which is diverted into the basins using "soft" diversion levees that are easily eroded and breached during periods of heavier flows. Desilting basins promote settling of sediment before water enters the basins.

3.7.2 Water Quality/Resources

Water is among the most essential needs of any community and is a particularly valuable resource in the Coachella Valley. A reliable supply of high quality water is critical to the health and welfare of valley residents, as well as the regional economy, which is largely based on golf resort industries and agriculture. Issues of water availability, quality, and management have been at the forefront of regional environmental dialogues in recent years, as the demand for groundwater continues to exceed natural supplies. Continued overdraft of this limited resource could have serious and irreversible social, environmental, and economic impacts on the region.

Groundwater Resources

The use of water by Native Americans in the Coachella Valley over the past 500 years was centered around the direct diversion of streams in mountain canyons, digging of wells to intercept the aquifer in Indian Wells, and exploitation of artesian wells associated with the San Andreas Fault system. It was not until the twentieth century that the enormous extent of the region's groundwater basins was recognized.

The Coachella Valley groundwater basin is a northwest-southeast trending sub-surface aquifer, which generally extends from Whitewater on the northwest, to the Salton Sea on the southeast. It is bounded by the non-waterbearing rocks of the San Bernardino and Little San Bernardino Mountains on the north and northeast, and the San Jacinto and Santa Rosa Mountains on the south and southwest. The valley's subsurface aquifer system largely consists of relatively young alluvial deposits underlain by older basement rocks. Although the sediment fill is estimated to be approximately 20,000 feet thick, the water-yielding section extends only to depths of a few thousand feet.[49]

Although interflow of groundwater occurs throughout the aquifer, it is limited by fault barriers, constrictions in the basin profile, and areas of low permeability. Based on these observations, the U.S. Geological Survey and the California Department of Water Resources have divided the groundwater basin into four distinct subbasins. Subbasin boundaries are generally based upon faults that restrict the lateral movement of groundwater, including the Mission Creek and

[49] "Ground Water Atlas of the United States, Segment 1: California/Nevada," United States Geological Survey.

Banning strands of the San Andreas Fault Zone, and have been determined regardless of water quantity or quality. The subbasins include: Mission Creek, Garnet Hill, Whitewater River, and Desert Hot Springs.

Each subbasin has been further divided into minor subareas based on geologic or hydrologic characteristics. The location of subbasins and subareas in the Coachella Valley are illustrated in *Exhibit 3-6.* As shown in this exhibit, potable groundwater is not readily available to the Indio Hills, Mecca Hills, and Salton Sea areas due to geologic or hydrologic characteristics. The CVWD estimates that the Coachella Valley groundwater basin contains approximately 36.5 million acre-feet of groundwater in storage in the first 1,000 feet below the ground surface (one acre-foot equals approximately 326,000 gallons), including groundwater contained in the Mission Creek, Garnet Hill, Whitewater River, and Desert Hot Springs Subbasins, as described in *Table 3-7.*

TABLE 3-7
Groundwater in Storage In the Coachella Valley Groundwater Basin

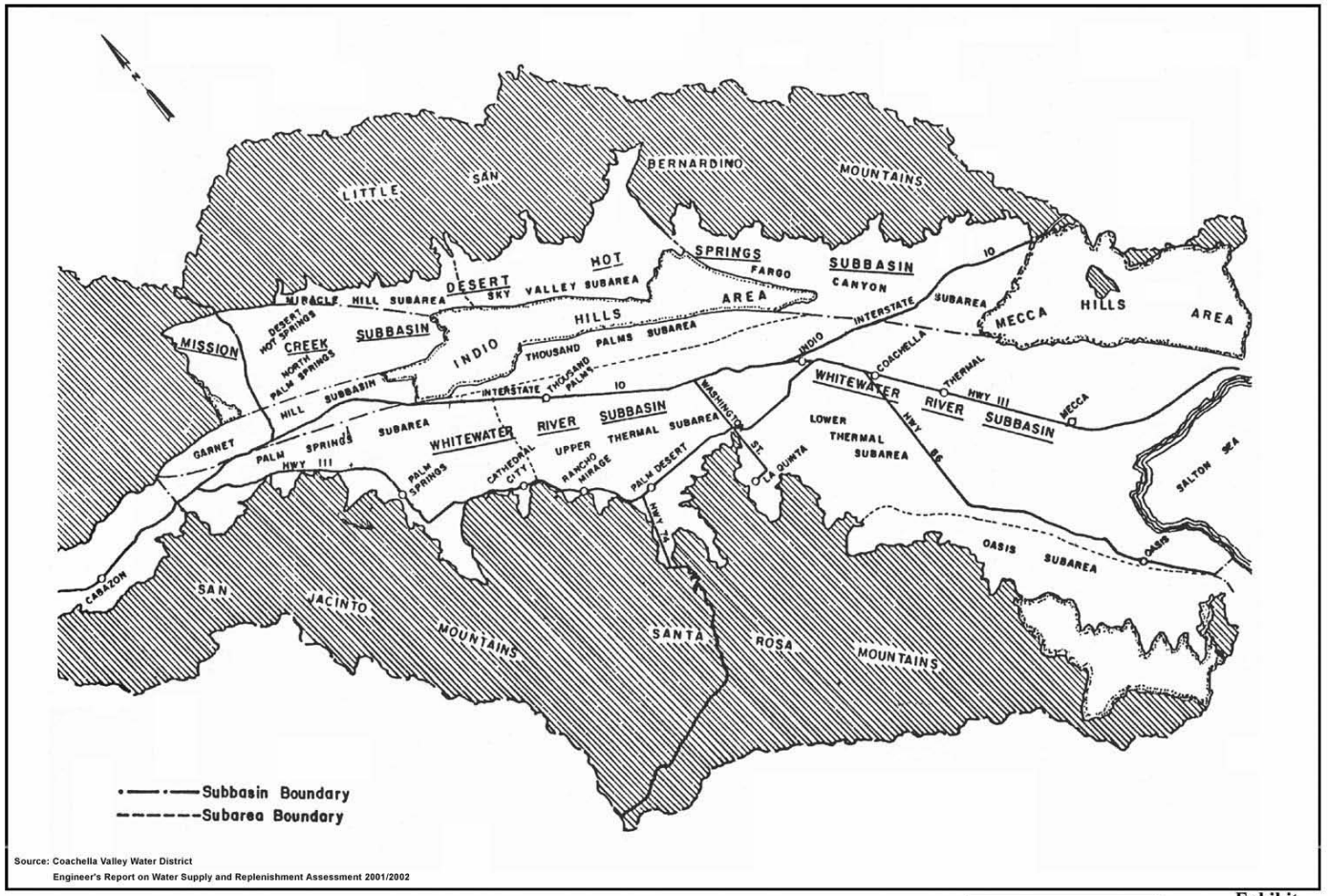
Subbasin	Storage (acre-feet)*
Mission Creek Subbasin	2,600,000
Garnet Hill Subbasin	1,000,000
Desert Hot Springs Substation	4,100,000
Whitewater River Subbasin	
Palm Springs Subarea	4,600,000
Thousand Palms Subarea	1,800,000
Oasis Subarea	3,000,000
Thermal Subarea	19,400,000
Total Groundwater in Storage:	36,500,000

* in the first 1,000 feet below the ground surface
Source: "Engineer's Report on Water Supply and Replenishment Assessment 2000/2001," Coachella Valley Water District, April 2000.

Whitewater River Subbasin[50]

The Whitewater River Subbasin encompasses nearly 400 square miles and serves as the primary groundwater repository for the Coachella Valley. It generally extends from the junction of State Highway 111 and Interstate 10 on the west, to the Salton Sea about 70 miles to the east. The subbasin is bounded on the north and east by the Garnet Hill and San Andreas Faults, respectively, and on the south by the San Jacinto and Santa Rosa Mountains.

[50] "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.



Source: Coachella Valley Water District
Engineer's Report on Water Supply and Replenishment Assessment 2001/2002

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Coachella Valley

CVAG

Exhibit
3-6

The Whitewater River Subbasin contains a total of about 28,800,000 acre-feet of groundwater within the first 1,000 feet below the ground surface. It is divided into four subareas: Palm Springs, Thermal, Thousand Palms, and Oasis. The Palm Springs subarea encompasses a triangular area extending from the Garnet Hill Fault, to the east-facing slope of the San Jacinto Mountains, to central Cathedral City. It contains unconfined groundwater and is the primary recipient of natural recharge waters for the entire Whitewater River Subbasin. Natural recharge sources include runoff from the San Jacinto Mountains and Whitewater River, and subsurface inflow from the San Gorgonio Pass Subbasin to the west. The Palm Springs subarea is also artificially recharged with imported Colorado River water, which is transported via the Colorado River Aqueduct (see Supplemental Water discussion for more information about artificial recharge).

The Thermal subarea extends from central Cathedral City to the Salton Sea. It is generally characterized by confined or semi-confined groundwater conditions, with free moving water present in alluvial fans at the base of the Santa Rosa Mountains. The Thermal subarea is divided into "upper" and "lower" subareas at Point Happy, to account for differences in water table characteristics and trends. Over the past several decades, the water table in the upper Thermal subarea has been dropping, largely due to increased urban development and associated increases in pumpage. The water table level in the lower Thermal subarea, however, has risen, primarily due to the importation of supplemental irrigation water through the Coachella Canal. This trend may be changing, however, as increased pumpage in the lower Thermal subarea is once again lowering the groundwater table.

The Thousand Palms subarea extends along the southwesterly edge of the Indio Hills. Although groundwater contained in other subareas of the Whitewater River Subbasin is generally composed of calcium bicarbonate, groundwater in the Thousand Palms subarea contains high concentrations of sodium sulfate. This is largely attributed to limited recharge flowing into the subarea, and may also be associated with the subarea's proximity to the San Andreas Fault.[51]

Inflow and intermixing of water from neighboring subbasins is substantially limited, and runoff from the Indio Hills serves as the only significant source of recharge to the Thousand Palms subarea. As a result, there is little opportunity for "dilution" of the native sodium sulfate. High concentrations of certain minerals, such as sodium sulfate, are also associated with faulting and geothermal activity. The proximity of the Mission Creek and Banning strands of the San Andreas Fault to the subarea may also explain why these groundwaters contain high concentrations of certain minerals.

[51] Steve Bigley, Coachella Valley Water District, personal communication, March 13, 2001.

The Oasis subarea extends along the base of the Santa Rosa Mountains west of the Salton Sea. Water-bearing materials that underlie this subarea include highly permeable fan deposits, and interbedded sands, gravel, and silts as they get closer to the Thermal subarea. CVWD estimates that this subarea contains approximately 3,000,000 acre-feet of groundwater in storage in the first 1,000 feet below the ground surface.

Garnet Hill Subbasin[52]

The Garnet Hill Subbasin is generally bounded by the Banning Fault on the north, the Garnet Hill Fault on the south, Edom Hill on the east, and the San Bernardino Mountains on the west. It contains approximately 1,000,000 acre-feet of groundwater within the first 1,000 feet below the ground surface. The Banning and Garnet Hill Faults restrict, to some extent, the flow of groundwater within this subbasin, as evidenced by a 170 feet difference in water level elevation over a horizontal distance of 3,200 feet across the Garnet Hill fault. The primary source of recharge to the Garnet Hill Subbasin is the Whitewater River through permeable deposits underlying Whitewater Hill, although some recharge may come from Mission Creek and other surface flows during high flood flows, and from spillage from the Mission Creek Subbasin across the Banning Fault. Mission Springs Water District drilled a well in this subbasin in 2006 and a booster pump station is in operation.[54]

Desert Hot Springs Subbasin[53]

The Desert Hot Springs Subbasin is bounded by the Little San Bernardino Mountains on the northeast, the Indio Hills and Mission Creek fault on the southwest, and the Mecca Hills on the southeast. It contains approximately 4,100,000 acre-feet of groundwater within the first 1,000 feet below the ground surface. Although the subbasin is quite extensive in size, the overlying land is only sparsely developed. Water-bearing materials in the subbasin primarily consist of coarse-grained, poorly sorted alluvial fan deposits, which are principally of Ocotillo conglomerate estimated to be more than 700 feet thick. Recent fanglomerates cover most of the land surface, and recent alluvium in the subbasin ranges in thickness from a thin edge to more than 100 feet.

Groundwater in this subbasin is characterized by high concentrations of fluoride, total dissolved solids, sodium sulfates and other undesirable minerals, which have limited its use for agricultural and domestic water purposes.[54] The presence of high mineral concentrations is largely due to faulting and associated with geothermal activity along the margins of the subbasin. As subsurface temperatures rise, minerals contained within the subbasin's sediments are more easily dissolved and mixed with groundwater, increasing its overall mineral content. Groundwater

52 "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.
53 "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.
54 Draft EIR/EIS comment letter from Mission Springs Water District, Refugio (Joe) Bocanegra, General Manager. January 10, 2005.

pumped from the Miracle Hill subarea can reach up to 200°F and is the primary source of mineral spa waters in the City of Desert Hot Springs.

The Coachella Valley Water District does not extract groundwater from the Desert Hot Springs Subbasin, given its high concentration of undesirable minerals. Instead, domestic water for the Sky Valley and Indio Hills communities is extracted by CVWD from the Mission Creek Subbasin to the west.[55] Confined groundwater from this subbasin rises to near the surface north of Willow Hole and spills over the Mission Creek Fault and into the eastern portion of the Mission Creek Subbasin, which is described below.

Mission Creek Subbasin

The Mission Creek Subbasin is bounded on the south by the Banning Fault, on the north and east by the Mission Creek Fault, and on the west by the San Bernardino Mountains. It contains approximately 2,600,000 acre-feet of groundwater within the first 1,000 feet below the ground surface. The subbasin is naturally recharged by surface and subsurface discharge, most of which is from Mission Creek, and Little and Big Morongo Creeks. Water depths below the ground surface, as determined by the U.S. Geological Survey in 1971, range from a maximum of 425 feet in the northwesterly portion, to flowing wells at a minimum in a narrow strip along the Banning Fault.[56] MSWD has eight wells in production located throughout the subbasin.[57] A steady water level decline of approximately 0.5 to 1.5 feet per year has been observed since 1952.[58] According to data collected at CVWD's Well No. 3407 (located at Dillon Road and Little Morongo Drive), the subbasin water level has dropped from 760 feet above sea level in 1955 to 715 feet in 1998.[59]

Groundwater Extraction

Water delivery services are provided by several water agencies and municipalities in the Coachella Valley, including the Coachella Valley Water District, Desert Water Agency, Myoma Dunes Mutual Water Company, Mission Springs Water District, and the cities of Coachella and Indio.

Although there are nearly 36.5 million acre-feet of groundwater in storage in the Coachella Valley in the first 1,000 feet below the ground surface (excludes water contained in the San Gorgonio Pass subbasin),[60] potable water is extracted from only three of the region's subbasins.

55 Ibid.
56 "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.
57 Draft EIR/EIS comment letter from Mission Springs Water District, Refugio (Joe) Bocanegra, General Manager. January 10, 2005.
58 Ibid.
59 "Water Master Plan for Mission Springs Water District," ASL Consulting Engineers, August 2000.
60 "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.

The Whitewater River Subbasin is where the most significant groundwater production (extraction) occurs. This water is used for domestic and agricultural purposes and golf course irrigation in the upper (west and north of Point Happy) and lower (east and south of Point Happy) subareas of the Whitewater River Subbasin. Smaller quantities of groundwater are produced from the Mission Creek Subbasin for use in the Desert Hot Springs area and unincorporated communities of Sky Valley and Indio Hills. The Mission Creek Subbasin is further discussed below.

MSWD began extracting water from the Garnet Hill Subbasin in 2006. Due to faulting and geothermal activity in the Desert Hot Springs Subbasin, its groundwater is characterized by high concentrations of fluoride, total dissolved solids (TDS), sulfates, and sodium, which renders it unsuitable as a potable water source. However, limited quantities of groundwater are extracted from this subbasin for use in spas and mineral baths in the City of Desert Hot Springs and are percolated or re-injected into the water table at the point of use.

Consumptive Demand

The historical demand for water in the Coachella Valley has been largely focused around agricultural, urban, and golf course irrigation uses. In 1936, total water demand in the valley was approximately 96,300 acre-feet.[61] By 1999, demand increased to approximately 668,900 acre-feet, a nearly sevenfold increase over 63 years. Historical water demand trends are illustrated in *Table 3-8* below.

Agricultural development in the Coachella Valley began around the turn of the twentieth century with concentrations in the eastern valley where groundwater was readily accessible and produced a wide range of fruit and vegetable crops (e.g., dates, grapes, and citrus). As shown in *Table 3-8*, the agricultural demand for water in 1936 was approximately 82,600 acre-feet. By 1999, this figure had increased greater than four-fold to approximately 333,300 acre-feet, with agricultural development accounting for nearly 50% of all water consumption in the valley. This dramatic increase was due to the rapid expansion of irrigated agriculture in the lower valley during the second half of the twentieth century. Additionally, the growth in agricultural area and production has benefited from significant strides in use efficiency with improved irrigation techniques and technology.

61 "Coachella Valley Water Management Plan," Coachella Valley Water District, November 2002.

TABLE 3-8
Historical Water Demand in the Coachella Valley, 1936 – 1999
(acre-feet/year)

Component	1936			1999		
	Upper Valley	Lower Valley	Total	Upper Valley	Lower Valley	Total
Agricultural						
Crop Irrigation	11,300	71,300	82,600	900	331,600	332,500
Greenhouses	0	0	0	0	800	800
Total	11,300	71,300	82,600	900	332,400	333,300
Municipal/Industrial						
Municipal	6,900	4,000	10,900	145,600	57,300	202,900
Industrial	0	0	0	0	1,100	1,100
Total	6,900	4,000	10,900	145,600	58,400	204,000
Fish Farms/Duck						
Clubs	0	200	200	0	21,100	21,100
Fish Farms	0	1,300	1,300	0	4,300	4,300
Duck Clubs	0	1,500	1,500	0	25,400	25,400
Total						
Golf Course						
Golf Course	1,300	0	1,300	77,700	28,500	106,200
Total	1,300	0	1,300	77,770	28,500	106,200
Total Demand:	19,500	76,800	96,300	224,200	444,700	668,900

Source: "Coachella Valley Water Management Plan," Coachella Valley Water District, November 2002.

From 1948 to 1999, the number of irrigated acres increased from about 23,000 to 72,800 acres.[62] The growth in agriculture was, at least in part, facilitated by the completion of the Coachella Branch of the All-American Canal by the U.S. Bureau of Reclamation in 1949. The canal delivered imported Colorado River water to the eastern Coachella Valley for irrigation purposes. This supplemental water source made additional agricultural activity possible and relieved pressure on the lower valley aquifer.

Urban demand for water, including municipal and industrial usage, has also increased substantially, from approximately 10,900 acre-feet in 1936 to 204,000 acre-feet in 1999. In 1936, urban water usage accounted for about 11% of total water demand in the Coachella Valley, However by 1999, it accounted for nearly 31% of total demand. This is largely due to rapid residential and commercial growth over the past two decades, particularly in the Coachella Valley. Industrial demand continues to be low, constituting only 0.2% of total regional demand.

62 Ibid.

Approximately 1,000 acres of fish farm ponds are located in the Coachella Valley, most of which occur in the lower valley.[63] Fish farms are water-intensive operations that involve raising and selling of a variety of fish, including tilapia, catfish, and striped bass. As shown in *Table 3-8* above, total water demand for fish farms has increased dramatically since 1936. However, in 1999 water demand for fish farms accounted for only about 3% of total demand in the Coachella Valley. Duck clubs also represent a small component of total water demand, accounting for only 0.6% of all water demanded in 1999. Regional duck clubs are located north of the Salton Sea and provide ponded water for ducks and other waterfowl during their winter migration.

The greatest increase in water demand since 1936 is the result of golf course development in both the upper and lower portions of the valley. In 1936, golf courses accounted for about 1.3% of total water demand in the Coachella Valley. By 1999, golf course demand had increased to 15.8% of total regional demand, which is evidence of the tremendous success and importance of the golf course resort industry in the Coachella Valley.

Groundwater Overdraft

The rapid increase in water demand in the Coachella Valley has resulted in overdraft of the substantial but finite groundwater supplies reasonably available for production. Overdraft represents a condition in which the amount of groundwater extracted exceeds the amount of groundwater recharging the basin.

Although recordkeeping of pumpage in the Plan Area since the mid 1930s has been maintained, the actual amount of accessible potable water in the Plan Area is not precisely known. The groundwater basins are geologically complex and are affected by elevated surrounding terrain, which occur within the regional watershed. The overdraft condition or "mining" of groundwater within the Coachella Valley has caused groundwater levels to decrease more than 60 feet in portions of the Lower Valley and has raised concerns about water quality degradation and land subsidence. Groundwater levels in the Upper Valley have also decreased substantially, except in the areas near the Whitewater Spreading Facility where artificial recharge has successfully kept constant water levels. It is difficult to estimate the amount of overdraft that takes place in this region. The most accurate way to estimate its effects is to look at the net annual change in freshwater storage within the basin. The cumulative change in freshwater storage from 1936 to 1999 is estimated to be nearly 4.8 million acre-feet.[64] In other words, approximately 4.8 million acre-feet of freshwater was withdrawn from the Coachella Valley's freshwater basins without being replaced.

63 Ibid.

64 "Coachella Valley Water Management Plan," Coachella Valley Water District, November 2002.

One method of determining the extent of overdraft is to compare the change in freshwater storage in the Coachella Valley's groundwater subbasin. In 1999, the change in freshwater in storage in the Coachella Valley was estimated at 136,700 acre-feet per year. Therefore, approximately 136,700 acre-feet of groundwater withdrawn from the basin were not replaced. *Table 3-9* illustrates the disparity between inflows and outflows to the groundwater basin. Inflows include natural recharge by mountain runoff, artificial recharge with Colorado River water, flows from outside the groundwater basin, and return flows from irrigation and septic tank water that is reabsorbed through the ground surface. Outflows include groundwater pumpage, evapotranspiration, flow to the Salton Sea, and flow to subsurface drains, which were installed in agricultural areas to intercept poor quality return flows and impede their percolation of return flows into the aquifer.

TABLE 3-9
Comparison of Historical Inflows and Outflows in the Coachella Valley, 1936-1999 (acre-feet)

Water Balance Component	Total Flows 1936	Total Flows 1999
Inflows		
Natural Recharge	32,600	16,800
Agricultural Returns	37,200	130,700
Domestic Returns	4,300	59,200
Golf Course Returns	500	39,300
Wastewater Percolation	200	16,500
SWP Recharge	0	88,800
Inflows from Outside Area	12,900	11,500
Inflows from Upper Valley	59,100	29,400
Total Flows	146,800	392,200
Outflows		
Groundwater Pumpage	92,400	376,100
Flows to Drains	3,200	55,800
Evapotranspiration	21,100	4,900
Net Flow to Salton Sea	5,300	-400
Outflows to Lower Valley	59,100	29,400
Total Outflows	181,199	465,800
Annual Change in Storage	-34,300	-73,600
Annual Change in Freshwater Storage	-41,800	-136,700
Cumulative Change in Storage since 1936	-34,300	-1,421,400
Cumulative Change in Freshwater Storage since 1936	-41,800	-4,684,000

Source: Table 3-4, "Coachella Valley Water Management Plan," Coachella Valley Water District, Adopted 2002. Does not include the Mission Creek Subbasin.

Table 3-9 indicates that groundwater pumpage, which includes groundwater pumped for agricultural and domestic purposes, is currently the largest component of outflow from the basin and represents 80% of all outflows. However, CVWD estimates that approximately 40% of the domestic water used in the upper valley (areas north and west of Point Happy) is reintroduced

into the groundwater table through percolation.[65] In the lower valley (areas south and east of Point Happy), this number ranges between 25% and 50%, depending on site-specific subterranean soil characteristics.

The greatest source of inflow is agricultural return, which represents about 33% of all inflows. However, agricultural return is typically characterized by high concentrations of total dissolved solids, making it unsuitable as a potable water source. Therefore, agricultural return actually reduces the amount of freshwater in storage (except for the return water which is intercepted by tile drains).

Overdraft can result in serious social, environmental, and economic consequences, including losing stored groundwater, diminishing water quality, intruding seawater, and increasing costs associated with drilling and installing deeper wells and larger pumps. Overdraft also increases the potential for land subsidence (i.e., sinking of the land surface). Subsidence can cause ground fissuring, damage to structural foundations and irrigation and other subsurface pipelines, and changes in drainage patterns. Surface fissures associated with ground subsidence were observed in 1948 near the intersection of Adams Street and Avenue 52 near the City of La Quinta. As much as 7 centimeters of ground subsidence was recorded in the City of Palm Desert from 1996 to 1998.[66] Both of these instances are believed to be the result of groundwater overdraft.

Mission Creek Subbasin

The Mission Creek Subbasin is bounded on the south by the Banning Fault and on the north and east by the Mission Creek Fault. The subbasin is bounded on the west by non-water-bearing rocks of the San Bernardino Mountains and to the southeast by the western slopes of the Indio Hills. Both the Mission Creek Fault and the Banning Fault are effective barriers to groundwater movement as evidenced by offset water levels across faults, fault springs, and changes in vegetation. Water level measurements in the spring of 1961 between wells 3S/5E-4L2 and 3S/5E-4M1 indicated a difference in the groundwater table elevation of 255 feet over a horizontal distance of 1,600 feet across the Mission Creek Fault.

It is estimated that based upon the high ground water elevations that occurred during the 1935-1936 season and to a depth of 1,000 feet below the ground surface, the Mission Creek Subbasin had a capacity for storing approximately 2,600,000 acre-feet of groundwater. The subbasin is naturally recharged by surface and subsurface inflows, most coming from Mission Creek and Little and Big Morongo Creeks.

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65 Tom Levy, General Manager-Chief Engineer, Coachella Valley Water District, letter correspondence to the City of La Quinta, August 16, 2001.

66 Ibid.

Water depths below the ground surface, as determined by the U.S. Geological Survey in 1971, range from a maximum of 425 feet in the northwesterly portion, to naturally flowing (artesian) wells in a narrow strip along the Banning Fault.[67] Although semi-confined groundwater is present (as indicated by the flowing wells), it is believed that the greater portion of the groundwater is unconfined. Movement of the water within the subbasin is generally southward and is confined along the Banning Fault and the Indio Hills following surface topography.

A steady water level decline of approximately 0.5 to 1.5 feet per year has been observed since 1952 in CVWD wells located west of Palm Drive.[68] According to data collected at CVWD's Well No. 3407 which is located at Dillon Road and Little Morongo Drive, the subbasin water level has dropped from 760 feet above sea level in 1955 to 715 feet in 1998.[69]

Mission Creek Groundwater in Storage[70]

Based upon several studies of the Mission Creek Subbasin, it is estimated that the total water in storage in 1955 was approximately 2,015,733 acre-feet (in storage in first 1,000 feet below surface). By 1970, total water in storage in the subbasin was estimated to have declined to 1,967,733 acre-feet, to 1,920,800 by 1978, and to 1,778,400 by 1997. Based upon pumpage in the subbasin between 1998 and 2002, the total water in storage in the subbasin in 2002 was estimated at 1,717,979. The best available pumpage data is from 1978 to the present and estimates indicate water in storage in 1978 at 1,920,800 acre-feet. Based upon this approach, total water in storage in the subbasin in 2002 was about 1,778,400.

Natural Recharge and Outflow for Mission Creek

Natural inflow or recharge to the Mission Creek Subbasin is primarily from percolation of runoff from Mission Creek, Big Morongo Creek, and Little Morongo Creek. The annual rate of recharge will vary but is estimated by the USGS to be about 5,000 acre-feet. The overall gradient of subsurface flows is from northwest to southeast, with the low point of the basin being located along the Banning Fault and at Willow Hole, where groundwater rises to or near the surface. is the USGS also estimates that 2,000 to 5,360 acre-feet per year flow across the Banning Fault and into the adjoining Garnet Hill Subbasin. In calculating annual recharge and outflow it is conservatively assumed that natural recharge roughly equals natural subbasin outflows.

67 "Engineer's Report on Water Supply and Replenishment Assessment," Coachella Valley Water District, April 2000.
68 Ibid.
69 "Water Master Plan for Mission Springs Water District," ASL Consulting Engineers, August 2000.
70 "Basin Water Supply and Initial Groundwater Replenishment and Assessment for the Mission Creek Subbasin," prepared by Krieger & Stewart, Inc., April 2003. Prepared for the Coachella Valley Water District.

Mission Creek Artificial Recharge

The Mission Creek Subbasin lies within an area covered by a Mission Creek Water Replenishment Agreement executed in April 2003 between the Desert Water Agency (DWA) and CVWD. A subbasin replenishment agreement[71] has also been entered into by MSWD, DWA and CVWD. The Mission Creek Management Committee was established by the MSWD, CVWD, and DWA through a December 2004 agreement. The purpose of this committee is to jointly manage the Mission Creek and Garnet Hill subbasins and to exchange technical ideas and information regarding the long-term stewardship of water resources. This includes replenishment assessments, basin recharge activities, water quality, and other basin management issues. Involved agencies have been aware of the overdraft situation in the subbasin and have taken steps to increase groundwater recharge using Colorado River water being delivered via a turnout on the Metropolitan Water District Colorado River Aqueduct. *Table 3-10* shows annual historical water production in the Mission Creek subbasin. Recently completed Mission Creek recharge ponds constructed in the northwest portion of the subbasin benefit all areas where extraction occurs and would occur in the future. In 2002, 4,733 acre- feet were delivered and recharged into the aquifer reducing the net overdraft for that year to about 4,346 acre-feet.

TABLE 3-10
Annual Historical Water Production, Mission Creek Subbasin

Year	Total Production Acre-Feet	Population Service Area
1978	1,516	-
1979	2,633	-
1980	3,001	8,441
1984	3,906	-
1988	4,952	-
1990	5,928	17,070
1994	6,959	20,455
1995	7,086	-
1996	7,434	-
1997	7,505	-
1998	7,055	24,500

Source: MSWD Water Master Plan, prepared by ASL Consulting Engineers, May 2000

[71] "Settlement Agreement" between Coachella Valley Water District, Desert Water Agency and Mission Springs Water District on the Mission Creek Subbasin groundwater replenishment program. December 7, 2004.

