Soils

Disturbances such as excavation or land leveling would alter the soil profile by destroying vegetation, root channels, and the soil horizons. Such activities expose the soils to increased wind and water erosion.

The Natural Resources Conservation Service (NRCS) has identified the Indio, Gilman, and Coachella soils as prime farmlands, if irrigated. These soils are minor in extent within the study area. (Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary of Agriculture [NRCS, 2005]).

Affected Environment

Soils data are from the Soil Survey of Riverside County, California, Coachella Valley Area, 1980 (U.S. Department of Agriculture, 1980). All of the soils in the study area are classified as Entisols, which are soils that show little or no evidence of development of differing horizons or layers.

In the Coachella Valley area, there are three major sources of parent material: (1) recent outwash, which is mainly granitic material from the mountains surrounding the Coachella Valley; (2) lacustrine deposits of Lake Cahuilla; and (3) the weathered rock in the San Jacinto Mountains.

The alluvium from the surrounding mountains is coarse textured near the mountains and becomes progressively finer until it is very fine sand, loamy very fine sand, fine sandy loam, and very fine sandy loam. This material is rich in primary minerals.

The lacustrine deposits are composed of fine textured sediment, which is a mixture of material from the upper watershed of the Colorado River.

The weathered rock in the San Jacinto Mountains on which soils developed is granite, granodiorite, gneiss, and mica schist, all rich in minerals.

The general soils map (**map 5.5, Coachella Canal Area Soil Associations**) presents the soil associations, which are landscapes that have a distinctive pattern of soils in defined proportions. The soil associations typically consist of one or more major soils and at least one minor soil and are named for the major soils. The soils in an association can occur in other associations but in different patterns. Soils information for portions of the study area not covered by the Soil Survey was extrapolated by Reclamation soil scientists using aerial photographs and USGS quadrangle maps.

Coachella Canal Area Soil Associations

August 2006

LEGEND

City Boundary

Land Ownership

Bureau of Reclamation

Soil Associations

- BADLAND-BEELINE-RILLITO
- CARSITAS-MYOMA-CARRIZO
- CHERIONI-HYDER-CIPRIANO
- DUNE LAND-ROSITAS-CAJON
- GILMAN-INDIO-COACHELLA
- GUNSIGHT-RILLITO-CHUCKAWALLA
- ROCK OUTCROP-LITHIC TORRIORTHENTS-CALVISTA
- ROCK OUTCROP-LITHIC TORRIORTHENTS-OMSTOTT
- ROCK OUTCROP-TECOPA-LITHIC TORRIORTHENTS
- SHEEPHEAD-ROCK OUTCROP-BANCAS

This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Map 5.5

N

0 1 2 3 Miles

RECLAMATION
Managing Water in the West

Produced by the Bureau of Reclamation
Remote Sensing and GIS Group
Denver Technical Service Center - Denver, CO

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

T4S R6E
T4S R7E
T4S R8E
T4S R9E
T4S R10E
T5S R6E
T5S R7E
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T6S R9E
T6S R10E
T7S R6E
T7S R7E
T7S R8E
T7S R9E
T7S R10E

Palm Desert Country
Bermuda Dunes
Indio
Indian Wells
La Quinta
Coachella
Mecca

End of Study Area
End of Study Area

The following descriptions are provided for only those soil associations pertinent to Reclamation lands.

Carsitas-Myoma-Carrizo Association: This association is nearly level to moderately steep, somewhat excessively drained or excessively drained sands, fine sands, gravelly sands, cobbly sands, and stony sands on alluvial fans and valley fill.

The soils in this association formed in coarse-textured alluvium. They are very deep. Elevations range from 220 feet below sea level to 1800 feet above sea level. Slopes are generally less than 5 percent but range to 30 percent in minor isolated areas. The soils are calcareous and mildly to moderately alkaline throughout. The content of organic matter is very low and decreases irregularly with increasing depth. Nitrogen and phosphorus are deficient for maximum plant growth. Small areas along the San Andreas Fault zone have a water table at a depth of 1 to 5 feet.

