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DRAFT ENVIRONMENTAL IMPACT STATEMENT AND CALIFORNIA DESERT CONSERVATION AREA PLAN AMENDMENT FOR THE WEST CHOCOLATE MOUNTAINS RENEWABLE ENERGY EVALUATION AREA

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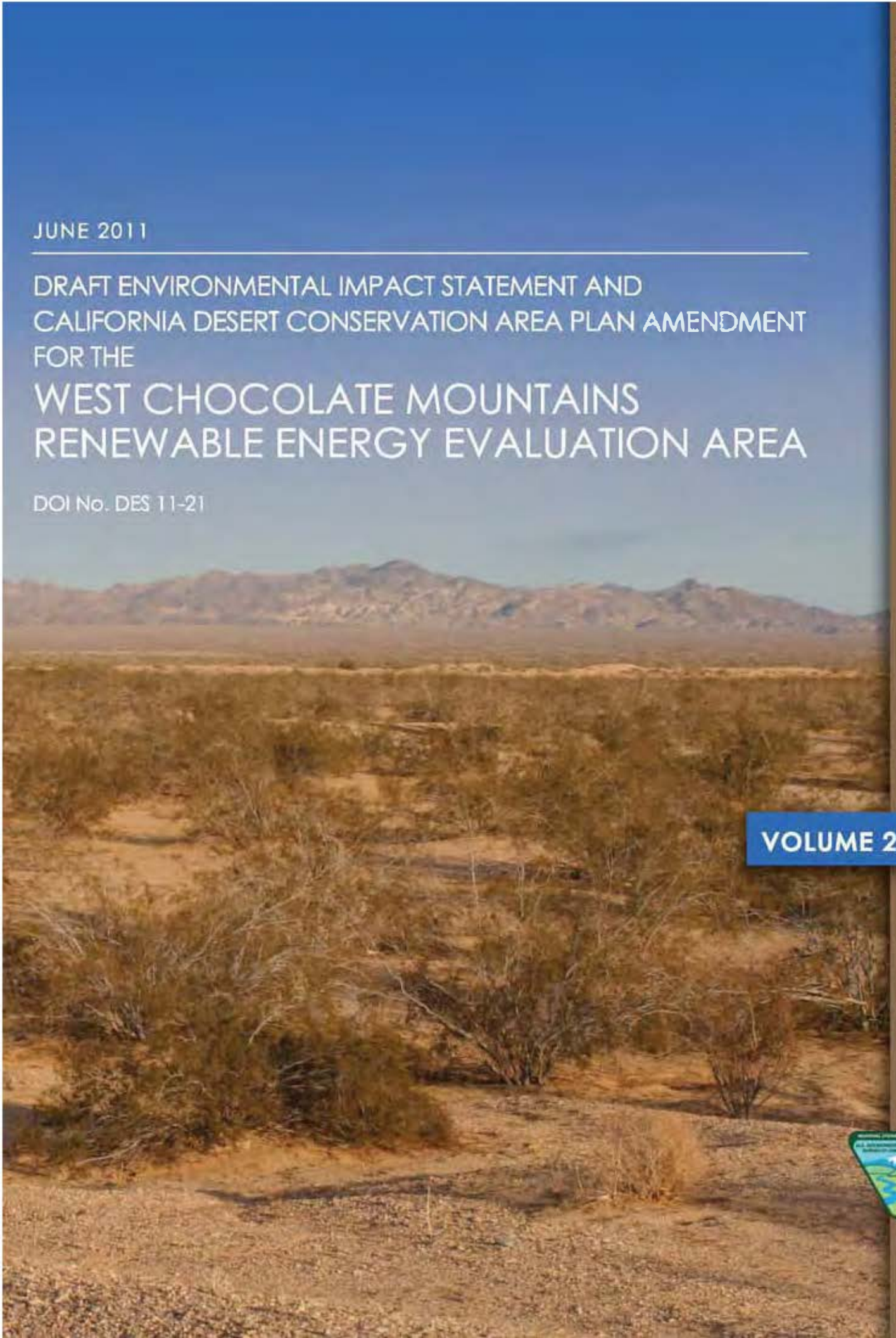

VOLUME 2

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Appendix A

Geothermal Reasonably Foreseeable Development Scenario

GEOTHERMAL
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GEOTHERMAL
REASONABLY FORESEEABLE DEVELOPMENT SCENARIO
WEST CHOCOLATE MOUNTAINS

1. Introduction

This Reasonably Foreseeable Development (RFD) scenario has been prepared as a basis for analyzing environmental impacts resulting from future leasing and development of federal geothermal resources within the West Chocolate Mountains Renewable Energy Evaluation Area (West Chocolate REEA, or the REEA). As the term "Reasonably Foreseeable Development" implies, the RFD scenario is a tool the Bureau of Land Management (BLM) can use to analyze the types of impacts that could be expected under an alternative being analyzed. A RFD is not a prediction of what would happen under a specific alternative.

For example, a RFD scenario could assume that all potentially productive areas for geothermal energy production, except exclusion areas, would be leased: (1) subject to the standard lease terms and conditions; or (2) subject to the lease terms and conditions applicable to each alternative. A RFD scenario would contain estimates for the number of wells and acres disturbed under each of the alternatives analyzed. This in no way is intended to imply that the BLM would be making decisions about development on lands not administered by the BLM or development of mineral estate that may underlie public lands. Those decisions are not exclusively the purview of the BLM. However, the RFD of those geothermal resources should be part of the RFD scenario analyzed because a cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 Code of Federal Regulations [CFR] § 1508.7).

In addition, geothermal leasing decisions would be related to the level and type of development of the geothermal resource occurring in subsequent stages of the process (exploration and development). The RFD scenario is intended to provide the information necessary to analyze potential cumulative impacts. The disturbance for the production facility and associated infrastructure (e.g., road, pipelines, transmission lines, etc.) would be based on the facilities typical in the surrounding area.

The foreseeable development described herein could occur on any land within the West Chocolate REEA, regardless of surface or mineral ownership. For this RFD, it is assumed that three 50-megawatt (MW) power plants would be constructed. The anticipated total surface disturbance for the area is summarized below (Table 1).

Table 1 Surface Disturbance for Three 50-Megawatt Geothermal Projects in the West Chocolate REEA*

	BLM Disturbance (acres)	Total Disturbance (acres)[1]
Initial	359	1,026
Final	328	938

Notes:
*Within the BLM's Western Colorado (WECO) Desert Region.
[1] Combination of disturbance for power plant and well field.

2. Available Data and Assumptions

Based on the available data and assumptions, geothermal energy development could occur on any land within the West Chocolate REEA, regardless of surface or mineral ownership. Of the 59,095 acres, 54,433 acres are available for geothermal energy development on both private and BLM land (land withdrawn by the U.S. Bureau of Reclamation [USBR], acquisition lands, and oil and gas only leases not included). Of the 54,433 acres, BLM land allocated for geothermal energy development would be 19,162 acres of BLM subsurface mineral rights, with the remainder of the area being state or private land. Pending lease applications cover all of one section (about 640 acres) which is split estate (private surface/federal subsurface). Approved geothermal leases in the REEA cover 3,322 acres. To estimate the amount of anticipated development for the 54,433 acres which would potentially occur on BLM land, a simple ratio was developed to estimate the percentage of development that could occur on BLM-managed land. This ratio is based on the percentage of land within the REEA that is managed by the BLM for geothermal leasing (35 percent [19,162 acres BLM/54,433 acres total]).

Approximately 24 temperature-gradient (TG) wells have been drilled within the West Chocolate REEA with data that provide insight into the geothermal resource temperatures that may be encountered. Most of these TG wells have been plugged and abandoned, but information about the wells is available from geothermal databases maintained by various organizations, including the California Division of Oil, Gas, and Geothermal Resources; the United States Geological Survey (USGS); Southern Methodist University; and the Geo-Heat Center. The TG wells include one deep geothermal exploration well (MCR No. 1-15, drilled in 1979 to 9,800 feet in Section 15, Township 9S, Range 12E), which showed a gradient of 1.9 degrees Fahrenheit (°F) per 100 feet (essentially a background gradient indicating no commercial potential at that site).

Some TG wells drilled for geothermal exploration to depths ranging from several hundred to over 1,500 feet indicate gradients exceeding 5°F per 100 feet. That gradient, if maintained to greater depths, implies reservoir temperatures around 350°F at depths from 5,000 to 6,000 feet, and potentially exceeding 500°F at 9,000 feet. Since actual geothermal gradients may locally decrease or even reverse with depth, it is reasonable to estimate resource temperatures somewhere near 350°F at commercially drillable depths within the West Chocolate REEA.

In addition to the TG well data, the West Chocolate REEA's proximity to the Salton Sea geothermal field indicates the potential for geothermal development. The Salton Sea geothermal

area is one of the most prolific geothermal areas in the world. The field is located in a geologic spreading center, where the Pacific Plate and the Continental Plate are being pulled away from each other. This pulling action results in abnormally thin crust, shallow magma, and high temperatures at relatively shallow depths. Temperatures in excess of 600°F have been encountered at depths as shallow as 3,500 feet below the surface, and single production wells can generate over 25 MW. The Salton Sea geothermal field has 10 operating geothermal power plants with a current capacity of 326 MW net.

At its closest point, the West Chocolate REEA is about 8 miles northeast of the developed portion of the Salton Sea field. Although decreasing resource temperatures on the northeast margin of the Salton Sea field are indicated by published temperature contours (CalEnergy 2003), there are spas with hot water wells adjacent to the northwest portion of the REEA (the Bashford, Lark, and Fountain of Youth spas), which suggests that geothermal resources suitable for electrical generation may be present within the REEA, itself. It is assumed that the productive areas would be less prolific than in the Salton Sea geothermal field and would require more production wells per MW than are required in the Salton Sea geothermal field.

3. Exploration

Geothermal exploration is carried out to help define the geothermal resource in terms of its geometry, boundaries, controls on permeability, temperature distribution, and fluid flow paths. Exploration is not only restricted to the pre-development phase, but may be undertaken after generation begins, perhaps in support of a capacity expansion, to identify locations for make-up production wells (drilled to maintain capacity) or to revise an injection strategy. Exploration programs are typically undertaken in stages, with lower-cost and logistically simpler activities undertaken first, gradually advancing to the more costly and complicated elements.

The activities described below may take place on any of the lands considered for leasing in the West Chocolate REEA.

Exploration typically begins with a geochemical survey, in which surface waters (if any) and ground waters (both thermal and non-thermal) are sampled and analyzed for their chemical content. This may involve creating access to areas with no roads or very poor roads (using four-wheel drive vehicles or on foot). In vegetated areas, some cutting of vegetation may be required for access; however, this is unlikely to be the case in the West Chocolate REEA, where the vegetation is generally low and sparse. Since there are no springs within the West Chocolate REEA, sampling of groundwater would entail either drilling monitoring wells or using existing production wells. Water samples are collected into sealed plastic bottles and taken off site for analysis. Small amounts of chemicals (such as NaOH) are often placed in the sample bottles prior to sampling to stabilize certain dissolved elements in the sampled water and avoid precipitation in the sample bottle.