The Mission Creek recharge facility is designed to recharge up to 25,000 acre-feet of Colorado River water in any one year. Based upon current production, the Mission Creek Recharge Project would use about 6% of the available State Water (SWP) project exchange water or up to 3,700 acre ft/yr of the current SWP entitlement.[72] It is anticipated that between 5,000 and 10,000 acre-feet per year would be delivered to the spreading facility, and in wetter years, up to 15,000 acre-feet may be spread.[73] DWA is to assess Mission Springs Water District a replenishment fee to help recover the costs of the groundwater recharge program.[74] Artificial recharge water being percolated into the subbasin would not reach the CVWD well field in the southeastern portion of the subbasin for several years but would in time increase water in storage in this area of the subbasin.

Mission Springs Water District Pumpage Trends

Mission Springs Water District (MSWD) is the larger of the two purveyors mining this aquifer. While the District's boundaries lie north of the Banning Fault, a review of MSWD production records illustrates the trend in groundwater production.

CVWD Pumpage in the Mission Creek Subbasin

The CVWD owns and operates production wells closest to the Banning Fault and the associated mesquite scarp. CVWD Wells No. 3406 and 3518 are located west of Palm Drive and north of 18th Avenue and are representative of the effects of production pumpage on groundwater levels. These and other production wells are located west and north of the aforementioned area of the subbasin where water quality has been impacted by high levels of fluoride and total dissolved solids from spillage of non-potable water from the Desert Hot Springs Subbasin (see Water Quality discussion below).

CVWD pumpage data shows a steady increase in groundwater extraction for CVWD users in the Sky Valley area, which is underlain by the non-potable Desert Hot Springs Subbasin. CVWD pumpage in 1978 was 854 acre-feet, rising to 2,302 acre-feet by 1988, 2,757 acre-feet in 1998, and jumping to 4,371 acre-feet in 2002. During the period from 1974 to 2002, groundwater levels in the production wells decreased from 139.4 feet below ground surface to 178.6 feet by 2002, resulting in a 74-foot lowering of the water table. Other CVWD wells in the area show a 51.8 foot drop in water table levels between 1973 and 2002. It should be noted that groundwater levels are identified as those in the well, pumping from which creates a "cone of depression" in the water table. Groundwater levels would be progressively less affected with distance from the well (depending on location and soils transmissivity).

72 "Water Master Plan for Mission Springs Water District," ASL Consulting Engineers, August 2000.
73 "Water Master Plan for Mission Springs Water District," ASL Consulting Engineers, August 2000.
74 Woody Adams, Senior Service Planner, Desert Water Agency, letter to City of Desert Hot Springs, July 24, 2000.

Constraints to Pumpage

In the vicinity of the Mission Creek Fault and in most of the southeastern portion of the subbasin there is an intrusion or spillage of groundwater from the Desert Hot Springs Subbasin into the Mission Creek Subbasin. This spillage is caused by an overflow across the Mission Creek Fault north of Willow Hole and has resulted in a plume of groundwater with high dissolved solids, including high levels of sulfate and fluoride which are non-potable. This intrusion extends from Willow Hole northwest to Palm Drive following the alignment of the Banning Fault. As a result, non-potable water has forced CVWD to develop its well field west of Palm Drive in Section 12, northwest of the high TDS plume.

Supplemental Water and Replenishment Programs

A number of replenishment and conservation programs have been implemented by local water agencies to combat the ongoing depletion of groundwater supplies in the Coachella Valley. The most important source (by volume) of groundwater recharge in the Coachella Valley is imported water from the Colorado River. It should be noted that flows on the Colorado River and their availability are affected by weather, institutional and other factors. Other sources of water, (including State Water Project resources, agricultural/urban transfers, etc.) may also be utilized in the future. Minor sources of recharge include groundwater inflow from subbasins outside the area, infiltration of precipitation that falls directly on the valley floor, and runoff that emanates from the surrounding mountains.

Colorado River Aqueduct

The CVWD and DWA are 2 of 29 agencies that have contracted for State Water Project (SWP) supplemental water resources. Under this contract, water from northern California would be transported to the valley via the Coachella Aqueduct. However, the high costs associated with the construction of such a project has precluded or forestalled construction of this aqueduct. Until the system is constructed, CVWD and DWA have entered into a water exchange agreement with the MWD.

This arrangement allows CVWD and DWA to exchange their SWP water entitlements for like amounts of water from MWD's Colorado River Aqueduct, which passes the northern portion of the Coachella Valley. The aqueduct is tapped just west of State Highway 62 and again where it crosses the Whitewater River. The Highway 62 turnout supplies water to the aforementioned Mission Creek recharge basins. The Whitewater turnout discharges into the Whitewater River, which conveys these flows to nineteen recharge basins near Windy Point to replenish the Whitewater River Subbasin.

CVWD's entitlement to SWP water is 23,100 acre-feet/year, and DWA's is 38,100 acre-feet/year, for a combined total of 61,200 acre-feet/year.[75] However, the actual quantity of supplemental Colorado River water diverted to the Coachella Valley fluctuates each year (depending on precipitation levels in northern California where SWP water originates, and drought conditions in southern California which require that water be directed toward the Los Angeles basin). Since the inception of the exchange program in 1973, 1.75 million acre-feet of Colorado River water have been delivered through the MWD Aqueduct.[76]

CVWD Coachella Branch Canal

Since 1949, the Coachella Branch of the All-American Canal has been delivering agricultural irrigation water to the eastern Coachella Valley. Since that time, golf course resort development has supplanted agricultural lands, especially along the coves of the Santa Rosa Mountains and many developments now use canal water to irrigate their golf courses. The canal extends from the Imperial Dam near the Mexican border, northwest to Lake Cahuilla near the City of La Quinta, and has a capacity of approximately 1,500 cubic feet per second (cfs).[77] In 1999, it delivered approximately 276,300 acre-feet of water to the Coachella Valley, representing about 41% of total water demand in the basin.[78]

CVWD has also constructed two pilot recharge facilities south of Lake Cahuilla and west of the U.S. Bureau of Reclamation's Dike No. 4 protective levee in La Quinta to determine whether groundwater recharge can be successfully accomplished in the lower Coachella Valley. This portion of the valley has an upper and lower aquifer separated by an aquitard, which significantly reduces the rate of vertical mixing between the two aquifers and hinders effective recharge of the lower aquifer. Testing at the aforementioned pilot facilities shows that land west of Dike No. 4 is appropriate for the construction of groundwater recharge basins using Coachella Canal water.

Quantification Settlement Agreement

The 1931 Seven Party Agreement divides California's share of Colorado River water among seven California agencies, including CVWD and IID. Under the agreement, CVWD and IID share the third party priority for Colorado River water, but IID has the first option to take as much third priority water as it can put to reasonable and beneficial use within its service area. Under the recently (Fall 2003) adopted Quantification Settlement Agreement CVWD is guaranteed an average of approximately 456,000 acre-feet per year over the lifetime of the

75 Ibid.

76 "Basin Water Supply and Initial Groundwater Replenishment and Assessment for the Mission Creek Subbasin," prepared by Krieger & Stewart, Inc., April 2003. Prepared for the Coachella Valley Water District.

77 "Coachella Valley Water Management Plan," Coachella Valley Water District, November 2002.

78 Ibid.

agreement (75 years). Approval of this agreement provides CVWD with reasonable assurances of a continued supplemental water resource and help to address supply as well as ground subsidence issues in the eastern valley.

Recycled Water

To further reduce the impacts of development on groundwater supplies, CVWD has implemented the use of "recycled" or tertiary (third stage) treated wastewater for golf course, landscape, and other irrigation purposes. Wastewater typically undergoes two levels of treatment before it is released to percolation ponds and reintroduced into the groundwater table. Tertiary treated wastewater, however, undergoes an additional stage of treatment, making it suitable for irrigation and decreasing (to some extent) the demand for groundwater. Recycled water was first used in the Coachella Valley in 1965. According to CVWD, usage remained below 500 acre-feet per year until the late 1980s, when its usage increased dramatically. By 1999, usage in the upper valley reached 8,100 acre-feet.[79] In 1999, CVWD also recycled 1,500± acre-feet of fish farm effluent for agricultural irrigation and use by duck clubs and fish farms in the lower valley. MSWD has completed the first phase of a federally funded recycled water appraisal for its service area with targeted users of recycled water expected to be parks, golf courses, greenbelts, and other open space areas.[80]

Water Quality in the Coachella Valley

Groundwater quality is dependent upon a number of factors, including the water source, type of water-bearing materials in which the water occurs, water depth, proximity to faults, presence of surface contaminants, and quality of well maintenance. Although the Coachella Valley groundwater basin has historically provided high quality water, regional water quality has declined since the 1930s.

Total Dissolved Solids

The concentration of total dissolved solids (TDS) in the Coachella Valley groundwater basin has increased since the 1930s, from about 250 milligrams per liter (mg/L) to current TDS levels ranging from 152 to 889 mg/L in the upper aquifer, and 131 to 198 mg/L in the lower aquifer.[81] This increase is partly due to declining water levels in the eastern valley, which allow total dissolved solids to migrate from the semi-perched zone down into lower aquifers. High TDS concentrations are associated with the importation of recharge water and the application of

79 Ibid.
80 Comment letter on Draft MSHCP EIR/EIS from Mission Springs Water District, Refugio (Joe) Bocanegra, January 10, 2005.
81 "Coachella Valley Water Management Plan," Coachella Valley Water District, November 2002.

fertilizers, but are also associated with major faults. Near the San Andreas Fault and the presumed extension of the Garnet Hill Fault, TDS concentrations exceed 1,000 mg/L.[82]

CVWD conducts routine monitoring of its wells for numerous organic and inorganic chemicals. Groundwater levels generally occur at about 200 to 250 feet below the surface, and CVWD wells are typically drilled to depths between 1,000 and 1,300 feet.[83] In 2001, none of the groundwater samples tested by CVWD exceeded the standards for potential contaminants in drinking water established by the California Department of Health Services.[84] Water quality in the Whitewater River Subbasin has been somewhat affected by the importation of Colorado River water via the MWD aqueduct. *Table 3-11* breaks out relative water quality of surface waters recharging the basin.

TABLE 3-11
Mineral Analysis of Representative Surface Waters

Source	Whitewater River (North)	Snow Creek	Colorado River	Whitewater River River (South)
Constituent	epm[1] / epm[2]	epm/ppm	epm/ppm	epm/ppm
Ca	1.75/35	0.50/10	3.97/79	9.08/181
Mg	0.90/11	0/0	2.31/28	3.74/45
Na	0.62/14	0.47/11	4.78/110	32.58/749
K	0.108/4.2	0.04/1.6	0.11/4.3	0.39/15
Cl	0.1/4	0/0	6.01/213	15.96/566
Total Dissolved Solids	201 ppm	55 ppm	727 ppm	2,983 ppm

Notes: 1 epm = chemical equivalents per million; 2 ppm = parts per million by weight
Source: DWR Bulletin No. 108: Coachella Valley Investigation, California Dept. of Water Resources, July 1964.

As the above table shows, Colorado River water has about three times the amount of total dissolved solids (TDS) as the upper Whitewater River source, and about one-fourth the TDS found in the Whitewater River surface source near Mecca, where agricultural tail water influences water quality. Analyses of wells in the vicinity and downstream from the Whitewater recharge basins using Colorado River water indicates that recharge water is moving down valley at approximately one mile per decade. Therefore, impacts to water quality in the upper Coachella Valley are not expected to be significant in the near term, with recharge water being progressively diluted as it migrates down gradient in the aquifer. This same water source is now being used to recharge the Mission Creek Subbasin, and plans are underway to recharge the

82 Ibid.
83 Steve Bigley, Coachella Valley Water District, personal communication. April 2002.
84 "Engineer's Report on Water Supply and Replenishment Assessment 2001/2002," prepared by Water Resources Branch, Engineering Department, Coachella Valley Water District, April 2001.

lower Whitewater Subbasin using Colorado River delivered by the Coachella Branch of the All-American Canal.

Nitrates

Nitrate concentrations in aquifers serving urbanized areas have also increased over time. During the 1930s, nitrate levels were typically less than 4 mg/L throughout the valley.[85] However, by the late 1970s, nitrate levels had increased to more than 45 mg/L in wells adjacent to the Whitewater River. Nitrate is a byproduct of the biological decomposition process, and high nitrate levels are primarily associated with the application of fertilizers and the discharge of effluent from septic tanks and wastewater treatment plants. Groundwater studies conducted by the U.S. Geological Survey from 1970 to 1996 identified increasing nitrate levels in Mission Springs Water District's Well No. 22 (Desert Hot Springs area), and concluded that septic tank wastewater had contaminated the shallow part of the saturated zone.[86] In recent years, MSWD has taken actions to reduce the number of homes and businesses on septic tanks and to reduce their contributions to nitrate levels within the subbasin (e.g., the establishment of sewer assessment districts).[87]

Similar occurrences have been documented elsewhere in the Coachella Valley. In 1993, the Desert Water Agency published a report indicating that a virus which infects *E. coli* bacteria was found in limited quantities within groundwater supplies in the southern portion of Cathedral City.[88] The impurity was related to the heavy use of on-lot septic systems south of the Whitewater River Channel. Subsequent water quality testing indicated that high nitrate levels affected only DWA's monitoring wells, and its production wells, which draw water from depths of more than 400 feet below the surface, were unaffected.

Salts

The water quality of the Coachella Valley groundwater basin is also impacted by the addition of salts through natural recharge, wastewater percolation, fertilizers, irrigation, artificial recharge, and intrusion from the Salton Sea. In 1936, the net salt addition to the Coachella Valley groundwater basin was approximately 12,000 tons per year. By 1999, this figure increased to about 265,000 tons per year. Approximately 65% of the regional salt addition occurs in the lower Coachella Valley, and most of this is associated with agricultural activity and the use of imported Coachella Canal water. The installation of tile drains beneath agricultural lands is credited with removing much of the salt from the perched water table and enhancing its conveyance to the Coachella Valley Stormwater Channel and ultimately to the Salton Sea.

85 Ibid.
86 "Master Sewer Plan for the Mission Springs Water District," Albert A. Webb Associates, March 2001.
87 Comment letter on Draft MSHCP EIR/EIS from Mission Springs Water District, Refugio (Joe) Bocanegra, January 10, 2005.
88 "The Effects of Subsurface Wastewater Disposal Systems on Groundwater Within Cathedral City," Desert Water Agency, February 1993.

Coachella Valley Water Management Plan

The Coachella Valley Water Management Plan,[89] prepared by the CVWD in November 2000 and adopted in 2002, describes existing and historical water conditions in the Coachella Valley and outlines the District's means of meeting water demands through 2035. The CVWD's Water Management Plan evaluates several alternatives for meeting future water needs and recommends a preferred alternative, which incorporates a combination of water conservation, source substitution, groundwater recharge, additional water supplies, and ongoing groundwater monitoring programs.

The CVWD's Water Management Plan sets goals for improving all areas of regional water management, including urban, golf course, overdraft, groundwater replenishment, water quality, and agricultural water, and establishes benchmarks by which progress can be measured. Implementation of CVWD's Water Management Plan would require the participation and cooperation of local residents and public and quasi-public agencies serving the valley.

MSHCP Plan Area Water Resources and Habitat Preservation

Regional surface waters provide habitat for a variety of wildlife species. Natural water bodies, including the Salton Sea, account for approximately 43,460 acres (3.80%) of the MSHCP Plan Area.[90] Man-made water features, including the Whitewater River recharge ponds and Lake Cahuilla, account for about 816 acres (0.07%) of the Plan Area.

The freshwater marshes and wetlands of the Salton Sea provide important nesting and foraging habitat for migratory waterfowl, as well as numerous species of fish, including some endangered and threatened species. However, rising salinity levels in the Salton Sea due to evaporation and the release of domestic and agricultural wastewater into the sea have damaged this sensitive habitat.

Washes, seeps, and springs in the Willow Hole-Edom Hill Preserve, Thousand Palms Oasis at the Coachella Valley Preserve, Dos Palmas Preserve/ACEC, and Oasis Springs Ecological Preserves provide habitat for a variety of Federal- and State-listed species, including Coachella Valley fringe-toed lizard, desert pupfish, and other species. Other water sources, including agricultural drains, canyon streams, desert fan palm oases, and the Coachella Valley Stormwater Channel, offer riparian habitat that supports populations of common and sensitive wildlife

89 *Coachella Valley Water Management Plan*, Coachella Valley Water District, November 2000.

90 "Public Review Draft, Coachella Valley Multiple Species Habitat Conservation Plan/Natural Communities Conservation Plan," prepared by Coachella Valley Mountains Conservancy, October 2004.

species. Preservation of these water sources (and the quality of water within them) is critical to the survival and propagation of numerous wildlife species.

3.8 Biological Resources

The regional setting and physical and environmental conditions of the Coachella Valley have a direct affect on the types of habitat and biological resources that have adapted to these unique and sometimes extreme conditions. In particular, geographic location, soils, climate, and topography are the most influential factors shaping the regional environment. *Exhibit 3-7* shows land use status in the Coachella Valley in June 2003. The following discussion provides a brief description of these conditions in the Coachella Valley, and how they form the basis for habitat and biological resources in the Plan Area.

Desert Biome

Many places on earth share similar climatic, topographic and soil conditions, and therefore form roughly comparable communities. These broad types of biological communities are called biomes. Desert biomes are characterized by low moisture levels and precipitation that is both infrequent and unpredictable from year to year. With little moisture to absorb and store heat, daily and seasonal temperatures generally fluctuate widely. Most deserts around the world are gravelly or rocky scrubland, where 5 to 10 cm of annual precipitation supports a sparse, but species-rich community dominated by shrubs or small trees. However, a wide variety of annual or ephemeral plants would blanket the desert floor in years when rains are adequate.

Plants and animals in this climate survive by utilizing a variety of structural and behavioral adaptations to conserve water and endure the heat. Plants have adapted mechanisms in their leaf structure which help reduce water loss from evaporation (e.g., tissues that can store water and thick epidermal layers). Many desert plants also produce leaves seasonally or have spines and thorns to discourage predators while also providing shade. Animals escape the main onslaught of daytime heat by hiding in burrows or shelters, emerging only at night to hunt for food and water. Some animals can obtain most of the moisture they need from the other animals, insects, grains and seeds they eat, in addition to physical adaptations that allow them to eliminate body wastes without losing moisture.

Climate in the Coachella Valley

As discussed in Section 3.4, local climatic conditions are largely influenced by the geographic location (latitude) of the region. Other influences include topographical features and the presence of the ocean or other large bodies of water. The Coachella Valley region's climatic conditions are greatly influenced by the Santa Rosas, San Jacinto, and San Bernardino Mountain ranges, which effectively isolate the valley from much of the cooler and wetter maritime conditions that occur to the west. The result is a subtropical desert environment characterized by low rainfall,

low relative humidity, and high levels of direct sunshine, with very hot summers and mild winters. Summer daytime temperatures commonly exceed 100˚F and occasionally reach more than 120°F, but drop to about 75˚F at night. In winter, the daily temperature range is from 80˚F to 30˚F. The surrounding mountain slopes are typically cooler with an approximate 5˚F decrease in temperature for every 1,000 foot increase in elevation and a commensurate increase in rainfall.

Mean annual rainfall on the valley floor is low, averaging between four and six inches, and about fifteen inches in the nearby mountains on the southern and western end of the valley. Winter months generally receive the most rainfall, but infrequent and occasionally intense thunderstorms may occur in late summer and early fall. However, most of the precipitation generated by these storms falls on surrounding mountain slopes, leaving the desert floor dry throughout the year.

Wind also has a significant impact on the climate of the Coachella Valley. As the desert floor heats up and warm air rises, cool, ocean-modified air masses from the west are drawn into the valley and are funneled and concentrated through the narrow San Gorgonio Pass. This Venturi effect generates strong winds that pass over the most erosive portions of the valley floor, transporting large quantities of sand and dust throughout the region. While this natural sand migration and transport process can pose a significant risk to health and property, it is also responsible for creating desert sand fields and dunes, which are an important habitat for unique native desert plants and wildlife.

The Coachella Valley is located in one of the hottest and driest parts of the country, making it a harsh and sometimes inhospitable place to live. Nevertheless, the Coachella Valley desert comprises one of the most biologically unique and diverse regions in the country. While vegetation on the desert floor is sparse and limited by heat and aridity, the climate becomes milder away from the desert floor as elevation increases. These alluvial fans, hillsides, and mountainous areas support more vegetation than the desert floor, including as many as nine species of cacti, a variety of woody plants such as palo verde and smoke tree and many herbaceous plants. In addition, they also include numerous canyons and ravines that collect snowmelt and runoff from the surrounding mountains. These niches in the mountainside support native riparian communities, fan palm oases, and a wide variety of other plants and animals.

Topographic Effects on Local Habitats

The natural features of the Coachella Valley include high mountain ranges, hillsides and uplands, alluvial plains, and the gently sloping valley floor. These topographic features are primarily a result of movement occurring along the San Andreas, San Jacinto, and other regional faults that traverse the area. These faults have uplifted and subsided the ground to form contrasting features, while weathering, erosion, and other secondary geological processes have sculpted and shaped the mountains into a series of canyons and alluvial fans that extend onto and fill the valley floor.

The result is a northwest-southeast trending alluvium-filled basin that is surrounded by mountainous terrain.

Elevations in the valley range from about 228 feet below sea level at the Salton Sea to the peaks of Mt. San Jacinto and Mt. San Gorgonio, more than 2 miles above sea level. This combination of a fault-extended valley basin and surrounding elevated terrain has created a number of complex and unique habitats and transition zones that make the region a rich area for biological resources.

Coachella Valley Habitats and Natural Communities

Habitat describes the place or set of environmental conditions in which plants and animals naturally live and grow. Habitats are more specific descriptions of locations within a biome or region, which have a distinct assortment of species. Temperature and precipitation are primary factors in determining locations of different habitats. However, in the Coachella Valley and surrounding areas, desert habitats are generally distinguished by physical differences in slope, soil substrate, solar and wind exposure, and water supply.

Biological resources are found in and are a part of a habitat that is an ecological system, network, or web of interrelationships between living things and their physical environment. The value and diversity of habitats are determined by climate, varied terrain, adequate space, a dependable supply of food and water, soils for healthy plant growth, shelter, and breeding sites. Many species of animals may live across and take advantage of different habitats to meet all their needs, while others are limited to areas meeting very narrow requirements. The Plan Area supports a wide variety of plant specie that provide differing habitats for a wide range of animals.

The Valley Floor: Dunes and Sand Fields

The valley floor habitat refers to open and gently sloping land within the central portion of the Plan Area. It is characterized by relatively flat and low-lying terrain, with regions of shifting and blowing sands generally supporting only sparse vegetation. Within the Plan Area this habitat can be further divided into three sub-communities: active sand dunes, active sand fields, and stabilized and partially stabilized desert sand fields. These blowsand habitats are characterized by low perennial plant diversity, very high annual or ephemeral plant diversity, and a very diverse array of invertebrates.

Most undeveloped land on the valley floor has been fragmented by development and disturbed by proximity to roads. As a result many of the species that are endemic to the valley floor's natural communities have declined. Furthermore, the State and Federal governments have listed a number of plant and wildlife species as threatened or endangered, including the Coachella Valley fringe-toed lizard and the Coachella Valley milk-vetch and several of the proposed

Covered Species. Others could become listed as threatened or endangered if their numbers and remaining habitat continue to decline.

Active Sand Dunes

Active sand dunes are located in exposed areas on the valley floor where high wind conditions convey sand and persistently shift the sand dunes, allowing for little or no vegetation to be supported there. "Active" refers to the fact that windbreaks have not impaired the aeolian (wind-borne) processes that contribute to sand transport, accumulation, and depletion in the sand fields. Because the dunes are continually shifting and accumulating sand, perennial plant cover is very low with much of the surface exposed or barren for most of the year.

However, the dunes are covered with native annual plants (most visibly sand verbena and dune primrose) in years with high rainfall. The principal active desert dunes community in the Plan Area consists of the large deposits of windblown sand in the Coachella Valley Preserve north of Interstate 10. The most common plant community found in the active sand dune and active sand fields (discussed below) is the Sonoran Desert creosote bush scrub, which includes creosote bush, burro bush, brittlebush, and desert brickellia.

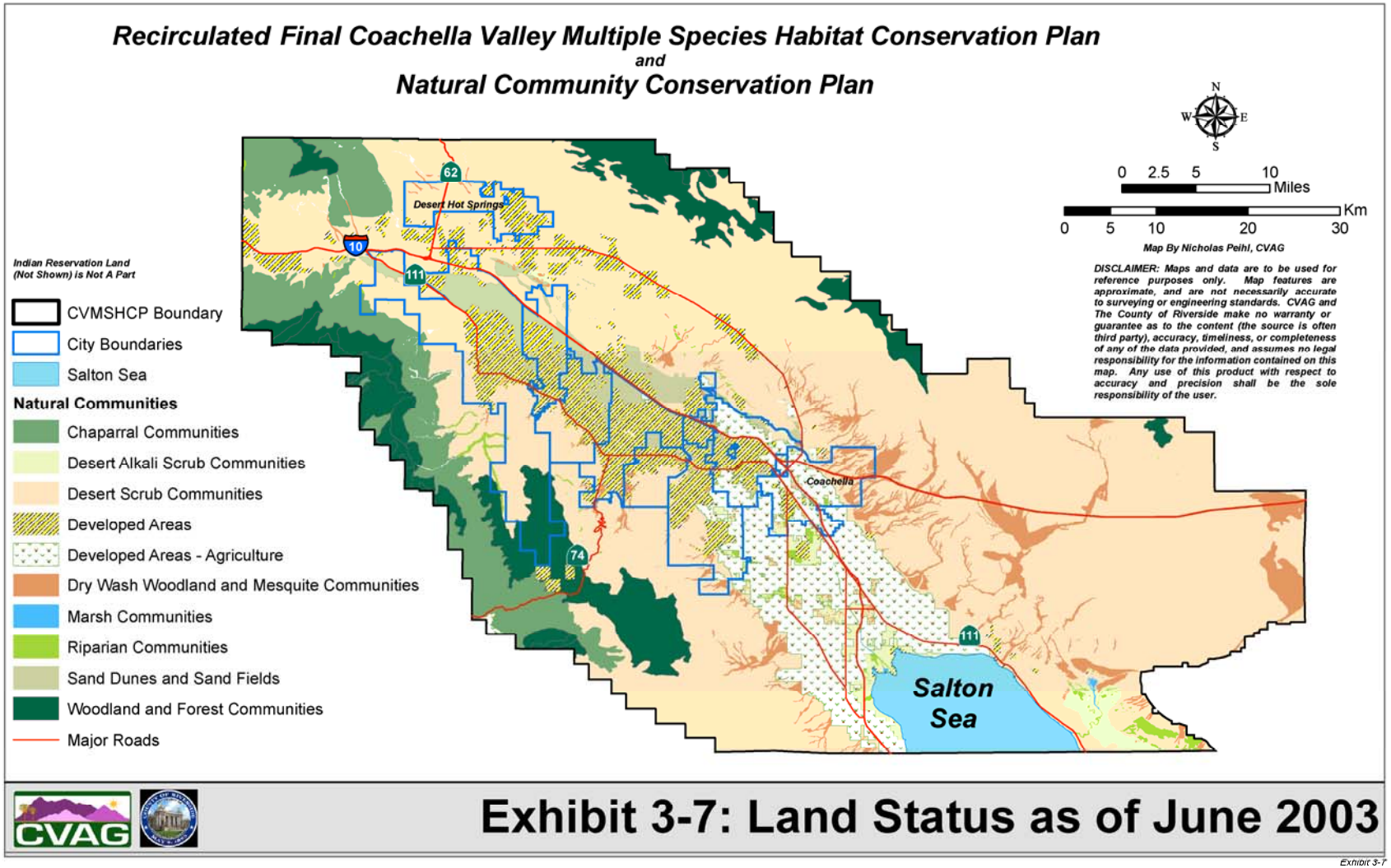
Active Sand Fields

Active desert sand fields are located within the Coachella Valley Preserve adjacent to the dunes. While not in dune formation, sand within these fields is actively being deposited and depleted to form sheets of desert sand. Active desert sand fields are also generally unable to support extensive vegetation due to the active aeolian processes. Sand may also pile up against creosote bush, mesquite, and other perennials to create hummocks or mounds that can support other plants and wildlife.

Stabilized and Partially Stabilized Sand Fields

Large portions of the Plan Area on the valley floor were originally comprised of active sand dunes and sand fields. However, a variety of changing circumstances have cut off many of these areas from fresh sources of sand, including the construction of the Union Pacific Railroad lines, Interstate 10 and associated windbreaks, upwind development, and the construction of roads. The result is stabilized or partially stabilized sand fields, which occur from just north of the Whitewater River to areas north of Interstate 10.

Stabilized and partially stabilized sand fields are areas on the valley floor with an accumulation of sand that is not in dune formation, where important physical processes are interrupted by barriers such as roads, buildings, and landscaping. In these areas, vegetation grows more readily and consists primarily of scattered herbs and shrubs. As in active sand dune areas, the dominant natural community is the creosote bush scrub. However, the valley floor comes alive with


Recirculated Final Coachella Valley Multiple Species Habitat Conservation Plan
and
Natural Community Conservation Plan
N
W
E
S
0 2.5 5 10
Miles
0 5 10 20 30
Km
Map By Nicholas Peihl, CVAG
DISCLAIMER: Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. CVAG and The County of Riverside make no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.
Indian Reservation Land
(Not Shown) is Not A Part
CVMSHCP Boundary
City Boundaries
Salton Sea
Natural Communities
Chaparral Communities
Desert Alkali Scrub Communities
Desert Scrub Communities
Developed Areas
Developed Areas - Agriculture
Dry Wash Woodland and Mesquite Communities
Marsh Communities
Riparian Communities
Sand Dunes and Sand Fields
Woodland and Forest Communities
Major Roads
Desert Hot Springs
Coachella
Salton Sea
62
10
111
74
CVAG
Exhibit 3-7: Land Status as of June 2003
Exhibit 3-7

ephemeral wildflowers during periods of high precipitation due to seeds that lie dormant through the majority of the year.