This association is comprised of about 65 percent Carsitas soils, 15 percent Myoma soils, 10 percent Carrizo soils, and 10 percent minor soils and land types.

Carsitas soils are excessively drained. They have a surface layer of gravelly sand, cobbly sand, fine sand, or sand about 10 inches thick. The underlying layer is gravelly, coarse sand or cobbly sand, and the substratum to a depth of 60 inches or more is gravelly, coarse sand that has varying amounts of coarse fragments. The soil is mildly to moderately alkaline.

Myoma soils are somewhat excessively drained. They have a surface layer of fine sand 18 inches thick. The next layer is very fine sand 6 inches thick, and the substratum to a depth of 60 inches or more is fine sand and very fine sand. The soil is neutral to moderately alkaline and non-calcareous to calcareous throughout.

Carrizo soils are excessively drained. They have a stony sand surface layer 10 inches thick. The next layer is very gravelly coarse sand 20 inches thick, and the substratum to a depth of 60 inches or more is very stony coarse sand. The soil is moderately alkaline and slightly calcareous. The coarse fragments in all layers are generally varying amounts of gravel, stones, or cobbles.

Minor soils in this association are Gilman, Indio, Carsitas variant, Lithic-Toilipsamments-Rock outcrop complex, Coachella, Imperial, Niland, and Fluvents. Rubble land, riverwash, borrow pits, and gravel pits and dumps are also included.

Practically all of the association is in native vegetation of creosote bush, bush sunflower, and cholla cactus, or under urban development. Where irrigation water is available from wells, some small areas are planted to dates, citrus, and permanent pasture.

Myoma-Indio-Gilman Association: This association is nearly level to rolling, somewhat excessively drained to moderately well-drained fine sands in dune areas and loamy fine sands, very fine sandy loamy, fine sandy loamy, and silt loamy on alluvial fans.

The soils in this association formed in moderately fine to coarse-textured alluvium. They are very deep. Elevations range from 600 feet above sea level to 50 feet below sea level. Slopes are generally less than 5 percent except in the rolling dune areas where they are as much as 15 percent. The soils are calcareous to non-calcareous and mildly to moderately alkaline throughout. The hazard of soil blowing is moderate to high, and these soils tend to drift in winds of 12 to 15 miles per hour or more. The content of organic matter is very low and decreases irregularly with increasing depth. Nitrogen and phosphorus for maximum plant growth are deficient.

This association is comprised of about 65 percent Myoma soils, 20 percent Indio soils, 10 percent Gilman soils, and 5 percent minor soils and land types.

Myoma soils were discussed previously.

Indio soils are well drained or moderately well drained. They have a surface layer of very fine sandy loam or fine sandy loam 10 inches thick. The underlying layer to a depth of 60 inches or more is very fine sandy loam stratified with silt and silt loam. The soil is moderately alkaline and moderately to strongly calcareous. In about half the acreage of Indio soils in this association, the seasonal water table is at a depth of 3 to 5 feet.

Gilman soils are well drained. They have a surface layer of fine sandy loam, loamy fine sand, or silt loam 8 inches thick. The underlying layer to a depth of 60 inches or more is stratified loamy very fine sand and loamy fine sand with thin lenses of silt loam and silty clay loam. The soil is moderately alkaline and slightly-to-strongly calcareous. In about two-thirds of the acreage of Gilman soils in this association, the seasonal water table is 3 to 5 feet deep.

Minor soils in the association are Coachella and Carsitas soils, Fluvents, and borrow pits. Most of this association north of Highway 111 is in native vegetation of creosote bush, mesquite, and bush sunflower, and under urban development. The area south of the highway is in field and vegetable crops, grapes, citrus, and dates with increasing urbanization.