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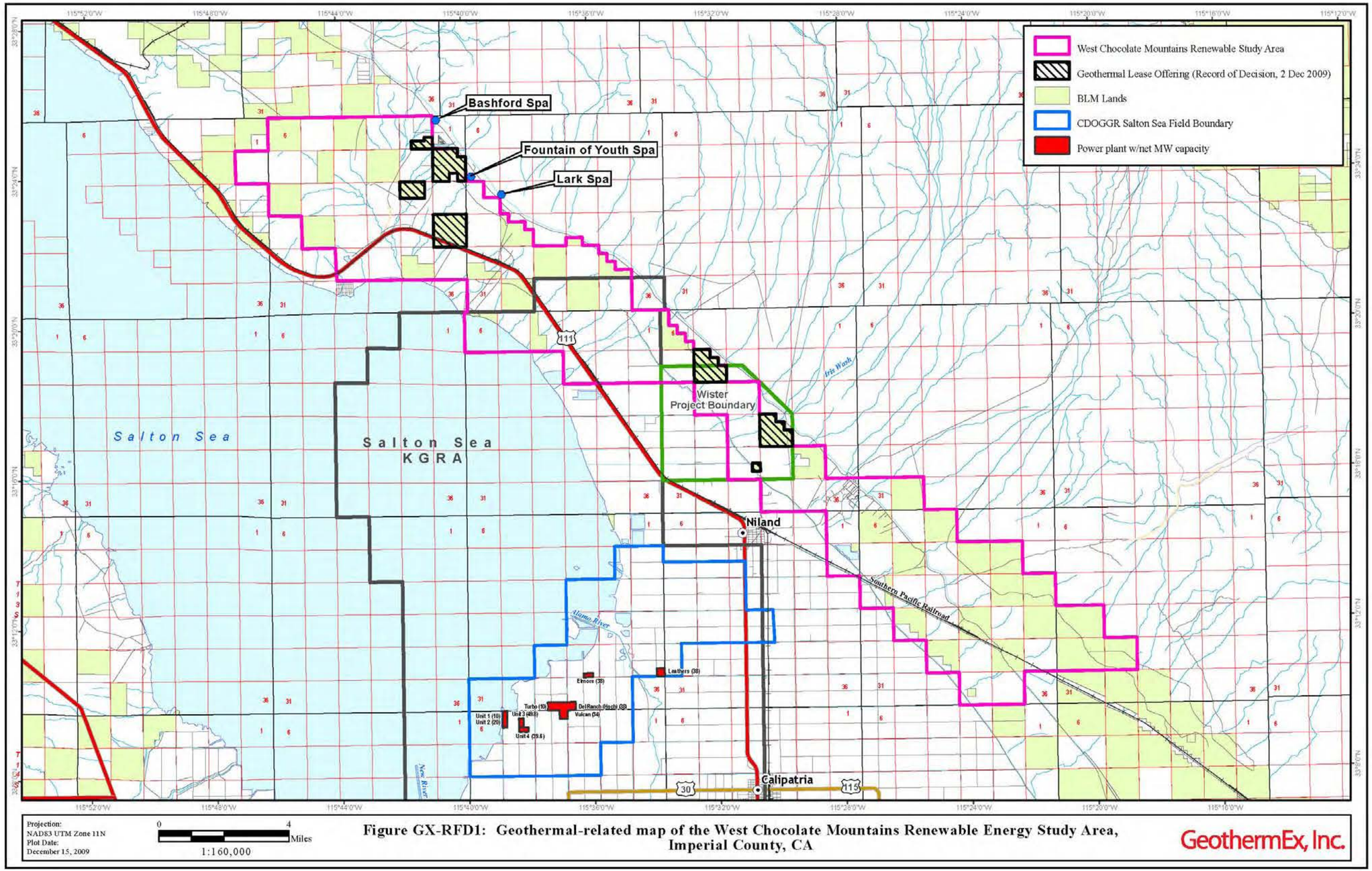

Figure GX-RFD1: Geothermal-related map of the West Chocolate Mountains Renewable Energy Study Area, Imperial County, CA

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In addition, soil gases may be measured to determine their chemical makeup, which is an indicator of geothermal energy potential, by temporarily installing gas collectors. Soil gas sampling may result in minor disturbances to a number of small areas (less than 3 square feet) since the sensors are partially buried. The gas collectors are left for a few days before they are removed from the site. Other than this, chemical sampling generally creates no impact.

Geologic mapping is also a common geothermal exploration activity. While some mapping work involves evaluating maps, aerial photos, and satellite images, it is common for the geologist to make on-the-ground observations to obtain more geologic detail and to sample rock units for petrologic or other analyses. This involves obtaining access to the area by some means (often setting out on foot from existing roads or trails), but there is little if any impact on the area being mapped.

Geophysical surveys may also be undertaken, using one of several methods. Surveys that may be undertaken could include gravity, magnetic, seismic, resistivity, and measurements of ground temperature by one of several means. The process of and potential disturbances from these geophysical techniques are discussed below.

Gravity and magnetic surveys are passive (detecting naturally occurring events) measurements. A gravimeter or magnetometer is moved around the area, and measurements are taken at convenient locations, typically along roads. Where road access is limited, the measuring equipment must be carried to each measurement site. This is typically done either on foot or by using pack animals or all-terrain vehicles. The amount of disturbance to the land from such activities is minimal.

Seismic surveys are typically undertaken by setting up a monitoring array of geophones (with the data transmitted to a central location) and creating a pulse or series of pulses of seismic energy. The pulse is created either by detonating a charge below the ground surface or by a “thumper truck” that is driven through the area on established roads. The monitoring array may be deployed at the ground surface, in small excavations made specifically for burying the geophones, and/or at the bottom of existing wells. These surveys are typically undertaken over the course of just a few days, thus limiting the impacts associated with the movements of a thumper truck or detonation of a charge. The vibrations from the seismic sources are negligible and would not cause damage to existing structures. Longer term deployment of geophones is sometimes undertaken in areas where natural seismic activity occurs; this is a completely passive data collection method that records naturally occurring earthquakes.

Resistivity surveys are very common in geothermal exploration, because variation in the earth’s resistivity can occur directly as a result of the presence (or absence) of geothermal fluids. Several possible methods may be used. Some involve laying out long lines (up to several hundred meters) of cable on the surface, typically along roads, although some convenient off-road areas may also be used for this purpose. Others, such as magneto-telluric (MT) surveys, involve setting up equipment repeatedly in small areas (a maximum of 20 or 30 square feet at each measurement site) and taking many measurements across the prospect. An MT survey is sometimes preferred because it evaluates conditions at greater depths than other resistivity methods (that is, at depths where the resource is likely to exist, rather than the overlying zone); therefore, it is quite possible

that this method would be used within the REEA. In an MT survey, electrodes are buried just beneath the ground surface at each site, and measuring equipment is set up nearby. Each site is monitored for several hours, and the equipment is then moved to the next site. The only disturbance is associated with access to the area and with minor, temporary disturbance of the ground surface to bury the sensors. Each site is restored as closely as possible to its original condition before the next site is monitored.

Shallow temperature measurements are another geophysical exploration method. These can be made with a long thermal probe, which is inserted into the ground to a specified depth, allowed to stabilize, and removed after the temperature has been recorded. Alternatively, a hand auger may be used to drill short (less than 6 feet deep), narrow-diameter (a few inches at most) holes, into which the probe is temporarily placed. This type of survey is likely to be undertaken on foot in a prospective area.

4. Drilling

The results of geologic mapping, geophysical surveys, and geochemical surveys are likely to define an area considered to be most prospective for drilling. The developer may choose to use temperature-gradient wells (TG wells) first and then use full-diameter (FD) wells, or may move directly to drilling FD wells. TG wells are smaller in diameter and usually shallower than FD wells, and cannot be used for either production or injection.

4.1 Temperature-Gradient Wells

TG drilling enables the investigation of temperatures at shallow depths in and around a geothermal system. These wells are drilled during the exploration phase of a project to help define the distribution of temperatures in the subsurface, and to extrapolate temperatures to different depths. It also provides valuable information on the shallow hydrology and may enable sampling of groundwater where the number of existing wells is limited. TG wells investigate conditions above the geothermal reservoir and, again, are not used for either production or injection. Their depth may range from perhaps 100 feet to 3,000 feet or more, depending on the potential characteristics of the geothermal resource, local hydrologic conditions, and other factors. The number of TG wells is also quite variable, depending on the system being investigated and the size of the anticipated power development. Samples are typically taken of any groundwater encountered during drilling. Then the wells are typically completed with sealed, water-filled tubing from surface to bottom, often with cement around the tubing. Later in the project, the tubing may be perforated to allow monitoring of groundwater pressure.

Drilling equipment for TG drilling is selected based on the depths and design of the wells to be drilled, and the physical and logistical conditions of the drilling sites. Most gradient wells are drilled with a small rotary rig (often truck-mounted) similar to that used for drilling water wells, or a diamond-coring rig, similar to that used for geologic sampling in civil works projects and mineral exploration. Neither requires much site preparation, but some auxiliary equipment is needed, including water trucks, tanks for mixing and holding drilling fluids, vehicles to transport supplies and personnel, and in some cases a backhoe to make minor excavations at the drilling

site. After the wells are completed, temperature profiles are measured periodically in each well using a small downhole temperature probe, which is typically transported in a small truck.

Because only limited geothermal drilling has been conducted within the West Chocolate REEA, it is assumed that some level of exploration would occur prior to full-field development. Exploration may include one or more of the geophysical exploration methods above, and drilling of TG holes. The number of TG holes can vary considerably from project to project, but it is reasonable to expect that for a single project, between 10 and 30 TG holes would be drilled.

Seismic testing can be either passive (again, to detect naturally occurring events) or induced (typically by "thumper trucks" driven along established roads to create seismic pulses that can be detected by a geophone array). Alternatively, the seismic pulse may be created by detonating explosive charges placed in shallow holes (less than 100 feet deep). Geophones may be deployed at the ground surface, in small excavations made specifically to bury geophones, or downhole in existing wells. It is assumed that the total surface disturbance relating to seismic testing would be 5 acres. The area of surface disturbance would be linear, and might consist of up to a few (less than 10) line-miles.

TG drilling requires road access; therefore, some construction of new roads or improvement of existing ones (e.g., grading) may be required. At the well site itself, a small cellar (typically less than 3 feet square and less than 3 feet deep) may be excavated to allow the conductor casing to be set beneath the rig. In most cases, little or no leveling or grading is needed. Drilling may take up to several weeks. First, a hole is drilled to about 30 feet, and a conductor pipe (typically 8 to10 inches in diameter) is cemented into place. Next, a smaller-diameter hole (7 to 8.5 inches) is drilled to perhaps 300 feet, where a second casing is cemented. The final hole (commonly less than 6 inches in diameter) is then drilled to the final depth. A string of tubing (typically 3 inches in diameter or less) may be run from the surface to the bottom of the well ("downhole") and cemented in place. As discussed above, this tubing is sealed at the bottom to allow stable temperature gradients to be measured.

After drilling, the rig and other equipment are moved off the site and all materials and refuse are removed. If a cellar has been excavated, it is back-filled to restore the ground to its original level. The well is left with the inner tubing protruding slightly above the ground surface to allow access for later temperature logging; the outer casings are cut off near ground level. In the months after completion, the well site is likely to be visited several times for temperature measurements, until a completely stabilized profile is obtained. After this, the wells can be left for periodic monitoring, or they can be abandoned, which involves excavating the ground around the well to a depth of about 3 feet, cutting off the casing and tubing, plugging the tubing with cement, and back-filling and grading the site to restore the natural contour.

TG holes are small-diameter holes that do not, by definition, penetrate a geothermal resource. The purpose of these wells is to identify areas that have the greatest amount of heat flow, which would be the most probable targets for production wells. It is assumed that the total surface disturbance for each TG hole would be 3 acres, including the drilling location and the access road. It is likely that some of the drilling locations used for the TG holes would also be used for production wells.

However, for the purpose of this RFD, it is assumed that they would remain separate disturbances.

The total surface disturbance anticipated for exploration is 95 acres (Table 2).

Table 2 Exploration Surface Disturbance For One, 50-Megawatt Power Plant

Description	Unit Surface Disturbance (acres)	Number	Total Surface Disturbance (acres)
Drilling TG holes	3	30	90
Seismic testing	5	1	5
Total			**95**

The time required to drill and complete each well depends most on well depth, but also on the type of drilling equipment used. It is reasonable to expect a maximum of several weeks per well. The drilling rigs typically operate in a single-shift mode (10 to 12 hours each day), but occasionally operate around the clock. The number of vehicle trips per well may vary from 20 or 30 to a few hundred, depending primarily upon the well depth, but is unlikely to exceed 10 per day. The weight of the heaviest vehicles is unlikely to exceed 55,000 pounds; most trips to bring materials, as well as personnel trips, would be made with lighter vehicles. Exhaust from these vehicles and the rig engines would be controlled with standard air-pollution control equipment (such as catalytic converters) to maintain air quality. The rig engines may be as large as 600 horsepower (hp) and would operate continuously throughout the drilling shift. Water trucks are often used to control the dust generated by excavation, grading, or vehicle movements on unpaved roads.

Since the TG wells produce no geothermal fluids and generally do not directly contact the geothermal reservoir, no impact from discharge of geothermal fluids would be likely to occur. Artesian pressures may exist within the West Chocolate REEA, so any TG well drilled to a depth below the groundwater table would be drilled with blow-out prevention (BOP) equipment. If a gradient well did penetrate a geothermal zone, a significant release of geothermal fluids at the surface would be unlikely because of the use of BOP equipment and because of the relatively small diameter of the wells. If zones with artesian pressure are encountered during TG drilling, the well would be completed with cemented tubing to prevent cross-flow to shallower zones.

4.2 Full-Diameter Wells

To support each 50-MW increment of net geothermal generation, it is estimated that up to 40 FD wells (16 production wells, 16 injection wells, and eight dry holes) would need to be drilled. This includes both the initial wells and make-up or replacement wells that would need to be drilled periodically during the life of the project. All wells on BLM-managed land would be permitted by BLM using standard review methods that ensure protection of ground water, public safety, and the environment. Typically, two to three FD wells are drilled during the early stages of the

project. These wells discover and confirm the resource, and data from drilling, logging and testing areas used as a basis for making the decision about proceeding with the development (i.e., determining project feasibility).