Alluvial Plain

Alluvial plain habitat is comprised of flood-formed fans that extend out toward the valley floor from the mouth of canyons emerging from the surrounding mountains. The uneven terrain of deposited rocks, gravels, and sand are the accumulated sediments of large floods that have been shaping these elevated flood plains for thousands of years. Smaller, more recent floods continue to shape and alter the landscape, but their effect is generally limited to sandy washes passing through the plain. Farther down the fan, the plain becomes smoother with a sandier substrate. In the Plan Area, these alluvial habitats are formed by a variety of mountain drainages from large and small canyons including: Chino Canyon and Palm Canyon draining the San Jacinto Mountains; Big Morongo Canyon, Thousand Palms Canyon, Long Canyon, East and West Wide Canyon, and East Deception Canyon draining the Little San Bernardino Mountains; Mission Creek, Whitewater River, and the San Gorgonio River draining the San Bernardino Mountains; and Dead Indian Canyon, Deep Canyon, Bear Creek, and Martinez Canyon draining the Santa Rosas Mountains. The habitat and natural communities found on these plains transition and change with increasing distance from canyon mouths, as the substrate is slowly altered from rocky deposits to sand.

Sonoran mixed woody and succulent scrub is the dominant plant community of the alluvial plain habitat. This community occurs along the lower slopes of the Santa Rosa and Little San Bernardino Mountains and is widespread, forming the north and south edges of the Coachella Valley. Sonoran mixed woody and succulent scrub is a variant of the creosote scrub community, and is very typical of the Colorado Desert. It includes creosote bush and a variety of woody and herbaceous plants, including indigo bush, catclaw acacia, desert lavender, rock daisy, and palo verde. The approximate 93 annual plant species found on the alluvial plains and fans make up more than half of the alluvial slopes flora. Several species of cacti are also present, and include beavertail, barrel cactus, fishhook cactus, hedgehog cactus, and four species of cholla. Species of note known from this community include California ditaxis and glandular ditaxis.

Sandy Washes

Desert washes form a distinct habitat, which connects the mountains and the valley floor. Washes emerge from canyon mouths as high-banked watercourses that cut through the alluvial plain. As a wash descends the plain, it broadens and the watercourse branches out. Farther from the canyons, washes become broader, shallower and less defined, so that the physical differences between the washes and the alluvial plain are diminished.

Sandy washes are often used as corridors by wildlife that use both the wash and the alluvial plain habitats. The washes are favored habitats of the desert tortoise. They also contain distinct

vegetation that is adapted to infrequent flooding. The most notable species include smoketree and palo verde. Other common shrubs and sub-shrubs include chuperosa, cheesebush, sweetbush, desert lavender, dyeweed, sandpaper plant, and bladderpod. Birds are more abundant in the desert washes than in the surrounding rocky hillsides or creosote bush scrub flats. Typical species include verdin, phainopepla, and black-tailed gnatcatcher.

Few good representations of sandy desert washes remain in the Coachella Valley. The largest desert washes in the Plan Area include the San Gorgonio River and Whitewater River washes, Palm Canyon Wash, Mission Creek, and Big Morongo Creek washes, Thousand Palms Wash, Deep Canyon Wash, Bear Creek Wash, Martinez Canyon, Pinkham Wash, and Box Canyon Wash.

Desert Fan Palm Oasis Woodland

The desert fan palm oasis woodland is a rare plant community that is one of the most unusual biological resources located within the Coachella Valley. These lush desert oases are found where water occurs on or near the surface within canyons and along the San Andreas Fault Zone. They are characterized by open to dense groves of native desert fan palms (*Washingtonia filifera),* which are the most massive native palm in North America, growing to more than 20 meters. Native desert fan palms are found from the Baja Peninsula to Death Valley National Park, with approximately 25,000 occurring in the wild[91] Because of their uniqueness, desert fan palm oases have been given special status by the State as a natural community with the highest inventory priority. Examples of this plant community in the Plan Area are located in Palm Canyon and other Indian Canyon locations, in the Santa Rosa Mountain canyons, and along valley faults, including palm groves associated with the Coachella Valley Preserve System along the San Andreas Fault zones.

A variety of wildlife species are also associated with the desert fan palm community, including the southern yellow bat, common kingsnake, desert slender salamander, California treefrog, hooded oriole, Cooper's hawk, golden eagle, prairie falcon, Least Bell's vireo, common flicker, carpenter bee, and giant palm boring beetle. The Peninsular bighorn sheep is supported by this habitat, frequenting the oases in the Santa Rosa and San Jacinto Mountains during the hot season to take advantage of the surface water.

Foothill and Montane Habitats

The San Bernardino, San Jacinto, Santa Rosa, and Little San Bernardino Mountains that extend from and above the edge of the alluvial plain comprise the rocky slopes habitat occurring within the Plan Area. This habitat reaches an elevation of about 3,500 feet, and is characterized by

91 "Desert Palm Oasis." Cornett, James W. & The Palm Springs Desert Museum. 1989.

continuous rock that is either weathered and fractured bedrock, or broken and displaced into loose debris of descending sand, pebbles, and stone. The steep slopes and extensive rock surfaces on the lower slopes of this habitat support little to no vegetation. However, the rocky slopes habitat supports up to 102 perennials and 115 annual species. Plant density and size increase with elevation and associated increases in annual rainfall. Plants of the rocky slopes habitat include creosote bush, brittlebush, burrobush, agave, ocotillo, spike moss, Parry's cloak fern, arrowleaf, pigmy cedar, bushy cryptantha, bedstraw, rush pea, and crossosoma. The rocky hillsides of the Plan Area mountains provide habitat for a different variety of plants and animals from those on the valley floor. Connectivity with the vast areas of wildlands in the surrounding mountains provide habitat for wide-ranging animals, including bighorn sheep, as well as predators such as prairie falcon, golden eagle, bobcat, and mountain lion.

Species and Natural Community Accounts

Section 9 of the MSHCP provides detailed accounts of the species proposed for coverage under the Plan, including plants, insects, fish, amphibians, reptiles, birds, and mammals. Section 10 of the Plan also provides detailed accounts of the various natural communities that are covered, including sand dunes and sand fields, desert scrub communities, alkali scrub communities, chaparral communities, marsh communities, riparian and desert fan palm communities, mesquite bosque and desert dry wash woodland communities, and pinyon and juniper communities. The species and natural community accounts are integral to the analysis in the EIR/EIS.

Natural Communities Addressed by the Plan

The original Planning Agreement identified 23 natural communities in the Plan Area. Over the course of Plan development, a total of 46 natural communities were identified in the Plan Area. As currently proposed, the Plan includes 27 of those natural communities (*Table 3-12*). With the exception of two communities (i.e., Active Shielded Dunes and Tamarisk Scrub), all other identified natural communities in the Plan Area are proposed to be adequately protected. The Active Shielded Dunes areas are surrounded by on-going urban Development and have been cut off from ecological processes upon which they would rely. Tamarisk Scrub is dominated by this invasive non-native species, and is to be reduced or eliminated in portions of the Plan Area where it occurs.

Sensitive, Rare, and Endangered Species

The Coachella Valley Plan Area contains a wide range of significant biological resources, many of which are species of plants and animals that are highly specialized and endemic to the Coachella Valley. On a continental scale, the Coachella Valley is a hot spot of biodiversity, distinguished by high endemism, rarity, and richness of several taxa. For example, researchers with The Nature Conservancy and the Association for Biodiversity Information identified this portion of Southern California as one of six regions in the United States that rank in the top tier

Table 3-12
Natural Communities Covered by the Plan

Active desert dunes	Stabilized/partially stabilized desert dunes
Active desert sand fields	Ephemeral desert sand fields
Stabilized and partially stabilized desert sand fields	Stabilized shielded desert sand fields
Mesquite hummocks	Sonoran creosote bush scrub
Sonoran mixed woody and succulent scrub	Mojave mixed woody scrub
Desert saltbush scrub	Desert sink scrub
Chamise chaparral	Redshank chaparral
Semi-desert chaparral	Cismontane alkali marsh
Coastal and valley freshwater marsh	Southern arroyo willow riparian forest
Sonoran cottonwood-willow riparian forest	Mesquite bosque
Desert dry wash woodland	Desert fan palm oasis woodland
Southern sycamore-alder riparian woodland	Arrowweed scrub
Majavean pinyon-juniper woodland	Peninsular juniper woodland and scrub
Interior live oak chaparral	

of conservation priority based on a rarity-weighted richness index.[92] In the case of the Coachella Valley, the majority of the important habitats for biodiversity are largely private land with high economic value; many have been developed for decades and the pace of development remains rapid.

The ongoing conversion of natural habitats within the Coachella Valley to other land uses and the consequent reduction in acreage and alteration of the structure and processes of those habitats has placed many species at risk of extinction. Due to the loss of viable habitat some of these species have been listed as threatened or endangered by the Federal and State governments. "Endangered" species are those with such limited numbers that they are considered in imminent danger of extinction, while "threatened" species are those that are likely to become endangered, particularly on a local scale, within the foreseeable future.

"Sensitive" species are those that are naturally rare or that have been locally depleted and put at risk by human activities. While sensitive species may not appear to be significantly threatened, they are considered vulnerable and are often candidates for future listing. A table of listed or sensitive species within the Plan Area that are proposed for coverage under the proposed MSHCP can be found in Section 2 of this document.

[92] S. Chaplin et al. 2000. Chapter 6 in *Precious Heritage: The Status of Biodiversity in the United States*. Oxford University Press.

3.9 Cultural Resources and Native American Concerns

The history of human occupation and use of the Plan Area has been pieced together from a wide variety of studies and assessments prepared for large scale planning efforts and for individual projects. Knowledge and information on native culture, technology, ethnobotany, and other cultural attributes continue to emerge as additional research adds to current data, interpretation, and understanding. The following discussion provides an overview current state of knowledge about the Native American groups that occupied the Plan Area and the region. A more detailed discussion can be found in Cultural Resources Background Report in Appendix F of this EIR/EIS.

Pre-Historic Culture in the Plan Area

Based upon the current regional knowledge of artifacts and habitation sites dating back approximately 12,000 years, archaeologists have divided the pre-European epoch into five periods: Early Man Period, Paleo-Indian Period, Early Archaic Period, Late Archaic Period, and the Late Prehistoric Period.

The earliest periods were distinguished by the use of large stone points to hunt and process large late ice age mammals, and by the lack of milling stones and other food grinding implements. As climate conditions and available food changed, local inhabitants started using smaller projectile points on the smaller game; there was also substantial migration going on during this period. From about 4000 years ago, seeds and grains and their processing became more important, and stone-tools became more sophisticated; there was also a corresponding increase in cultural complexity and variation.

By about 1500 years ago, at the end of the archaic period, burial practices had changed to cremations and a wider food base was exploited. Milling of foodstuffs also continued extensively. This new period, the Late Prehistoric, involved important cultural changes including the introduction of pottery and the bow and arrow. The Late Prehistoric pre-ceramic transitional phase from 1200 to 1500 years BP; ceramics were locally introduced at about 1200 years BP. Pottery was an innovation of peoples of the Colorado River, and its presence in the Coachella Valley indicates that contact occurred between inhabitants of the Coachella Valley and Colorado River settlements. From about 800 years ago to just before contact with Europeans, there is evidence of extensive contact and trade with tribes of the Colorado River. This included the distribution of pottery across the upper Colorado and Mojave Deserts. It is from this period that ethnic or tribal affiliations are best known.

The MSHCP Plan Area encompasses a wide range of environments, which have been exploited by different indigenous groups over thousands of years. These included the low desert fresh water lakes of the various stands of Ancient Lake Cahuilla, the palm oases and mesquite

vegetation associated with fault zones and other areas of high groundwater, alluvial fan areas, mountain canyons, and the mountains themselves.

In the MSHCP Plan Area, the oldest cultural remains date back about 2,700 years before the present (BP) and were discovered near the intersection of Jefferson Street and Fred Waring Drive along the ancient shore line of Lake Cahuilla (Love 1996) Numerous types of habitation and village sites developed throughout the Plan Area. These included villages occupied for extended periods of time, milling sites used seasonally as particular foods became available, lithic workshops and quarries for making stone tools and weapons, and rock art sites that were used for artistic/religious expression.

The Cahuilla Indians

The most recently identifiable native culture to evolve in the Coachella Valley region is the Cahuilla. The Cahuilla were a Takic-speaking, hunting and gathering people from the Great Basin region of Nevada, Utah, and eastern California whose migration into southern California occurred sometime between 1000 BC and AD 500. The Cahuilla are generally divided into three groups by anthropologists: the Pass Cahuilla of the Banning-Beaumont area, the Mountain Cahuilla from the Santa Rosa and San Jacinto Mountains, and the Desert Cahuilla from the western Coachella Valley east to the Salton Sea.

The Cahuilla did not have a single name that referred to an all-inclusive tribal affiliation; rather, membership was in terms of lineages or clans, and each belonged to one or two main divisions of the people, known as moieties. Members of clans in one moiety had to marry into clans from the other moiety. Individual clans had villages, or central places, and territories they called their own. Each clan, or lineage, had its own food harvesting areas, ceremonial house, and lineage chief. However, a number of lineages are known to have cooperated with one another for political, social and economic purposes.

Surveys performed by the U.S. Government Land Office (GLO) in the mid-1850s noted a large number of Native American villages (i.e., Rancherias), in the Plan Area. All or most of these settlements are believed to have been settlements of the Desert or Pass Cahuilla people. Prominent settlements were located adjacent to major resource areas, including the shorelines of Lake Cahuilla, along the “cove communities” areas supported by shallow wells, mesquite and wildlife resources, and in the Indian Canyons areas of Palm Canyon. Seasonal occupation sites were also associated with palm oases on the east side of the valley, which were an important source of water, food, and fiber. Another feature believed to have been made by the Cahuilla included an extensive network of trails.

The first Cahuilla contact with Europeans occurred in the 1770s when Spaniards crossed through Cahuilla territory in search of new land routes between Mexico and northern California. As time passed, relations between European settlers and the Cahuilla became strained due to conflicts over land ownership and exploitation, and religious and cultural practices. European disease, to which the Cahuilla had no immunity, furthered the gap between Indian and non-Indian relations. A smallpox epidemic in the early 1860s decimated the Cahuilla population, which declined from an estimated 6,000 to 10,000 people to only 2,500 individuals. By the time the Plan Area was re-surveyed by the U.S. government in the early twentieth century, most of the villages and rancherias noted from earlier surveys had vanished, and signs of Euroamerican influence (e.g., fences and irrigation ditches) were observed. The Cahuilla continue to inhabit parts of the Coachella Valley today, and are mostly affiliated with one or more of the Indian reservations in the Coachella Valley. Among these are the Torres Martinez, Augustine, Agua Caliente, Cabazon, and Morongo Reservations.

Known Local Native American Resource Areas

A large number of cultural resource surveys have been conducted in the MSHCP Plan Area and several hundred archaeological sites have been identified. Recorded archaeological resources are generally assigned a unique numerical identifier, referred to as a "tri-nomial" by the Eastern Information Center's (EIC) Archaeological Research Unit at the University of California, Riverside. Site records on file at the EIC provide information about the type, contents, cultural affiliation, and period of occupation of archaeological resources.

Archaeological resources in the Plan Area include numerous village sites associated with the shoreline of ancient Lake Cahuilla, which was created and maintained by inflows of the Colorado River. Approximately 500 years ago, the Colorado changed course and once again found its way to the Sea of Cortez. As the lake level fell, the Cahuilla moved their villages into or near the mouth of mountain canyons where about 80% of the necessary food and other resources were to be found within a 5-mile radius.[93] Occupation sites, beyond seasonal hunting and gathering camps, were rare above 5,000 feet.

Areas with dependable water supplies were essential, especially after the retreat of ancient Lake Cahuilla. Canyons of the San Jacinto Mountains had apparently been important habitation areas during Lake Cahuilla's last stand, including Palm, Andreas, and Murray Canyons, which then as now had year-round streams. Many canyons of the Santa Rosa Mountains also had springs which supported palms and other sources of food and fiber. Whitewater Canyon was an important wintering home[94] and is still an area of high sensitivity to modern Cahuilla. As stated by Bean et

93 Bean 1972.

94 Bean 1960.

al., "It can be assumed that spring sites were places known to the Cahuilla and used by them, and that there were villages or significant use sites near all major springs."[95]

The Indian Canyons south of Palm Springs have included many important heritage sites of the Cahuilla from pre-historic time to the present. Villages, rock art, irrigation ditches, ceremonial trails, and food processing areas are found throughout the area. Important trails were also associated with the canyons and associated springs.

Compilations of Cahuilla cultural heritage site records by Lowell John Bean, Sylvia Brakke Vane, and Jackson Young[96] have been essential in recording places important to the Cahuilla in the Plan Area. Hundreds of such sites have been identified within the Plan Area. The following lists a few of these sites and their Cahuilla names.

Hidden Spring (Ataki)
Near Palm Canyon (Tev ing el we wy wen it)
Tahquitz Mountain (Ta co witz)
South Palm Canyon (Tatmilmi)
Murray Canyon (Sewitckul or Wa wash ca)
Whitewater Canyon (Con kish wi qual)
Whitewater Canyon Village (Wanup)
Snow Creek (Na hal log)
Cathedral Canyon "mescal gathering place"
(Taupakic) Deep Canyon (To-ho)
Bradley Canyon (Tanki)
Mission Creek Area (Yamisevul)
Bradley Canyon Trail
Magnesia Spring (Pah-wah'-te)
Edom Hill/Indio Hills (Pa hal ke on a)

Also important is the significant and obvious pattern emerging from the archaeological record of a dense clustering of Native American archaeological sites on alluvial cones and at the mouth of springs and on the alluvial fan. Site surveys in the Plan Area have revealed many previously identified and newly recorded sites, including those with pottery scatters, grinding rocks, trail segments, and rock cairn features. The sites indicate extensive use of these canyon and "cove" areas prior to European settlement.

Of particular interest are potentially significant rock cairn alignments found in canyon/alluvial fan areas. Many of these cairn features appear to represent supports for blinds constructed to guide and ambush bighorn sheep and deer (Love 1995 and 1997) making their way to water and foraging areas. Also well documented is the Coachella Valley Fish Traps, a 208± acre archaeological site constructed on the shoreline of ancient Lake Cahuilla, which is listed in the

95 "The Cahuilla and the Santa Rosa Mountain Region: Places and Their Native American Association," Lowell J. Bean, Sylvia Brakke Vane and Jackson Young. Edited by Russell L. Kaldenberg. Cultural Systems Research, Inc. for the U.S. Bureau of Land Management. October 1981.

96 Ibid.

National Register of Historic Places. These numerous small weirs were loosely constructed of stacked rock, creating small ponds into which fish would swim and become isolated, allowing their easy capture.

Archaeological resources associated with Native American occupation are less numerous in the eastern portion of the Plan Area. This is generally due to drier conditions and less vegetation and wildlife in these areas. Areas supporting the highest density of Native American resources include the Whitewater Canyon in the San Gorgonio Pass, Mission Creek northwest of Desert Hot Springs, Big Morongo Canyon the shoreline of Ancient Lake Cahuilla, and the numerous vegetation scarps with desert fan palms and mesquite associated with the diked groundwater along the San Andreas Fault Zone. (Arkush 1989, Drover 1989). Most sites associated with these areas were typically small gathering and processing sites characterized by grinding stones, milling features and occasional large rock-lined roasting pits (Bean and Saubel, 1972; Bean 1972; Barrows, 1900).

The Historic Period

Historically significant sites are generally more than forty-five to fifty years of age, but range from the period of the earliest European contacts (i.e., around the end of the 1700's to about the end of World War II). Types of potentially significant sites range from permanent trails and highways to living areas and small-scale remains of single activities. The following paragraphs discuss the historic period and identify significant historical resource areas.

Earliest European History of the Plan Area

The Coachella Valley region was first explored by Spaniards making forays northward from Mexico along the coast and the Colorado River. The earliest documented period of Spanish influence began in 1769 when explorers moved into what was then referred to as Upper California to establish a military, political, and religious foothold. The development of land routes to supply inland missions brought the Spanish into the region in the 1770's.

The Mexican and Post Mexican-American War Periods

In 1821, although there is no historical evidence of settlements in the Plan Area, the region fell under the influence of Mexico as it secured its independence from Spain under the Treaty of Cordova. The issuance of land grants and the establishment of agricultural enterprises, under the organization of rancheros, dominated the region for the next thirty years. The defeat of Mexico in the Mexican-American War and the signing of the Treaty of Guadalupe Hidalgo in 1848 ushered in a new era. With the region under American control and the discovery of gold in California, the stage was set for admittance of California into the union in 1850. This led to the influx of people from many countries. The first U.S. Government Surveys were made in the

Coachella Valley in 1855-56 by surveyors Henry Washington, John La Croze, and James G. McDonald, who observed a number of trails and roads crossing the area.

The Bradshaw Trail and Other Routes

The most prominent trail identified in the government surveys was one labeled as a "road" on the survey maps and ran along the course of the Whitewater River. It was joined by a trail that skirted the base of the Santa Rosa Mountains in a more southerly course. The surveyors also noted an "Indian Trail" apparently passing through the northeastern portion of the study area on Edom Hill. By the 1880s, the trail along the base of the Santa Rosa Mountains had become the main route for travelers passing through the study area. And by 1885 it had been identified as part of the road from San Bernardino to the Colorado River and was to become known as the Bradshaw Trail, one of the most important desert trails in Southern California during the 1860s and 70s.

Identified as a historic route between Los Angeles and the Palo Verde Valley, the Bradshaw Trail was in fact an ancient Indian trade route variously named the Cocomaricopa Trail or the Halchidoma Trail. In 1857, a small party led by Dr. Isaac W. Smith surveyed portions of the trail, including that segment running through today's cove communities (although the lack of water limited its use by travelers). By 1862, however, the William David Bradshaw exploration party had "rediscovered" the route, which for the next few years served as the primary access to the gold fields along the Colorado River.

By the late 1870s, stage coach services gradually discontinued with the depletion of the gold mines and the expansion of the railroads into the region. Railroads eventually connected the coast directly to Yuma, resulting in the second transcontinental railroad authorized by Congress in 1866 and later known as the Sunset Route. It was not until after the turn of the century that the Cocomaricopa Trail was revived as the Bradshaw Highway, ultimately becoming State Highway 111.

Most of the Plan Area remained unsettled and devoid of any evidence of land development until the turn of the twentieth century. The only features recorded during that time were the Southern Pacific Railroad, Bradshaw Trail, and another trail along the base of the Little San Bernardino Mountains at the mouth of West Wide Canyon. Several railroad construction workers' camps were present by the early 1900s.

In 1926, the Federal government established the National Highway System, which included the Ocean-to-Ocean Highway that ran through the valley along its central axis and with portions "along the Southern Pacific Railroad". Exact dates of construction are unclear, with archival sources tracing it to the late 1930s. Right-of-way for this highway was granted by the Federal

government in November of 1938, which was delineated as U.S 60/70/99. Proof of construction was apparently never filed on this segment of the highway. A segment of Varner Road running through the center of the valley was part of the original Ocean-to-Ocean Highway

During the 1910s, the County of Riverside improved the Bradshaw Trail into a county trail (the forerunner of today's Highway 111), which further paved the way for settlement and growth in the "cove communities" region of the Coachella Valley. By 1914, a railroad station named Edom, which contained a post office, was established in the Plan Area. In 1939, the post office was moved to the nearby community of Thousand Palms and renamed after that community, which by that time had a population of about 20 permanent residents and 15 to 20 winter residents.

Non-Indian settlement in the Coachella Valley began in earnest in the 1870s, with the establishment of railroad stations along the Southern Pacific line. The rate of settlement increased significantly in the 1880s after public lands were opened for claims under the Homestead Act, Desert Land Act, and other Federal land laws. With the availability of underground water resources, farming became the dominant economic activity in the Coachella Valley.

The date palm was introduced to the area in 1904 and by the late 1910s the date industry was firmly established, extending from present-day Cathedral City south beyond Indio, which became the central agri-business district. The date palm became the area's main agricultural staple and the Coachella Valley became known as the "Arabia of America". However, as the easily accessible groundwater resource was tapped, its limitations were quickly realized and further growth of agriculture was limited until the completion of the Coachella Branch of the All-American Canal in 1949, which brought Colorado River water to the valley for irrigation and other uses.

The European settlement of the Coachella Valley was also given significant impetus by the early development efforts of John Guthrie McCallum and others in the Palm Springs area, starting about 1872. Surveys and land divisions began in about 1884, with the settlement initially called "Palm City" and later changed to Palm Springs in 1887. Surface water from the Whitewater River and Snow Creek provided a dependable supply and supported rapid development. By 1890, the population had grown sufficiently to support the establishment of a U.S. Post Office. And by the 1920s and 30s, Palm Springs became a favorite retreat for those in entertainment and show business, spawning a development trend that continues to this day.

By the 1920s, the resort industry had begun to spread throughout the Coachella Valley. The construction of the La Quinta Hotel in 1926 by Walter H. Morgan and his Desert Development

Company provided the impetus for more "winter resort" development in the La Quinta area. In the early 1930s, E.S. "Harry" Keiner began subdividing the Cove area and marketing the sale of furnished weekend homes. Although the rest of the La Quinta area remained predominantly rural during this period (harboring scattered ranch-style houses), the Plan Area experienced rapid growth during the post World War II era. The City of La Quinta was incorporated on May 1, 1982, and in recent years has been recognized as the fastest growing city in California.

The construction of the Colorado River Aqueduct by the MWD between 1933 and 1939 brought a number of permanent and temporary features to the northernmost portion of the Plan Area. Among these were roads, power transmission lines, waterlines, and construction camps. The remains of one of eight construction camps (i.e., Camp Thousand Palms) has been discovered at the mouth of an un-named canyon in the foothills of the Little San Bernardino Mountains.

By 1941, several rural settlements were established in the area between the Southern Pacific Railroad (now Union Pacific) and the Indio Hills. Among these were Thousand Palms, Edom, Myoma, the Ferguson Ranch, the Thousand Palms Oasis, the Bar Bell Ranch, the Chuckwalla Ranch, and the Hunter Palms Ranch. The small community of Palm Village was established south of the railroad on the north side of Highway 111 in present day Palm Desert. General George S. Patton selected Palm Village as the site for his motor pool during World War II, as it was in close proximity to the Desert Training Center used for military training during the war.

Documentation of Cultural Resources

Archaeological studies and surveys are prepared to satisfy the requirements of current county, State (CEQA), and Federal (NEPA) laws and guidelines pertaining to the identification and preservation of prehistoric and historic sites on property proposed for development. As discussed in Section 4 of this EIR/EIS, the lead agency is obligated to determine what project-related activities, if any, have the potential to adversely impact known or suspected sites of archaeological, historical, and/or cultural significance within the Plan Area. Projects involving a Federal agency, Federal funding or other Federal assistance must conform to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. As set forth in 30 CFR 60.4, the Federal government has established criteria to determine a site's eligibility for the National Register of Historic Places.

According to California Public Resources Code (PRC Section 5020.1(j) a:

> "…'historical resource' includes, but is not limited to any object, building, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic,

agricultural, educational, social, political, military, or cultural annals of California".

The Eastern Information Center (EIC) at the Archaeology Research Unit of the University of California-Riverside is the local repository for local field surveys and other cultural records developed for the Plan Area.

An overall review of existing records indicates that substantial portions of the Plan Area have been surveyed for cultural resources since the 1970s, particularly in those areas where resort and other development has been concentrated in the past several decades. However, almost all of the MSHCP Plan Area proposed for conservation is comprised of lands that have had little or no development and, therefore, have not been extensively surveyed. While the type and extent of archaeological resources occurring in these areas can be extrapolated from current knowledge and understanding, specific information on resources in these areas is largely unknown.

Archaeological Sites

1. Village Sites: Villages are the most significant sites identified. They are generally located in areas that offer optimal climate, food, water, and materials. Occupied for extended periods of time, village sites are recognized by rich deposits of organic, ashy soil often containing artifacts and plant and animal remains.
2. Campsites and Temporary Habitation Sites: These sites are similar to villages but are shallower and contain fewer artifacts.
3. Milling Stations: These are sites in which grinding, pounding, and processing was performed on food materials.
4. Lithic Quarries: Quarries are outcrops of certain types of rock used in tool-making.
5. Lithic Reduction Sites/Lithic Workshops: Lithic workshops are areas in which rocks were reduced and shaped into tools and other useful materials.
6. Aboriginal Trails: The remains of Indian trails that were likely used as important travel corridors.
7. Sparse Lithic Scatters: These sites include the remains of stone-making activities.
8. Pot Drops: Areas in which pottery fragments from the breakage of a single vessel are identified.
9. Rock Cairns and Rock Art Sites: A rock cairn is a collection or mound of stones that served as a part of a screen, or landmark. Rock art sites include pictographs, petroglyphs, and cupule boulders.

Historic Sites

(A historic site includes any area more than 45 years old that contains evidence of human activity.)

1. Homes/Ranches: These sites include intact structures or the remnants of house foundations, wells, fences and rock walls, out buildings, and other features associated with living activities.
2. Roads/Trails: Corridors that were important transportation and/or trading routes.
3. Mining Sites: Mining sites include mine shafts, equipment associated with mining, and shallow pits in which minor prospects may have occurred.
4. Trash Dumps/Can Scatters: These sites contain trash that can be accurately dated.

The California Office of Historic Preservation (OHP) maintains the California Register, which includes all properties listed in or officially determined to be eligible for listing the National Register. The OHP also maintains the register of California Historical Landmarks for properties of statewide historic importance, and Points of Historical Interest for properties of county-wide or regional importance.