Gilman-Coachella-Indio Association: This association is nearly level to rolling, somewhat excessively drained to moderately well-drained fine sands, fine sandy loans, silt loans, loamy fine sands, and very fine sandy loans on alluvial fans.

The soils in this association fanned in medium- to coarse-textured alluvium. They are very deep. Elevations range from 300 feet above sea level to 230 feet below sea level. Slopes are less than 5 percent except for some small rolling dune areas.

Some areas are hummocky. The soils are calcareous to non-calcareous and mildly to moderately alkaline throughout. The hazard of soil blowing is moderate to severe, and the sandy soils tend to drift in winds of 12 to 15 miles per hour or more. The content of organic matter is very low and decreases irregularly with increasing depth. Nitrogen and phosphorus are deficient for maximum plant growth. In about 40 percent of this association, the seasonal water table is 3 to 5 feet deep.

This association is comprised of about 35 percent Gilman soils, 20 percent Coachella soils, 20 percent Indio soils, 20 percent Myoma soils, and 5 percent minor soils and land type.

Gilman soils were discussed previously.

Coachella soils are well drained. They have a surface layer of fine sand or very fine sandy loam 11 inches thick. The underlying layer to a depth of 60 inches or more is fine sand and very fine sand stratified with silt or very fine sandy loam lenses about one-half to one-fourth inch thick. The soil is moderately alkaline and slightly calcareous and has a few scattered freshwater shells throughout.

Indio and Myoma soils were discussed previously.

Minor in this association are Carsitas soils, Fluvaquents, Fluvents, and borrow pits.

Most of the association is in field crops, vegetables, grapes, citrus, and dates. Urban areas of Indio, Coachella, and Thermal occur on this association. Undeveloped land on the Indian Reservation has a cover of native vegetation—saltbush, arrowweed, saltgrass, alkali goldenbush, and mesquite.

Chuckawalla-Badland Association: This association consists of gently sloping to very steep, well-drained to excessively drained sands, cobbly fine sandy loans, and very gravelly sandy clay loans in the Indio Hills and on terraces.

This soil association is at the northwest and east edges of the Coachella Valley area on the Indio Hills uplift. The soils formed in the old mixed alluvium deposited by streams through Berdoo and Fargo Canyons and by Mission Creek and the Whitewater River. They are very deep, cobbly fine sandy loans and very gravelly, sandy clay loans and also very shallow sands in severely eroded areas and in areas of semiconsolidated alluvium. Slopes range from 2 to 75 percent; elevations are 50 to 1800 feet. The soils are calcareous and moderately alkaline. The content of organic matter is very low and decreases irregularly with increasing depth. The supply of nitrogen and phosphorus is deficient for maximum plant growth.

This soil association is of minor importance to the study. It is about 55 percent Chuckawalla soils, 30 percent Badland, and 15 percent minor soils.

Chuckawalla soils are well drained. They have a very thin surface layer of very fine sand covered with a close fitting desert pavement of gravel and cobbles. The next layer is very gravelly, sandy clay loam or cobbly, fine sandy loam 12 inches thick. The substratum to a depth of 60 inches or more is stratified very cobbly and very gravelly, loamy sand and coarse sand. The soils are moderately alkaline and slightly-to-strongly calcareous. In about one-third of the acreage of Chuckawalla soils, at the northwest edge of the Coachella Valley area, there is no desert pavement; and the soil is non-calcareous.

Badland is excessively drained and severely eroded. In some small areas, only a 1- to 8-inch cover of loose sand overlies the semiconsolidated alluvium.

Minor soils in the association are Carsitas soils and Lithic Torripsamments.

Most of the association has only a sparse cover of desert shrubs. The Badland part is nearly barren.

Rock Outcrop-Lithic Torripsamments Association: This association is strongly sloping to very steep, excessively drained to well-drained sands, gravelly sands, and loamy sands and rock outcrop in the transition zone between the Southern California Mountains and the Great Basin Ranges.