Surface Disturbance

Each well is anticipated to be from 4,000 to 9,000 feet deep. However, these depths should not be considered a limiting factor when permitting, because there is no strong correlation between depth and environmental impacts. In other words, a 12,000-foot well could be drilled with only slightly more impacts than a 9,000-foot well. The difference in impacts is covered by the high-development bias of this RFD scenario.

The use of multi-well drill pads would depend on the depth of the resource that is encountered. Resource depths of less than 4,000 feet would make directional drilling difficult and require fewer wells per pad, whereas depths of 9,000 feet would allow five or more wells to be directionally drilled from a single pad. If there were more wells per pad, fewer pads would be required to achieve the same number of MWs, which would result in less overall surface disturbance. However, because little is known about the depth of potential resources within the West Chocolate REEA, rather than risk underestimating the potential surface disturbance, it is assumed that only one well would be drilled from each pad.

The potential impacts associated with drilling FD wells are similar to those for TG wells, although at a larger scale. The important differences for FD wells are as follows:

- The access roads need to meet higher standards than must roads needed for a TG-well-drilling rig, as the rig for a FD well is transported to the site by tractor-trailer trucks. It is highly likely that new roads would be needed for this activity in the West Chocolate REEA.
- The number of trips for both heavy and light vehicles would be significantly greater. Getting the rig and ancillary equipment to the site may require 15 to 20 trips by full-sized tractor-trailers; the same number would be required to de-mobilize the rig. The size of the material-supply trucks and water trucks would necessarily be larger than for a TG well, and the number of trips would be proportionally greater, given the greater well depth.

Well pads for a single well are typically on the order of 200 feet wide and 250 feet long. Thus, each FD well would require a well pad of approximately 2 acres, including cut and fill. As the topography is relatively flat, cut and fill would not contribute significantly to surface disturbance. The length would increase if multiple wells are to be drilled from a single pad. The various constituents of the well pad include a reserve pit (or “sump”) for collection of drill cuttings and drilling fluids. Typically, the reserve pit is approximately 100 feet long by 60 feet wide. The depth varies according to the volume required and local soil conditions, but a typical depth is about 10 to 12 feet. The sides of the pit typically are sloped at approximately 45 degrees. A partition is typically constructed within the reserve pit to separate the drill cuttings and drilling fluids. The exact shape of the reserve pit at a specific drilling site will depend on the topography, and its holding capacity will vary with the requirements of the job, but a minimum

capacity of a few hundred thousand gallons is typical. The base and sides of the pit are typically lined with an impermeable layer to prevent any infiltration of fluids into the subsurface. This can be a membrane material such as hypalon, or a clay liner may be used.

The reserve pit is used to receive fluids that come out of the well during the drilling process. Later, the reserve pit is used during testing operations. For example, during a brief discharge test, the reserve pit receives the produced fluids. If no well is available to inject the produced fluids (which is certainly the case for the first well drilled in a particular area), then the duration of the discharge test is limited by the capacity of the reserve pit. The reserve pit can also be used to store water for an injection test.

Each well location is assumed to need 1 mile of 30-foot-wide access road and 1 mile of pipeline. It is assumed that the pipelines would follow the access roads, thereby adding 10 feet to the total width. It is also assumed that all drilling locations would remain open for the life of the project.

While a temperature-gradient drilling operation can be run by about three onsite personnel and others traveling to the site periodically with materials and supplies, a FD drilling operation typically has from 10 to 15 people on site at all times, with more people coming and going periodically with equipment and supplies.

Rigs for FD wells typically operate around the clock. Noise control measures (such as the positioning of tanks and the use of baffling) may be employed to meet applicable noise limits.

The total foreseeable surface disturbance for new wells is summarized below (Table 3).

Table 3 Well Site Surface Disturbance for 50-Megawatt Projects

Description	Unit Surface Disturbance	Number for One Project	Total Surface Disturbance for One Project (acres)	Number for Three Projects	Total Surface Disturbance for Three Projects (acres)
Well pads	2 acres per well pad	40 well pads	80	120 well pads	240
Access roads	3.6 acres/mile	40 miles	144	120 miles	432
Pipelines	1.2 acres/mile	40 miles	48	120 miles	144
Total			**272**		**816**

Noise

Each well would be expected to take between 60 and 120 days to drill. During this time, high levels of noise would be generated by the diesel engines that power the drilling rig and air compressors/mud pumps, as well as by the draw-works, draw-works brake, racking of pipe, and well testing. The racking of pipe and draw-works brake are higher-pitched noises that typically travel further and are more difficult to mitigate than sources such as diesel engines. All diesel engines would use mufflers according to standard industry practice. All well testing would be done through mufflers or separators to reduce noise. Up to three drilling rigs could be in operation simultaneously, and drilling would be expected to take place 24 hours a day, 7 days per week.

Water

Water for mixing drilling fluids would be needed in much greater quantities than for TG wells. Such water is typically obtained from local water wells and is transported to the site by truck or temporary irrigation pipelines.

Air Quality

Diesel engine exhaust, reservoir gases produced during well testing, and dust are the primary impacts to air quality from the drilling of wells. Vented steam during a well test may contain non-condensable gases. Carbon dioxide (CO_2) comprises the major portion of the non-condensable gases (typically more than 90 percent). If present in the steam phase of the discharge, hydrogen sulfide emissions may be abated by injecting hydrogen peroxide and sodium hydroxide into the test line. Other non-condensable gases do not require abatement. Dust emissions from roads are mitigated by periodic watering.

Ground Water

It is unknown whether there are underground sources of drinking water in the West Chocolate REEA. Protection of groundwater from contamination by geothermal fluids is facilitated by the use of multiple casing strings, whose depths are specified partly on the basis of the depths of groundwater aquifers. In addition, redundant BOP equipment is used. For a 9,000-foot well, surface casing is normally set between 50 and 100 feet, an intermediate casing string is set between 300 and 1,000 feet, and a production casing string is set down to 4,000 feet or deeper, depending on the depth of the top of the anticipated zone of production or injection. If necessary to maintain hole stability, a slotted liner may be hung over the production or injection interval. Other than the slotted liner, all casing would be cemented in place using standard industry practice. In addition, all injection wells are required to be periodically tested for mechanical integrity. The testing protocol would depend on the nature of any aquifers and the type of resource encountered.

5. Power Plants

5.1 Construction

Power plant construction requires access via good-quality roads (those capable of accommodating large tractor-trailer trucks). Roads constructed to reach sites for FD wells could also be used to access the power plant site, if the plant were located near one or more of the wells. If topography allowed, the power plant could be positioned so as to be less visible from well-traveled roads; however, there are locations (such as Steamboat, Nevada) where power plants are visible from main roads. A site with reasonable air circulation (for example, not down in a gully) may be required for efficient operation of the plant’s condensers.

Given the anticipated reservoir temperatures within the West Chocolate REEA, it is likely that geothermal power plants in this field would use binary conversion technology. The plants could use either air-cooled or water-cooled condensers to condense the binary working fluid after its transit through the turbines. Both water-cooled condensers and flash conversion technology with

cooling towers (in which the geothermal fluid goes from a liquid to a vapor instantly when the pressure is dropped) can produce plumes of water vapor (sometimes incorrectly called “steam plumes”), which might be visible on cold days.

The amount of geothermal plant capacity to be installed within the West Chocolate REEA would depend on the resource capacity that is proven by drilling. Regardless of the total size of the resource, it is likely that power plants would be developed in increments of 20 to 50 MW of plant capacity, with separations of a mile or more between plants. A typical plant size of 30 MW would use a site area of up to 15 acres to accommodate all the needed equipment, which would include (in addition to the power plant itself) space for pipelines supplying the brine from the production wells and distributing the cooled brine back to the injection wells, a switch yard, space for moving and storing equipment, and buildings needed for various purposes (power plant control, fire control, maintenance shop, and so forth). The power plant itself would occupy approximately 25 percent of this area for a water-cooled plant, or about 50 percent for an air-cooled binary plant (more area is required for the cooling tower fans in an air-cooled plant). A 50-MW plant would require a larger footprint, on the order of 20 to 25 acres, depending on the conversion technology used.

The number of personnel required during construction varies widely, but at any one point there may be as many as 155 laborers and professionals on site, with attendant vehicle traffic.

After construction was complete, the area around the power plant that was no longer needed for access and maintenance would be regraded and revegetated with local species.

5.2 Wellfield Equipment

A geothermal power plant is typically supported by pipeline systems in the vicinity of the plant. These pipeline systems include a gathering system for produced geothermal fluids and an injection system for disposal of geothermal fluids after heat extraction by the plant. The pipeline routes are highly site-specific, but typically are located along access roads where possible. Pipelines are usually less than 24 inches in diameter, and their lengths are minimized to the extent possible to reduce cost and heat loss. In some projects, new pipeline corridors across previously undisturbed areas may be chosen for logistical reasons. Since the pipelines are typically constructed on supports above ground, there is little if any impact to the surrounding area once construction and re-vegetation of the pipeline corridors are complete. Small animals can easily pass beneath the pipelines. The pipeline height is typically a few feet (less than five) above ground surface, and they are painted to blend in with the environment, thus minimizing their visual impact. Production pipelines are typically insulated, while injection pipelines (which are cooler) are usually left unclad. Pipeline expansion and contraction is accommodated by using expansion loops. These are large, U-shaped bends, with the contraction or expansion of the U being accommodated by slides or rollers mounted on the pipeline on either side of the U. These expansion loops are commonly horizontally oriented, but occasionally vertical (for example, where a road crosses a pipeline corridor).

A small shed (usually no more than 10 feet x 10 feet) may be constructed at each well site to house certain equipment (e.g., flow-metering equipment, electrical equipment, lubrication oil for the pump, and so forth). As for the pipeline, the sheds are painted to blend in with the environment.

5.3 Operations and Maintenance

Operation of a Binary-Cycle Geothermal Power Plant

In a binary-cycle geothermal power plant, which is the most likely type to be constructed within the West Chocolate REEA, the heat from the produced geothermal fluid is transferred to a working fluid that boils at a lower temperature than water. It is the working fluid (such as isobutane or n-pentane) that expands through a turbine to generate electricity, rather than the geothermal fluid itself. The geothermal fluid and the working fluid are maintained in separate, sealed loops to prevent them from mixing and/or escaping to the environment.

Geothermal wells supplying binary geothermal power plants are typically pumped (rather than self-flowing). Standard line-shaft pumps are the most commonly used downhole pumps. These are contained within their own casing and consist of several pump stages in a vertical arrangement. Lubricating oil is used to keep the bearings from seizing up. The production well system is maintained at a pressure greater than the “bubble point” (the pressure at which boiling would occur) to keep all gases in solution.

Hot water from the production wells is gathered in a series of pipelines and delivered to the power plant site, where it is then passed through several heat exchangers, which transfer heat from the geothermal fluid to the working fluid. After flowing through the heat exchanger, the cooled geothermal fluid enters the injection system to be returned to the reservoir via the injection wells. This type of system incurs no loss of geothermal fluid; only a portion of the heat (but no mass) is removed. No geothermal fluid or steam is emitted to the atmosphere.

The working fluid flashes into a vapor phase in the heat exchangers and is then passed through a condensing turbine. Electricity is created from a generator attached to the turbine shaft. After passing through the turbine, the working fluid is condensed into a liquid phase and the process is repeated. Like the geothermal fluid, the working fluid is also maintained in a closed loop, thus avoiding any leakage to the atmosphere or mixing with the geothermal fluid. Condensation of the working fluid in a binary power plant may be achieved either through air-cooling or water-cooling; however, given the high ambient summer temperatures in the West Chocolate REEA, water cooling would be the preferred option (if an adequate supply of cooling water is available), as it would result in greater generation efficiency. The cooling water could possibly be purchased from the Imperial Irrigation District (IID) for circulating through the cooling system. Some evaporative water loss is expected; the amount of loss increases during the hotter summer months.

The power plant itself requires electricity to operate, as do the production and injection pumps. This “parasitic power” may be purchased from the local utility or the plant may provide its own electricity, with less net power being available for sale. A source of outside power is required on site in any case for cold starts. The energy consumption of the plant and pumps varies

significantly, but is typically no more than about 30percent of the gross generation. That is, if a plant is designed to produce 30 MW total, it may consume as much as 10 MW in supplying its own parasitic power needs and thus produce 20 MW net.

Maintenance of a Binary Plant

As discussed above, wells may periodically require some maintenance, which may or may not require the presence of a drilling rig. One of the most common maintenance tasks for pumped wells is removing and replacing the pump. This is done only as needed (on the order of once every several years), typically using a crane or boom truck.