3.10 Parks, Trails, and Recreation

Among the Coachella Valley's most valued and valuable assets are its unique and impressive scenic and ecological resources, which attract thousands of visitors each year. Much of the valley's recreational appeal is due to a combination of distinctive topography, temperate climate, desert wildlife and vegetation, and proximity to large public parks, monuments, and recreation lands. The preservation and promotion of the region's natural and recreational resources is critical to maintaining its desirability as a world-class vacation destination.

Regional Parks and Conservation Areas

With its extensive ecological and scenic resources, the Coachella Valley contains a wide range of regional parks, recreation, and conservation areas. Regional parks are generally defined as large natural areas, which serve entire regions with populations of 50,000 or more. In some cases, they may be state or national park sites. Within the Coachella Valley, regional parks are managed by numerous public and quasi-public agencies, including the BLM, National Park Service, U.S. Forest Service (USFS), California Department of Fish and Game (CDFG), California State Parks Department, and the University of California Natural Reserve System.

Many of these areas are managed strictly for conservation purposes, such as habitat protection or preservation of land in its natural state. Others are developed and operated with the full intent of

providing recreational opportunities to the public. The Coachella Valley MSHCP document provides a comprehensive listing of public and private conservation areas contained within the MSHCP Plan Area (see Plan Table 8-7) and an exhibit identifying the location of each area (see Plan Figure 8-5). Following are descriptions of those sites in the Plan Area that are most utilized by the public for recreational purposes.

Joshua Tree National Park

Joshua Tree National Park is located along the northeastern boundary of the Coachella Valley and managed by the National Park Service, encompassing 794,000 acres in the Little San Bernardino Mountains,. Approximately 170,650 park acres are located within the MSHCP Plan Area, 12,000 of which are private holdings, while the remaining 137,509 acres are managed by the National Park Service.[97] The Park is accessible via the Cottonwood Springs entrance along Interstate-10 near Chiriaco Summit, and two entrances along State Highway 62 in the High Desert. The park attracts an average of 1.25 million visitors a year, with two peak seasons extending from February through May, and October through November.[98]

The park includes the transition zone between the Mojave and Sonoran deserts and contains diverse natural communities that support numerous common and special-status wildlife species. It also contains some of the most interesting geologic formations in Southern California, Native American rock paintings and pottery, and abandoned mines and ranches from the nineteenth and twentieth centuries. More than 80% of the park is designated as wilderness. It offers excellent opportunities for hiking, camping, rock climbing, horseback riding, interpretive walks, and wildlife photography.

Santa Rosa and San Jacinto Mountains National Monument

In October 2000, the President of the United States signed legislation creating the Santa Rosa and San Jacinto Mountains National Monument. The new Monument encompasses approximately 272,000 acres within the Santa Rosa and San Jacinto Mountains, including lands within and adjacent to the MSHCP Plan Area. The Monument is managed by a number of public and quasi-public agencies, including BLM, USFS, CDFG, the California Department of Parks and Recreation, Agua Caliente Band of Cahuilla Indians, and Coachella Valley Mountains Conservancy, in cooperation with Riverside County, adjacent cities, and private landowners.

The area was previously designated in 1990 as the nation's fourth National Scenic Area, in recognition of its valuable scenic, cultural, recreational, and wildlife resources. The designation

97 "Public Review Draft, Coachella Valley Multiple Species Habitat Conservation Plan/Natural Communities Conservation Plan," prepared by Coachella Valley Mountains Conservancy, October 2004.

98 "Recreation and Cultural Access Study," prepared by Terra Nova Planning & Research, Inc. for the Coachella Valley Association of Governments, 2000.

as a National Monument further demonstrates the area's value as recognized by Congress and provides for further protection of nationally significant biological, cultural, recreational, geological, wilderness, and educational resources. Visitor use includes hiking, backpacking, camping, wildlife viewing, and horseback riding.

Mount San Jacinto State Park

The Mount San Jacinto State Park is located in the San Jacinto Mountains and includes Mt. San Jacinto (10,804 feet above sea level), the highest point in the San Jacinto Range and the second highest in Southern California. Much of the park is designated as wilderness and it offers a number of hiking, backpacking, and camping opportunities, with 54 miles of hiking trails and 11 primitive campsites. It is accessible from the Palm Springs Aerial Tramway and the town of Idyllwild. About 30,000 visitors access the park annually from Idyllwild, while more than 373,000 visitors access it via the Tramway.[99]

Big Morongo Canyon Preserve/ACEC

The Big Morongo Canyon Preserve/Area of Critical Environmental Concern (ACEC) encompasses 29,000 acres in the Little San Bernardino Mountains northwest of the City of Desert Hot Springs. It is partially contained within the MSHCP Plan Area and is managed by the BLM, straddling the jurisdictional boundary between Riverside and San Bernardino counties. The Preserve is accessible from State Highway 62 in Morongo Valley or the Canyon Trail trailhead on Indian Avenue in Desert Hot Springs. It is one of the few remaining desert wetlands on the Pacific Migration Flyway and is considered one of the top bird-watching locations in the country. Recreational opportunities include hiking, bird watching, interpretive tours, and horseback riding. The Preserve attracts an estimated 30,000 visitors annually.[100]

Salton Sea State Recreation Area

The Salton Sea State Recreation Area is managed by the California Department of Parks and Recreation and is located on the northeast shores of the Salton Sea. The Salton Sea is an inland saline lake, which is a modest and more recent stand of prehistoric Lake Cahuilla. More than 4 million birds are estimated to use the Salton Sea each day in the winter, which surpasses any other resource area in the nation. The State Recreation Area includes more than 1,400 campsites, hundreds of day-use picnic sites, trails, a visitor center, playground, and boat ramp. More than 150,000 people visit the recreation area each year to participate in boating, water-skiing, fishing, jet skiing, hiking, bird watching, sailboarding, and watercraft races.[101] Interpretive programs and lecture presentations are offered at the Sea and Desert Visitor Center.

99 Ibid.
100 Ibid.
101 Ibid.

Coachella Valley Preserve (Thousand Palms)

The Coachella Valley Preserve (Thousand Palms) is one of three preserves that comprise the larger Coachella Valley Preserve System. The Preserve System includes more than 20,000 acres and was established for the protection of desert sand dune habitat, which is critical to the survival and continued viability of the federally listed Coachella Valley fringe-toed lizard. The Thousand Palms Preserve consists of 17,651 acres within the Indio Hills, north of the City of Palm Desert. The preserve includes the Thousand Palms Oasis and other fan palm groves located along the San Andreas Fault Zone, as well as springs and pools that harbor a variety of rare and sensitive wildlife and plant species. The preserve is also used for nature interpretation, astronomy gatherings, and other activities. Recreational opportunities also include hiking, birding, and horseback riding.

Indian Canyons

The Indian Canyons are located in the City of Palm Springs, but are part of the Agua Caliente Band of Cahuilla Indians reservation lands and are managed by the Agua Caliente Tribe. The Canyons are listed in the National Register of Historic Places and are home to the largest stand of fan palms in the world. The park includes four canyons that are accessible to the public: Murray, Andreas, Tahquitz, and Palm Canyon. Recreational opportunities include hiking, horseback riding, wildlife viewing, and photography. Interpretive programs are offered at the visitor center.

Wilderness and Other Conservation Areas

The Coachella Valley contains numerous other public conservation areas for which the primary management objective is species' habitat protection or the preservation of land in its natural state. Although human access to several of these preserves may be prohibited, light recreational uses (e.g., day hiking, backpacking, hunting) are permitted on others. Such activities are controlled through adopted management programs. Among the sites allowing limited recreational opportunities are the Mecca Hills Wilderness, Orocopia Mountains Wilderness, San Gorgonio Wilderness, San Jacinto Wilderness, Santa Rosa Wilderness, Willow Hole/Edom Hill ACEC, Whitewater Canyon ACEC, and Carrizo Canyon Ecological Reserve. More intensive land uses (e.g., grazing, mining, and energy production) are permitted on some lands in accordance with applicable management plans.

Local Parks

Local parks are generally smaller in size than regional parks and serve the recreational needs of local residents. They range from "mini" or "pocket" parks to "neighborhood" and "community" parks, based on their size, permitted activities, and the facilities they provide. These parks are typically owned and managed by local municipalities or special districts, such as the Riverside

County Regional Parks and Open Space District or the Coachella Valley Recreation and Parks District.

Riverside County Regional Parks and Open Space District

The Riverside County Regional Parks and Open Space District is an independent district governed by the Riverside County Board of Directors. This district acquires, manages, and protects regional parks and trails, recreation areas, and archaeological and historic sites in Riverside County. The District manages two facilities in the Coachella Valley: Fish Traps Archaeological Site and Lake Cahuilla County Park. The Fish Traps Archaeological Site is a 208-acre undeveloped site approximately 10 miles south of Indio. Although it is rich in historical and educational value and harbors sensitive cultural resources, it is not widely publicized or utilized by the public for recreational purposes. Lake Cahuilla County Park encompasses 845± acres at the base of the Santa Rosa Mountains in the southern portion of the City of La Quinta. It includes 710 acres of parkland and the 135-acre Lake Cahuilla owned and managed by CVWD. Lake Cahuilla was constructed in the 1960s as the terminal reservoir of the Coachella Branch of the All-American Canal. The park offers a wide range of recreational opportunities, including camping, fishing, horseback riding, hiking, swimming, picnicking, and non-motorized boating. Approximately 3,000 visitors use the park each month.

***Coachella Valley Recreation and Park District*[102]**

The Coachella Valley Recreation and Park District owns, manages, and/or maintains public park and recreation facilities within a 1,830-square mile area in the eastern Coachella Valley. Its service area extends from Thousand Palms on the west, to east of Chiriaco Summit, north to the Riverside/San Bernardino County boundary, and south to the Riverside/Imperial County boundary. Facilities include 100± acres of mini, neighborhood, and community parks, as well as numerous ball fields, tennis courts, basketball courts, picnic facilities, playgrounds, swimming pools, boxing clubs, community centers, roller hockey rinks, and adult and youth education and fitness programs. Facilities are located within the cities of Palm Desert, La Quinta, Indio, and Coachella, and the unincorporated communities of Thousand Palms, Thermal, Mecca, Salton Sea, and others. Several facilities are shared with or operated in conjunction with school district facilities.

Parklands within Municipalities

Each incorporated city in the Coachella Valley owns and maintains parks and recreation facilities. The table below (*Table 3-13*) summarizes the number and approximate acreage of municipal parks in the valley. Some are cooperative-use facilities that are shared with school

[102] "Coachella Valley Recreation and Park District Master Plan, 1998," prepared by V2C Group, Inc. for the Coachella Valley Recreation and Park District, adopted December 9, 1998.

districts. The data indicate that there are approximately 53 municipal parks encompassing 509± acres throughout the valley.

TABLE 3-13
Municipal Parks in the Coachella Valley

City	No. of Municipal Parks	Approximate Park Acreage
Cathedral City	5	27
Coachella	6	26
Desert Hot Springs	7	47
Indian Wells	2	2
Indio	8	50
La Quinta	9	67
Palm Desert	8	150
Palm Springs	5	130
Rancho Mirage	3	10
Total	53	509

Source: Parks and Recreation Element of City General Plans.

Trails in the Plan Area

The Coachella Valley MSHCP Plan Area encompasses and is in proximity to county, State, and Federal parks and protected lands, which are home to an extensive system of pedestrian, equestrian, and mountain bike trails providing a variety of recreational opportunities and experiences for the area's residents, visitors, and tourists. More than 100 trails occur in and near the Coachella Valley, giving visitors access to desert and mountain wilderness. Many people utilize this trail system for recreational activities like hiking, backpacking, wildlife viewing, and horseback riding. People have been encouraged to use the trails, although conservation efforts have limited access to certain areas at specified times of the year. Interpretive signs and brochures have been developed for some of the trails to enhance understanding and increase appreciation for the surrounding natural environments, and to generate support for conservation efforts.

The following discussion provides a description of the major trails in and around the Plan Area, including most of those proposed for management under the Santa Rosa and San Jacinto Mountain Trails Plan which provides hundreds of miles for hiking, equestrian, and mountain bike use. While these trails provide enjoyable activities for residents and visitors, many are located within protected environments or conservation areas that are being managed to protect

and preserve natural communities. Currently, trails and trail use restrictions are imposed through a variety of permits and agreements entered into by the agency managing these lands. Management agencies have imposed use conditions, including the following: restricting motorized off-road vehicles, keeping dogs on a leash and prohibiting them from certain areas, restricting certain types of uses, and limiting access during sensitive periods or seasons.

Wilderness Trails

More than 60 trails provide visitors and residents with direct access to desert and mountain wilderness in the Coachella Valley. Wilderness trails are used for various recreational activities, including hiking, backpacking, wildlife viewing, mountain biking, and horseback riding, and they offer varying degrees of difficulty. Interpretive signs, brochures, and maps are often available to enhance the public's understanding and appreciation of the surrounding environment.

Although a few wilderness trails facilitate jeeps and other motorized vehicles, most are located within protected conservation areas with restricted trail use. Restrictions may include prohibitions on motorized off-road vehicle use, restricted or prohibited mountain bike use, restricted or prohibited access during sensitive wildlife nesting/breeding and bighorn lambing seasons, limitations on group permits and recreational events, and leash requirements or the complete banning of dogs. Trails management is especially important in bighorn sheep habitat in the Santa Rosa and San Jacinto Mountains. The proposed MSHCP includes four alternatives for the long-term management of trails in and around the valley. The impacts associated with each alternative are evaluated in Section 4 of this document.

The most well-developed trail system occurs in the Santa Rosa Mountains and consists of approximately 35 trails, extending for a combined length of nearly 120 miles. The Pacific Crest National Scenic Trail, which extends from Canada to Mexico, traverses both the Santa Rosa and San Jacinto Mountains. Five additional trails connect primitive campgrounds within the San Jacinto Wilderness and State Park. BLM manages 3 trails in the Mecca Hills and Box Canyon area and 6 trails in the Big Morongo Canyon Preserve. The Coachella Valley Thousand Palms Preserve includes a series of trails leading to palm oases. Joshua Tree National Park contains numerous trails, including 4 in the southerly (Coachella Valley) portion of the park. Lake Cahuilla County Park provides access to the Morrow Trail, which leads to the larger Boo Hoof trailhead in the Santa Rosa Mountains.

MSHCP

Santa Rosa and San Jacinto National Monument

The following trails in the National Monument are accessible from the cities of the Coachella Valley, and extend south and west in the Santa Rosa and San Jacinto Mountains.

Alexander Trail is a 1.8-mile trail that originates near the Indian Canyons Toll Gate in Palm Springs and ranges between 600 and 800 feet above sea level. It ends at its intersection with the Palm Canyon Trail. This trail accommodates hiking and equestrian use.

Andreas Trail is a 1-mile beginner's trail that begins at an elevation of 760 feet above sea level near the Indian Canyons Toll Gate and climbs the alluvial fan into Andreas Canyon. It accommodates hiking and equestrian use.

Araby Trail is a 0.8-mile moderate trail that begins at the Rim Crest/Southridge neighborhood at an elevation of 400 feet above sea level, and connects to the Berns Trail. It rises 800 feet, and provides spectacular views of the Valley floor. This trail accommodates hiking and equestrian use.

Art Smith Trail is an 8-mile strenuous trail that begins at an elevation of 1,000 feet above sea level, and rises to 2,300 feet above sea level. It begins at State Highway 74 and Dead Indian Canyon in the City of Palm Desert, and proceeds northwesterly to connect with trails in Palm Canyon via the Hahn Buena Vista Trail and Dunn Road. The trail accommodates hiking, mountain biking, and equestrian use. A parking area is provided off Highway 74 near the Santa Rosa and San Jacinto Mountains National Monument Visitor Center.

Bighorn Overlook Trail is located in Rancho Mirage immediately south of Rancho Mirage City Hall. The 0.2-mile trail leads from the upper parking lot at City Hall to an overlook area which provides views of the Magnesia Spring Ecological Reserve in the foothills. The trail is open to hikers only.

Bear Creek Canyon/Oasis Trail is a 3.1-mile trail that rises from an elevation of 340 feet to more than 2,600 feet above sea level. It begins at the southern end of La Quinta Cove and provides a strenuous climb to a palm oasis in the Santa Rosa Wilderness. The trail accommodates hiking and equestrian use.

Berns Trail connects the Garstin and Shannon Trails to the Araby, Eagle Canyon, and Goat Trails. This 0.9-mile trail begins at the top of Garstin Trail at an elevation of 1,500 feet, and rises 200 feet to Araby Trail. It accommodates hiking and equestrian use.

Boo Hoff Trail begins at Lake Cahuilla in La Quinta and continues for 9 miles through Guadalupe and Devil Canyons. It also connects with the La Quinta Cove to Lake Cahuilla Trail. The trail accommodates hiking and equestrian use.

Bud Furer Trail is a 2.5-mile trail that begins at the eastern end of Escoba Road in Palm Springs and follows the Tahquitz Wash through Palm Springs. It ends at its connection to the Carl

Lykken Trail at the mouth of Tahquitz Canyon. The trail accommodates hiking, bicycling, and equestrian use.

Cactus Spring Trail begins at an elevation of 4,000 feet in Pinyon Flat and proceeds east, then southeasterly, for 4.1 miles through Horse Thief Canyon to Agua Alta Springs, ending at Martinez Canyon south of La Quinta. The trail accommodates hiking and equestrian use.

Coffman Trail can be accessed from the Indian Canyons south of Palm Springs. The 3-mile trail climbs to the southwest along the south side of Murray Canyon, beginning at an elevation of 760 feet and ending at about 1,000 feet above sea level. The trail accommodates hiking and equestrian use.

Clara Burgess Trail is 2.2 miles long, begins at an elevation of 900 feet, and rises to an elevation of 2,300 feet above sea level reaching the summit of Murray Hill. The trail is accessed from either the Wild Horse Trail or the Eagle Canyon and Goat Trails by hikers, mountain bikers, and equestrians.

Dry Wash Trail is a jeep trail 2.7 miles in length that connects Palm Canyon and Dunn Road. The trail rises from an elevation of 1,400 feet to 2,200 feet in the mountains above Cathedral City.

Dutch Charlie Trail is a 2-mile trail that rises from upper Palm Canyon south of Palm Springs, starting at an elevation of 2,600 feet and rising to 3,500 feet above sea level to connect with Dunn Road. The trail accommodates hiking, mountain bicycle, and equestrian use.

Eagle Canyon Trail is a 2-mile hiking and equestrian trail west of Cathedral City Cove that can be accessed from the Garstin, Shannon, or Araby Trails. Approximately 0.3 mile of the trail is located on non-Indian lands.

Fern Canyon Trail can be accessed from either the Palm Canyon or Wild Horse Trails and extends for a length of 2.3 miles, rising from 760 feet above sea level to 1,220 feet above sea level. The trail accommodates hiking and equestrian use.

Garstin Trail runs for 1.2 miles connecting with the Shannon, Berns, and Wild Horse Trails, and ranges in elevation from 740 to 1,500 feet above sea level. The trailhead is located on Bogert Trail in Palm Springs near the eastern end of the Bogert Bridge. The trail accommodates hiking and equestrian use.

Hahn Buena Vista Trail begins at an elevation of 1,400 feet at the Vandeventer Trail, rises to 2,650 feet, and connects with the Art Smith Trail at Dunn Road. This 2.3-mile trail accommodates hiking, mountain biking, and equestrian use.

Henderson Trail can be accessed from either the Palm Canyon Wash or the eastern end of the Bogert Bridge on Bogert Trail. The trail extends for a distance of 1 mile along the toe of slope and Palm Canyon Wash ending near Highway 111. The trail accommodates hiking and equestrian use.

Jo Pond Trail rises from 2,200 feet to 6,700 feet at the Pacific Crest National Scenic Trail, and then descends to Morris Ranch Road near Highway 74 via the Cedar Springs Trail over a total distance of 12 miles. It can be accessed from either the Pelton or West Fork trails via the Indian Canyons, and is available for hiking and equestrian use.

Live Oak Spring Trail can be accessed from the Pacific Crest National Scenic Trail trailhead on Highway 74 south of Palm Desert. The trail runs easterly for 8 miles at an elevation ranging from 4,800 to 5,900 feet. The trail accommodates hiking, mountain bike and equestrian use.

Lykken Trail North extends northerly for a distance of 3.1 miles at an elevation ranging from 520 to 1,400 feet above sea level, beginning at the western end of Ramon Road. The trail accommodates hikers, mountain bikers, and equestrians, and connects to the 1.1-mile Palm Springs Desert Museum Trail, which starts in the north parking lot of the Museum and climbs steeply for an elevation gain of 800 feet.

Lykken Trail South begins at the west end of Mesquite Road and extends southerly for 2.5 miles to South Palm Canyon Drive, ending near the site of the old Canyon Hotel. Ranging in elevation from 560 to 1,460 feet, the trail accommodates hiking and equestrian use.

Maynard Mine/Rod Johnson Trail begins in Andreas Canyon, extends for 4 miles, and rises 2,000 feet. It accommodates hiking and equestrian use. Access to this trail is via the Indian Canyons.

Museum Trail extends for 0.9 miles from the Palm Springs Desert Museum to the North Lykken Trail. The trail is for hiking only and steeply rises 800 feet above the desert floor.

Murray Canyon Trail can be accessed from a trailhead 1 mile south of the Indian Canyons Toll Gate at the south end of Palm Canyon Drive in Palm Springs. The trail extends for 1.8 miles and is available for hikers and equestrians.

Pacific Crest National Scenic Trail extends from Mexico to Canada. In the San Jacinto Mountains, it leads hikers and equestrians from Snow Creek Village north of Palm Springs to Highway 74 south of Palm Desert. This portion of the trail begins and ends at elevations of 1,200 and 4,800 feet, though intermediate points along the trail climb to much higher elevations.

Palm Canyon Trail is a 15-mile trail accessed from the Trading Post in the Indian Canyons south of Palm Springs. The trail rises from an elevation of 800 feet to 4,300 feet.

Pelton Trail is accessible from Murray Canyon, and extends deep into the San Jacinto Mountains for a distance of 4 miles to its intersection with the West Fork and Jo Pond Trails. The trail accommodates hiking and equestrian use.

Shannon Trail extends for 1.2 miles from the Garstin and Berns Trails to the Henderson Trail, dropping in elevation from 1,540 feet to 780 feet. The trail accommodates hiking and equestrian use.

Skyline Trail can be accessed from either the Museum or North Lykken Trails, and runs for a distance of 8 miles to Long Canyon near the upper station of the Palm Springs Aerial Tramway. Elevations of this trail range from 1,200 to over 8,000 feet. The trail accommodates hiking only.

Vandeventer Trail begins at the south end of the Victor Trail in Palm Canyon and extends for 2 miles in an easterly direction to end at the Hahn Buena Vista and Fern Canyon Trails. The trail accommodates hiking and equestrian use.

Victor Trail begins at an elevation of 800 feet and rises to 1,200 feet above sea level. It begins at the intersection of the Palm Canyon and Fern Canyon Trails in the Indian Canyons, and extends for 1 mile to the Vandeventer Trail. The trail accommodates hiking and equestrian use.

Wild Horse Trail runs for 3.2 miles from Smoketree Mountain at an elevation of about 1,800 feet to its intersection with the Fern Canyon Trail, descending 600 feet. The trail accommodates hiking, mountain biking, and equestrian use.

West Fork Trail is 4 miles in length, starting at the Trading Post in the Indian Canyons and rising 1,500 feet. The trail accommodates hiking and equestrian use.

The following list of trails and trail segments and their respective mileages occur within Essential bighorn sheep Habitat in the Santa Rosa and San Jacinto Mountains. These trails comprise the named trails addressed by the proposed Santa Rosa and San Jacinto Mountains Trails Plan:

Trails Addressed by the Trails Plan		Miles*
1.	Pacific Crest National Scenic Trail	43
2.	North Lykken Trail	3.1
3.	Museum Trail	0.9
4.	Skyline Trail	2.3
5.	South Lykken Trail	2.5
6.	Picnic Table Trail	1.3
7.	Araby Trail	0.8
8.	Shannon Trail	1.2
9.	Berns Trail	0.9
10.	Garstin Trail	1.2
11.	Henderson Trail	1.0
12.	Alexander Trail	1.8
13.	Goat Trails	3.5
14.	Eagle Canyon Trail	0.3
15.	Wild Horse Trail	3.2
16.	Fern Canyon Trail	2.3
17.	Vandeventer Trail	3.3
18.	Clara Burgess Trail	2.2
19.	Hahn Buena Vista Trail	2.3
20.	Dry Wash Trail	2.7
21.	Dunn Road	12.0
22.	Dry Wash to Vandeventer Trail	0.9
23.	Thielman Trail	1.6
24.	Palm Canyon Trail	6.6
25.	Indian Potrero Trail	1.9
26.	Potrero Canyon Trail	2.8
27.	Cathedral Canyon Trail	1.8
28.	Bighorn Overlook Trail	0.2
29.	Mirage (“Bump and Grind”) Trail	1.9
30.	Art Smith Trail (including Dead Indian Canyon)	8.0
31.	Carrizo Canyon Trail	5.2
32.	Schey Trail	0.8
33.	Eisenhower Mountain Trail	4.0
34.	Bear Creek Canyon Trail	1.3
35.	Bear Creek Oasis Trail	1.8
36.	Boo Hoff Trail	6.0
37.	La Quinta Cove to Lake Cahuilla Trail	2.4

Trails Addressed by the Trails Plan		Miles*
38.	Guadalupe Trail	3.7
39.	Cactus Spring Trail	4.1
40.	Martinez Canyon Trail	7.1
Total Distance		**115.2**

San Jacinto State Park and Wilderness

The Pacific Crest National Scenic Trail connects to a number of trails located within the San Jacinto State Park and Wilderness at the top of the Palm Springs Aerial Tramway. A number of campgrounds within the area are connected by the Deer Springs Trail, Seven Pines Trail, Marion Mountain Trail, Devil's Slide Trail, South Ridge Trail, and others. The Deer Springs Trail connects the State Park and Wilderness to the town of Idyllwild. The trails are accessible to hikers and equestrians. Parking is available at the base station for the Tram, and these trails are most easily accessed from the Tramway's Mountain Station. A ranger station in Long Valley provides hiking permits and directional brochures.

Mecca Hills and Box Canyon

The Mecca Hills are located on the northeastern edge of the Coachella Valley, east of the Coachella Branch of the All American Canal. A series of trails take hikers to Painted Canyon, Ladder Canyon, and Rainbow Rocks. These trails offer less elevation gain than those in the Santa Rosa Mountains, ranging from 400 to 1,000 feet. They provide a broad range of difficulty from easy to strenuous. Trailheads and trails are inconsistently marked. Parking is available at the end of Painted Canyon Road, a dirt thoroughfare, as well as along the paved Box Canyon Road.

Coachella Valley Thousand Palms Preserve

The Thousand Palms Preserve is a 19,000-acre site that is part of the larger Coachella Valley Preserve system. Near the visitor center, interpretive signage is displayed and self-guided trail brochures are provided which offer information on the one-mile long McCallum Trail. Other trails include the 2.25-mile Moon Country Trail, as well as the trails leading to the Indian, Pushawalla Palms (3 miles), Horseshoe, Hidden Palms (1.75 miles), and Willis Palms (2.25 miles) oases. Horseback riding is permitted on the Willis, Horseshoe, and Hidden Palms Trails. These trails range in elevation from 500 feet at the visitor center to 700 feet above sea level at Pushawalla Palms.

The Living Desert

The Living Desert offers both paths within the park and access to the Eisenhower Peak loop trail. The 6 mile trail offers a moderate level of difficulty with an elevation change of 700 feet. Access

from The Living Desert is well marked, and information on both the walks within the park and the trail to Eisenhower Peak is available at the main building.

Joshua Tree National Park

Although the primary access points for Joshua Tree National Park occur from the High Desert communities of Yucca Valley, Joshua Tree, and Twentynine Palms, several trails occur north of Desert Hot Springs that lead into the Park's western mountains. These are listed below.

Long Canyon Trail is accessed from a trailhead north of Long Canyon Road. The trail extends into the Park, and although strenuous, can serve as access to the facilities and trails within the park.

Blind Canyon Trail can be accessed from Santa Cruz Road at the north end of Desert Hot Springs. The trail branches into several directions and connects to the Long Canyon Trail.

Other Trails near Joshua Tree National Park

Little Morongo Canyon Trail, also known as the Kickapoo Trail, is a jeep trail that extends northerly for a number of miles from the north end of Little Morongo Road to Yucca Valley.

Big Morongo Canyon Trail extends for 5 miles from Indian Avenue to the Big Morongo Preserve in Morongo Valley (see below). The trail is accessible to both hikers and equestrians.

Big Morongo Canyon Preserve

The Preserve is located on 29,000 acres in the Little San Bernardino Mountains northwest of the City of Desert Hot Springs. Elevations in the Preserve range from 1,700 feet on the canyon floor to 3,050 feet at the ridge tops. The Preserve has 6 trails ranging in difficulty from easy to moderate. All trails can be accessed from the kiosk in the parking lot where self-guided trail brochures are available. These trails offer a variety of experiences, including a bird's eye view of the Preserve along the Yucca Ridge Trail, or hiking along the stream and marsh habitat. The Preserve is accessed off Highway 62 in Morongo Valley.

Lake Cahuilla County Park

Lake Cahuilla Park is a Riverside County Regional Park located at the base of the Santa Rosa Mountains off Avenue 58 south of La Quinta. This 710-acre Park features Lake Cahuilla as the main attraction and offers camping facilities and a staging area for equestrian activities. The Morrow and Boo Hoff Trails can be directly accessed from the Park's southern end.

Urban Trails and Pathways

Urban trails connect residential, shopping, employment, and recreational centers and provide convenient alternatives to motor vehicle use. Most are designed as multi-use trails that can facilitate pedestrian and bicycle traffic, and even equestrian traffic, where appropriate. Urban trails are generally categorized by I, II, or III classifications. Class I trails are completely separated from any street or highway and are dedicated exclusively for shared bicycle and pedestrian use. Because of their inherent pedestrian/bicycle conflicts, Class I trails serve only a recreational purpose for bicyclists. Class II trails are on-road bicycle lanes within the paved section of the street. Class III trails are bike routes located on the street within vehicular traffic lanes. Adoption of the proposed MSHCP is not expected to affect urban trails and pathways.