This association is on the east, north, and west sides of the Coachella Valley where steep mountainous areas rise from the valley floor. Slopes are 9 to 75 percent; elevations are 50 to 3200 feet. A large part of the association is rock outcrop. The soils are very shallow. They are slightly acid to mildly alkaline and non-calcareous. The content of organic matter is very low and decreases with increasing depth. The supply of nitrogen is deficient for maximum plant growth.

This soil association is made up of about 80 percent rock outcrop, 10 percent Lithic Torrinsamments, and 10 percent rock outcrop-soil complexes, other land types, and minor soils. The rock outcrop of this association is 75 to 100 percent granite, granodiorite, gneiss, and mica schist. Between the outcrops is 1 to 6 inches of excessively drained sand, gravelly sand, or loamy sand. These areas have a desert varnish at the lower elevations, especially at the east side of the Coachella Valley.

Lithic Torripsamments are well-drained soils that have a very thin layer of sand or loamy sand over consolidated alluvium or sandstone. They are mildly to moderately alkaline and non-calcareous to calcareous. About 35 to 65 percent of the surface area is flat, exposed sandstone rock, and 3 to 15 percent is stones.

Minor in the association are the Torriorthents-Rock outcrop complex, Carrizo soils, Cajon soils, and Rubble land.

Most of the association is in sparse, stunted native vegetation of creosote bush, bursage, ocotillo, barrel cactus, and in a few places annual grasses.

Badland-Carsitas Association: This association is nearly level to very steep, excessively drained fine sands, sands, gravelly sands, and cobbly sands in the Indio Hills.

The soils of this association formed in sandy or gravelly alluvium in the drainage ways of the Badland areas north of Thousand Palms. They are extremely shallow except in the very deep alluvium along the drainage ways. Slopes are mainly more than 9 percent. Elevations are 50 to 1800 feet. The soils are slightly to moderately calcareous and are neutral to moderately alkaline throughout. The content of organic matter is very low and decreases irregularly with increasing depth. Supplies of nitrogen and phosphorus are deficient for maximum plant growth.

This soil association is of minor importance to this study. It is about 80 percent Badland, 15 percent Carsitas soils, and 5 percent minor soils.

Badland and Carsitas soils were discussed previously.

Minor soils in the association are the Carsitas variant and Carrizo soils.

Practically all of the association is in native vegetation of creosote bush, encelia, and barrel cactus. Badland is nearly barren with only a few stunted plants. Table 5.13 displays the primary physical and chemical characteristics of the dominant soil series and mapping units that occur in the Coachella Valley.

Environmental Consequences

The analysis of the effects of the alternatives on soils focuses on the potential for wind erosion.

Alternative A

Wind erosion hazard would be the same as under current conditions.

Alternative B

Under Alternative B, phasing out land uses that are not compatible with the conservation and protection of natural resources would result in less wind erosion than under the No Action Alternative. Eliminating OHV use, except for emergency situations, installing fencing and barriers to prevent future OHV use, and rehabilitating OHV roads and reclamation of unused borrow pits and stabilization of active borrow pits also would result in less wind erosion.

Table 5.13 – Physical and chemical characteristics of soils in the Coachella Valley

Soil series	Type	Depth (inches)	Permeability (inches per hour)	Available water capacity (inches per inch)	Soil reaction (pH)	Salinity (micro-mhos per centi-meter)	Erosion hazard (wind)	Erosion hazard (water)	Hydro-logic group
Carrizo	StS	0-10	>20	0.03-0.05	7.9-8.4	<2	Slight	Slight	A
		10-28	>20	0.02-0.03	7.9-8.4	<2			
		28-60	>20	0.02-0.03	7.9-8.4	<2			
Carsitas	GrS	0-60	6.0-20.0	0.03-0.06	7.9-8.4	<4	Slight	Moderate	A
Coachella	CoS or FS	0-60	2.0-6.0	0.03-0.08	7.9-8.4	<4	High	Slight	B
Myoma	FSL and FS	0-60	6.0-20.0	0.06-0.09	7.9-9.0	<2	Moderate High	Slight Slight	A
Lithic Torripsamments		0-4	6.0-20.0	0.04-0.06	6.1-7.3				D

StS - stony sand; GrS - gravelly sand; CoS - cobbly sand; FS - fine sand; FSL - fine sandy loam.