The wells may be routinely sampled for changes in chemical composition via a port in the flow line. Periodic temperature and pressure surveys may be run in both the production and injection wells (for pumped production wells, this can only be done when the pump is out of the well) to evaluate how subsurface conditions are changing. Idle wells may be used for pressure monitoring, either at the wellhead (for artesian wells) or downhole. If the latter, an instrument is placed at a specified depth in the well, and the pressure readings are transmitted to the surface where they are recorded for a specified time period.

Tracer testing is another typical wellfield activity. In this type of test, a chemical is added to the injection stream, and samples are collected at each production well over a period of time. The tracers that are typically used in geothermal testing are non-toxic organic compounds (such as fluorescein) that reach only minute concentrations (usually less than 100 parts per million [ppm]) in reservoir fluids and degrade over several months at reservoir temperatures. The formations exposed to tracer testing are isolated from any potable groundwater by the configuration of well casings.

There are several reasons why a well may need to be worked over after it has been completed. It may experience a mechanical failure such as a casing collapse, which renders it unusable as a producer or injector. It may suffer a decline in productivity that could be remediated by some intervention, such as a scale clean-out. Since the wellfield represents a significant portion of the investment in a geothermal field, a diligent operator seeks to monitor its wells and maintain them in the best possible condition, within the constraints of operating budgets.

In some cases, a drilling rig may not be required for remediation. Sometimes a coiled-tubing unit can be mobilized for scale clean-outs or other activities. While a certain amount of disturbance comes with the mobilization of any equipment, coiled-tubing operations are typically much more compact and of shorter duration than those requiring a drilling rig.

If a well has a major problem, a drilling rig needs to be mobilized to the site. Depending on the nature of the problem, it may be possible to have a smaller rig than was used to originally drill the well. The impact of remediation operations is a function of the size of the rig, the duration of the operation, and the nature of the problem.

Staffing

The number of people required for routine operation of any kind of geothermal power plant is typically 37 using the ratio of 0.74 full-time employees per MW. For comparison, the Heber geothermal facility (which combines both binary and flash plants and has a total capacity of about 130 MW gross) in the southern part of the Imperial Valley had a staff of 47 people as of 2006, including both operating and administrative staff.

Impacts

Noise

Power plant noise usually entails a constant low-level hum primarily created by the cooling tower fans.

Air Quality

Binary plants use a closed-loop process in which the geothermal fluid is never exposed to the atmosphere, and there are no significant sources of air pollution.

A dual flash plant, on the other hand, would discharge any non-condensable gases that are produced with the steam including carbon dioxide, methane, ammonia, and hydrogen sulfide. However, local air quality districts typically have strict limits on hydrogen sulfide emissions. If it is necessary to mitigate hydrogen sulfide emissions, the non-condensable gases may be scrubbed using a “Stretford,” iron chelate, or burner process.

Visual

Power plants would be sited using terrain to obstruct visual impacts to the extent possible. All facilities would also be painted a color that blends into the natural setting. If water cooling is used, steam plumes from the cooling towers can rise up to perhaps several hundred feet above the cooling towers on cold days. During the hot summer months, the steam plume would be minimal. Air-cooled binary plants would have no such steam plume.

Seismic

Development of geothermal fields typically results in the creation of micro-seismic events that seem to be related to production and/or injection. These micro-seismic events are detectable by sensitive instrumentation but are usually too small for people to feel. Induced seismicity that is strong enough for people to feel is not typical of geothermal developments. In certain vapor-dominated reservoirs (such as at The Geysers geothermal field in northern California), concerns have been raised that injection has resulted in seismic activity that could be felt by local residents. However, the vapor-dominated conditions found in The Geysers geothermal field that may be associated with seismicity are rare and not expected to be encountered within the West Chocolate REEA. While environmental analysis at The Geysers suggests that seismic events are a result of geothermal activity, these events are not large enough to cause structural damage to homes or other improvements. Therefore, this potential has not been considered a significant impact for geothermal development within the REEA.

The West Chocolate REEA spans a region in which strike-slip motion along the San Andreas Fault system to the north transitions into divergent motion that pulls apart the Pacific and Continental plates at points further south (Lohman and McGuire 2007). Within this tectonically active area, felt earthquakes have often occurred in the past and are expected to occur in the future. However, it is not expected that geothermal development in the REEA would cause any increase in seismicity above naturally occurring levels. Within the Imperial Valley, several geothermal projects with liquid-dominated reservoirs similar to those potentially occurring within the REEA (for instance, the Salton Sea, Heber, and East Mesa projects) have had active production and injection since the 1980s with no increase in felt seismicity attributable to geothermal operations.

There is significant potential for the development of conventional hydrothermal projects in the West Chocolate REEA. However, it is possible that an enhanced geothermal systems (EGS) project may also be proposed by a developer, and therefore this possibility is discussed. In EGS projects, fluid injection is used to enhance rock permeability and recover heat from the rock. During the process of creating an underground heat exchanger by injection or the subsequent circulation of the system, stress patterns in the rock may change, resulting in seismic events.

In almost all cases, these events have been of relatively small magnitude, and by the time the released energy reaches the surface, the vast majority are rarely felt (Majer *et al.*, 2007). The impacts of a seismic event created by fluid injection can be significantly different from those associated with a natural earthquake: the former generally falls into the category of an annoyance, as with the passing of a rail transit vehicle or large truck, whereas the latter may cause damage in a moderate to large event. To date, there is no recorded instance of a significant danger or damage associated with induced seismicity related to geothermal energy production, including the event associated with the EGS project in Basel, Switzerland in late 2006. The introduction of EGS technology in populated areas could be regarded by some as an intrusion on the peace and tranquility of populated areas due to its potential "annoyance factor." For this reason, if an EGS project was proposed in the West Chocolate REEA, induced seismicity would be one of the issues to be covered by the project Environmental Impact Statement (EIS).

Hazardous Materials

The power plant is maintained on a regular schedule, with major maintenance overhauls typically scheduled every two to five years. It is usually necessary either to reduce the output of the plant (for example, by shutting down one set of energy conversion units) or to shut down the entire plant for a few days while the equipment is inspected and serviced.

The routinely used chemicals that are specific to binary geothermal power plants include the hydrocarbon working fluid and the lubricating oil used in the downhole pumps. If a well's pressure falls below the "bubble point," it is possible that downhole scaling might occur. This would require either a mechanical clean-out with a drilling rig or coiled-tubing unit, or an "acid job," during which acid (typically HCl or less commonly HF) is injected into the wellbore to dissolve the scale. If scaling is persistent, the operator may choose to adopt routine injection of a scale-inhibitor chemical, such as polymaleic anhydride or polyacrylic acid, used in dosages of 1 to 10 ppm.

5.4 Surface Disturbance

It is anticipated that up to three power plants would be built to use the resource from the West Chocolate REEA. Each power plant would be capable of generating 50 MW (net) of electricity. Given what is currently known about the resource, the power plants would likely use binary power generation to produce electricity. It is possible, however, that a flash generation system, in which the geothermal fluid goes from a liquid to a vapor instantly when the pressure is dropped, could be used, possibly in conjunction with the binary plants, to maximize the amount of energy produced. Until more information is gathered during the exploratory phase, the precise technology that would be used is unknown.

As described above, in a binary cycle, hot water from the wells is delivered to a heat exchanger at the power plant. The heat is transferred to a working fluid, and the cooled geothermal water is sent to injection wells and returned to the reservoir. This is a closed loop with no loss of water. The hot working fluid flashes into a vapor phase and is sent through a turbine (for binary generation, the working fluid flashes, while for flash generation, the geothermal fluid flashes). Electricity is created via a generator that is attached to the turbine shaft. After passing through the turbine, the secondary fluid is condensed into a liquid phase and the process is repeated. The secondary fluid is also maintained in a closed loop. Condensation of the working fluid in a binary power plant may be achieved either through air cooling or water cooling. Most plants in operation today are air-cooled, often because of the lack of sources of cooling water. Air-cooled binary plants have banks of cooling fans, beneath which the secondary fluid is circulated in a series of condensers. In areas where an outside source of water is available, the cooling water is circulated through a condenser.

Power plants based on flash technology can have multiple stages of flash. For the resource temperatures contemplated in this RFD scenario, a plant design with two stages of flash (a “dual-flash” design) would be typical. In a dual-flash power plant, hot water from the wells is first sent to a high-pressure separator where the pressure is reduced, thereby causing some of the hot water to flash to steam. The steam is sent to the high-pressure inlet of the turbine. The hot water that is not flashed to steam is then sent to a low-pressure separator where the pressure is once again reduced, and some of the hot water flashes into low-pressure steam. The low-pressure steam is typically sent to a low-pressure inlet of the turbine. Whatever hot water is not flashed into steam is sent to an injection well. Typically, this process only flashes 20 to 30 percent of the hot water into steam, on a mass basis. After leaving the turbine, both the high- and low-pressure steam are condensed into water and then sent to a cooling tower for further temperature reduction. The cooled water (condensate) is then circulated back through the condenser to increase plant efficiency. Water that is not evaporated in the cooling process or used in the condenser loop is also sent to an injection well.

Regardless of whether the plant uses binary or flash technology, each plant location would require about 25 acres, which would be 30 acres of total surface disturbance including cut and fill. Each plant would also require 1 mile of access road and 3 miles of new transmission line to intertie with an existing transmission line that runs through the middle of the West Chocolate REEA. It is assumed that the access road would require 30 feet of surface disturbance including cut and fill.

Transmission intertie lines require 100 feet of initial surface disturbance; however, once the lines are constructed, all but a 20-foot access road would be reclaimed with native vegetation.

The total surface disturbance for power plants is summarized below (Tables 4 and 5).

Table 4 Site Disturbance for One 50-Megawatt Power Plant

Description	Unit Surface Disturbance	Number	Total Surface Disturbance (acres)
Power plant location	30 acres/50 MW	1 50-MW	30
Access Roads	3.6 acres/mile	1 mile	3.6
Transmission lines initial	12.1 acres/mile	3 miles	36.3
Transmission lines final	2.4 acres/mile	3 miles	7.2
Total			**69.9 (initial)** **40.8 (final)**

Table 5 Site Disturbance for Three 50-Megawatt Power Plants

Description	Unit Surface Disturbance	Number	Total Surface Disturbance (acres)
Power plant location	30 acres/50 MW	3 50-MW	90
Access Roads	3.6 acres/mile	3 mile	10.8
Transmission lines initial	12.1 acres/mile	9 miles	108.9
Transmission lines final	2.4 acres/mile	9 miles	21.6
Total			**209.7 (initial)** **122.4 (final)**

6. References

CalEnergy. 2003. Testimony of CE Obsidian Energy LLC (an affiliate of CalEnergy Operating Corporation) before the California Energy Commission at a Notice-of-Intent hearing on the proposed Unit 6 project in the Salton Sea field.

Lohman, R. B. and J.J. McGuire. 2007. Earthquake swarms driven by a seismic creep in the Salton Trough, California. Journal of Geophysical Research 112 (B04405).

Majer, E.L., R. Baria, M. Stark, S. Oates, J. Bommer, B. Smith, and H. Asanuma. 2007. Induced seismicity associated with enhanced geothermal systems. Geothermics (36):185-222.

Appendix B

Solar
Reasonably Foreseeable Development Scenario

SOLAR
REASONABLY FORESEEABLE DEVELOPMENT SCENARIO
WEST CHOCOLATE MOUNTAINS

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SOLAR
REASONABLY FORESEEABLE DEVELOPMENT SCENARIO
WEST CHOCOLATE MOUNTAINS

1. Introduction

This Reasonably Foreseeable Development (RFD) scenario has been prepared as a basis for analyzing environmental impacts resulting from future development of federal lands for solar energy projects within the West Chocolate Mountains Renewable Energy Evaluation Area (West Chocolate REEA, or the REEA). This RFD scenario is a tool the Bureau of Land Management (BLM) can use to analyze the types of impacts that could be expected under an alternative being analyzed. A RFD is not a prediction of what would happen under a specific alternative.

The RFD scenario is intended to provide the information necessary to analyze potential cumulative impacts. The disturbance for a production facility and associated infrastructure (e.g., road, pipelines, transmission lines, etc.) would be based on the facilities typical in surrounding areas.

This RFD scenario assumes that two types of solar technologies could be developed: concentrated solar power (CSP), which is also referred to as solar thermal; and photovoltaic (PV).

CSP technologies use mirrors to reflect and concentrate sunlight onto receivers that collect the solar energy and convert it to heat. This thermal energy can then be used to produce electricity via a steam turbine or heat engine driving a generator. CSP technologies include parabolic trough technology, dish-engine technology, and power tower technology (U.S. Department of Energy [DOE] 2009a).