Existing non-motorized transportation facilities in the Coachella Valley are identified in the CVAG's *1995 Non-Motorized Transportation Element Draft Master Plan*.[103] Most of these urban trails accommodate pedestrian and bicycle traffic, while a few are available for equestrian use. In recent years, several municipalities have also planned and developed their own golf cart pathway systems to encourage and accommodate the day-to-day use of golf carts and to recognize their importance in golf resort communities. Although a contiguous valley-wide network of bicycle lanes and multi-use trails has been planned by CVAG and its member cities, such a network has not been fully implemented. Many proposed facilities would be developed in conjunction with future development.

Recreational Sites and Attractions

In addition to the outdoor recreational opportunities provided by parks, conservation lands, and trails, the Coachella Valley has a broad range of urban and cultural recreational opportunities and facilities. Among these are golf courses, museums and special attractions, performing arts venues, festivals, shopping, casinos, and guided tours.

Golf Courses

The Coachella Valley is nationally recognized for its world-class golf courses and professional golf tournaments. According to the Palm Springs Desert Resorts Convention and Visitors Bureau, there were 100 golf courses in the valley by 1999, including 46 public and semi-private, 44 private, and 10 reciprocal courses.[104] Approximately 39.8% of visitors to the Coachella

103 "Non-Motorized Transportation Element Draft Master Plan," Coachella Valley Association of Governments, 1995.
104 "General Information Handout," Palm Springs Deserts Resorts Convention and Visitors Bureau, December 1999.

Valley play golf, which indicates the popularity of this sport in the valley and its importance to the regional economy.[105]

Museums and Special Attractions

The Living Desert Wildlife and Botanical Park

The Living Desert Wildlife and Botanical Park is the Coachella Valley's number one tourist destination, attracting about 300,000 visitors annually.[106] Located in Palm Desert and Indian Wells at the base of the Santa Rosa Mountains, the 1,200-acre park includes a 200-acre zoo and botanical garden and 1,000-acre wildlife preserve. The facility is dedicated to the conservation of deserts and desert wildlife of the world. It offers numerous interpretive programs and operates wildlife rehabilitation and captive breeding programs.

Palm Springs Aerial Tramway

The Palm Springs Aerial Tramway is the largest vertical cable rise in the United States and the second largest in the world. It transports visitors from the Valley Station at 2,643 feet above sea level in western Palm Springs to the Mountain Station at 8,516 feet in the Mt. San Jacinto Wilderness State Park. The mountaintop facility offers a 360-degree view of the Coachella Valley and the San Jacinto Wilderness. The tram has been in operation since 1963, with state-of-the-art rotating cable cars installed in 2000.

Soak City Waterpark

The Soak City Waterpark, located in Palm Springs, is a seasonal attraction which includes thirteen waterslides, a wave-action pool, 600-foot lazy river ride, health spa, café, and villa hotel. The park attracts about 200,000 visitors annually during its peak season, which extends from June through August.[107]

Palm Springs Desert Museum

Founded in 1938, the Palm Springs Desert Museum is a non-profit cultural, scientific, and educational institution. It offers a wide range of natural science and performing and fine arts programs, as well as workshops, lecture series, gallery talks, and nature hikes. The museum attracted 165,000 visitors in 1999. In April 2004 the museum announced it would discontinue its natural science programs.[108]

105 "Palm Springs Desert Resorts Fact Sheet," Palm Springs Desert Resorts Convention and Visitors Bureau, Spring 2000.
106 "Recreation and Cultural Access Study," prepared by Terra Nova Planning & Research, Inc. for the Coachella Valley Association of Governments, 2000.
107 Ibid.
108 Ibid.

Palm Springs Air Museum
Located at the Palm Springs International Airport, the Palm Springs Air Museum houses one of the world's largest collections of World War II warplanes. It is dedicated to the preservation, presentation, and interpretation of WWII airpower and its impact on world history and contemporary life.

Agua Caliente Cultural Museum
The Agua Caliente Cultural Museum is a non-profit tribal museum committed to the collection, preservation, and study of the cultural and historic resources of the Agua Caliente Band of Cahuilla Indians. It offers interpretive tours, demonstrations, video presentations, teachers' workshops, and classes in pottery, basketry, cooking, and the Cahuilla language. It attracts an average of 9,000 visitors per year, most of which visit during late winter and early spring.[109]

Children's Discovery Museum
The Children's Discovery Museum in Rancho Mirage is a popular destination for young families with children. Exhibits provide hands-on learning and entertainment experiences for children. The museum attracts an average of 65,000 visitors per year and accommodates large field trip groups.[110]

Performing Arts

McCallum Theatre
The McCallum Theatre opened in 1998 in Palm Desert, featuring Broadway productions, concerts, ballet and dance performances, and community outreach and educational programs. Its audience capacity is 1,127 persons and it typically offers 60 to 70 productions per year. An average of 200,000 people visit the theatre per season.[111]

The Annenberg Theatre
The Annenberg Theatre, located in the Palm Springs Desert Museum, is a 437-seat facility which offers performances in dance, theater, music, and film.

Festivals

Coachella Valley communities host numerous festivals and street fairs each year, including the Palm Springs VillageFest, College of the Desert Street Fair, La Quinta Main Street Marketplace, and La Quinta Arts Festival. Nicknamed the "City of Festivals," the City of Indio hosts the

109 Ibid.
110 Ibid.
111 Ibid.

Southwest Arts Festival, International Tamale Festival, Indio Desert Circuit Horse Show, and seasonal Indian Pow Wows. The Riverside County Fair and National Date Festival is a popular event that celebrates the region's agricultural heritage.

Guided Tours

Guided sightseeing tours offer a unique way to see some of the Coachella Valley's natural and man-made features. Several eco-tourism companies offer jeep and hiking tours of the Indian Canyons, Joshua Tree National Park, Santa Rosa Mountains, wind turbine farms, San Andreas Fault, and historic gold mines. Another tour company specializes in covered wagon tours of the Coachella Valley Preserve.

3.11 Air Quality

Air quality is one of the most critical environmental issues affecting the Coachella Valley and can have profound impacts on the public's health, the regional economy, and ecological resources. Although coordinated local, regional, and State efforts have steadily improved the valley's air quality in recent years, the region continues to face significant air pollution challenges. Complicating the matter are two additional factors: varied and frequently extreme local climatic conditions, and the significant contribution to local air pollutants from the import of pollutants from the Los Angeles and Riverside/San Bernardino air basins.

There is also a correlation of temperature extremes between desert and coastal air basin with the western air basins' production of pollutants and their importation into the Coachella Valley. Nonetheless, the most significant air pollutant in the MSHCP Plan Area (i.e., suspended particulate matter of 10 micron (millionths of an inch) in size and smaller (PM10)), is primarily a local condition with local sources.

Air Quality Regulatory Environment

A number of Federal, State, and regional efforts have been undertaken to protect human health and the environment from excessive air pollution. The 1990 Federal Clean Air Act (CAA), enforced by the U.S. Environmental Protection Agency, is intended to ensure that Americans have basic health and environmental protections with regard to air quality. It establishes minimum air pollution standards, but delegates much of the responsibility for implementation to State agencies and allows States to enact and enforce stronger standards.

The California Clean Air Act (CCAA) was enacted in 1988 to ensure the protection of the future health and welfare of California residents, as well as the State's environment and economy. Ambient air quality standards set forth in the CCAA and the deadlines for achieving those

standards are generally more stringent than those established by the Federal CAA. The California Air Resources Board (CARB) has been entrusted as overseer of the CCAA and advises and evaluates the efforts of local and regional air pollution control agencies and districts.

The South Coast Air Quality Management District (SCAQMD) is responsible for leading the regional effort to attain State and Federal air quality standards. It also develops and routinely updates the regional Air Quality Management Plan (AQMP), a multi-tier effort to regulate pollutant emissions from a variety of sources. SCAQMD's management area is divided into distinct air basins; the Coachella Valley is located within the Salton Sea Air Basin (SSAB). The Southern California Association of Governments (SCAG) and Coachella Valley Association of Governments (CVAG) are also key participants in regional air quality improvement efforts.

State and Federal Air Quality Standards

Ambient air pollutants are generally classified into two categories: primary and secondary. Primary pollutants are largely a direct consequence of the combustion of petroleum and other fuels, which results in the production of oxides of carbon, sulfur, nitrogen, and a number of reactive hydrocarbons and suspended particulates. These pollutants typically affect only local areas and do not undergo chemical modification or further dispersion. Secondary pollutants are those that undergo chemical changes and disperse after emission, particularly under high ambient temperatures and high rates of solar insolation. Principal secondary pollutants are termed "oxidants" and include ozone, peroxynitrates, nitrogen dioxide, and chemical aerosols.

State and Federal ambient air quality standards for ozone, particulate matter, and other pollutants are shown in the following table (*Table 3-14*). State standards are generally more restrictive than Federal standards.

TABLE 3-14
State and Federal Ambient Air Quality Standards

	State Standards		Federal Standards	
Pollutant	Averaging Time	Concentration	Averaging Time	Concentration
Ozone	1 hour	0.09 ppm	8 hour	0.08 ppm
Carbon Monoxide	1 hour	20.0 ppm	1 hour	35.0 ppm
	8 hours	9.0 ppm	8 hours	9.0 ppm
Nitrogen Dioxide	1 hour	0.25 ppm	AAM	0.053 ppm
Sulfur Dioxide	1 hour	0.25 ppm	AAM	0.03 ppm
	24 hours	0.04 ppm	24 hours	0.14 ppm
Suspended Particulate Matter (PM10)	24 hours AGM	50 $\mu g/m^3$ 30$\mu g/m^3$	24 hours AAM	150$\mu g/m^3$ 50$\mu g/m^3$

Notes: ppm = parts per million ; $\mu g/m^3$ = micrograms per cubic meter of air; AAM = Annual Arithmetic Mean ; AGM = Annual Geometric Mean
Source: "1997 Air Quality Management Plan," South Coast Air Quality Management District

Geophysical and Climatic Conditions in the Coachella Valley

The geophysical and climatic conditions of the Coachella Valley have a significant effect on regional air quality and the limited ability to control it. The valley is a northwest-southeast trending geologic basin surrounded by major mountain ranges. The mountains effectively isolate the valley from surrounding climatic conditions, including coastal influences from the west, and greater precipitation and cooler temperatures that prevail in the surrounding mountains. The resulting environment is a hot, arid desert basin with sparse, widely spaced vegetation. The Coachella Valley is susceptible to severe drought conditions (less than 0.5 inches in 2001-02), excessive flooding, and high winds, each of which influences regional air quality.

From spring through fall, the desert floor heats up and the air expands and rises, resulting in surface air pressures being systematically lowered. This creates a vacuum-like effect, whereby cooler coastal air masses are drawn and funneled through the narrow San Gorgonio Pass and flow sometimes violently into the desert. These strong winds frequently exceed 40 miles per hour and flow generally southeast crossing eroded and highly exposed areas of the upper and central valley. This large-scale wind regime transports and deposits large quantities of blowing sand, which serve as an essential component of sandy habitats supporting a variety of specialized plant and wildlife species.

Blowing sand (blowsand) and dust also have adverse environmental effects, especially to the human environment due to deposits on buildings, fabrics, automobiles, streets, and other structures, and can damage materials and coatings. Extensive wind-borne sediments can dirty streets, fill drainages and yards, pit windshields, damage landscaping, and limit visibility. Dust that remains on vegetation can interfere with plant respiration, damage foliage, and stunt plant growth. The adverse health effects of dust in humans, including reduced lung capacity and function, can be severe.

Blowsand Regime in the Coachella Valley

The geophysical characteristics of the Coachella Valley also play a significant role in determining the distribution and intensity of regional blowsand generation and deposition. The local mountains are comprised of granitic and metamorphic rocks, which readily weather into grain-size sediments that are spread and sorted on alluvial fans and shed onto the valley floor by flooding (fluvial transport) during rain events.

The smallest and least compacted sediments are deposited in major active drainages that cross the valley floor, including the San Gorgonio River and the Whitewater River. Other major drainages include the Palm Canyon Wash, Chino Canyon Wash, Mission Creek, Big and Little Morongo Creeks, Blind Creek, Long Creek, East and West Deception, East and West Wide Canyon, other canyons emerging from the Little San Bernardino Mountains further east, and

numerous drainages emerging from the Indio Hills. These drainages emanate from the surrounding mountains and extend in a generally southerly direction across the central axis of the valley floor, providing large cross-sections of deposition area exposed to the strongest regional winds.

If disturbed, the alluvial (stream-deposited) and aeolian (wind-deposited) sediments comprising much of the valley floor can be easily picked up and transported by prevailing winds. Flooding events are important precursors to the generation of fresh blowing sand, which must be brought to the surface and exposed to the wind. Sand transport generally requires wind speeds in excess of 14 mph, while the finer, silty components of flooding-exposed alluvial soils are easily lifted into the air by moderate breezes, as well as by the strong winds common to the region.

The mountains bordering the valley are aligned in a roughly northwest-southeast direction and act to contain and channel the flow of wind down the central axis of the Coachella Valley. The valley floor slopes gently to the southeast, with elevations ranging from about 1,200 feet at the San Gorgonio Pass, to about 228 feet below sea level at the Salton Sea. This sloping terrain allows air masses to move unrestricted down the central axis of the Coachella Valley, where loose sediments are episodically picked up and transported down valley.

Other Sources of Regional Pollution

Although the geophysical and climatic conditions of the Coachella Valley have a tremendous impact on regional air quality, the man-made environment is also a major contributor to air pollution. Fugitive dust generated by grading and other construction activities, vehicles on roadways, agricultural tilling, and other land disturbances generate sand and dust, which are easily transported by the strong winds described above, and further contribute to poor visibility, sand accumulation, and potentially serious health problems. Blowing sand and fugitive dust can reduce visibility from the typical 35+ miles in the desert to less than a mile and in severe cases to tens or hundreds of feet. Automobile exhaust, emissions from heating and ventilating equipment, and emissions associated with the consumption of natural gas and the generation of electricity also contribute to regional air pollution, although their impacts locally are more limited.

The Coachella Valley is also susceptible to occasional air inversions in which a layer of stagnant air is trapped near the ground where it is further loaded with pollutants. This process, when combined with chemical aerosols and other pollutants emitted by automobiles, furnaces, and other sources, can further intensify air pollution, haziness, and poor visibility. If conditions persist, secondary air pollutants like photochemical smog can be generated.

Regional Pollutants of Concern

SCAQMD operates and maintains numerous air quality monitoring stations, which monitor air pollution levels and trends throughout its jurisdiction. The Coachella Valley is included in Source Receptor Area (SRA) 30, which includes two pollutant monitoring stations: one at the Palm Springs Airport and one in the City of Indio. The Indio site has been operational since 1985, and the Palm Springs site since 1987. The most prevalent air pollutants affecting the Coachella Valley are ozone and PM10, described below.

Ozone (O3)

Ozone is a pungent, colorless, toxic gas that is the main component of photochemical smog. It is formed when byproducts of combustion react in the presence of ultraviolet sunlight. This is a daily occurrence associated primarily with emissions from motor vehicles. Excessive exposure to ozone can result in diminished breathing capacity, increased sensitivity to infections, and inflammation of lung tissue.

The Coachella Valley has a history of exceeding regulatory ozone standards, although the number of days and months the Federal one-hour standard has been exceeded has dropped steadily over the past decade. Regional exceedance trends are provided in *Table 3-15.* The Coachella Valley is classified as a Subpart 2 "Serious" ozone non-attainment area under the Federal Clean Air Act as of the effective date of June 15, 2004. This classification means that the region must come into compliance with Federal ozone standards by November 15, 2007, which is 17 years from the date the Clean Air Act was enacted. Projects subject to and securing Federal approval prior to June 15, 2005 shall be subject to the 1-hour ozone standard (see 40 CFR Part 93.150-160).

Although some ozone is produced within the Coachella Valley, studies conducted by SCAQMD indicate that most ozone is transported to the region by coastal winds from Los Angeles and the Riverside/San Bernardino metropolitan air basins. Although it is difficult to quantify the amount of ozone contributed from these regions, improved air quality in the Coachella Valley would be partly dependent upon reduced ozone emissions in the South Coast Air Basin to the west.

Particulate Matter (PM_{10})

Small, suspended particles, including dust and sand, metallic and mineral substances, road-surfacing materials, pollen, smoke, fumes, and aerosols are generally referred to as particulate matter. These various particles are categorized by settling characteristics, and those that are ten microns or smaller in diameter are referred to as "PM_{10}." These eroded particles may be further pulverized by motor vehicles on roadways and re-suspended in the air. PM_{10} particles can pass through the filtering system of the lungs and irritate lung tissues, potentially resulting in serious health problems.

TABLE 3-15
Coachella Valley Air Quality Trends Exceedances of Ozone Standards

Monitoring Station	Year	Max. Concentration in 1 hour	No. Days Standard Exceeded	
			Federal[1]	State[2]
Palm Springs	1990	0.17 ppm	27	73
	1991	0.18 ppm	22	72
	1992	0.15 ppm	21	69
	1993	0.17 ppm	20	79
	1994[3]	0.17 ppm	13	71
	1995[3]	0.16 ppm	12	60
	1996	0.16 ppm	12	60
	1997*	0.16 ppm*	4*	45*
	1998	0.17 ppm	8	40
	1999	0.13 ppm	1	27
	2000	0.12 ppm	0	40
Indio	1990	0.16 ppm	10	47
	1991	0.18 ppm	13	48
	1992	0.14 ppm	8	45
	1993	0.16 ppm	3	25
	1994[3]	0.17 ppm	13	71
	1995[3]	0.16 ppm	9	49
	1996	0.12 ppm	0	26
	1997	0.11 ppm	0	3
	1998	0.13 ppm	2	16
	1999	0.13 ppm	1	13
	2000	0.11 ppm	0	43

1 = >0.12 parts per million in 1 hour
2 = >0.09 parts per million in 1 hour.
3 = Palm Springs and Indio ozone levels represented as a single Coachella Valley data value in SCAQMD annual reports. Values recorded are the highest recorded at either station.
* = Less than 12 full months of data; may not be representative.
Source: Annual air quality site monitoring reports, prepared by South Coast Air Quality Management District.

Most PM_{10} in the Coachella Valley is generated locally by direct particle erosion and fragmentation. Natural sources of PM_{10} are discussed above, and are those responsible for the sorting and distribution of sand, silt and dust particles throughout the Coachella Valley. The rich, silty soils in the mid and eastern portions of the valley testify to the primary deposition areas for these materials, which has occurred over thousands of years. On a day-to-day basis, natural processes do not significantly contribute to the PM_{10}-related degradation in air quality.

Unhealthful levels of PM_{10} are primarily associated the human disturbance of soils rich in sand and silt deposited many years ago and exposed to wind erosion by human disturbance. A portion of the PM_{10} problem is associated with uncontrollable natural and climatic conditions, including strong, sustained winds and loose, sandy soils, and cannot feasibly be limited by pollutant

control measures and/or technology. In addition, pollutant transport studies have indicated that PM_{10} precursors, including nitrates and sulfates, are transported to the Coachella Valley from the Los Angeles and other metropolitan areas to the west, further contributing to PM_{10} generation in the valley. A significant portion of local PM_{10} is generated by local grading, construction, agricultural tilling, and other land disturbance activities.

Recent History of PM_{10} Regulation

The Coachella Valley has a history of elevated PM_{10} levels which is closely correlated to and primarily associated with fugitive dust emissions from construction activities and the valley's natural wind processes. Regional PM_{10} trends for the past decade are described in *Table 3-16*. In November 1990, amendments to the Federal Clean Air Act (CAA) were adopted, requiring that the State Implementation Plan (SIP) for PM_{10} be revised to incorporate "reasonably available control measures" for PM_{10}, and to establish a future attainment date for all areas that were previously unable to meet Federal PM_{10} standards.[112] In response to this requirement, the South Coast Air Quality Management District adopted the "State Implementation Plan for PM_{10} for the Coachella Valley" (90-CVSIP). In January 1993, the Coachella Valley was reclassified from a "moderate" to "serious" non-attainment area for PM_{10} by the U.S. EPA.[113]

CVAG and its member cities have worked closely to implement the PM_{10} reduction and control measures set forth in the 90-CVSIP. Examples of control measures implemented by local governments include adopting City-based dust control ordinances, implementing street cleaning programs, and reducing the amount of blowsand generated through the use of chemical stabilizers, site watering, and landscape treatments.

Although the Coachella Valley achieved the Federal PM_{10} standard for several years in the mid-1990's, it was unable to achieve the annual average standard for sufficient, extended period of time. The region continues to be designated a "serious" non-attainment area for PM_{10}. In an effort to remedy this situation, the SCAQMD and CVAG jointly developed "Guidelines for Dust Control Plan Review for Coachella Valley Jurisdictions" in November 2000. The guidelines are intended to supplement local dust control ordinances and assist local government staff in reviewing dust control plans submitted for construction projects in the valley.

In addition, SCAQMD, in conjunction with local jurisdictions, prepared the 2002 Coachella Valley PM_{10} State Implementation Plan which includes PM_{10} control program enhancements and a request for an extension of the region's PM_{10} attainment date. Should the region continue to

112 "Coachella Valley PM10 Attainment Redesignation Request and Maintenance Plan," prepared by South Coast Air Quality Management District, September 1996.

113 Ibid.

fall short of Federal PM_{10} standards, the U.S. EPA could impose more stringent regulations and sanctions.

TABLE 3-16
Coachella Valley Air Quality Trends Exceedances of PM_{10} Standards

Monitoring Station	Year	Maximum Concentration (µg/m³/24 hours)	No. (%) Samples Exceeding 24-Hr Standards		Annual Average (µg/m³/)	
			Federal[1]	State[2]	AAM[3]	AGM[4]
Palm Springs	1990	83	0 (0.0%)	9 (15.3%)	34.5	30.5
	1991	197	1 (1.8%)	14 (25.0%)	42.9	36.6
	1992	175	1 (1.7%)	4 (6.7%)	29.6	24.3
	1993	58	0 (0.0%)	1 (1.7%)	27.0	23.6
	1994	97	0 (0.0%)	23 (38.3%)	48.7	45.3
	1995^	199	1 (1.6%)	27(44.3%)	52.0	47.2
	1996	130	0 (0.0%)	2 (3.3%)	29.3	25.2
	1997a)	63	0 (0.0%)	1 (1.8%)	26.4	23.6
	1998	72	0 (0.0%)	3 (5.2%)	26.4	23.8
	1999	104	0 (0.0%)	3 (5.0%)	28.8	26.1
	2000	44	0 (0.0%)	0 (0.0%)	24.4	22.7
Indio	1990	520	4 (6.8%)	41 (69.5%)	79.3	64.9
	1991	340	3 (5.1%)	37 (62.7%)	69.0	59.8
	1992	117	0 (0.0%)	18 (30.5%)	43.4	39.2
	1993	125	0 (0.0%)	25 (41.0%)	46.4	40.6
	1994	97	0 (0.0%)	23 (38.3%)	48.7	45.3
	1995^	199	1 (1.6%)	27 (44.3%)	52.0	47.2
	1996*	117	0 (0.0%)	29 (50.0%)	50.8	46.1
	1997a)	144	0 (0.0%)	23 (42.6%)	49.1	44.2
	1998	114	0 (0.0%)	32 (40.0%)	48.1	43.8
	1999	119	0 (0.0%)	30 (54.0%)	52.7	49.8
	2000	114	0 (0.0%)	52 (50.0%)	51.9	48.4

1 = > 150 µg/m^3 in 24 hour period
2 = > 50 µg/m^3 in 24 hour period
3 = Federal Annual Average Standard = AAM > 50µg/m^3
4 = State Annual Average Standard = AGM > 30µg/m^3
^ = Includes high-wind natural event days
a) = Less than 12 full months of data; may not be representative.
* = Data for samples collected on high-wind days were excluded in accordance with EPA's Natural Events Policy.
Source: Annual air quality site monitoring reports, prepared by South Coast Air Quality Management District.

PM_{10} Controls and Habitat Preservation

The balance between urbanization, controlling PM_{10} emissions, and preserving sensitive biological habitat in the Coachella Valley is a delicate one. The Coachella Valley experienced rapid urbanization over the two past decades with increased grading, construction, and other land disturbances that have exacerbated the regional fugitive dust problem.

Whereas early twentieth century development occurred primarily at the margins of the valley in the lee of the protecting mountain coves, more recent development has expanded into unprotected central areas of the valley, including the Thousand Palms area, where high winds, loose soils, and blowing sand predominate. Elements of the built environment (e.g., buildings, roads, parking lots, sidewalks, vegetative windbreaks, fencing, walls, and other man-made barriers) can interrupt natural blowsand transport pathways and reduce the amount of sand reaching important sand dune habitat.

Particularly sensitive blowsand habitat areas include the three preserves established by the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan and upwind lands, which facilitate natural sand migration to the preserves. The natural process of sand migration is essential to the maintenance of viable habitat for several listed and sensitive species including the Coachella Valley fringe-toed lizard, Coachella Valley giant sand-treader, Jerusalem crickets, Coachella Valley milkvetch, and others. Interference with these and other sand transport and deposition areas can severely compromise the long-term viability of sand dune/sand field habitat and the survival of endangered, threatened, and other sensitive species. It is essential that these issues be considered as future Development proposals are reviewed and PM_{10} control measures are implemented.

Sunline Services Group, which provides public transit services to the Coachella Valley, recently implemented a sand re-deposition program to enhance sand availability in the Coachella Valley Preserve. The Preserve encompasses about 15,000 acres east of Thousand Palms and is the largest of three blowsand habitat preserves established by the Coachella Valley Fringe-toed Lizard Habitat Conservation Plan. Sand collected on streets after major blowsand incidents is sifted through large screens to remove trash and road debris, and is re-deposited by CNG-operated (compressed natural gas) dump trucks in the westerly, upwind portion of the Coachella Valley Preserve. During 2000, approximately 200 tons of sand was deposited in the Preserve. The program helps replenish sand resources in this important habitat area and reduces, to some extent, the impacts of urbanization in the western Coachella Valley on natural blowsand processes.

Conflicts have occasionally arisen between the natural sand deposition process and human development. Few developments have been proposed or constructed within the valley's blowsand hazard area, but those that have now cite the Coachella Valley Preserve's sand dunes as unacceptable sources of upwind sand. Also see related discussions in Section 3.4: Soils and Geology.

3.12 Noise

Noise has long been a consequence of industrialization and urbanization, but only recently has it received adequate attention as a potential environmental hazard, to humans as well as wildlife. Excessive and/or sustained noise, including ground-bourn noise and vibration, can contribute to both temporary and permanent physical impairments, such as hearing loss and increased fatigue, as well as stress, annoyance, anxiety, and other psychological reactions in humans. In wildlife, certain types and intensities of noise may adversely affect nesting or burrowing behavior.[114] The evaluation and mitigation of noise in a community is essential to protecting the health and welfare of the general public, and preserving the inherent value of open space and conservation lands. Furthermore, it can help define the need for additional remedial measures which mitigate noise problems.

Noise Rating Scales[115]

The most common unit used to measure noise levels is the A-weighted decibel (dBA), which is a measurement of the noise energy emitted from a monitored noise source. The A-weighted frequency scale has been adjusted to correlate noise or sound to the hearing range of the human ear, and ranges from 1.0 dBA at the threshold of hearing to 140 dBA at the threshold of pain. The quiet rustling of leaves typically measures approximately 10 dBA, a normal conversation at 5 feet measures 55 dBA, and a jet taking off at 200 feet measures 125 dBA.

Other noise rating scales utilize measurements that are weighted and averaged over time. The Single Event Noise Exposure Level (SENEL) measures a single noise event in decibels. The equivalent sound level (Leq) converts sound which varies over time to a constant level that emits the same amount of acoustic energy. The day-night average sound level (Ldn) measures the cumulative noise exposure of a community, and accounts for the subjective annoyance of noises that occur during normal sleeping hours. Ldn measurements combine hourly noise measurements over a 24-hour period and apply a weighting penalty factor to those measurements occurring between 10:00 p.m. and 7:00 a.m. Community Noise Equivalent Levels (CNEL) include weighting penalty factors for noises that occur during nighttime hours (10:00 p.m. to 7:00 a.m.) and evening hours (7:00 p.m. to 10:00 p.m.).

114 "Effects of Noise on Wildlife and Other Animals." Prepared by Memphis State University under Contract 68-04-0024. December 31, 1971.
115 "Desert Hot Springs Noise Element Update Background Study," Endo Engineering, March 27, 2000.