Group A - Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These soils have a high rate of water transmission.

Group B - Soils having a moderate infiltration rate when thoroughly wet. These soils have a moderate rate of water transmission.

Group C - Soils having a slow infiltration rate when thoroughly wet. These soils have a slow rate of water transmission. (This group is not applicable to the study area.)

Group D - Soils having a very slow infiltration (high runoff potential) when thoroughly wet. This group includes soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Alternative C

The emphasis on recreation, commercial, and community development under Alternative C would result in moderately greater wind erosion. However, wind erosion control measures implemented during construction should alleviate much of the wind erosion losses, and landscaping, irrigation, and additional vegetation would reduce the wind erosion hazard.

Alternative D

Limited development of recreation facilities and opportunities would result in slightly more wind erosion, especially during construction of facilities. However, phasing out uses that are not compatible with conservation and protection of natural resources should result in less wind erosion than under the No Action Alternative. New trail development would require wind erosion control measures during construction. Eliminating OHV use, except for emergency situations, installing fencing and barriers to prevent future OHV use, rehabilitating OHV roads, reclaiming unused borrow pits, and stabilizing active borrow pits also would result in less wind erosion.

Mitigation

No mitigation has been identified.

Residual Impacts

No residual impacts have been identified.

Air Quality

Air quality is a major concern in southern California and the Coachella Valley. Riverside County generates the lowest emissions of any county in the South Coast Air Basin and Salton Sea Air Basin (SSAB), but air quality in the county is among the SSAB's worst.

Affected Environment

The Environmental Protection Agency developed National Ambient Air Quality Standards pursuant to the Clean Air Act as amended (1990). These standards are used to classify areas as being in attainment, non-attainment, or unclassified for any of the air quality standards. Areas that are classified as being in non-attainment are required to prepare and implement a State Implementation Plan (SIP) that identifies and quantifies sources of emissions and provides a strategy to reduce those emissions. (See "Coachella Valley Regulatory Status.")

EPA has designated the air basins in Riverside County (including the Coachella Canal Area) as non-attainment areas, largely because of the geographical features and high levels of pollutants produced in the region. Designation as a non-attainment area infers that because of the high levels of pollutants, the area is not expected to meet National Ambient Air Quality Standards in the near future.

In 1977, the California Legislature created the South Coast Air Quality Management District (SCAQMD). SCAQMD is responsible for developing and enforcing air pollution control rules and regulations for the South Coast Air Basin, Mojave Desert Air Basin, and SSAB. The study area is within the Salton Sea Air Basin. Additionally, the Southern California Association of Governments was tasked with working with SCAQMD. The two agencies first adopted an Air Quality Management Plan in 1979 and have revised the plan several times subsequently, as earlier attainment forecasts were shown to be overly optimistic.

The California Legislature enacted the California Clean Air Act (CCAA) in 1998. CCAA requires regional emissions to be reduced by 5 percent per year, averaged over a 3-year period, until attainment can be demonstrated. Each region that did not meet a national or State air quality standard was required to prepare a plan

that demonstrated how the 5-percent reductions were to be achieved. In response, SCAQMD revised its air quality plans to meet CCAA requirements.