1.1 Concentrated Solar Power Technologies

Parabolic Trough

Parabolic trough systems consist of a large field of single-axis tracking parabolic trough solar collectors. The solar field is modular and is composed of many parallel rows of solar collectors aligned on a north-south horizontal axis. Each solar collector has a linear trough or parabolic-shaped reflector that focuses the sun's direct beam radiation on a linear receiver located at the focus of the parabola. The collectors track the sun from east to west during the day to ensure that the sun is continuously focused on the linear receiver. A heat transfer fluid (HTF) is heated as it circulates through the receiver and returns to a series of heat exchangers in the power block where the fluid is used to generate high-pressure superheated steam. The superheated steam is then fed to a conventional reheat steam turbine/generator to produce electricity. The spent steam from the turbine is condensed in a standard condenser and returned to the heat exchangers via condensate and feed water pumps to be transformed back into steam, which is traditionally released into the atmosphere, hence the large amounts of water needed on an annual basis to keep the project going. After passing through the HTF side of the solar heat exchangers, the

cooled HTF is re-circulated through the solar field (National Renewable Energy Laboratory [NREL] 2003).

Each plant includes thermal storage, consisting of a dual, two-tank molten salt system, sufficient to support approximately 3.5 full load hours of electricity production. The thermal energy storage (TES) system contains a “”hot” and a “cold” storage tank connected via two parallel trains of six oil to salt heat exchangers in series. For charging the storage, the salt is heated up to approximately 386 degrees Celsius (°C), and for discharging it is cooled down again to approximately 292°C. The salt freezes at approximately 221°C. Freezing of the salt must be avoided to prevent damage of components. The freeze protection system, which uses the hot HTF, keeps the salt at a minimum temperature of 260°C. To avoid freezing of the salt in nonworking periods, the heat exchangers are equipped with electrical heat tracing. The electric output of the plant would be supplied entirely with solar energy. No electricity is generated by the use of fossil fuel in this plant complex. A small gas-fired HTF heater is used for infrequent freeze protection of the HTF in the solar field. Gas for this purpose is supplied by truck.

The HTF is a synthetic hydrocarbon liquid – diphenyl/biphenyl oxide – that has a freezing point of about 13ºC. Freeze protection is routinely accomplished by circulating HTF at a very low flow rate through the solar field using hot HTF from the storage tank as a source. Performance model results indicate that the HTF heater may be required on very cold nights in the deep winter months (Solar Millennium 2008).

Dish-Engine

Dish-engine technology focuses sunlight from a large parabolic reflector onto a receiver above the dish. Each dish is independent and includes two major elements, the solar concentrator and the power conversion unit. The solar concentrator consists of many mirror facets attached to a frame by three point-adjusting mounts that are designed in five subassembly units for ease of transport and installation on site. Two small motors are attached to the pedestal and programmed to swivel the dish on two axes, following the sun’s progression across the sky during the day. The power conversion unit consists of a Stirling engine, which includes a cylinder block that incorporates four sealed cylinder assemblies along with coolers, regenerators, and heater heads. Concentrated solar energy heats up self-contained hydrogen gas in the power conversion unit, causing the gas to expand into the cylinders, moving the cylinders, and generating electricity. This cycle is repeated multiple times as the engine runs at a steady rate and power is generated by heat transfer from the concentrated solar energy to the working gas in the engine’s heater head, which converts the heat energy into mechanical motion. The generator of each unit in a utility-scale project is connected by underground transmission line to a small substation where the power can be transformed into a higher voltage for more efficient transmission across the grid (BLM 2010).

Power Tower

Solar power towers generate electric power from sunlight by focusing concentrated solar radiation on a centralized tower-mounted heat exchanger or boiler (receiver). The receiver on the top of the tower is filled with a fluid, typically molten salt, which has the ability to hold large amounts of heat. The heat is transferred to water in the same way as the parabolic trough system to produce electricity. Some designs have eliminated the molten salt step and converted water

directly into steam but these systems cannot produce electricity at night whereas the molten salt method can store heat in the salts and produce electricity at night (National Joint Apprentice and Training Committee for the Electrical Industry [NJATC] 2007). This technology uses hundreds to thousands of sun-tracking mirrors called heliostats to reflect the incident sunlight onto the receiver boiler at the top of the tower. Electricity is produced by the system's solar receiver boiler and a steam turbine generator. These plants are best suited for utility-scale applications in the 30- to 400-MW ranges (NREL 2003).

1.2 Photovoltaic Technologies

The most prevalent kind of solar technology is PV panels, and the vast majority of solar panels are silicon-based. About 90 percent of PV sales are made from silicon-based solar cells (Hasan 2007). The basic unit in a PV system is the solar cell. Silicon is crystallized to create a crystal column called an ingot, which is sliced thinly and processed into cells. PV cells are made of at least two layers of semiconductor material, one with a positive charge and the other with a negative charge. When sunlight enters the cell, some of the photons from the light are absorbed by the semiconductor atoms, freeing the electrons from the cell's negative layer to flow through a circuit and back into the positive layer, producing an electric current.

PV technology generates electric power by using solar cells to convert energy from the sun's direct and diffused solar radiations directly into electricity. Two categories of PV cells are used in most of today's commercial PV modules: crystalline silicon and thin film. Cells are arranged, interconnected, covered with tempered glass, and packaged into a structure called a panel. Dozens of individual cells can be arranged together in a sealed, weatherproof package to form a panel to produce additional energy. Panels can then be fitted into an array, which produces electricity based on the number and efficiency of the panels. A PV array is, thus, a set of panels arranged in frames for mounting on the ground, rooftops, or other locations. A PV array along with other components including inverters, mounting equipment, charge regulators, and sometimes batteries for storage make up large photovoltaic systems (Aruvian's Research 2010).

The foreseeable development described here could occur on any land within the West Chocolate REEA (59,095 acres), regardless of surface ownership. Based on modeling performed by the NREL, the follow solar energy could be developed:

Concentrated Solar Power Technology

Trough – 2,696 MW

Dish – 1,498 MW

Power Tower – 1,498 MW

Photovoltaic Technology

1% Slope or less – 1,497 MW

3% Slope or less – 5,145 MW

5% Slope or less – 5,540 MW

The anticipated surface disturbance for the area is summarized below (Table 1).

Table 1 Surface Disturbance for Solar Power Plants in the West Chocolate REEA*

Technology Type	BLM Disturbance (acres)	Total Disturbance (acres)
Solar Trough	4,583	13,480
Dish – Engine	4,583	13,482
Power Tower	4,583	13,482
PV		
1% Slope or less	4,580	13,473
3% Slope or less	15,743	46,304
5% Slope or less	16,954	49,864

Note:
*Within the BLM's Western Colorado (WECO) Desert Region.

2. Available Data and Assumptions

The West Chocolate REEA encompasses about 95 sections, or approximately 59,095 acres. Of this, 42 sections contain roughly 20,762 acres of surface land administered by the Bureau of Land Management (BLM: land withdrawn by the U.S. Bureau of Reclamation [USBR] not included), with the remainder being state or private land.

Of the 59,095 acres, 2010 modeling performed by the NREL using the above constraints revealed that only a maximum of 49,864 acres was developable for solar energy. Of the 49,864 acres, 46 sections contain roughly 20,762 acres of BLM surface land (land withdrawn by the USBR not included), with the remainder of the area being state or private land. Based on the available data and assumptions, of the 49,864 acres, BLM land allocated for solar energy development would be 17,163 acres. The remainder was eliminated for reasons discussed previously in this section. To estimate the amount of anticipated development for the entire 49,864 acres which would potentially occur on BLM land, a simple ratio was developed to estimate the percentage of development that could occur on BLM-managed land. This ratio is based on the percentage of land within the West Chocolate REEA that is managed by the BLM and is available for solar ROW (34 percent [17,163 acres BLM/49,864 acres total]).

The NREL provides solar resource estimates in kilowatt hours per meter squared per day (kWh/m^2/day) for CSP and PV across the United States (Figures 1 through 4). Portions of the West Chocolate REEA are indicated as suitable land for CSP solar development and contain solar thermal resources estimated at 6.7 to 7.4 kWh/m^2/day on a scale ranging from 6 to 8.2, Portions of the REEA are indicated as suitable land for PV solar development and contain solar thermal resources estimated at 6.4 to 6.6 kWh/m^2/day on a scale ranging from 6 to 8.2.

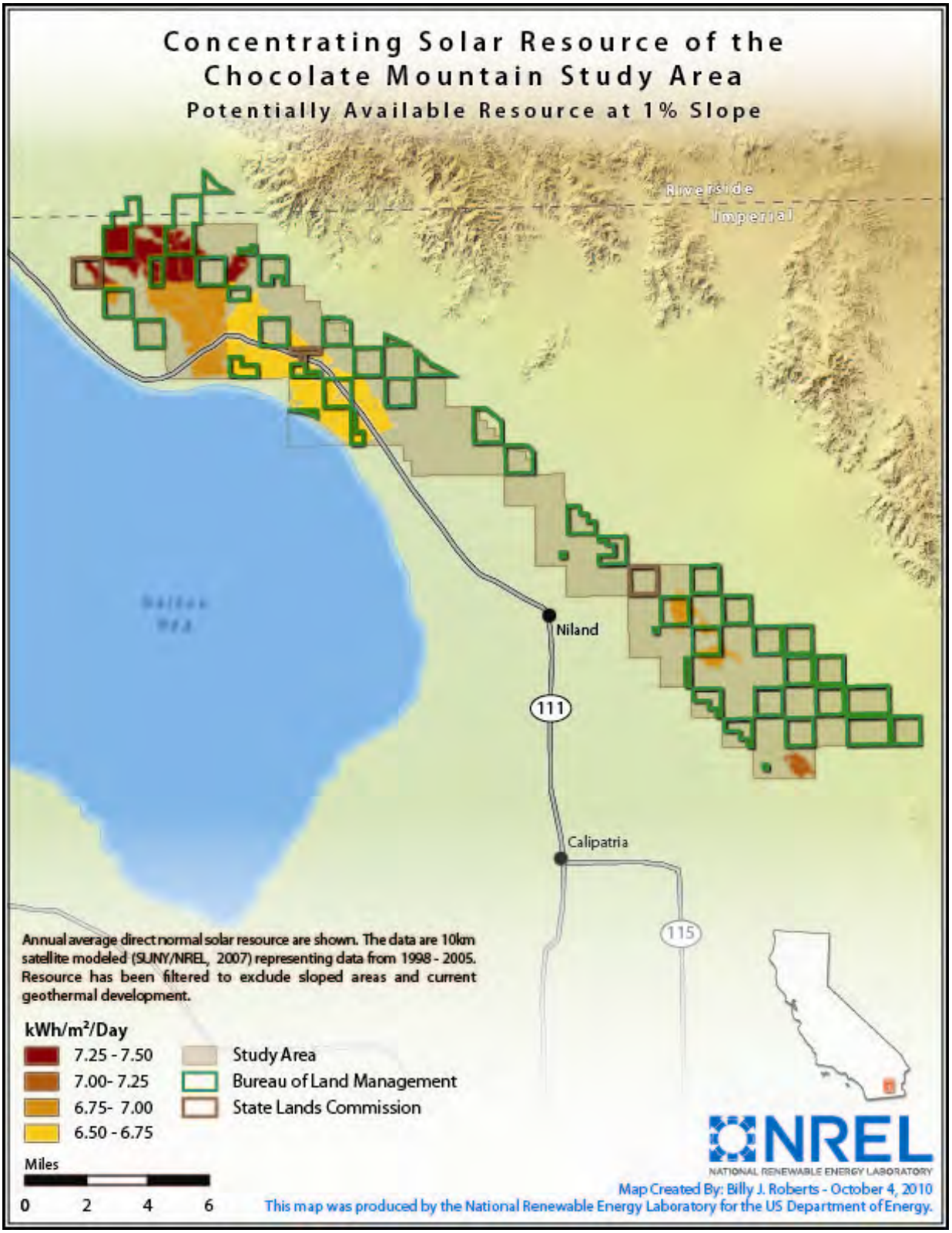

Figure 1. Concentrating Solar Resource of the West Chocolate REEA, Potentially Available Resource at 1% Slope