Land Use Compatibility

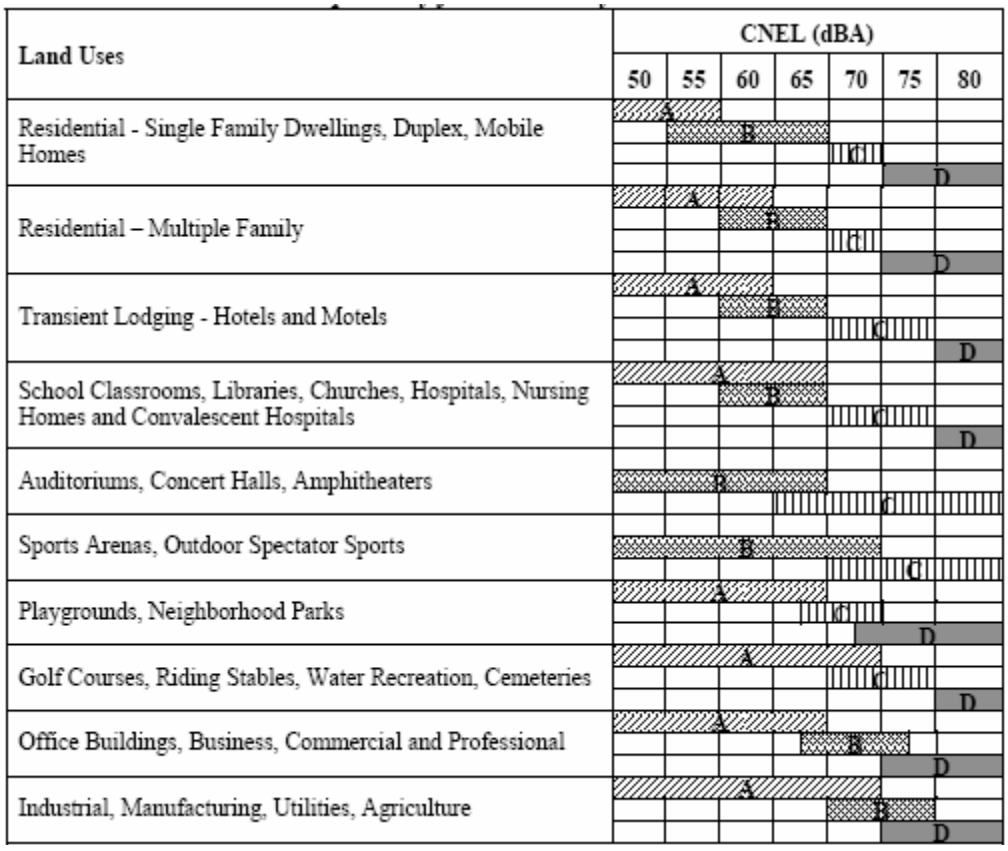
Ambient noise levels can have a direct impact on the desirability of an urban development or community and can enhance or weaken its long-term economic health. For this reason, land use compatibility with the surrounding noise environment is one of the most important aspects of urban planning. Effective development plans and noise control programs must consider the location and extent of local noise sources and maintain compatibility between adjacent land uses, to the greatest extent practical.

Part of this effort requires the identification of sensitive receptors. Sensitive receptors are those land uses that are particularly sensitive to noise intrusion, such as residences, schools, libraries, churches, hospitals and other health care facilities, and nursing homes. Day care centers, parks, and other outdoor recreation and conservation areas may also be considered sensitive receptors. Moderately sensitive land uses include cemeteries, golf courses, country clubs, hotels and motels, and dormitories. The least sensitive uses include commercial and industrial developments, heavy manufacturing facilities, agricultural lands, parking lots, warehousing operations, and transit terminals.

Noise standards have been developed by a variety of agencies to help reduce noise impacts to sensitive receptors and enhance the overall noise environment of urban areas. California Administrative Code Section 1092 of Title 25 includes noise insulation standards for new multi-family structures within the 60 CNEL contour adjacent to roads, railroads, rapid transit lines, airports, and industrial areas.[116] Title 21 of the California Administrative Code also requires that interior noise levels in all inhabitable rooms of a multi-family detached unit must not exceed 45 CNEL. Most local jurisdictions have adopted noise ordinances which specify acceptable interior noise standards for various land uses. The California Office of Noise Control has established noise control guidelines to be used in developing Noise Elements of municipal General Plans, as shown in *Table 3-17*.

116 Ibid.

TABLE 3-17
Land Use Compatibility for Community Noise Environment



Explanatory Notes

A Normally Acceptable: With no special noise reduction requirements, assuming standard construction.

B Conditionally Acceptable: New construction of development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design.

C Normally Unacceptable: New construction is discouraged. If new construction does not proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

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

Source: "Guidelines for the Preparation and Content of the Noise Element of the General Plan," California Department of Health Services, 1990 (as shown in "Cathedral City General Plan Update Noise Background Study," Endo Engineering, 2001).

Existing Noise Environment in the Plan Area

The existing noise environment in the MSHCP Plan Area varies somewhat depending upon location, but is relatively quiet overall. The noise environment is as low as 45 dBA away from major roads and other noise sources. The noise environment in the urban core of the Coachella Valley, which generally extends from Desert Hot Springs and Palm Springs on the west to Indio and Coachella on the east, is consistent with that of a low to medium-density, suburban community, which would range between 55 to 70 dB CNEL.

Wildlife and Environmental Noise Types and Levels

The potential effects of human noise impacts on wildlife have been the subject of significant study since the 1970s. Just as noise can affect humans psychologically and physically, noise can also impact wildlife both behaviorally and physiologically. A variety of wildlife species, including relatives of the proposed Covered Species under the MSHCP, can be adversely affected by high ambient and intrusive noise levels, affecting hearing essential for avoiding prey, finding food, or interacting with other individuals of the same species. A noisy environment can also force relocation of species into potentially marginal or less suitable habitat and have lasting effects on survivability and reproduction, as has been cited for the kangaroo rat (*Dipodomys* sp.).[117] A U.S. EPA report concluded that environmental noise can act as a physiological stressor on wildlife by producing changes that are similar to exposure of extreme heat, cold, pain, and other high-stress environmental conditions.[118]

Motor Vehicle Noise

Noise monitoring and modeling data conducted within the Plan Area indicate that the primary noise source is motor vehicle traffic on highways and major arterials. The level of noise generated varies with traffic volume, vehicular speed, truck mix, and roadway cross-section and geometric design. Typically, the greater the vehicle speed and truck mix, the greater the level of noise. The table below (*Table 3-18*) describes the existing distance of noise contours from roadway centerlines for several major roadway segments in the Plan Area. The data were obtained from General Plan Noise Elements for several jurisdictions in the Coachella Valley and represent existing conditions for years 1996 through 2001. Analysis of the data indicates the highest noise levels along Interstate 10 and State Highway 111, is approximately 75 dBA CNEL within 300 feet of I-10.

117 "Effects of Off-Road Vehicle Noise on Desert Vertebrates", Brattstrom, B.H.. and M.C. Bondello. 1983. In "Environmental Effects of Off-Road Vehicles: Impacts and Management in Arid Regions", Edited by R.H. Webb and H.G. Wilshire.

118 "Effects of Noise on Wildlife and Other Animals". Prepared by Memphis State University under Contract 68-04-0024. December 31, 1971.

TABLE 3-18
Existing Noise Contours along Major Roadways in the MSHCP Plan Area

Roadway Segment	Distance to CNEL Contours In Feet from Roadway Centerline		
	60 CNEL	65 CNEL	70 CNEL
Interstate 10			
W of Date Palm Drive (Cathedral City)	1,567	729	342
Ramon Road to Monterey Avenue (Rancho Mirage)	2,186	1,359	755
Jefferson Street to Jackson Street (unincorp. Riv. Co./Indio)	7,924	2,506	792
State Rte. 86 to Dillon Road (unincorp. Riv. Co./Coachella)	3,972	1,256	397
State Highway 111			
W of Date Palm Drive (Cathedral City)	273	128	63
Frank Sinatra Drive to Country Club Drive (Rancho Mirage)	855	420	181
SE of Bob Hope Drive (Rancho Mirage)	810	393	169
Washington Street to Monroe Street (La Quinta/Indio)	1,256	397	126
State Highway 62			
N of Pierson Blvd. (Desert Hot Springs)	50	R/W	R/W
S of Pierson Blvd. (Desert Hot Springs)	55	R/W	R/W
Varner Road			
E of Date Palm Drive (Cathedral City)	110	51	R/W
Washington Street to 42nd Avenue (unincorp. Riv. Co./Indio)	126	<50	<50
Indian Avenue			
N of Mission Lakes Blvd. (Desert Hot Springs0	302	96	R/W
S of Pierson Blvd. (Desert Hot Springs)	416	132	R/W
Ramon Road			
W of Date Palm Drive (Cathedral City)	433	204	100
Los Alamos to Bob Hope Drive (Rancho Mirage)	564	250	97
Monterey Avenue			
Dinah Shore Drive to Gerald Ford Drive (Rancho Mirage)	614	282	118
Country Club Drive to Clancy Lane (Rancho Mirage)	673	319	131
Washington Street			
N of Avenue 42 (Bermuda Dunes)	291	135	63
S of State Highway 111 (La Quinta)	428	199	92
N of Avenue 52 (La Quinta)	283	108	50
N of Avenue 38 (unincorp. Riverside Co.)	199	63	<50

Note: R/W indicates the contour falls within the right-of-way.

Sources: "Cathedral City General Plan Update Noise Background Study," Endo Engineering, 2001; "Desert Hot Springs General Plan Update Noise Background Study," Endo Engineering, March 2000; "Acoustical Analysis Report for the Rancho Mirage General Plan Update," Hersch Acoustical Engineering, Inc., July 1996; "Noise Background Study for the La Quinta General Plan Update," RKJK & Associates, Inc., 2000; "Indio General Plan 2020," Volume II, Chambers Group, Inc., October 1993.

Rail Noise

Other mobile noise sources include rail and air traffic, which constitute occasional but more intrusive elements to the noise environment. Railroad lines of the Union Pacific Railroad extend along the central axis of the Coachella Valley in a northwest-southeasterly direction. The tracks run parallel with and just south of Interstate-10 through much of the valley, and extend southeast

along State Highway 111 from Indio to Imperial County. These facilities carry between 30 and 40 trains per day. Most rail activity is freight traffic operated by Union Pacific Railroad, although Amtrak provides passenger service along the same tracks to Palm Springs and Indio. Union Pacific is planning to add a full second track parallel to the existing one between 2001 and 2003, and is anticipating a 50% to 75% increase in regional rail traffic. This increase would further impact the noise environment on adjacent lands. A currently un-used rail line also diverges from the UPRR line at Salt Creek just north of the Salton Sea and continues northeast to Eagle Mountain Mine. This line is expected to carry trash to the Eagle Mountain Landfill once all clearances have been secured and the facility built. At this time, it is uncertain when the Eagle Mountain Landfill would be constructed and necessitate the use of this inactive rail line.

The passage of trains results in considerable noise impacts to adjacent lands, although the impacts are periodic and of short duration. Much of the land in the immediate vicinity of the tracks is designated for industrial and commercial uses. However, UPRR lines pass through or in proximity to existing and proposed conservation areas set forth in the MSHCP. In North Palm Springs (1993), noise measurements placed the 60 dB CNEL contour 1,050 feet from the railroad tracks, the 65 CNEL contour 570 feet from the tracks, and the 70 CNEL contour 310 feet from the tracks.[119] In 2001, the combined impacts of Interstate-10 and Union Pacific Railroad traffic in the City of Cathedral City placed the 60 CNEL contour about 770 feet from the tracks from the railroad tracks, and the 65 CNEL noise contour approximately 430 feet from the tracks.[120] Similar noise monitoring data collected in the City of Rancho Mirage (1996) placed the 65 CNEL contour 277 feet from the railroad tracks, and the 70 CNEL contour 117 feet from the tracks.[121]

Aircraft Noise

Overflights associated with the Palm Springs, Bermuda Dunes, and Desert Resorts Airports also generate occasional, but intrusive noise impacts in the MSHCP Plan Area. The Palm Springs International Airport, located at the northwest corner of Ramon Road and Gene Autry Trail in Palm Springs, serves as the major air transportation link for the Coachella Valley and is classified in the National Plan of Integrated Airport Systems (NPIAS) as a long-haul commercial service airport. Aircraft noise can reach high levels for relatively short periods, and the effect can be characterized as significantly intrusive to lands in the immediate vicinity of the airport. The Airport Master Plan and Part 150 Noise Compatibility Study (1994) evaluated airport operations and projected future noise impacts from planned extensions and increased operations.[122]

119 "City of Palm Springs General Plan," Smith, Peroni & Fox, adopted march 3, 1993.
120 Cathedral City General Plan Update Noise Background Study," Endo Engineering, 2001.
121 "Acoustical Analysis Report for the Rancho Mirage General Plan Update," Hersh Acoustical Engineering, Inc., July 26, 1996.
122 "Palm Springs Regional Airport Master Plan and F.A.R. Part 150 Noise Compatibility Study Update," Coffman Associates, 1994.

Projected 2015 peak season airport noise levels indicate the 60 CNEL noise contour remaining within the urbanized areas of Palm Springs and Cathedral City.

The Bermuda Dunes Airport is a general aviation airport located between 42nd Avenue and Interstate 10 in Bermuda Dunes. It accommodates approximately 25,500 airplane operations (take-offs and landings) per year, but has a maximum capacity of about 26,852 operations per year.[123] During the winter season, the airport handles about 120 planes per day, but the level of activity slows to about 20 planes per day during the off-season (summer) months. The airport noise contours extend in a northwest-southeasterly direction and encompass a relatively limited area within about one-half mile of the airport. The airport's ability to expand is severely constrained due to surrounding development, and therefore, future increases in noise impacts are expected to be minimal. Noise impacts to surrounding lands are also limited, with the airport being located immediately south of and parallel to Interstate 10. The Bermuda Dunes Airport has a 60 CNEL contour that parallel's I-10. Noise impacts are geographically limited and would not affect proposed conservation areas.

The Desert Resorts Airport (formerly known as the Thermal Airport) is located at the southwest corner of Airport Boulevard and Polk Street in Thermal and serves the general aviation needs of the eastern Coachella Valley. In 2000, there were approximately 108,100 operations (take-offs and landings) at the airport; however, it is capable of handling a maximum of 210,000 operations annually.[124] The peak travel season extends from mid-October through May, as well as during special events (e.g., golf tournaments and festivals). The planned expansion of the 17-35 runway would have an impact on surrounding lands to the north and south, however, the 60 CNEL contour impacts urban and agricultural areas but would not impact proposed Conservation Areas.

Stationary Source Noise

Stationary noise sources in the MSHCP Plan Area include grading and construction activity, power tools, household appliances, high-level radio and/or television usage, and mechanical equipment (e.g., heating and air conditioning units). Noise from roof-mounted equipment (e.g., fans and compressors) that emit a constant hum can travel substantial distances. Although construction noise typically has a short-term noise impact on adjacent lands, impacts can be significant. Heavy construction equipment can generate noise levels ranging from 70 to 95 dBA at a distance of 50 feet. Grading, ripping, blasting, and pile driving occur, with high noise levels sometimes accompanied by ground and structural vibration.

123 "Recreational and Cultural Access Study," prepared for the Coachella Valley Association of Governments by Terra Nova Planning and Research, Inc., 2000.

124 Ibid.

Wind Turbine Noise

Viable wind resource areas occur in the western Coachella Valley and as far east as Edom Hill, where strong, sustained winds emanate from the San Gorgonio Pass and cross the valley in a southeasterly direction. Large areas within and immediately east of the San Gorgonio Pass under the jurisdiction of either Riverside County, Desert Hot Springs, or Palm Springs are already developed with Wind Energy Conversion Systems (WECS) wind farms or designated for future energy-related industrial development. Many turbines have been constructed within or in the vicinity of lands proposed for Conservation under the proposed MSHCP. According to the California Energy Commission, there were approximately 2,898 wind turbines in the San Gorgonio Pass area in 1995 that produced 662.6 million kilowatts/hour. Typical wind turbines being installed in the Coachella Valley are rated at between 750 kilowatts and 1.25 megawatts.[125] Most turbines are three-blade, horizontal axis machines with galvanized steel or painted towers that may be up to 300 feet tall.

Wind turbines generate both audible and low frequency (deep base vibration) sound waves that can be disturbing to those occupying nearby buildings. Wind turbines generate two types of noise: mechanical and aerodynamic. Mechanical noise is associated with the basic operating components of the turbine, including gearboxes and wheels. Improvements in technology and engineering have virtually eliminated mechanical noise from modern wind turbines, particularly those manufactured after the early 1980s. Aerodynamic noise is best described as the "swish" sound generated by the rotation of rotor blades; the higher the rotational speed, the louder the sound. Turbine manufacturers have minimized aerodynamic noise in recent years by smoothing blade surfaces, carefully designing blade edges and rotor tips, and care during turbine installation. Vibrations have been reduced on some larger turbines by drilling holes into the chassis frame to ensure that the frame does not vibrate in step with other turbine components.

Wind turbine noise varies based on the turbine model and design specifications, including the age, height, and tower damping features of each turbine. According to the National Wind Coordinating Committee, a 300-kilowatt (kW) wind turbine typically produces a noise level of about 45 dBA at 400 feet, which is generally less than the noise generated by light traffic at 100 feet, approximately 55 dB CNEL.[126]

Conventional noise survey sound measurements taken at a wind turbine in Sandusky, Ohio indicate that acoustic emissions associated with operation of turbines are indistinguishable from

125 Chris Copeland, Wintec Energy, personal communication, April 10, 2000.
126 "Wind Energy Series, January 1997, No. 2" National Wind Coordinating Committee.

background noise at distances greater than 200 meters.[127] However, other studies have shown that sound from wind turbines can produce ground noise impacts and structural vibrations in nearby homes and other structures. Noise data collected for wind turbines in the North Palm Springs area indicate that different types of turbines produce different noise levels that decrease at different rates with distance.[128]

Environmental factors, including intervening topographic noise attenuation features (e.g., terrain, vegetation, and distance and elevational offsets between the turbine and the noise receptor) also affect ambient noise levels. Sound intensity decreases with the square of the distance to the sound source; therefore, the sound level at 200 meters away is only one-quarter of what it is at 100 meters away, and the doubling of distance results in a decrease of 6 dBA.[129] However, intervening topography and vegetation can further reduce noise levels. For general analysis purposes, atmospheric and ground absorption losses in the Coachella Valley can be assumed to equal 1 dBA per 1,000 feet of distance.[130]

Wind speed and direction also play an important role in determining perceived noise levels. At wind speeds around 8 meters per second (m/s) and above, it generally becomes difficult to perceive or measure actual sound emissions from a wind turbine, since background noise (i.e. blowing wind, rustling leaves) generally masks any turbine noise.[131]

As mentioned above, the greater the wind speed, the faster the rotational speed of the turbine blades and the louder the noise emitted. An acoustical analysis prepared for a commercial WECS permit south of Whitewater Hil, between Interstate 10 and State Highway 111 indicated that turbine-generated noise levels at wind speeds of 10 m/s were estimated to be about 1.3 dB to 2 dB lower than those at wind speeds of 13 m/s.[132]

Aside from turbine engineering and design improvements, mitigation of WECS noise and vibration impacts on human receptors can be achieved through the adoption and implementation of local zoning ordinances. Riverside County and the cities of Palm Springs and Desert Hot Springs have adopted WECS ordinances that identify acceptable noise levels, setback

127 "Acoustical Measurements of DOE/NASA MOD-O Wind Turbine at Plum Brook Station, Ohio," Solar Energy Research Institute, June 1983.

128 "Final Environmental Impact Report for the Palm Springs Annexation Study," Smith, Peroni & Fox, April 1993. Micon turbines can generate noise levels of approximately 50 dBA at a distance of more than 3,500 feet, while Carter turbines can produce noise levels equivalent to about 50 dBA at 750 feet

129 "Measuring and Calculating Sound Levels," Danish Wind Industry Association, September 9, 2000.

130 Hersh Acoustical Engineering, Inc., letter correspondence to Wintec Energy, Ltd. Dated September 18, 1998, regarding noise study for Enron/Wintec WECS project in Sections 8 & 17 T3S, R4E, Riverside County, California.

131 "21 Frequently Asked Questions About Wind Energy," Danish Wind Industry Association, 2001.

132 "Acoustical Analysis Report, Revised Noise Impact Analysis, Commercial WECS Permit No. 107, Sections 18 and 19, T3S, R4E, Riverside County, CA," Hersh Walker Acoustics, August 14, 2000.

requirements, and other development standards for wind turbines. According to the Riverside County ordinance, the projected WECS noise level to each receptor shall be at or below 55 dBA, but this shall be reduced by 5 dBA where it is projected that pure tone noise would be generated.[133] The Palm Springs and Desert Hot Springs WECS ordinances establish similar standards.

Noise Environment in Outlying Areas

Rural communities, including those in the vicinity of the Indio Hills and Salton Sea, can also be characterized as quiet, with even less noise intrusion from mobile or stationary sources. These communities are generally more distant from high-volume transportation corridors, truck traffic, and commercial and industrial activity. They typically consist of low to very low-density residential development with limited opportunities for intrusion from mechanical and construction noise, although agricultural machinery may generate short-term noise impacts in the eastern valley.

Outlying, remote desert lands, including large-scale open space and conservation areas, are subject to little, if any, noise intrusion and are characterized as having a very quiet noise environment. Such areas include undeveloped mountainous land in the Indio Hills, Mecca Hills, and San Jacinto, Santa Rosa, San Bernardino, Little San Bernardino, and Orocopia Mountains. Large, undeveloped expanses of low-lying desert lands include the Coachella Valley Preserve, Willow Hole-Edom Hill Area of Critical Environmental Concern (ACEC), and the Dos Palmas Preserve/ACEC.

Noise from motor vehicle traffic may be generated on access roads; however, noise levels are limited due to very low traffic volumes and speeds. Vegetation, rocks, soil, ridges, and other natural features are likely to absorb or muffle most noise in undeveloped areas. In the western valley, within and east of the San Gorgonio Pass, open space lands may be impacted by wind energy operations; however, noise generated by wind turbines is generally compatible with open space and conservation uses. Potential impacts of noise on wildlife addressed in the proposed MSHCP are analyzed in more detail in Section 4.

3.13 Visual and Scenic (Aesthetic) Resources

The MSHCP Plan Area is distinguished by its unique arrangement of low-lying desert landscape and surrounding high terrain of the San Jacinto, San Bernardino, Little San Bernardino, and Santa Rosa Mountains. These contrasting viewsheds result in an exceptional display of open

[133] Riverside County Municipal Code, Chapter 17.224.040(L).

space and mountain scenery that enhances the aesthetic quality of the area. The mountainous portions of the Plan Area are comprised of highly differential rock formations, large expanses of light gray granite, and a diversity of vegetation, including live oak and towering pines. Views of the mountain ranges that ring much of the Plan Area, in particular, are highly valued.

The two highest peaks associated with the region are San Jacinto Peak in the San Jacinto Mountains, which rises to an elevation of 10,804 feet, and San Gorgonio Peak in the San Bernardino Mountains, with an elevation of 11,502 feet. The rise of Mt. San Jacinto, from the desert floor to the peak, is the steepest gradient in North America. The Santa Rosa Mountains extend through the southwest portion of the Plan Area. The highest peaks in the Santa Rosa Mountains include Toro Peak at 8,717 and Santa Rosa Peak at about 8,000 feet. To the north and northeast of the subject property are the Indio Hills, with elevations rising to about 1,600 feet.

The lower elevations of the Plan Area include numerous alluvial fans and cone that form at the mouth of the many canyons draining the area mountains. These expansive deposition areas form an important and visually interesting transition between the foothills and mountains, and the valley floor. The alluvial fans also are comprised of washes and braided streams that support important habitat and diverse visual character.

The valley floor is comprised of a mix of sand dunes, sand fields, and more limited areas of desert pavement swept clear of sand. Dunes and sand fields are archetypal desert visual resources with high visual resource value. In many areas, they are enhanced by the presence of mesquite hummocks that provide a vivid contrast of green against the light color of expanses of sand. In the spring, the dunes and sand fields are also frequently covered with a profusion of annual plants, including sand verbena and mallow.

In the central portion of the valley, the Indio and Mecca Hills have been uplifted by compressive forces associated with the San Andreas Fault Zone that parallels the long northwest–southeast axis of the Coachella Valley. Along the fault zone, fault dikes have blocked and impounded the movement of groundwater. This has resulted in the emergence of numerous groves of native desert fan palms (*Washingtonia filifera*) and associated mesquite and other vegetation, which also provide a unique and high value visual resource.

The lowest portions of the Plan Area are also a result of tectonic forces associated with the San Andreas Fault Zone. The Coachella Valley is the northwestern extension of a fault-controlled spreading zone that extends from the Gulf of Mexico. The spreading and subsidence has created a terminal lake (i.e., the Salton Sea) that has no outlet and currently stands at a surface elevation of 228± feet below mean sea level.

3.14 Utilities/Public Services and Facilities

The provision of utilities and public services (e.g., electricity, water, sanitary sewers, schools, libraries, fire and police protection) are essential to the day-to-day functioning of residents, visitors, businesses, and institutions in the Plan Area, and to its long-term growth and economic viability. Public services and facilities in the Coachella Valley are provided by a number of public and quasi-public agencies that ensure a coordinated system of services for valley residents and businesses.

Domestic Water

Although limited, scattered development in outlying areas of the Coachella Valley relies upon privately owned, on-site wells for the delivery of potable water. Most development is connected to a public or quasi-public water delivery system. Rural areas with utility water service include certain unincorporated areas of Desert Hot Springs, Sky Valley, and the Indio Hills, which are served primarily by CVWD.

Domestic water services are provided to the valley by a number of agencies that extract groundwater from deep wells and convey it to homes and businesses through extensive systems of reservoirs and distribution pipelines. Storage reservoirs are at elevated locations above pressure zones they serve and assure gravity system pressure throughout the valley. Colorado River water is imported via the Colorado River Aqueduct (which extends across the northerly portion of the valley) to artificially recharge the regional groundwater basin (also see Section 3.7: Water Quality/Resources for more information about supply and demand of groundwater resources).

The CVWD is the principal domestic water provider serving the Coachella Valley. Its coverage area encompasses approximately 637,000 acres, mostly within Riverside County, but also within northern Imperial and San Diego counties.[134] In 1999, CVWD served nearly 192,000 Coachella Valley residents.[135] Its coverage area includes: development east of the Whitewater River Stormwater Channel in Cathedral City; the cities of Rancho Mirage, Palm Desert, Indian Wells, and La Quinta; and most unincorporated communities, including Sky Valley, Thousand Palms, Thermal, Mecca, Oasis, and portions of Desert Hot Springs.

Other water purveyors also serve the remainder of the Coachella Valley. The MSWD provides domestic water to the City of Desert Hot Springs and unincorporated outlying areas including

134 "Coachella Valley Water Management Plan," Coachella Valley Water District, 2002.
135 Ibid.

North Palm Springs, Garnet, and Painted Hills. DWA serves the City of Palm Springs and the portion of Cathedral City west of the Whitewater River Stormwater Channel. The unincorporated community of Bermuda Dunes is served by the Myoma Dunes Mutual Water Company, and the cities of Indio and Coachella own and operate their own municipal water delivery systems.

Irrigation Water

Beginning in the early twentieth century, agriculture evolved as the dominant economy of the eastern Coachella Valley. Since the late 1940s, the CVWD has provided imported Colorado River water for irrigation purposes to agricultural lands in the eastern valley via the Coachella Branch of the All-American Canal. In 1999, CVWD delivered Coachella Canal water to approximately 78,553 irrigable acres in the eastern valley.[136] [137]

Construction of the All-American Canal by the U.S. Bureau of Reclamation began in 1934 and was completed in 1949. The Coachella Branch, which is under the jurisdiction of CVWD, is about 122 miles long. It diverges from the main All-American Canal about 37 miles downstream from the Imperial Dam (north of Yuma, Arizona), and terminates at Lake Cahuilla in the City of La Quinta. The Coachella Branch has a capacity of about 941,200 acre-feet per year. Much of the canal is concrete-lined to prevent water loss from seepage.

Wastewater Collection and Treatment

Sewage collection and treatment services are provided throughout the Coachella Valley by several agencies. CVWD serves the cities of Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and a portion of Cathedral City, as well as some unincorporated communities including Thousand Palms, Thermal, and North Shore. CVWD operates six wastewater reclamation plants in the Coachella Valley. CVWDs three largest plants include the Mid-Valley Wastewater Reclamation Plant south of Thermal, the Palm Desert Regional Wastewater Reclamation Plant on Cook Street in Palm Desert, and the Madison Street/Avenue 38 Wastewater Reclamation Plant northeast of Indio. The latter two plants include tertiary treatment facilities that subject wastewater to a third stage of treatment and make it suitable for the irrigation of golf courses, parks, greenbelts, and other landscaped areas.

DWA provides wastewater collection services to the southerly portion of Cathedral City. It does not operate its own wastewater treatment plant, but conveys effluent from Cathedral City to CVWD's Cook Street treatment facility in Palm Desert. MSWD provides sewage collection and

136 Ibid.
137 "Annual Review 2002", Prepared by the Coachella Valley Water District. 2003.

treatment services to the City of Desert Hot Springs and its environs. MSWD operates two wastewater treatment plants, including the Horton Plant on Verbena Road and the Desert Crest Plant on Sunrise Road.

Two cities in the Coachella Valley operate their own municipal wastewater treatment plants. The City of Palm Springs' plant is located on Mesquite Avenue west of Gene Autry Trail. To facilitate the recycling of wastewater generated in Palm Springs, the DWA operates a Water Reclamation Facility on Gene Autry Trail just east of the City's wastewater treatment plant. The City of Coachella also operates a municipally owned wastewater treatment plant located on Avenue 54.

Although most urbanized areas within the Coachella Valley are connected to wastewater collection and treatment systems, many homes and businesses in the Plan Area continue to rely upon on-site septic systems for the treatment of effluent. Most unsewered sites are located in outlying areas of the valley, such as Sky Valley, the Indio Hills, and remote areas of Desert Hot Springs, where the demand for services is relatively low and not sufficient to warrant the costs of constructing sewer system extensions. However, a substantial number of unsewered sites are located within the central, urbanized portion of the valley, including the Cathedral Canyon Cove neighborhood in Cathedral City, and scattered development in the community of Bermuda Dunes. Negotiations between DWA and the City of Cathedral City are currently underway to expand sewer service to the Cove and other unserved areas within DWA's boundaries.[138]

The long-term use of on-lot septic systems has been associated with groundwater contamination in isolated areas of the Coachella Valley, including the Cathedral City Cove.[139] The impact of septic systems on groundwater quality depends upon a number of factors, including population density, wastewater volume, soil conditions, and the quality of septic system maintenance. The greatest potential impacts on groundwater quality are expected to occur where poorly maintained septic systems serve relatively large populations in high densities. Community sewer systems generally provide excellent protection of groundwater resources by providing efficient and controlled removal and treatment of sewage materials.