Suspended particulate matter is the most serious air quality issue faced by the region, which occasionally exceeds both State and Federal standards for PM_{10}. PM_{10} refers to small suspended particulate matter, 10 microns or less in diameter, which can enter the lungs. These small particles can be directly emitted into the atmosphere as a byproduct of fuel combustion; through abrasion, such as wear on tires or brake linings; or through wind erosion of soils. PM_{10} emissions can also be formed in the atmosphere through chemical reactions. PM_{10} is reduced by direct control of fugitive dust and/or indirect control of other pollutants that contribute to the formation of particles.

Emissions sources (mobile, industrial, etc.) and atmospheric conditions such as wind speed, wind direction, temperature, and rainfall all directly affect air quality within the SSAB. Moreover, onshore winds transport vast amounts of pollutants from Los Angeles and Orange Counties.

Additionally, within the Coachella Valley, sand naturally migrates, which directly and indirectly affects air quality. Winter rains erode adjacent mountains, while water runoff into the northern part of the Coachella Valley produces deposits of newly created sand. During the spring months, strong winds lift the sand and transport it down the Coachella Valley. Known as "blow sand," this natural sand migration process produces PM_{10} in two ways: (1) by direct particle erosion and fragmentation (natural PM_{10}) and (2) by secondary effects such as sand deposits on road surfaces which can be ground into PM_{10} by moving vehicles and re-suspended in the air by the same vehicles (human-made PM_{10}).

SSAB is separated from other designated air basins within the region by the San Jacinto Mountains and the Little San Bernardino Mountains. During the summer, SSAB is generally influenced by a Pacific subtropical high cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. Meteorological conditions can often create strong winds throughout the Coachella Valley, especially during the spring and summer months. Seasonally, as the desert begins to heat up, surface pressures become systematically lower. This creates a "vacuum-like" effect in which cooler, ocean-modified air is pulled toward the deserts. As the air is channeled through Banning Pass, which separates the Coachella Valley from the South Coast Air Basin, it accelerates, creating winds that frequently exceed 40 miles per hour (mph). At times, winds exceed 60 mph, and widespread natural dust storms develop. Visibility in the desert, which typically exceeds 35 miles, can be reduced to less than 1 mile by the resulting blow sand. Summer thunderstorms can also generate strong gusts and produce large-scale dust storms. When either or both of these meteorological conditions occur, the natural large-scale effects over the desert occur in a much greater proportion than the local human-made dust-producing conditions. Such

events, which occur approximately 10 to 15 days per year are considered "natural events" by EPA and are excluded from violation status determinations.

EPA has also identified other pollutants of concern with respect to the health and welfare of the general public. Current standards have been established for six air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide ($S0_2$), PM_{10}, and lead (Pb). Referred to as "criteria" pollutants, these substances have numerical health-based criteria for each that define acceptable levels of exposure.

SCAQMD currently monitors ambient air quality for the "criteria" pollutants at two air monitoring stations in the Coachella Valley—at Indio and Palm Springs. The Indio station has been operational since 1985, and the Palm Springs station has been operational since 1987. At both stations, particulates are sampled every 3 days.

On the basis of monitoring reported in the Coachella Valley SIP (CVSIP), approximately 53 tons of PM_{10} were released into the atmosphere in Coachella Valley on an average day in 1995. Of this, 1 percent was caused by fuel combustion, waste burning, and industrial processes. Human-made and natural dust-causing activities, including agricultural tilling in fields, construction, and demolition operations, or driving on paved or unpaved roads, accounted for 96 percent of the PM_{10}.

The 1990 amendments to the Federal Clean Air Act set into motion new statutory requirements for attaining National Ambient Air Quality Standards for PM_{10}. All areas in the United States that were previously designated as Federal non-attainment areas for PM_{10}, including the Coachella Valley, were initially designated as "moderate" PM_{10} non-attainment areas. Revisions to the SIPs for PM_{10} were to be completed by November 15, 1991, incorporating "reasonably available control measures" for PM_{10} and identifying an attainment date. In response to these regulatory requirements, SCAQMD developed the "State Implementation Plan for PM_{10} in the Coachella Valley" (1990 CVSIP). The 1990 CVSIP identified control measures and demonstrated attainment of the National Ambient Air Quality Standards for PM_{10} by 1995, 1 year after the statutory limit for moderate non-attainment areas. Section 188(b) of the Clean Air Act specified that any area not attaining the standards by December 1994 be re-designated as a "serious" non-attainment area.