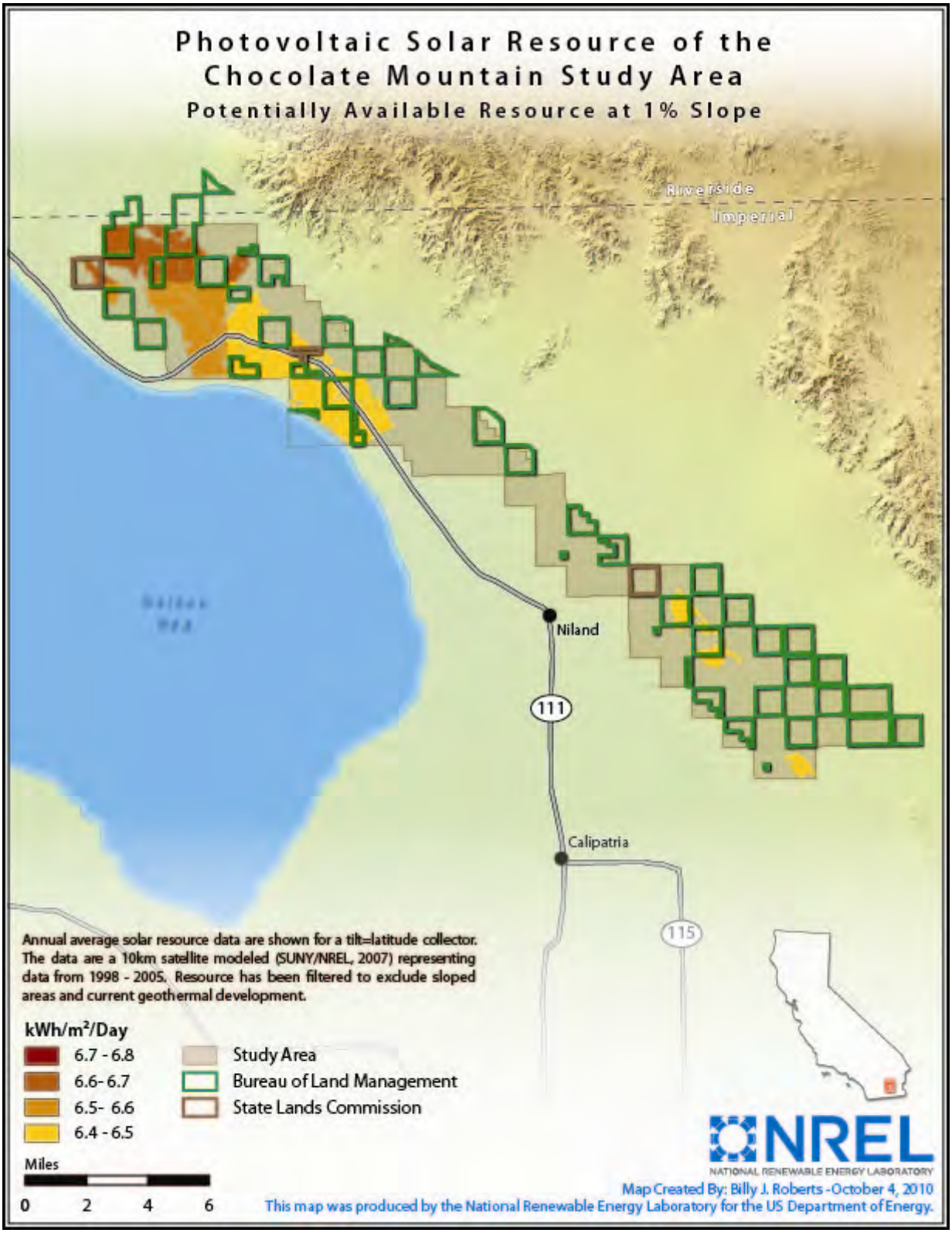

Figure 2. Photovoltaic Solar Resource of the West Chocolate REEA, Potentially Available Resource at 1% Slope

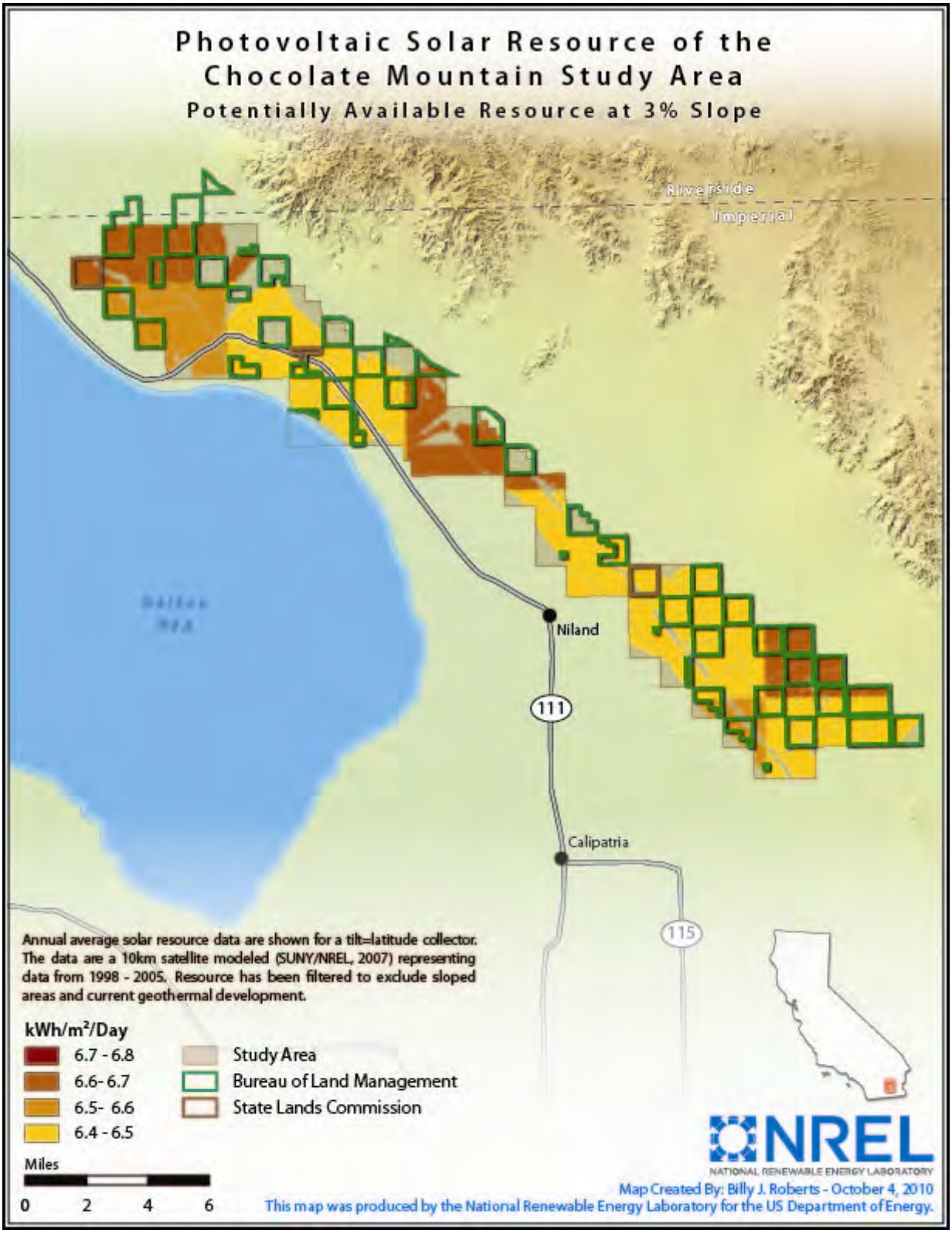

Figure 3. Photovoltaic Solar Resource of the West Chocolate REEA, Potentially Available Resource at 3% Slope

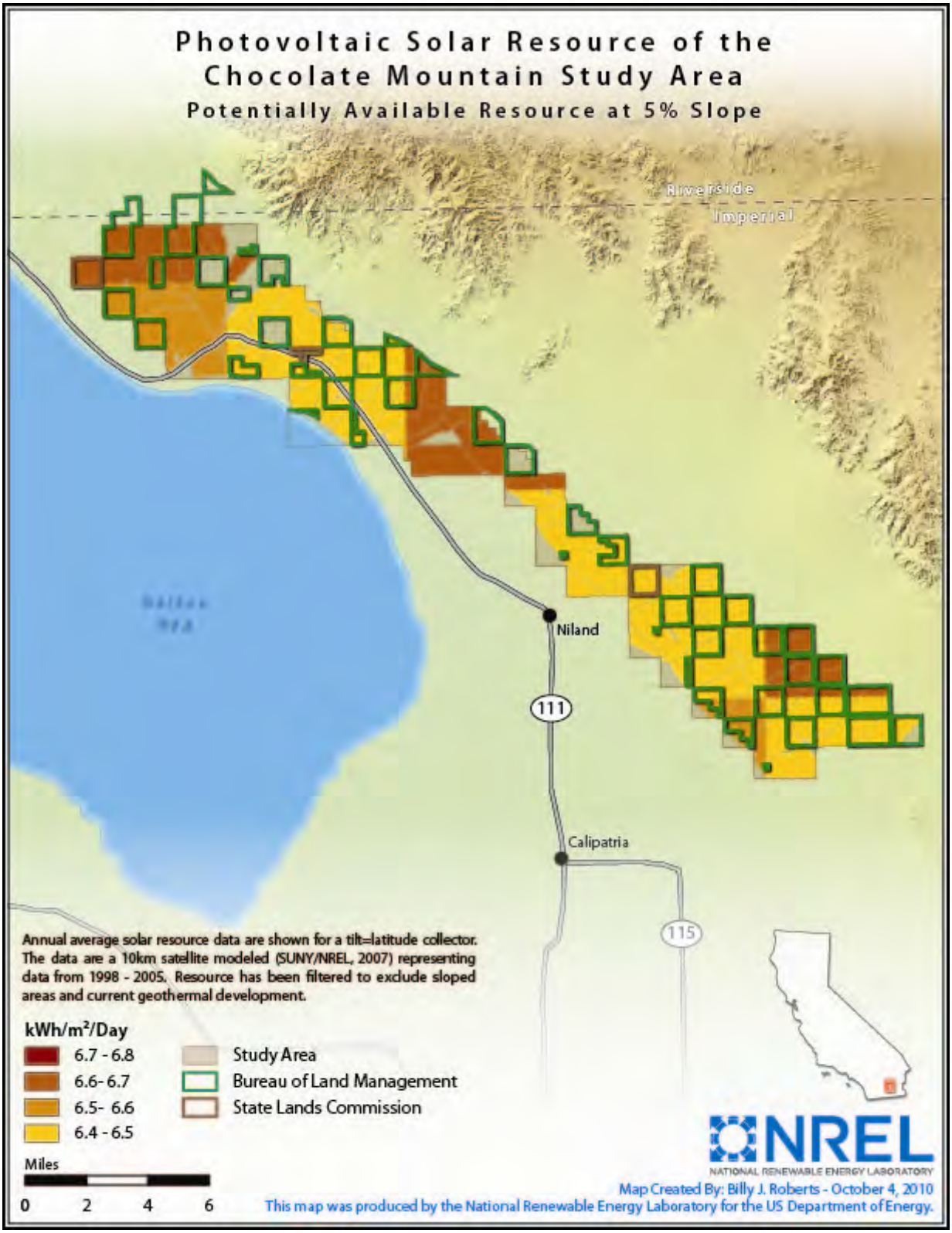

Figure 4. Photovoltaic Solar Resource of the West Chocolate REEA, Potentially Available Resource at 5% Slope

The model inputs are hourly visible irradiance from satellites and monthly average aerosol optical depth, precipitable water vapor, and ozone sampled at a 10 kilometer resolution. These factors are used to estimate the amount of solar radiation that would penetrate the atmosphere at a particular location. This 2010 NREL analysis used modeled direct normal solar radiation estimates at a 10 kilometer ground resolution. These results were further and results were screened by BLM to eliminate: (1) areas with an annual average resource less than 6.00 $kWh/m^2/day$; (2) for CSP, areas where slope is greater than 1 percent; for PV, areas where slope is greater than 1, 3, and 5 percent; (3) major urban areas; (4) water features (buffered out to 100 feet); (5) areas falling within environmentally sensitive federal lands such as national parks or wilderness areas; (6) remaining areas less than 1 square kilometer; and (7) USBR withdrawn land not available for right-of-way (ROW) applications (NREL 2007a). For CSP, it was assumed that 5 acres per MW would be needed for development of a solar trough project and 9 acres per MW would be needed for dish-engine and power tower. For PV, it was assumed that 9 acres per MW would be needed for development.

All projects located on BLM-managed land would be evaluated as part of the Federal Land Policy and Management Act (FLPMA) ROW application and National Environmental Policy Act (NEPA) processes.

3. Activities Involved in Solar Development

Due to the wide range of solar development that could occur in the project area, the activities that could occur during solar development have been based on the development of a 50-MW PV project and a 500-MW solar trough project. These sizes were selected because of the availability of data related to development of these types of projects. PV and solar trough are the two technologies that have been fielded most widely in the United States and throughout the world.

3.1 Exploration

Because there has not been any actual development of a solar project in the area, it is assumed that some level of exploration would occur prior to full-field development. This exploration is typically limited to the placement of solar meters in the vicinity of a proposed solar project area. These meters record direct normal, global horizontal and diffuse horizontal irradiation. Temperature, humidity, wind speed, and wind direction are measured and then recorded in one minute increments. These meters are typically small, less than 1 square meter and can be installed using off highway vehicles (OHVs). They are commonly secured to a piece of concrete or other heavy object so they cannot be easily stolen. Ground disturbance is typically limited to 1 to 2 square meters.