Electric Service

SCE is the primary electric service provider for Southern California, including the upper Coachella Valley. Within the valley, the SCE service area generally includes the cities of Desert Hot Springs, Palm Springs, Cathedral City, Rancho Mirage, Indian Wells, and Palm Desert, and

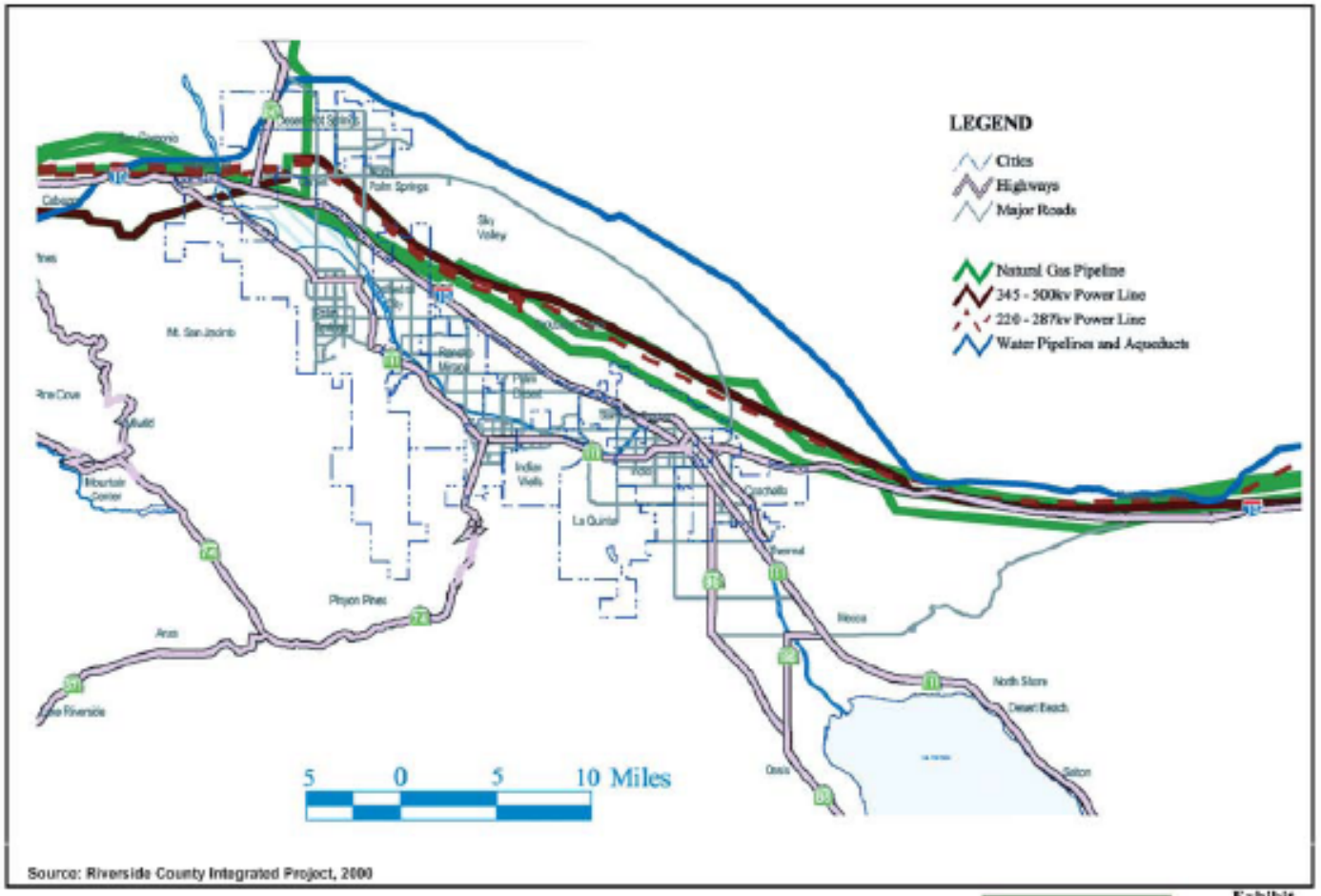
138 Dave Luker, Desert Water Agency, April 16, 2001.
139 "The Effects of Subsurface Wastewater Disposal Systems on Groundwater within Cathedral City," Desert Water Agency, February 1993.

intervening unincorporated lands. SCE derives its power from a number of sources, including cogeneration, geothermal, hydroelectric, solar, and wind sources. Its most important generating facilities are located outside the Coachella Valley and include the Big Creek hydroelectric system on the western slope of the Central Sierra Nevada Mountains and San Onofre Nuclear Generating Station.

SCE's facilities include high-voltage transmission lines rated between 55 and 500 kilovolts (kv), lower-voltage distribution lines rated below 55 kv, and substations which "step down" voltage so that it can be distributed to individual homes and businesses. As shown in *Exhibit 3-8*, SCE's largest transmission lines pass through the Coachella Valley along an east-west trending utility corridor, which is roughly parallel to Interstate 10. In the upper valley, near Thousand Palms and southern Desert Hot Springs, these facilities pass directly through high wind hazard zones and natural blowsand corridors. However, they are limited in their ability to obstruct blowing sand and are generally compatible with the preservation of this ecological process.

IID is a non-profit, community-owned utility district serving customers in Imperial County and parts of Riverside and San Diego counties. In the MSHCP Plan Area, IID's service area includes the following: a limited portion of the City of Palm Desert; the cities of La Quinta, Indio, and Coachella; the unincorporated communities of Sky Valley, Thousand Palms, Bermuda Dunes, Thermal, Oasis, Mecca, and North Shore; and other unincorporated lands in the eastern Coachella Valley.

IID obtains its power from a combination of hydroelectric, thermal, diesel, and geothermal generation sources. Since 1936, IID has constructed a number of its own power generating plants, including the El Centro Generating Station, a diesel-fired plant near Brawley, a series of hydroelectric plants along the All-American Canal near the U.S.-Mexico border, the Pilot Knob Power Plant, and the East Highline hydroelectric plant. IID also purchases power from outside sources, including the Western Area Power Administration. The Coachella Valley Substation, located east of State Highway 111 in the City of Coachella, serves as a key link between IID and California Independent System Operator control areas.


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
Source: Riverside County Integrated Project, 2000
TERRA NOVA®
Planning & Research, Inc.
Coachella Valley MSHCP
Major Utility Transmission Lines
Coachella Valley
CVAG
Exhibit
3-8

Electric Power Market Deregulation

The California energy industry has changed dramatically over the past few years. In 1998, the State of California implemented legislation that deregulated its power industry in an effort to enhance competition and bring a wider range of choices to consumers. The legislation mandated rate reductions from some electric companies, allowed consumers of large, investor-owned utilities (like SCE) the option to choose alternative service providers, and established a statewide Power Exchange where electricity is bought and sold at wholesale prices. Small, community-owned utilities (like IID) were not required to offer their customers the option of selecting alternative service providers at that time. Under the current regulatory environment, SCE is precluded from building electric power generation plants or selling any power it generates. Instead, all power generated by SCE is fed into the State's power grid, and the California Independent System Operator (Cal-ISO) regulates its day-to-day distribution.

The legislation froze rates charged by investor-owned utilities at 1996 price levels until no later than March 31, 2002. However, by winter 2000, a significant price gap emerged between wholesale electricity prices and maximum permitted retail prices, with wholesale prices typically exceeding the maximum permitted retail prices. In essence, it became cheaper not to provide electricity to consumers. As a result, several California communities experienced rolling blackouts to save on the State's power grid during the "supply shortage". It is uncertain whether and to what degree there is an electric supply problem in California. While demand fluctuates with levels of economic activity, statewide demand for electricity is expected to continue to grow in the long-term. Many interstate suppliers that have sold electricity to California utilities in the past have experienced low winter temperatures and precipitation in recent years, making hydroelectric and other power resources not as readily available as they once were.

Natural Gas

Natural gas is used for space heating, domestic and commercial hot water, cooking, and air conditioning, and other industrial applications. The Gas Company (Sempra Energy) provides natural gas services and facilities to much of the Coachella Valley. The natural gas originates in Texas and is transported to the valley through 3 east-west trending gas lines that cross the valley just north of Interstate 10 and continue west to Los Angeles.[140] These pipelines include one 30-inch line and two 24-inch lines, with pressures of 2,000 pounds per square inch (psi).

A system of high- and medium-pressure pipelines is connected to these major pipelines and distributes natural gas to individual homes and businesses. High-pressure gas lines are typically

[140] Art Escobedo, The Gas Company, Palm Desert Base, February 26, 2001.

steel pipes, with pressures greater that 60 psi, and are usually located within the rights-of-way of major streets throughout the Coachella Valley.[141] Medium-pressure distribution lines consist of plastic pipelines (although older pipes may be constructed of steel) with pressures less than 60 psi.[142] Pressures are reduced at numerous limiting stations and regulator stations throughout the valley. Most residences and businesses are fed through pipelines rated at 25 to 40 psi.

Most development in the central, urbanized core of the Coachella Valley is connected to the natural gas distribution system. Rural, outlying areas are generally not connected, given the prohibitive costs associated with extending the necessary infrastructure. In addition, small pockets of development remain unconnected, including Cahuilla Hills in Palm Desert and the southerly portion of the La Quinta Cove, among others. These residents typically use propane as an alternative fuel source.

Telephone Service

Verizon provides a wide range of residential and business telephone services to the Coachella Valley MSHCP Plan Area. Services include local and long distance connections, wireless cellular service, calling cards, business 800 numbers, and voice mail. Verizon also provides state-of-the-art data services such as internet and high-speed DSL data connections. The backbone of Verizon's communications network consists of central switching offices, which facilitate the connection of telephone and data transmissions. Numerous central switching offices are located throughout the urbanized areas of the Coachella Valley.

Cable Television

The Coachella Valley's largest cable television service provider is Time Warner, whose coverage area includes the following: the cities of Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and Coachella; and the unincorporated communities of Windy Point, North Palm Springs, Thousand Palms, Bermuda Dunes, and part of Thermal.[143] Digital cable service, which includes approximately 200 video channels, is offered throughout the Time Warner service area. Time Warner's high-speed cable-modem data services are being phased in and would be available to the entire service are in the next few years.[144]

Time Warner's public access Channel 17 is available for informational and educational purposes. In the cities of Palm Springs and Indian Wells, Channel 17 is a city-exclusive channel, which is

141 Ibid.
142 Ibid.
143 Cathy Jacobs, Government Affairs Supervisor, Time Warner, June 6, 2001.
144 Ibid.

used by Indian Wells for public announcements and by Palm Springs for the presentation of City Council meetings. In other cities, the channel is shared, with many jurisdictions utilizing it to air City Council meetings.

Desert Hot Springs Cablevision provides cable television services to the City of Desert Hot Springs and a portion of Sky Valley. The company currently provides approximately 71 channels and additional services such as telephone communications.[145] The current franchise agreement between the City of Desert Hot Springs and Cablevision provides the City with up to three public access channels, although only one channel currently in use. Cablevision provides videotaping and broadcasting services for community-sponsored events and City Council meetings.

Cable services are provided to the easternmost communities of the Coachella Valley by Kountry Kable, whose coverage area includes the communities of Mecca and Thermal. The company recently expanded to 30 channels with plans to add a public access channel.[146]

Solid Waste Management

Solid waste management has become an increasingly important issue in the Coachella Valley during recent years. With the closure of the Edom Hill Landfill in December 2004, municipalities are faced with an urgent need for alternative landfill sites and effective solid waste reduction methods.

The largest provider of solid waste management services in the Coachella Valley is Waste Management of the Desert, which serves the following communities: Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, Coachella, Thousand Palms, Bermuda Dunes, Sky Valley, Thermal, Oasis, Mecca, and North Shore. During 2000, approximately 289,912 tons of solid waste was collected within the Waste Management service area.[147] The cities of Palm Springs and Desert Hot Springs contract with Palm Springs/Desert Valley Disposal for solid waste management and disposal services. A variety of residential and commercial services are available from each of these companies, including special pick-up services for large waste generators, such as restaurants, hotels, and resorts.

Most cities in the valley have implemented a comprehensive recycling program, which has proven beneficial in the preservation of landfill space, and energy and other finite resources used in materials production. Recyclable materials, including glass, plastic, newspaper, aluminum, concrete and other construction debris, and green (landscaping) waste are collected by

145 "City of Desert Hot Springs Draft Comprehensive General Plan," prepared by Terra Nova Planning & Research, Inc., April 25, 2000.
146 James Fairfield, Kountry Kable, June 6, 2001.
147 Mark Wasserman, Waste Management of the Desert, June 7, 2001.

residential, commercial, and industrial consumers. Most green waste collected in the valley is recycled at facilities in Thermal and Thousand Palms, while other recyclables are transported to Los Angeles processors. Several privately operated recycling facilities are located within the Coachella Valley.

Most of the solid waste generated in the Coachella Valley was previously disposed of at the Edom Hill Landfill, located in the northwest portion of the Indio Hills, in the northern area of Cathedral City. The Edom Hill landfill was closed to waste delivery and disposal in December 2004. The Edom Hill Transfer Station, which was built on a portion of the landfill property and built to replace the landfill when it closed, has been in operation since that date. However, "final closure" of the landfill (construction of the final cover per Title 27 regulations) will be carried out in 2007 and will last 180 working days. Upon completion, post-closure maintenance will be carried out at the landfill and will be no less than 35 years.

A limited amount of waste collected in the easterly Coachella Valley is disposed of at the Mecca Landfill. In 1997, the remaining capacity of this landfill was 175,020 cubic yards.[148] The projected closure date for the Mecca Landfill is 2011; however, this date may change depending upon future levels of waste generation and demands for landfill space. Residential and commercial waste collected in the City of Cathedral City is transported by truck to the Copper Mountain Landfill in Wellton, Arizona. Compactor and roll-off waste from Cathedral City, including concrete and other bulky construction waste, is disposed of at the Edom Hill transfer station.

The waste that goes to the Edom Hill Transfer Station now goes to either the Badlands Landfill or the Lamb Canyon Landfill. The Badlands Landfill is located off Highway 60 and northeast of the City of Moreno Valley. It is owned and operated by Riverside County and is prepared to accept solid waste from the Coachella Valley immediately.[149] The landfill is permitted to receive up to 4,000 tons of waste per day. Lamb Canyon Landfill is located between the cities of Beaumont and San Jacinto, and the El Sobrante Landfill south of the City of Corona.

Public Schools

Public education services and facilities in the Coachella Valley are provided by several school districts, including the following: Palm Springs Unified School District, Desert Sands Unified School District, and Coachella Valley Unified School District. Additional educational opportunities are offered at numerous private schools throughout the valley.

148 Kathryn Gifford, Planner III, Riverside County Waste Resources Management District, letter correspondence, March 6, 2000.
149 Ibid.

The Palm Springs Unified School District (PSUSD) coverage area includes Desert Hot Springs, Palm Springs, Cathedral City, Thousand Palms, and much of Rancho Mirage. It operates a total of 22 schools, including 14 elementary, 4 middle, 3 high, and one continuation high school. Other educational services include head start preschools, childcare, adult education, and independent study programs.

Desert Sands Unified School District (DSUSD) provides public education services to Palm Desert, Indian Wells, La Quinta, Indio, Bermuda Dunes, and the southeast portion of Rancho Mirage. DSUSD operates 23 schools, including 14 elementary, 5 middle, 3 high, and one continuation high school.

The Coachella Valley Unified School District (CVUSD) coverage area encompasses approximately 1,200 square miles, including the easternmost portion of the Coachella Valley and a limited portion of Imperial County. In Riverside County, the district's coverage area includes Coachella, Thermal, Mecca, Oasis, North Shore, and parts of Indio and La Quinta. In Imperial County, it includes Desert Shores and Salton City. CVUSD operates a total of 14 schools, with grades ranging from kindergarten through twelfth grades, and including one continuation high school.

Each public school district has experienced overcrowding in recent years. In addition to permanent classroom facilities, the districts use portable classroom buildings on some campuses. They analyze a wide range of historical, actual, and projected demographic and housing data to determine the demand for new facilities, as well as their optimal locations and timelines for development.

When the State of California reduced funding for public schools, it passed legislation effective January 1, 1987, to permit school districts to levy a per square foot fee for residential, commercial, and industrial development. These fees must be paid by developers directly to the school district prior to the issuance of building permits. The fees are used to assist in the construction or reconstruction of school facilities. In 2001, the fees were $2.05 per square foot of residential development, and $0.33 per square foot of commercial or industrial development.

Four colleges and universities that offer a wide range of vocational and advanced education opportunities are located within the Coachella Valley. The College of the Desert (COD) is a California State Community College on Monterey Avenue in the City of Palm Desert, with off-site classes at the Eastern Valley Center in Indio and the Western Valley Center in Palm Springs and Desert Hot Springs. Established in 1958, COD offers associates degrees, transferable degrees, and certificate programs in more than 70 disciplines. During its fall 2000 semester, COD enrolled 8,602 students.

The Coachella Valley Campus (CVC) of California State University-San Bernardino (CSUSB) opened during fall of 1986. The CVC has recently relocated administration and some classrooms from the College of the Desert Campus in Palm Desert to new buildings on its new campus at the northeast corner of Frank Sinatra Drive and Cook Street. The new campus offers a variety of undergraduate and graduate degree programs across 6 disciplines and is expected to support a peak population of approximately 25,000 students.

The University of California-Riverside (UCR) Extension Program offers a variety of professional and certificate classes at the College of the Desert campus in Palm Desert. The program is largely directed at working adults seeking professional enrichment, with most courses offered during evenings and weekends. The Richard J. Heckman International Center for Entrepreneurial Management, which is part of the Gary Anderson Graduation Business School of UCR, is currently under construction at the southeast corner of Gerald Ford Drive and Cook Street in Palm Desert. The center will offer upper level courses in business management, finance, and related business studies.

The Coachella Valley campus of Chapman University was established in 1979 and is located on Cook Street in the City of Palm Desert. The curriculum focuses on the adult learner and includes a variety of undergraduate and graduate degrees, teaching credentials, and certificate programs.

Libraries

Libraries are important community assets and provide adults and children with enhanced educational opportunities. The principal provider of library services in the Coachella Valley is the Riverside County Library System, a network of public libraries serving Riverside County residents. Coachella Valley branches of the County Library System include libraries in the following locations: Desert Hot Springs, Cathedral City, Thousand Palms, Palm Desert, La Quinta, Indio, Coachella, and Mecca. These facilities are operated by the County of Riverside, under contract with the cities where they are located. Among the services offered are a County-wide literacy program, volunteer programs, adult computer courses, youth programs, guest speaker lectures and presentations, musical events, and access to all volumes and state-of-the-art research facilities.

Two Coachella Valley cities operate their own municipal libraries independent of the County Library System. The Palm Springs Public Library is located on Sunrise Way and the Rancho Mirage Public Library is located at the northeast corner of State Highway 111 and Bob Hope Drive.

Other regional libraries include the College of the Desert (COD) Library, a joint-agency facility funded by the College of the Desert, City of Palm Desert, and Riverside County. The COD

Library is located on Monterey Avenue in Palm Desert and is available to COD students and the general public.

Fire Protection

The threat of fire poses hazards to life and property. Given the region's generally sparsely vegetated terrain, developed areas are the primary source of fire service calls in the Coachella Valley. The location of fire stations, availability of fire water flows, adequacy of fire equipment and personnel, and emergency preparedness planning are crucial factors in preventing and suppressing urban fires.

The Riverside County Fire Department is the largest provider of fire protection and suppression services in the Coachella Valley. Not only does it serve unincorporated County lands, but it is also contracted to protect the following cities: Desert Hot Springs, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and Coachella. The Riverside County Fire Department operates approximately 22 fire stations in the Coachella Valley and provides fire suppression and prevention, emergency medical response, hazardous materials response, fire investigations, and other related services.

The cities of Palm Springs and Cathedral City operate their own municipal fire departments. The Palm Springs Fire Department is headquartered on North El Cielo Road and includes five fire stations. The Cathedral City Fire Department operates three fire stations and also provides paramedic, code enforcement, and disaster preparedness services. Both fire departments maintain mutual aid agreements with neighboring communities.

Police Protection

Police protection is a critical community service that not only influences the crime rate, but also indirectly affects the community's growth and prosperity. Most communities strive to maintain a high ratio of officers to population, as this allows for more effective crime identification and prevention. Crime rates and the effectiveness of police personnel are impacted by the distribution of land uses, anticipated development patterns, traffic circulation patterns, and the integration of "defensible" spaces in building designs.

The following Coachella Valley cities contract with the Riverside County Sheriff's Department for police protection services: Rancho Mirage, Palm Desert, Indian Wells, La Quinta, and Coachella. The Sheriff's Department also provides protection to unincorporated County lands throughout the valley.

The cities of Desert Hot Springs, Palm Springs, Cathedral City, and Indio maintain their own municipal police departments. The Desert Hot Springs Police Department operates out of City Hall on Pierson Boulevard. The Cathedral City Police Department was created in 1984 and includes three satellite community service offices, which offer accessibility and high visibility to the community. Indio's Police Department is headquartered on South Jackson Street.

3.15 Socio-Economic Resources

Although the Coachella Valley economy is closely tied to that of the broader Southern California region and the entire nation, the valley is in many ways a self-contained economic unit. This is due to several factors, including the valley's distance and relative geographic isolation from other metropolitan areas, its unique desert environment and reputation as a world-class destination resort area, and its ability to attract a large population of seasonal residents and retirees. The following discussion describes existing demographic and economic conditions in the Coachella Valley and the relative importance of its strongest employment sectors.

Regional Demographics

Population

The Coachella Valley population has grown rapidly over the past 2 decades. As described in *Table 3-19*, the combined population of the valley's 9 incorporated cities doubled during the 1980s, from 91,124 to 182,515. During the 1990s, the population grew to 255,790, which represents a 10-year gain of 73,275 or 40.1%. This includes only those residents living in cities and does not account for persons living in unincorporated communities in the valley, such as Bermuda Dunes, Thousand Palms, and Mecca. According to the 2000 Census, the combined population of these 3 communities was 16,751 residents.

TABLE 3-19: Population Trends for Coachella Valley Cities, 1980-2000

	Population			
City	1970	1980	1990	2000
Cathedral City	N/A[1]	N/A[1]	30.085	42,647
Coachella	8,353	9,129	16,896	22,724
Desert Hot Springs	2,378	5,941	11,668	15,682
Indian Wells	760	1,394	2,647	3,816
Indio	14,459	21,611	36,793	49,116
La Quinta	N/A[1]	3,328[2]	11,215	23,694
Palm Desert	N/A[1]	11,081	23,252	41,155
Palm Springs	20,936	32,359	40,181	42,807
Rancho Mirage	N/A[1]	6,281	9,778	13,249
RivCo Unincorporated	39,980	42,000	48,350	67,690
Total	86,866	133,124	230,865	323,480

[1] City was not yet incorporated. [2] Estimate: La Quinta was incorporated in 1982.
Source: U.S. Census Bureau, Census 1970, 1980, 1990, 2000.

Seasonal and part-year residents also represent a significant portion of the regional population and have a tremendous impact on the valley's economy. According to the Palm Springs Desert Resorts Convention and Visitors Bureau, the Coachella Valley population swells to about 500,000 during winter months.[150] The permanent Coachella Valley population is expected to continue to grow rapidly over the next 2 decades. SCAG forecasts indicate that the population will reach approximately 440,301 by year 2010, and 540,901 by year 2020 (also see Section 4.14 of this document).[151]

Median Age

In 2000, the median age of residents living in MSHCP Plan Area ranged from a low of 22.8 in Coachella, to a high of 63.4 in Indian Wells.[152] This wide range of ages is representative of the valley's diverse population, which includes students, young families, middle-aged professionals, retirees, and seniors.

Race and Ethnicity

The Coachella Valley is primarily a Caucasian community, with approximately 68.6% of residents in the nine cities classifying themselves as "white." However, nearly half (44.3%) of the population identifies themselves as Hispanic or Latino, of any race. *Table 3-20* describes the region's racial/ethnic composition, according to the 2000 U.S. Census.

TABLE 3-20
Ethnicity in Coachella Valley Cities, 2000

	Population	
Race	Total No.	Percent
White	175,692	68.6%
Black or African American	6,292	2.5%
American Indian/Native Alaskan	2,172	0.8%
Asian	6,077	2.4%
Native Hawaiian/Pacific Islander	240	0.09%
Some Other Race	56,676	22.1%
Two or More Races	8,641	3.4%
Total	255,970	100%[1]
Hispanic/Latino (of any race)	113,305	44.3%

[1] Difference due to rounding.
Note: table includes combined data for all nine incorporated cities in the Coachella Valley.
Source: U.S. Census Bureau, Census 2000.

150 "Palm Springs Desert Resorts Fact Sheet," Palm Springs Desert Resorts Convention and Visitors Bureau, Spring 2000.
151 Southern California Association of Governments, letter correspondence to City of La Quinta, May 23, 2001.
152 U.S. Census Bureau, Census 2000.

Households[153]

In 2000, there were a combined total of 95,504 households in the nine Coachella Valley cities and 29,683 households in the unincorporated portions of the Plan Area. Average household sizes ranged from a low of 1.92 persons per household in Rancho Mirage, to a high of 4.72 in Coachella. Based upon household and population numbers for 2000, the average household size in the unincorporated portions of the Plan Area was 2.28 persons. These data indicate that the region contains a wide variety of family units, ranging from singles and couples to large, extended families.

In 2000, the total number of housing units in the 9 Coachella Valley cities was 133,175. Vacancy rates ranged from a low of 4.3% in Coachella, to a high of 48.4% in Indian Wells. However, a substantial portion of the Plan Area's resort communities' vacancies are due to recreational, seasonal, or other occasional residents and the resulting relatively large seasonal population that occupies the valley during winter months.

To provide a more accurate reflection of housing unit vacancies in the Coachella Valley, recreational/seasonal "vacancies" must be subtracted out from total vacancy rates. When these data are removed, actual vacancy rates range from a low of 4.1% in Coachella, to a high of 16.2% in Rancho Mirage. Given the large seasonal resident and the continued strong growth in housing development, vacancy rates are difficult to definitively quantify.

Employment and Jobs

The evaluation of employment data and job numbers is also an important socio-economic indicator. Employment data indicates the number of Plan Area residents that are employed, and the jobs data indicate the estimated number of jobs (employment opportunities) within the Plan Area.

According to the California Employment Development Department, the number of jobs in the Coachella Valley increased from 74,146 in 1991, to 100,231 in 1999. This represents a gain of 26,085 jobs or 35.2% over the 8-year period.[154] As shown in *Table 3-21*, in 1991, the region's largest employment sector was retail trade (18,265 jobs), followed by agriculture (11,518), and hotel and amusement (7,847). By 1999, however, the hotel and amusement industry had replaced agriculture as the second largest employment sector.

153 Ibid.

154 California Employment Development Department data, as provided in "Coachella Valley Economic Review," John E. Husing, Ph.D., July 22, 2000.

TABLE 3-21
Coachella Valley Jobs by Sector, 1991-1999

Sector	No. of Persons Employed		% Change
	1991	1999	1991 – 1999
Retail Trade	18,265	22,219	21.6%
Hotel & Amusement (travel)	7,847	15,973	103.6%
Agriculture	11,518	12,379	7.5%
Construction	4,376	8,456	93.2%
Health Services	6,325	8,269	30.7%
Other Services	4,722	6,741	42.8%
Education	4,856	6,520	34.3%
Distribution & Transport	2,923	4,385	50.0%
Finance, Insurance, & Real Estate	3,583	3,766	5.1%
Manufacturing	2,605	2,935	12.7%
Business Services	1,661	2,855	71.9%
Utilities	2,138	2,090	- 2.2%
Engineering & Management	1,534	1,394	- 9.2%
Government	1,264	1,385	9.5%
Employment Agencies	534	867	62.5%

Source: California Economic Development Department, as provided in Exhibit 17, "Coachella Valley Economic Review," John E. Husing, Ph.D., July 22, 2000.

The comparison of 1991 and 1999 data shown above indicate that the hotel and amusement industry was the fastest growing jobs sector during the 8-year period (103.6%), closely followed by the construction industry, which rose 93.2% and was fueled by a regional housing and development boom. Other growing job-producing industries include business services (up 71.9%), employment agencies (up 62.5%), and distribution and transport services (up 50.0%). Although it remains the region's largest employment sector, retail trade saw more modest growth (21.6%), as did the health services, education, agriculture, and manufacturing industries. Utilities and engineering/management experienced negative growth.

The number of firms in the Coachella Valley has risen from 5,400 in 1991 to 6,461 in 1999, for an 8-year gain of 1,061 or 19.6%.[155] The largest number of firms is in the retail trade (1,382), consumer services (1,081), construction (730), and finance, insurance, and real estate (730)

[155] Ibid.

sectors.[156] An important attribute of local employers is their relatively small size. The average number of workers per firm was 13.7 in 1991 and 15.5 in 1999.[157]

Employment data from SCAG and the US Census Bureau show that the number of Coachella Valley residents employed in 1997 was approximately 123,099, climbing to 130,852 persons employed in 2000 (also see Section 4.14 for future employment projections). Although total employment is rising in the Coachella Valley, the largest and fastest growing sectors (i.e., travel, retail, and agriculture) also tend to be the lowest paying.[158]

The average Coachella Valley worker was paid $19,917 in 1991 and $24,867 in 1999 (note that this is not the same as median household income, which is described below).[159] This represents an increase of $4,950 or 20.4% over 8 years. These average payroll levels are lower than the $29,000 to $30,000 average found in the Inland Empire region and are largely a result of the Coachella Valley's high concentration of labor-intensive employment (i.e., agriculture, travel, and retail).[160]

Household Income

Median household incomes in the Coachella Valley have risen steadily over the past decade. The following table (*Table 3-22*) describes median household incomes for the region's 9 cities. In 1990, they ranged from a low of $20,687 in Desert Hot Springs, to a high of $87,942 in Indian Wells. By 1998, they ranged from $29,555 in Desert Hot Springs to $125,642 in Indian Wells. These data demonstrate the substantial variation in residents' economic situations and expendable incomes.