Completing its re-designation process in January 1993, EPA included the Coachella Valley with four other areas nationwide re-designated as "serious" non-attainment areas. The Clean Air Act also specified that a new SIP be due within 18 months of the re-designation to "serious" non-attainment. In response to this requirement, the SCAQMD prepared a SIP revision (1994 CVSIP) that identified "best available control measures" for implementation prior to February 1997.

In 1996, a Coachella Valley SIP was completed that determined that the Coachella Valley had not violated either the 24-hour or annual average PM_{10} standards during the 3 calendar years from 1993 through 1995. This determination was based on EPA guidance which states that a determination of compliance with the Nation Ambient Air Quality Standards must be based on three complete, consecutive calendar years of quality-assured air quality monitoring data. Section 107(d)(3)(E) of the Clean Air Act states that an area can be re-designated to attainment if, among other requirements, EPA determines that the National Ambient Air Quality Standards have been attained. Accordingly, SCAQMD requested a re-designation of the Coachella Valley to attainment for PM_{10}.

However, from 1999 through 2001, PM_{10} dust levels rose sufficiently to exceed the annual average PM_{10} standards and standards for ozone. Levels recorded at the Indio monitoring station exceeded the PM_{10} annual average, while levels recorded at the Palm Springs monitoring station were within both standards. Special monitoring began at other sites throughout the Coachella Valley; this monitoring confirmed that PM_{10} standards were exceeded throughout the Coachella Valley. Therefore, the region continues to be designated a "serious" non-attainment area for PM_{10}. Should the region continue to fall short of Federal PM_{10} standards, EPA could impose more stringent regulations or sanctions on local jurisdictions (BLM, 2002).

In response to the air quality concerns within the Coachella Valley, SCAQMD developed *Guidelines for Dust Control Plan Review in the Coachella Valley* (2001). The guidelines are intended to provide guidance for activities that are required to prepare a fugitive dust control plan. The 2003 Coachella Valley PM_{10} SIP (2003 CVSIP) identifies sources of PM_{10} and control measures to reduce emissions.

Environmental Consequences

Alternative A

Existing air quality and potential effects on air quality would continue under Alternative A.

Alternative B

The maximum benefits to air quality within the study area would occur under Alternative B, primarily because less land disturbance from development activities would be allowed. Currently, dust blowing from lands where the natural vegetation has been removed is a common cause of airborne particulate pollution in the study area. Also, limited public use and access (compared to the other alternatives) throughout the study area would result in less air quality degradation from vehicle emissions and dust caused by vehicles on dirt roads. In addition,

less commercial development would mean fewer diesel truck emissions and industrial airborne pollutants. Implementation of Alternative B also could mean the reestablishment of vegetation on bare lands, further leading to fewer airborne particulates.

Alternative C

The greatest adverse effects on air quality would occur under Alternative C. Emphasizing recreation, community, and commercial development within the study area would result in more unsurfaced roads and parking areas, cleared land (and, thus, more vehicle-caused dust and blowing dust), and vehicle and industrial airborne emissions than under either Alternative B or D.

Alternative D

Effects on air quality would be the same under Alternative D as under Alternative A, except there would be greater potential for adverse effects on air quality from the development of unsurfaced roads, parking areas, and other developments associated with increased recreation.