3.2 Construction

Concentrated Solar Power Technology

Construction of a 500-MW solar trough project generally follows the sequence of site prep, grading, and road (180 days); installation of piers, solar field prep (180 days); assembly of solar collector elements (180 days); installation of the power block (180 days); and installation of buildings, evaporation ponds (180 days) (Solar Millennium 2008).

Planning, Construction Workforce Numbers, Vehicles, Equipment, Timeframes

Prior to mobilization for construction, a detailed construction plan would be developed to define the construction supervisory and technical field organizations and staffing levels required for the project. Approximately 2,100 people would be required during all phases of construction, although not all would be on site at any one time.

Site Clearing, Grading, Excavation, Temporary Fencing and Parking, and Stormwater Systems

Site work and solar field foundation preparation would include the following tasks:

- Earthwork, main entrance and construction personnel entrance roads, preparation of the solar collector assembly area, storage area, parking area and construction office area and installation of temporary and permanent site utilities.
- Construction of flood bypass channels.
- Installation of solar and piping drilled piers, sequenced with earthwork. Installation of underground piping and electrical systems would be sequenced consistent with orderly evacuation and placement of concrete foundations. Concrete foundations are required throughout the solar field, for the turbine pedestal, for the control and maintenance buildings and for the cooling tower basins (Solar Millennium 2008).

Solar Collector and Power Block Assembly and Construction

For construction of the solar collector element assembly an assembly line would be erected in the site fabrication and storage area. Assembly line fabrication consists of assembly of the solar collector element structural steel components and the mounting of the mirror panels. For field assembly the solar collector element assembly would be transported to the field by truck and trailer and lifted with a spreader bar and crane and set on end, middle, shared or drive pylons, and then aligned (if the wind speed is less than 12 kilometers/hour). The alignment takes approximately 2 to 3 hours. The heat collector element's (HCE's) are installed (three preassembled welded sections) in the field and the ends are welded to an adjacent solar collector element. Ball joint assembly and assembly of measuring equipment would follow (Solar Millennium 2008).

For solar field commissioning, the solar collector assembly (SCA) loops would be commissioned on an ongoing basis as they are completed during the installation of the solar collection field. Power block foundations would start shortly after the start of solar field drilled piers. The power blocks would be erected and commissioned in parallel with the solar collection field (Solar Millennium 2008).

Facilities Outside the Solar Field Boundary

Construction of the evaporation pond, storm water retention pond, HV intertie, warehouse and gatehouse would run concurrent with construction of the power plants and would be commissioned to support the startup of the plants (Solar Millennium 2008).

Cleanup and Reclamation

Temporary work areas would be cleaned up and reclaimed as necessary.

Transmission Line

During construction of the transmission line there would be temporary pulling and tensioning sites, material staging sites, and concrete batch plants. There would be no grading at the pole site work areas or the pull and splicing site; rather, vegetation would be crushed (Solar Millennium 2008).

Photovoltaic Technology

Construction of a 50-MW solar PV project generally follows the sequence of planning, surveying/staking/flagging the perimeter of the project area (5 days); constructing security fencing (5 days) and access roads (5 days); clearing, grading, excavating, and installing temporary fencing and parking and stormwater systems (25 days); assembling and installing project facilities (360 days), cleaning up, and reclaiming any temporary work areas (20 days). In addition, some facilities are constructed outside the solar field boundary, and transmission lines are installed.

Planning, Construction Workforce Numbers, Vehicles, Equipment, Timeframes,

Prior to mobilization for construction, a detailed construction plan would be developed to define the construction supervisory and technical field organizations and staffing levels required for any solar PV project. On average, 20 construction and supervisory personnel are required on site for approximately a 14-month period to construct one solar PV plant, with 40 personnel being required at the peak of construction. Approximately 400 personnel would be required during all phases of construction although not all would be on site at any one time.

Surveying, Staking, and Flagging

Pre-construction survey work would consist of staking or flagging the site area boundaries, work areas (permanent and short term), cut and fill areas, access roads, transmission pole locations, and concrete pad and foundation areas.

Fencing and Access Roads

Initial construction activities would include installation of security fencing and construction of access roads and maintenance tracks.

Site Clearing, Grading, Excavation, Temporary Fencing and Parking, and Stormwater Systems

Site preparation consists of clearing, earthwork, and grading as required to construct the facility and achieve finished site grades. Grading is done to promote proper drainage and remove major scarring from previous drainage through the site. Cut and fill materials are typically in balance so that no material is either exported or imported to the site to achieve final grade. Rough site grading, excavation, and backfilling are performed using heavy-duty earth moving equipment.

Temporary fencing encloses material lay down and storage areas, and temporary parking areas are created to accommodate the construction workforce.

Typically, the solar panels would be mounted in a manner that follows the existing topography and, as a result, does not change the natural flow of water across the site. If necessary, hydraulic modeling would be completed during the design stage. Erosion control and storm drainage systems would be designed to promote sheet drainage, evenly distributing the flow of storm water across the site. A Site Grading and Erosion Control Plan would be developed and silt fences and fiber rolls would be used as necessary for drainage and to control erosion.

Solar Array/Power Plant Assembly and Construction

In a PV plant, electrical power is produced directly by solar PV arrays, each comprised of several PV panels; one leading brand of panel is approximately 40 by 55 inches. Two of these panels are placed in portrait orientation on a south-facing rack tilted at approximately 20 to 25 degrees.

After a site is graded, underground conduit, overhead transmission lines, an inverter, and transformer pads are installed. Next, the PV panel supports and frames are installed. The support members are typically driven steel piles consisting of H beams or round pipe that are driven to a depth of 3 to 5 feet, depending on soil conditions. If the soil is exceptionally loose, corrosive, or too rocky to drive the supports, different support designs that could include augured holes with concrete fill could be required. The frame tables are then mounted to the support members. These tables consist of bolted or riveted steel members that are either built at the assembly point or fabricated in a factory and shipped preassembled to the construction site. The frame tables are aligned and fastened to the support members.

The PV panels are then set onto and secured to the frame tables. Three 135-watt (W), direct current (DC) photovoltaic panels are wired in series to a form a 1,000-volt (V) DC level string. Ten strings are then bound together in a wiring harness. Six groups of wiring harnesses are routed together into a row of panels. A single combiner box combines the electrical output of 180 panels. The output of 25 combiner boxes (4,500 PV panels) is collected at a 500-kilovolt (kV) inverter. Four 500-kV inverters and a 2-MW step-up transformer are co-located on a single concrete pad. The 480-V alternating current (AC) output of four 500-kV inverters is combined and stepped up to 33 kV in a single 2-MW transformer. Each 2-MW transformer handles the output of 18,000 PV panels. The 50-MW build out would use 180,000 PV panels.

A switchyard typically consists of a 10-foot x 12-foot concrete pad that accommodates the utility metering, the switchgear, and a protection breaker. Since the power is stepped up to utility line voltage at the solar field collector system, the switchyard does not require additional step-up transformers. From the step up transformers, the 33-kV collector system comprised of underground or overhead lines collects the output of the solar field and delivers it to the onsite switchyard, where it is metered and delivered to the 33-kV distribution system.

Cleanup and Reclamation

Temporary work areas would be cleaned up and reclaimed as necessary.

Facilities Outside the Solar Field Boundary

Construction of an electrical switchyard, communications, and a control/maintenance building would run concurrent with construction of the solar field. Even though some facilities are outside the solar field boundary, if they are located on public lands they would be authorized as part of the project ROW or authorized to the facility owner. Facilities such as power lines and switch/sub-stations are often within or near the solar field but not owned by the solar developer.

Transmission Line

A 33-kV collector system would aggregate power produced in the solar field and deliver it to an electrical switchyard. Since the electrical collector system operates at the same voltage at the transmission line, only a small switchyard meeting interconnection control and metering requirements is typically required. This equipment is located on a concrete pad approximately 10 by 12 feet.

3.3 Surface Disturbance

Concentrated Solar Power Technology

A typical ratio of land required for development of a solar trough project (solar arrays and ancillary facilities) is about 5 acres for every MW. Thus, a 500-MW solar CSP project would require approximately 2,500 acres of land. In an average solar trough energy project, approximately 90 percent of the project area is occupied by the parabolic trough solar field, and 10 percent is occupied by ancillary facilities, such as operation and maintenance (O & M) buildings, substations, access roads, and parking/laydown areas (Solar Millennium 2008). Each 500-MW solar trough development would need one or more 20-foot-wide interior access road, the placement of which would be determined by the solar field configuration.

Using this land use scenario as a model for the West Chocolate REEA, solar arrays for the development of one, 500-MW solar trough project would occupy approximately 2,000 acres, and development of related facilities would occupy 500 acres (Table 2).

Table 2 Surface Disturbance for One 500-Megawatt CSP Project

Description	Unit Surface Disturbance (acres unless otherwise noted)	Number	Total Surface Disturbance (acres)
Solar troughs	2,000	1	2,000
Access roads within site area	70	1	7
Substation switchyard	0.03	1	0.03
O & M building	0.06	1	0.06
Parking laydown area	50	1	50
230-kV transmission line	5 acres/mile	40	200
33-kV collector line	5 acres/mile	20	100

Table 2 Surface Disturbance for One 500-Megawatt CSP Project

Description	Unit Surface Disturbance (acres unless otherwise noted)	Number	Total Surface Disturbance (acres)
Fencing and other discretionary facilities	125	1	125
Total			**2,482.09**

Source: Solar Millennium 2008.

Photovoltaic Technology

A typical ratio of land required for development of a solar PV project (solar arrays and ancillary facilities) is about 9 acres for every MW. Thus, a 50-MW solar PV project would require approximately 450 acres of land. In an average solar PV energy project, approximately 90 percent of the project area is occupied by PV arrays, and 10 percent is occupied by ancillary facilities, such as operation and maintenance (O&M) buildings, substations, access roads, and parking/laydown areas (Chevron Energy Solutions 2009). Each 50-MW PV development would need one or more 20-foot-wide interior access road, the placement of which would be determined by the PV array configuration.

Using this land use scenario as a model for the West Chocolate REEA, solar arrays for the development of one 50-MW PV project would occupy approximately 400 acres, and development of related facilities would occupy 50 acres (Table 3).

Table 3 Surface Disturbance for One 50-Megawatt PV Project

Description	Unit Surface Disturbance (acres unless otherwise noted)	Number	Total Surface Disturbance (acres)
PV arrays	400	1	400
Access roads within site area	7	1	7
Substation switchyard	0.003	1	0.003
O & M building	0.006	1	0.006
Parking laydown area	0.5	1	0.5
230-kV transmission line	5 acres/mile	4	20
33-kV collector line	5 acres/mile	2	10
Fencing and other discretionary facilities	12.5	1	12.5
Total	500	1	**450**

Source: Chevron Energy Solutions 2009.

3.4 Total Amount of Solar Development

The solar energy RFD scenario generally identifies surface disturbance that either PV or CSP technology would cause if all land within the West Chocolate REEA is developed for solar energy, consistent with the Solar PEIS assumptions. It also generally describes the construction, maintenance and operations activities for both technologies.

While the West Chocolate REEA has significant solar energy potential, several factors would probably limit its full exploitation Therefore, in order to more accurately describe likely (i.e., reasonably foreseeable) development and associated impacts, this RFD scenario has been written to reflect real world activities. Because solar power in the West Chocolate REEA could be developed in a virtually unlimited number of ways, assumptions need to be made to allow for analysis.

Either CSP or PV technologies may be proposed, so the land requirements and construction and operational activities of each must be accurately described.

Proposals may be located only on BLM land, or may include participation of adjacent, non-BLM land to create larger or more logically arranged projects. If a project is proposed on both non-public and public lands, the project would be considered as being under a federal nexus and an environmental review including the private lands may be required.

Typical projects proposed in the region have historically been less that 50 MW in size (note: this is probably true for CSP projects on federal land because developers routinely stay below 50 MW to avoid California Energy Commission (CEC) involvement. While PV projects on federal land do not have a similar CEC nexus, these projects have tended to also be less than 50 MW in size.

Transmission would constrain future energy development, including solar, geothermal and wind. Large projects that have not entered the California Independent System Operator (CAISO) queue may not be built until new transmission capacity is built. Smaller projects may be able to fit within existing capacity. The Environmental Impact Statement (EIS) must include a thorough discussion of existing and currently planned transmission capacity to estimate when new or upgraded transmission would be needed to off-take additional power from the West Chocolate REEA.