Overview of Regional Economy

Agriculture was the Coachella Valley's dominant industry during the first half of the twentieth century. The region's main staple, the date palm, was introduced around the turn of the century by the U.S. Department of Agriculture, and the industry soon expanded to include the cultivation of grapes, citrus, and other fruit and vegetable crops.

156 Ibid.
157 Ibid.
158 Ibid.
159 Ibid.
160 Ibid.

TABLE 3-22
Median Household Income in the Coachella Valley 1990-1998

	Median Household Income	
City	1990[1]	1998[2]
Cathedral City	$30,908	$44,158
Coachella	$23,218	$35,191
Desert Hot Springs	$20,687	$29,555
Indian Wells	$87,942	$125,642
Indio	$25,976	$37,112
La Quinta	$39,572	$56,536
Palm Desert	$37,315	$53,312
Palm Springs	$27,538	$39,343
Rancho Mirage	$45,064	$64,383

1 1990 U.S. Census
2 Inland Empire Economic Databank & Forecasting Center, University of California-Riverside
Source: Community Economic Profiles, Riverside County Economic Development Agency, 1998.

However, hotels, restaurants, country clubs, and casinos began to emerge in the western Coachella Valley as early as the 1920s, especially in the Palm Springs and Cathedral City areas. Equestrian camps and resort hotels, including the historic La Quinta Hotel, were constructed in the lower valley. By the 1930s, the character of the region had been transformed toward the budding resort industry, with the marketing and construction of "weekend homes" throughout the valley.

A new era of development emerged during the post-World War II era, giving the region its predominant image as a destination resort community. Over the past three decades, the Coachella Valley has expanded to become one of the premier destination resort areas in the country. Today, it is characterized by high quality hotels, convention facilities, spas, and planned residential golf course developments that are an essential part of the valley's resort residential economy.

Agriculture in Riverside County and the Coachella Valley

Despite the significant urban growth that has occurred in the Coachella Valley over the past century, agriculture remains the third largest employment sector in the region and represents a mainstay of the broader Riverside County economy. During 2001, Riverside County ranked ninth among California counties for total value of agricultural production. Its agricultural production was valued at approximately $1.1 billion and represented 4.0% of the State's total

production.[161] *Table 3-23* compares various Riverside County agricultural data for 1987, 1992, and 1997, as reported by the U.S. Department of Agriculture.

As shown in the table below, the number of farms in Riverside County decreased by about 21.3% from 1987 to 1997. However, the acreage being farmed increased by 3.6% during the same period, and the number of cropland acres harvested increased by 12.6% . More importantly, the market value of agricultural products sold by Riverside County farms increased by $320 million or 44.1% during this 10-year period. As shown below, the County's leading agricultural products are fruit and nut crops, livestock products, and vegetable products. Major Coachella Valley products include dates, grapes, citrus, and a variety of other fruits and vegetables. *Table 3-24* shows the gross value of agricultural production in Riverside County by commodity groups for the years 1995 to 2000.

TABLE 3-23
Agricultural Profile for Riverside County, 1987 – 1997

	1987	1992	1997
Number of farms[1]	3,874	3,511	3,048
Land in farms (acres)	491,150	423,602	509,031
Average size of farms (acres)	127	121	167
Total Cropland harvested (acres)	217,994	226,950	245,446
Estimated market value of land and Buildings (average per acre)	$3,759	$5,804	$4,618
Estimated market value of land and Buildings (average per farm)	$484,266	$711,639	$749,295
Estimated market value of machinery and Equipment (average per farm)	$43,776	$48,123	$62,823
Market value of agricultural products sold, entire County	$726,902,000	$846,932,000	$1,047,525,000
Market value of agricultural products sold, average per farm	$187,636	$241,223	$343,676
Hired farm labor (number of workers)	not available	29,325	23,417
Hired farm labor payroll	$101,673,000	$133,587,000	$128,522,000

[1] A farm is any place from which $1,000 or more of agricultural products were sold, or normally would have been sold during the census year.

Source: U.S. Department of Agriculture, 1997 Census of Agriculture.

[161] Resource Directory 2002, California Department of Food and Agriculture. In 2001, the agricultural marketing of California farmers and ranchers reached $27.6 billion.

TABLE 3-24
Gross Value of Agricultural Production in Riverside County, by Commodity Groups, 1995-2000 ($ 000)

	1995	1996	1997	1998	1999	2000
Field Crops	79,264	84,387	90,314	76,790	64,185	66,433
Seed Crops	144	493	334	390	369	488
Vegetable Crops	228,196	164,667	164,609	204,368	237,878	193,648
Fruit & Nut Crops	339,351	309,898	206,655	259,140	342,743	292,035
Nursery, Flowers	71,169	81,943	82,827	94,549	90,377	107,520
Apiary Products	4,280	6,306	5,376	6,539	5,572	4,269
Livestock	71,535	52,410	45,867	36,895	45,329	40.879
Livestock Products	290,931	323,918	298,613	337,515	335,599	275,207
Poultry	304	77	75	76	77	68
Poultry Products	78,257	117,721	93,250	83,243	75,233	68,013
Total Value	1,163,431	1,141,820	1,087,920	1,199,505	1,197,362	1,048,560

Source: Summary of County Agricultural Commissioners' Reports, Gross Values by Commodity Groups, California 1995-2000, as compiled and tabulated by the Southern California Association of Governments (SCAG). Does not include all crops/products produced.

The Coachella Valley farmland totals about 84,852 acres or 7.50% of the MSHCP Plan Area.[162] Regional agricultural lands are largely concentrated in the eastern portion of the valley, in and around Indio, Coachella, Thermal, and Mecca. Some of these lands are designated as "prime farmland," "statewide important farmland," "unique farmland," and "local important farmland," based on their soil characteristics, climatic conditions, water supplies, and suitability for production.[163] Large packing houses and transportation/distribution centers are major employers in this vicinity. Coachella and Indio, in particular, are key transportation hubs that are situated near Union Pacific Railroad lines and facilities, Desert Resorts Airport, and junction of Interstate 10 and State Route 86, all of which can facilitate the transport of agricultural products nationwide.

Tourism in the Coachella Valley

As described in *Table 3-20* above, the Hotel and Amusement industry was the fastest growing employment sector in the Coachella Valley during the 1990s. This sector provides a wide range of jobs and wage levels and includes hotels, resorts/spas, amusement facilities, golf courses, restaurants, convention facilities, car rentals, air travel, and other modes of transportation.

[162] Coachella Valley Multiple Species Habitat Conservation Plan GIS Database. Coachella Valley Association of Governments and US Bureau of Land Management. April 2003.

[163] Farmland Mapping and Monitoring Program, 2001, California Department of Conservation, Division of Land Resources Protection 2002.

During the first half of the twentieth century, the regional tourism market area was largely concentrated in the western Coachella Valley, particularly in the Palm Springs area, with fewer scattered hotels/motels in the eastern valley. However, the market now encompasses the entire urbanized portion of the valley, from Palm Springs southeastward.

Approximately 3 million (overnight) visitors come to the Coachella Valley annually, and tourism has an estimated $1.5 billion annual economic impact on the region.[164] A 1997-1998 visitors survey and study conducted by the Palm Springs Desert Resorts Convention and Visitors Bureau found that, of more than 2,000 Coachella Valley visitors, 41% resided in California and 12% were international visitors.[165] The primary purpose of visits to the Coachella Valley was vacation/pleasure for 64.7% of respondents. The area attracted a large number of repeat visitors, as more than 57% had visited the area previously. The average size of the visitor party was 2.4 persons, and the average age was 43 years old. The average visitor stayed for 5.7 nights and spent $254 per day.

Local hotels and motels play a critical role in the tourism industry. *Table 3-25* describes hotel/motel characteristics in the valley from 1995 to 1999. The data indicate that, while the number of hotel/motel rooms grew by only 4.4% during this five-year period, gross hotel room sales increased by 46.8%.

TABLE 3-25
Hotel/Motel Trends in the Coachella Valley, 1995-1999

	No. of Hotels*	No. of Hotel Rooms*	Gross Hotel Room Sales
1995	282	13,980	$238,844,815
1996	225	14,061	$263,863,690
1997	230	14,333	$284,973,227
1998	236	14,566	$313,052,359
1999	227	14,597	$350,758,958

* Excludes condominiums, timeshares, and rental properties other than hotels/motels.
Source: "General Information Handout," Palm Springs Desert Resorts Convention and Visitors Bureau, December 1999.

Entertainment and amusement venues also play a major role in the regional economy. The Coachella Valley is known nationwide for its world-class golf courses and high-profile professional golf events. In 1999, there were 100 golf courses in the valley, including 46 public and semi-private, 44 private, and 10 reciprocal courses.[166] Approximately 39.8% of Coachella

164 "Palm Springs Desert Resorts Fact Sheet," Palm Springs Desert Resorts Convention and Visitors Bureau, Spring 2000.
165 "Visitor Study – 1998," Palm Springs Desert Resorts Convention and Visitors Bureau, 1998.
166 "General Information Handout," Palm Springs Desert Resorts Convention and Visitors Bureau, December 1999.

Valley visitors play golf, which demonstrates the importance of this industry to the regional economy.[167] Other recreational and entertainment venues include 600 tennis courts, 682 restaurants, community theatres, museums, casinos, and numerous parks and trails.

Retail Trade in the Coachella Valley

The retail trade industry is closely related to the tourism industry described above. Both visitors and residents of the Coachella Valley patronize local restaurants, gas stations, grocery stores, and other retail establishments. In 2000, there were approximately 7,776 retail outlets, which generated $2.45 billion in retail sales in the Coachella Valley.[168] Strong markets include the automotive sector, eating and drinking establishments, lumber and building materials, and general merchandise. Retail development ranges from strip commercial centers, to regional-scale shopping malls with department store anchors, to "big box" retail, to unique specialty shopping and entertainment districts.

3.16 Environmental Justice and Children

Environmental justice refers to the fair and equitable treatment of all individuals, regardless of race, ethnicity or income level, in the development and implementation of environmental laws and policies. The concept of environmental justice is rooted in the Civil Rights movement of the 1960s. However, it did not gain momentum until the 1980s and early 1990s when various researchers and community members noticed that a disproportionate number of landfills, toxic waste sites, and other government-sponsored environmental projects were being proposed and constructed in and around predominantly low income and minority communities. Such projects were exposing, or had the potential to expose, these populations to disproportionate levels of health hazards and adverse environmental consequences. Since then, the movement has expanded to address a broader range of development projects and to include Federal and State policy guidance.

Federal Regulation and Implementation

In February 1994, the President of the United States signed Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, which is one of the principal mechanisms used to implement environmental justice at the Federal level. Its fundamental objective is to require each Federal agency to "…make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs,

167 "Palm Springs Desert Resorts Fact Sheet," Palm Springs Desert Resorts Convention and Visitors Bureau, Spring 2000.
168 Ibid.

policies, and activities on minority populations and low-income populations."[169] The EO further requires each Federal agency to establish its own environmental justice strategy, and it created the Interagency Working Group for Environmental Justice (chaired by the Environmental Protection Agency (EPA)) to oversee implementation of the executive order.[170]

The EO was accompanied by a memorandum that emphasized the importance of NEPA as a means for implementing environmental justice principles. The memorandum directs Federal agencies to analyze the environmental effects, including human health, economic, and social effects, of their actions where such analysis is required by NEPA. Of particular importance is the involvement of affected communities in NEPA's public participation process and the formulation of appropriate mitigation measures and project alternatives.

The Council on Environmental Quality (CEQ) oversees the Federal government's compliance with Executive Order 12898 and NEPA. According to the CEQ, environmental justice issues may arise from a broad range of impacts on the natural and physical environment, including social, cultural, and economic effects, such as human health or ecological changes.

Federal agencies are required to address these issues at each step of the NEPA process and identify disproportionately high and adverse effects on low income, minority, and Native American populations. The CEQ defines key terms, such as "minority," "low income population," and "disproportionately high and adverse environmental effects" in its guidance document entitled *Environmental Justice: Guidance Under the National Environmental Policy Act*.

California Regulation and Implementation

California legislation does not specifically address analysis of environmental justice under CEQA. The most relevant guidance is found in the CEQA Guidelines, which state that social and economic effects may be used to determine the significance of a physical change caused by a project (Section 15131(b)), and that any project that will cause substantial adverse effects on human beings, either directly or indirectly, shall be determined to have a significant impact on the environment (Section 15065(d)).[171]

Two pieces of environmental justice legislation have been enacted in California in recent years. In October 1999, Senate Bill (SB) 115 was signed into law, codifying the definition of environmental justice, establishing the Governor's Office of Planning and Research (OPR) as the

169 "Environmental Justice: Guidance Under the National Environmental Policy Act," Council on Environmental Quality, December 10, 1997.
170 Ibid.
171 "Addressing Environmental Justice in California," Gregory King, Environmental Monitor, Summer 2001.

lead agency responsible for implementing the State's environmental justice programs, and requiring the California Environmental Protection Agency (CalEPA) to develop a model environmental justice mission statement.[172]

In September 2000, the Governor signed SB 89, which mandated the formation of a working group to assist CalEPA in developing an interagency strategy for addressing any gaps in existing programs and policies that might hinder the achievement of environmental justice goals.[173] Further efforts to enhance the State's environmental justice programs include the creation of an Assistant Secretary for Environmental Justice within the CalEPA in the 2000-01 budget, and OPR's consideration of drafting guidance for local governments on preparing optional General Plan elements that address environmental justice.[174]

Minorities and Minority Populations

The Coachella Valley population is a unique assemblage of persons of different ethnicities and races. *Table 3-26* describes the year 2000 racial composition of the entire MSHCP Plan Area, as well as that of individual cities and Census Designated Places (CDPs) within the Plan Area. The data indicate that the majority of residents in the Plan Area categorize themselves as "white," and other races represent a significantly smaller segment of the population. A substantial portion of the population identifies themselves as Hispanic or Latino, of any race. Minority populations are generally well-integrated and dispersed geographically throughout the Coachella Valley, and there are few isolated minority neighborhoods or districts in the region. However, the data indicate that larger percentages of minorities reside in certain regions of the valley. As shown in the table below, the percentage of "white" residents in the entire Plan Area is approximately 68.6% . Within individual communities, the percentage of "white" residents ranges from a low of 24.1% in the unincorporated community of Mecca, to a high of 96.3% in the City of Indian Wells. "White" residents clearly represent the majority of the regional population. This segment of the population appears to be dispersed throughout all communities, but is most concentrated in the central urbanized portion of the valley, including Rancho Mirage, Palm Desert, Indian Wells, and Bermuda Dunes.

The percentage of "Black or African Americans" in the Plan Area is approximately 2.5%, but ranges from 0.1% in Mecca to 6.1%, in Desert Hot Springs. "American Indian and Alaskan Natives" represent about 0.8% of the Plan Area population, with a low of 0.2% in Rancho Mirage and Indian Wells, and a high of 1.4% in Desert Hot Springs. The "Asian" population accounts for 2.4% of the entire Plan Area, ranging from 0.3% in Coachella to 3.8% in Palm

172 Ibid.
173 Ibid.
174 Ibid.

TABLE 3-26
Racial Composition of the MSHCP Plan Area, 2000 (%)

	White	Black or African American	American Indian & Alaska Native	Asian	Native Hawaiian & Pacific Islander	Some Other Race	Two or More Races	Hispanic/ Latino (of any race)
Cities and Census Designated Places (CDP)								
Bermuda Dunes	84.2	2.1	0.6	2.7	0.1	6.9	3.4	19.5
Cathedral City	65.3	2.7	1.0	3.7	0.1	23.1	4.1	50.0
Coachella	38.8	0.5	0.8	0.3	-	56.6	3.0	97.4
Desert Hot Springs	68.2	6.1	1.4	2.0	0.1	16.4	5.8	40.4
Indian Wells	96.3	0.4	0.2	1.5	0.1	0.5	1.0	3.0
Indio	48.7	2.8	1.0	1.5	0.1	42.0	3.9	75.4
La Quinta	78.5	1.4	0.7	1.9	0.1	13.9	3.5	32.0
Mecca	24.1	0.1	1.0	0.7	-	70.7	3.4	98.0
Palm Desert	86.8	1.2	0.5	2.6	0.1	6.5	2.4	17.1
Palm Springs	76.3	3.9	0.9	3.8	0.1	9.8	3.1	23.7
Rancho Mirage	92.7	0.9	0.2	1.2	0.1	3.6	1.3	9.4
Thousand Palms	74.8	0.7	0.9	0.7	0.3	19.4	3.2	43.6

- represents zero or rounds to zero.
Source: For Cities and Census Designated Places: U.S. Census Bureau, Census 2000.

Springs. "Native Hawaiians and Other Pacific Islanders" account for about 0.09% of the population in the Plan Area, ranging from a low of 0% (or near 0%) in Coachella and Mecca to a high of 0.3% in Thousand Palms. These individuals clearly represent minority populations in the MSHCP Plan Area. The data indicate that they are dispersed geographically, but the greatest percentages generally live in the western portion of the Coachella Valley, including the cities of Palm Springs, Desert Hot Springs, and Cathedral City.

Individuals of two or more races account for about 3.4% of the entire Plan Area, and range from 1.0% of the population of Indian Wells to 5.8% of the population of Desert Hot Springs. This segment of the population appears to be dispersed geographically throughout the Coachella Valley, with the largest percentages residing in Desert Hot Springs and Cathedral City.

The percentage of valley residents describing themselves as "some other race" represents about 22.1% of the Plan Area, but varies widely from community to community, from a low of 0.5% in Indian Wells to a high of 70.7% in Mecca. According to the U.S. Census Bureau, this category includes races other than "white," "Black or African American," "American Indian/Alaskan Native," "Asian," or "Native Hawaiian/Other Pacific Islander," and may include racial categories such as "interracial" or a specific Hispanic/Latino group (e.g., Mexican, Puerto Rican, or Cuban). Given the percentage of persons identifying themselves as "Hispanic/Latino (of any race)" in the table, the data suggest that many of the "other races" are those of Hispanic or Latino

origin. This segment of the population is largely concentrated in the easterly portion of the Plan Area, particularly in Indio, Coachella, and Mecca.

As described in *Table 3-25,* approximately 44.3% of the population in the entire Plan Area describe themselves as Hispanic or Latino, although they may be of any race. This category is unique in that it identifies the heritage, nationality group, lineage, or country of birth of a population segment that is growing throughout the Coachella Valley region and entire nation. Within individual communities, this population ranges from a low of 3.0% in Indian Wells to a high of 98.0% in Mecca. According to the U.S. Census Bureau, people who identify themselves as Hispanic or Latino classify themselves as Mexican, Puerto Rican, Cuban, or of other Spanish, Hispanic, or Latino descent. The data indicate that individuals identifying themselves as Hispanic or Latino are well-dispersed throughout the valley, but the greatest percentage resides in the southeasterly portion of the Coachella Valley, including Indio, Coachella, and Mecca.

Low Income Populations

The Coachella Valley population is also characterized by a diverse range of incomes. Residents include young working families, middle and upper class professionals, retirees on fixed incomes, those receiving public assistance, and seasonal workers employed in the region's agricultural and resort industries. *Table 3-27* compares median incomes and the number of persons living below poverty level for the Plan Area and for each city and Census Designated Place within the Plan Area.

TABLE 3-27
Comparison of Income Levels in the MSHCP Plan Area, 2000

Cities and Census Designated Places (CDP)	Median HH Income ($)	Persons Living Below Poverty Level	
		Total No.	% of Population
Bermuda Dunes	51,082	418	6.9
Cathedral City	38,887	5,814	13.6
Coachella	28,590	6,468	28.9
Desert Hot Springs	25,987	4,443	27.4
Indian Wells	93,966	129	3.4
Indio	34,624	10,419	21.5
La Quinta	54,552	1,847	7.8
Mecca	22,973	2,413	45.4
Palm Desert	48,316	3,766	9.1
Palm Springs	35,973	6,402	15
Rancho Mirage	59,826	765	5.9
Thousand Palms	34,172	658	12.8

Source: For Cities and Census Designated Places: U.S. Census Bureau, 2000 Census.

The data in the table above indicate that there is a significant range of those in poverty within the above cited cities and communities in the MSHCP Plan Area. The communities with the greatest percentage of households in poverty include Mecca (45.4%), Coachella (28.9%), Desert Hot Springs (27.4%) and Indio (21.5%). Plan Area communities with the lowest percentage of households in poverty include Indian Wells (3.4%), Rancho Mirage (5.9%), Bermuda Dunes (6.9%), and La Quinta (7.8%).

One particular segment of the population that may qualify as low income is migrant farm workers, which is generally more geographically concentrated than other low income groups in the Coachella Valley. This population generally resides in the southeasterly portion of the valley in the vicinity of Indio, Coachella, and Mecca, where agricultural lands predominate. Some workers live in the valley year-round while others do so only on a seasonal basis. The proposed MSHCP does not target agricultural land for Conservation, and is not expected to directly or indirectly affect the viability of the valley's agricultural industry or the jobs associated with it.

Native American Populations

Approximately 69,578 acres physically located within the MSHCP Plan Area are Native American reservation lands or Tribal-owned lands that are not part of the proposed Plan and shall not be subject to its provisions. These lands include Tribal trust land, Tribal fee land, allotted trust land, and privately owned fee lands under the jurisdiction of the following entities: (1) the Cabazon Band of Mission Indians in the Indio-Coachella area, (2) the Agua Caliente Band of Cahuilla Indians in the Palm Springs, Cathedral City, and Rancho Mirage areas, and (3) the Torres-Martinez Indians in the La Quinta-Salton Sea area.

All three Tribal Councils were included in the initial MSHCP planning process, and each is a signatory to the 1996 Memorandum of Understanding (MOU) for the MSHCP, which governed the preparation of the proposed Plan. However, the Agua Caliente Tribe has prepared their own draft HCP (in process). Other Indian lands would be covered by the MSHCP Plan only if Tribal Councils choose to adopt the proposed CVAG MSHCP and Implementing Agreement, and conduct necessary procedures for amendments as outlined in the MSHCP. Pursuant to a 1997 Secretarial Order, Tribal Councils have the option of developing separate habitat conservation plans to address the protection of listed species and their ecosystems.[175] Such plans may be coordinated and implemented in conjunction with the proposed MSHCP if the Tribal Councils so desire. Efforts have been made to coordinate the Agua Caliente draft HCP and proposed CVAG MSHCP, including extensive meeting and consultation through the MSHCP Planning Advisory

[175] Public Review Draft "Coachella Valley Multiple Species Habitat Conservation Plan/Natural Communities Conservation Plan, Administrative Draft Review," Coachella Valley Mountains Conservancy, October 2004.

Group; both planning organizations have shared relevant data, mapping, and information wherever possible.

Given that Indian reservation lands are excluded from the MSHCP Plan Area, implementation of the proposed Plan is not expected to result in any direct impacts to concentrated Native American populations. Data in *Table 3-25* indicate that individual Native Americans (and Alaskan Natives) living in the MSHCP Plan Area account for an extremely small percentage of the regional population and are generally well-dispersed geographically. In individual communities, the percentages range from a low of 0.2% in Rancho Mirage and Indian Wells to a high of 1.0% in Cathedral City and Mecca. Implementation of the proposed Plan is not expected to disproportionately affect these individuals.

Children

Children represent a segment of the population that could be at a disproportionately high risk for illness and other physical dangers associated with environmental hazards. For this reason, the environmental justice strategy of the BLM requires the agency to address potential environmental and health impacts of a proposed project on children. Although the Coachella Valley is nationally recognized as a winter haven for retirees and other seniors, much of the valley's year-round population includes younger families with children. The following table (*Table 3-28*) identifies the number of persons under the age of 18 living in the entire Plan Area and individual cities and CDPs within the Plan Area.

Table 3-28
Children in MSHCP Plan Area, 2000

	Persons Under Age 18	
	Total No.	% of Population
Cities & Census Designated Places (CDP)		
Bermuda Dunes	1,365	22.6
Cathedral City	13,364	31.1
Coachella	9,136	40.6
Desert Hot Springs	5,346	32.4
Indian Wells	297	7.8
Indio	17,384	35.3
La Quinta	6,815	28.8
Mecca	2,053	38.1
Palm Desert	6,912	16.7
Palm Springs	7,340	17.1
Rancho Mirage	1,286	9.9
Thousand Palms	1,315	25.5

Source: For Cities and Census Designated Places: U.S. Census Bureau, 2000 Census.

The data indicate that approximately 18.7% of the population in the entire Plan Area is under the age of 18. Children are generally well-distributed geographically throughout the Plan Area, and the percentage of children in each community ranges from a low of 7.8% in the City of Indian Wells to a high of 40.6% in the City of Coachella.

Public Participation

The MSHCP Plan Area boundary has been selected without regard to the racial, ethnic, cultural, income, or age mix of human populations in the Plan Area. The primary objectives of the proposed Plan are (1) to preserve undeveloped, uninhabited open space lands that can be used to create large, interconnected reserve areas for listed and sensitive species and their habitats, and provide the basis for Take Authorization under FESA and the NCCP Act, and (2) to standardize mitigation/compensation measures for the proposed Covered Species in a manner that satisfies applicable Federal and State laws pertaining to species protection. The Plan Area includes all City and County lands believed necessary to achieve this goal, and it does not target or exclude any community or parcel of land based on demographic or income characteristics.

Since its inception, the MSHCP planning process has been open to the public in an effort to disseminate information, solicit comments, and provide opportunities for public input. Three public scoping meetings in 2000 were fully noticed in local newspapers and mailings to public interest groups and potentially affected landowners in the western, central, and eastern portions of the Coachella Valley. More than a dozen meetings were held by the U.S. Bureau of Land Management to solicit input and feedback from special interest groups. All meetings of the Project Advisory Group (PAG), which has met once a month since 1998, have been open to the public. PAG membership includes representatives of the parties to the MOU, other public agencies, and private sector groups, and provides a forum for input from a broad spectrum of interests.

3.17 Hazardous and Toxic Wastes

The manufacture, transport, and disposal of hazardous and toxic wastes have become a progressively important issue, especially in desert areas where potential impacts are erroneously considered to be less than in other areas. Regulation of toxic and hazardous materials lies with a variety of Federal, State, and local agencies, including the U.S. Environmental Protection Agency, the California Office of Health Planning and Development, and county health departments. Applicable Federal regulations include the Resources Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), the Safe Drinking Water Act (SDWA), the Federal Clean Air Act, and the Toxic Substances Control Act.

Counties are authorized by State law to prepare Hazardous Waste Management Plans (HWMP) in response to the need for safe management of hazardous materials and waste products. In the MSHCP Plan Area, the California Regional Water Quality Control Board (CRWQCB) and area water districts maintain information concerning contaminated water wells and groundwater. The State and Federal EPA and the State Department of Health provide information concerning specific hazardous waste sites.

There are no large industrial or commercial users of hazardous materials in the Plan Area or area of influence, although there are identified hazardous/toxic materials, small-quantity generators are associated with commercial, industrial and medical operations. These have the potential to be associated with accidental spills, purposeful illegal dumping, air emissions, and other uncontrolled discharges into the environment. Improper use and management of these materials pose a significant potential threat to the environment.

Products, chemical and purified chemical compounds, and elements that are considered hazardous or toxic exist in wide variety and are used in households, commercial businesses and industrial operations, and processes. They exist in home and pool related chlorine products, chemical fertilizers, herbicides and pesticides, stored fuels and waste oil, chemical solvents and lubricants, and a variety of medical materials that include biological and radioactive wastes.

Hazardous Waste Management Plans

Jurisdictions responsible for land management coordinate with appropriate county, State, and Federal agencies in the identification of hazardous material sites and their timely cleanup. In order to manage these issues, the jurisdiction may establish and maintain information on these sites and periodically monitor facilities and operations that produce, utilize or store hazardous materials. Plan managers can better protect against potential hazards associated with hazardous materials and wastes by staying involved in multi-agency monitoring of illegal dumping in the proposed Conservation Areas and regulating the transport of hazardous materials through the Plan Area.

The CVAG member jurisdictions, the BLM, and other agencies with land management responsibility coordinate and cooperate with Riverside County in addressing illegal use and/or dumping of hazardous and toxic materials on public lands. The Riverside County HWMP was adopted by the Board of Supervisors and approved by the California Department of Health Services in 1990. The County HWMP identifies the types and amounts of wastes generated in the County and established programs for managing these wastes. The Riverside County HWMP also assures that adequate treatment and disposal capacity is available to manage hazardous wastes generated within its jurisdiction, and addresses issues related to manufacture and use.

The State and Federal Environmental Protection Agencies (EPA) and the State Department of Health also supply information concerning specific hazardous waste sites and their locations. The California Department of Industrial Relations, Cal-OSHA Division, regulates the proper use of hazardous materials in industrial settings. Private database screening and documentation services are also available, which would search, extract, and summarize reports on contaminated site recorded in various State and Federal databases.

Household Hazardous Waste

Residential use of household chemicals, automobile batteries, used oil, paint, and similar materials result in hazardous waste. "ABOP" (Antifreeze, Batteries, Oil and Latex Paint) disposal sites are available for Plan Area residents to dispose of these materials. These facilities will take up to 5 gallons or 50 pounds of materials per trip, and all materials must be clearly marked and sealed. Local residents may also properly dispose of used motor oil through a variety of local programs, including curbside pick up. Additionally, Riverside County organizes Household Hazardous Waste collection days throughout the year at fire stations and city corporation yards across the valley.

Hazardous Materials Response

Hazardous and toxic materials are determined critical by county health departments, which can require owners of storage facilities to test, temporarily close, and/or remove all hazardous liquids, solids, or sludge located on a site. Leaking underground storage tanks must be removed by contractors having Hazardous Waste Certification and a General Engineering license. Between cessation of storage and actual closure, monitoring is generally required by the site's operating permit.

When soils contamination is detected, the clean up procedure to be followed, the degree or level of cleanliness required by the regulator, and the method of treatment (if permitted) will be directed by the county hazardous materials division and/or the Regional Water Quality Control Board. Regulatory functions are not expected to change with the proposed adoption of the MSHCP.

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