Mitigation

Potential adverse air quality impacts would be associated with construction of recreation facilities and trails and the use of borrow pits. However, because the RMP is at the programmatic level, specific details of these activities are not appropriate; thus, associated emissions cannot be analyzed. Prior to implementation of any of these activities, site-specific environmental compliance will be completed. Pollutant emissions will be calculated using an appropriate model. Compliance with Federal, State, regional, and local air quality regulations will be required. Measures to reduce or minimize construction air quality effects would be required and included in all construction plans and specifications. Mitigation measures to reduce the amount of dust would likely include using surfactants and other chemical stabilizers, wheel washers for construction equipment, watering down of all construction areas, limiting truck traffic to non-peak hours, etc. Use of these and similar measures would likely reduce particulate matter impacts to less than significant levels.

Residual Impacts

No residual impacts have been identified.

Visual Quality

Affected Environment

Riverside County and the Coachella Valley are known nationally for their exceptional scenery, highly valued by the recreation and tourism industry.

Local zoning ordinances and other government actions have been implemented to protect this visual quality by limiting continued development of the natural lands. Moratoriums on hillside development have been issued in some locations to protect remaining tracts of natural land from development.

Land within the study area consists of three distinct types, with elevations ranging from over 500 feet above sea level to approximately 220 feet below sea level. These areas are (1) mountainous terrain composed mainly of steep, rocky, barren slopes; (2) relatively flat or rolling desert land dissected by manmade facilities, such as the Coachella Canal, roads, power lines, and undeveloped desert land, and (3) large areas of land developed for agricultural purposes. Cities, towns, and other communities are also located throughout the study area.

Perception of visual quality in a landscape is based on several common principles. First, landscape character is determined by four basic visual elements: form, line, color, and texture. These visual elements are present in every landscape and exert varying degrees of influence. The stronger the influence exerted by these elements, the more interesting the landscape to the human eye. Additionally, landscapes that contain visual variety are generally more aesthetically pleasing. Variety in the landscape that harmonizes with the surroundings is considered attractive, while landscape alterations that create disharmony are generally considered unattractive (BLM, 2003b).

Generally, the natural landscape of the study area is in shades of tan and brown, as normally associated with a desert environment. The vegetation, consisting of various species of brush with interspersed grasses, offers softly contrasting greens and bluish greens, especially during the spring and early summer months.

Increasingly, the intrusion into the visual landscape of housing and commercial developments, roads, and power lines provides disharmony with the natural environment. Many developments use muted earth-tone colors to help soften the visual intrusion; however, manmade structures still tend to overpower the natural landscape in portions of the study area. The agricultural areas of the Coachella Valley have distinct colors and manmade lines which provide contrast to the natural setting.

Environmental Consequences

Alternative A

Implementation of Alternative A would result in few dramatic changes to the visual resources. Continued issuance of land use authorizations and periodic development of recreation facilities could result in a gradual degradation of the visual quality of the area but not to a degree greater than under Alternative C or D.

Alternative B

The visual quality of the study area would be best protected under Alternative B because fewer non-natural intrusions on the visual character of the study area would be allowed. Also, this alternative would provide for the rehabilitation of already visually scarred areas, such as OHV trails.

Alternative C

The greatest adverse effect on the visual quality of the study area would occur under Alternative C. Emphasizing community, recreation, and commercial development would result in the greatest number of intrusions on the natural landscape, such as buildings, roads, and parking areas. Degradation of the visual quality could be minimized through careful and thoughtful design of constructed facilities. However, the potential exists to heavily degrade the visual character of the area because of the study area's relatively stark landscape and sparse vegetation.

Alternative D

The visual quality of the study area would be less affected under Alternative D than under either Alternative A or C because fewer facilities would be developed, resulting in fewer intrusions on the natural landscape. However, because some limited development would be allowed, adverse effects would be greater than under Alternative B. Rehabilitation of disturbed areas exhibiting evidence of human intrusion would enhance the visual quality.

Mitigation

No mitigation has been identified.

Residual Impacts

No residual impacts have been identified.