Development would be constrained by buffers around sensitive resources, including hydrologic features, which have been incorporated into the existing RFD scenario.

Development would be constrained by slope. The RFD scenario currently includes lands that have slopes of 5 percent or less for PV and 1 percent for CSP.

The number and size of CSP projects may be limited by higher operational water requirements than PV.

CSP power tower technology may not be used in some locations due to airspace conflicts.

This RFD scenario identifies the maximum amount of land that could be developed for solar energy (CSP and/or PV) within the West Chocolate REEA. It does not take into account market factors and resource specific constraints (see above) that would likely result in a much smaller footprint in actual development. For the purpose of impact assessment across each alternative, the following assumptions would be used. Actual development may vary depending on future conditions.

The RFD scenario identifies a range of total disturbance of 13,473 acres to about 49,864 acres for PV energy. There would be approximately 13,480 acres within the West Chocolate REEA of surface disturbance for CSP technology. This includes use of adjacent, non-BLM lands for project development; BLM land usage would be considerably smaller. Using 9 acres per MW (PV) or 5 acres per MW (CSP), there could be as much as 5,540 MW (PV) or up to 2,696 MW (CSP) energy produced within the West Chocolate planning area, assuming full build out solely for solar energy. This would result in between 30 to 111 PV projects of 50 MW each and three to five, 500-MW CSP projects could be constructed. Thus, under the RFD scenario there could be a minimum of three, 500-MW projects to a maximum of 111, 50-MW PV projects or a combination thereof.

4. Operation and Maintenance Needs

4.1 Concentrated Solar Power Technology

Management and supervision of the plant would be centered within the solar field maintenance organization. Skilled personnel would be assigned to conduct expedient maintenance and mirror washing. The primary responsibility of “field operators” is to monitor, in considerable detail, the condition and repair needs of the solar fields. The O&M workforce is comprised of approximately 90 people. Equipment includes water trucks for cleaning mirrors and standard pickup trucks (Solar Millennium 2008).

4.2 Photovoltaic Technology

The operation and maintenance of a PV power plant is primarily automated. Scheduled and unscheduled maintenance activities require some staffing throughout the life of the power plant. The main operations and maintenance needs are panel washing and inverter inspection, as well as vegetation control and routine inspection of switchgear. Plants typically have a staff of only five full time staff during regular operations, including a security officer during non-business hours. The power components of PV solar power plants are turned on in the morning and off at night automatically.

Maintenance equipment includes all-terrain vehicles capable of going inside the array for physical inspection and parts replacement. PV solar power plants are well known for being almost maintenance-free, but there are some large maintenance tasks, such as panel washing, that require the presence of full-time personnel for the duration of the task. Outside contractors, in addition to the full time staff, are often used to conduct these activities. Panels are typically washed on a quarterly to semi-annual basis, depending on the long-term needs of the project owners. Inverter maintenance consists of inspection of intake air ducts, cooling fans, and refrigeration units and is conducted approximately monthly. Inspection of seals, connections, and

enclosure are conducted yearly. Scheduled maintenance may involve the manufacturer of equipment such as the inverter.

Scheduled Maintenance

The following activities are conducted regularly:

- Solar panel cleaning (quarterly)
- Array visual and infrared inspection
- Vegetation mowing (as needed)
- Inverter maintenance
  - Inspection of intake air ducts, cooling fans, and refrigeration units (monthly)
  - Inspection of seals, electrical connections (torque setting), and transformer and/or inductor enclosure (yearly)
- Switchyard maintenance

Unscheduled Maintenance

Exposure to the elements and equipment failures require the following maintenance activities:

- Solar panel replacement
- Troubleshooting, repair, and eventual replacement for:
  - Inverters
  - Switchyard equipment
  - Digital Control Systems

4.3 Hazardous Materials

Construction (CSP and PV)

During construction, any necessary storage of diesel fuel, gasoline, motor oil, hydraulic fluid, and coolant are kept on site in above-ground tanks in a location with secondary containment and spill prevention countermeasures in place. These tanks are removed upon completion of construction and no permanent storage of these petroleum products occurs after construction is completed. A spill prevention control and countermeasure (SPCC) plan would be prepared, in accordance with all applicable BLM and California regulations.

Operation

Concentrated Solar Power Technology

- Typical chemicals on-site include the following:
- Diphenyl/biphenyl oxide
- Caustic (Sodium hydroxide)
- Acid (Sulfuric acid)

- Algaecide (Slimicide C-31) or chlorine equivalent
- Oxygen Scavenger (Powerline 1405)
- Liquid Propane Gas
- Lubricating Oil

Oil-Filled Transformers

Secondary containment structures would be provided around any oil-filled transformers located outdoors, STG lube oil tanks, HTF overflow and expansion vessels and any other oil containing tanks over 55 gallons without double walls or vendor supplied secondary containment. The containment would be sized to contain 125 percent of the fluid in the transformer or vessels with appropriate freeboard required per code. Additional equipment (such as HTF pumps, feedwater pumps, etc.) would be provided with 6 inch tall curbs as appropriate. Containment designs would be based on manual cleanup, with a portable sump pump (Solar Millennium 2008).

Heat Transfer Fluid

HTF, diphenyl/ biphenyl oxide (trade name Therminol or Dowtherm), requires periodic make-up due to the minor fluid degradation that occurs during the cyclic operation as well as due to the effects of vaporization (losses from pump seals, valve packings, and other mechanical joints), and unplanned spillage. The HTF make-up quantity projected is based on annualized losses of 2percent by volume (Solar Millennium 2008).

Heat Transfer Fluid Spill Remediation

The HTF fluid for the solar fields would be diphenyl/biphenyl oxide. Dowtherm A and Solutia VP-1 are commercial products that have been used in trough plants to date, and one of these products would be used in this project. The diphenyl/biphenyl oxide mixture (CAS numbers 101848 and 92524, respectively) is not classified as a hazardous material by the U.S. Dept. of Transportation, nor is it listed under U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations. However, this material, when discarded, may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. Occasional small spills of HTF do occur, primarily due to equipment failures (Solar Millennium 2008).

Photovoltaic Technology

Solar PV projects do not typically generate, store, use, or release any toxic substances regulated under the federal Toxic Substances Control Act (TSCA) or similar state or local laws and regulations. No hazardous chemicals or extremely hazardous substances as defined by the Emergency Planning and Community Right to Know Act (EPCRA) are typically present at the project sites in excess of the quantities for which reporting is required under Section 312 of EPCRA. Stockpiles of petroleum products, coolants, antifreeze, diesel fuel, gasoline, cleaning solvents, and used petroleum products are housed and stored at the O&M facilities. Maintenance personnel are typically trained in the procedures of spill prevention and countermeasures, and keep spill kits on their service vehicles for immediate use in the event of a spill.

Solar panel towers provide secondary containment, in the event a leak occurs, no petroleum products escape the solar panel housing and tower. The transformer foundations are placed on grade and designed to provide containment of 125 percent of the volume of cooling oil in the transformer in case of a leak. No petroleum products containing polychlorinated biphenyls (PCBs) are used.

5. Decommissioning (CSP and PV)

The expected project life is 30 years. Given the unique and extreme levels of solar radiation at this site, it is highly plausible that new and improved solar power generating technology would be deployed at the site to continue clean and renewable power generation. However, should the site be removed from power generation service, the site would be made suitable for reclamation. All equipment, buildings, concrete foundations, and driven piles would be removed from the site. Consistent with BLM requirements, a detailed decommissioning plan would be developed in a manner that both protects public health and safety and is environmentally acceptable.

6. Potential Impacts

6.1 Noise

Significant increases in local noise levels could occur during the construction phase of solar projects due to truck traffic and noise resulting from the construction of the solar panels and ancillary structures. However, this increase in noise is short term, concluding at the end of construction. The operation phase does not produce significant noise impacts.

6.2 Air Quality

Diesel engine exhaust, dust from trucks, and dust generated during construction grading are the primary impacts to air quality from the construction of solar energy projects. Exhaust emissions can be controlled by approved emission control devices on each vehicle, and dust emissions can be mitigated by periodic watering of roads. Dust during grading can be minimized by watering the surface prior to grading. Commercially available bonding agents can be applied after grading is complete to prevent dust during periods of high winds.

6.3 Visual

Solar panels are typically sited using terrain to obstruct visual impacts to the extent possible.

6.4 Soils/Hydrology

Solar projects introduce a larger percentage of impermeable surfaces (e.g., solar panels) to project areas than do other renewable energy projects. Increased surface runoff results; however, with a drainage plan that meets all federal CWA standards, these impacts can be mitigated to a less than significant level.

6.5 Water Supply

In all thermal power plants (regardless of the energy source), heat is used to boil water into steam, which runs a steam turbine to generate electricity. The exhaust steam from the generator must be cooled prior to being heated again and turned back into steam. This cooling can be done with water (wet cooling) or air (dry cooling), or a combination of both (hybrid cooling). Water cooling is the most efficient. PV, concentrating PV, and dish-engine solar plants are not thermal cycle plants and therefore do not require water for cooling. CSP plants using parabolic trough, linear Fresnel, and power tower technologies must use one of the following forms of cooling:

Wet Cooling

Heat is dissipated from the power plant through evaporation, most often via a cooling tower. Wet cooling is the most common cooling method for power plants, as it is the most efficient and cheapest cooling method available. All CSP systems currently in operation use wet cooling.

Dry Cooling

Heat from the condenser is rejected using fans and ambient air. A significant temperature difference between the outside air and the exhaust steam is needed for an adequate heat exchange, limiting performance on hot summer days. Dry cooling systems have greater capital costs in comparison to wet cooling, but significantly reduce total water consumption.

Hybrid Cooling

The hybrid approach involves constructing both a wet and a dry cooling system. These systems can either operate in parallel or switch from dry cooling to wet cooling during the hottest hours of the day. Hybrid systems conserve less water than dry cooling but are more expensive than either alone (SEIA 2010).

6.6 Biological Resources

The West Chocolate REEA is within the southern extent of the habitat region for the federally listed desert tortoise. Mitigation measures approved by the U.S. Fish and Wildlife Service (USFWS) for desert tortoise would be required with any solar energy development in the area. Additionally, surveys for rare plants and other special status species such as the burrowing owl would be required prior to construction.

7. References

Aruvian's Research. 2010. Trends in the Global Solar Photovoltaics Industry. April 2010.

Black & Veatch. 2009. Renewable Energy Transmission Initiative (RETI) Phase 1B Final Report. January.

Bureau of Land Management (BLM) and California Energy Commission (CEC). 2010. Draft Project Description for the Ridgecrest Solar Power Project. February 28, 2010.

Chevron Energy Solutions. 2009. Lucerne Valley Solar Plant – File # CACA 49561 Plan of Development. Revision 4 submitted to United States Department of the Interior, Bureau of Land Management, Barstow Field Office, Barstow, California. June 23.

Department of Energy (DOE). 2009a. "Concentrating Solar Power." http://www1.eere.energy.gov/solar/csp_program.html (accessed August 17, 2010).

Hasan, Russell. 2007. "The Solar Silicon Shortage and Its Impact on Solar Power Stocks". http://www.solarhome.org/newsthesolarsiliconshortage.html (accessed September 3, 2010).

National Joint Apprentice and Training Committee for the Electrical Industry (NJATC). 2007. Photovoltaic Systems. American Technical Publishers, Inc. Homewood, Illinois.

National Renewable Energy Laboratory (NREL). 2003. Assessment of Parabolic Trough and Power Tower Solar Technology Cost and Performance Forecasts. Subcontractor Report from Sargent & Lundy LLC Consulting Group, Chicago, IL

_____. 2010a. Concentrating Solar Power Prospects of West Chocolate Mountain Map. September.

_____. 2010b. Photovoltaic Power Prospects 5 Percent Slope or Less Prospects of West Chocolate Mountain Map. September.

_____. 2010c. Photovoltaic Power Prospects 3 Percent Slope or Less Prospects of West Chocolate Mountain Map. September.

_____. 2010d. Photovoltaic Power Prospects 1 Percent Slope or Less Prospects of West Chocolate Mountain Map. September.

Solar Millennium, LLC. 2008. Updated Plan of Development, Amargosa – Farm Road Solar Project. BLM Land Use Application, File #NVN-84359. Revised Submission November 26, 2008.

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Appendix C

Wind
Reasonably Foreseeable Development Scenario

WIND
REASONABLY FORESEEABLE DEVELOPMENT SCENARIO
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WIND
REASONABLY FORESEEABLE DEVELOPMENT SCENARIO
WEST CHOCOLATE MOUNTAINS

1. Introduction

This Reasonably Foreseeable Development (RFD) scenario has been prepared as a basis for analyzing environmental impacts resulting from future leasing and development of federal lands for wind energy projects within the West Chocolate Mountains Renewable Energy Evaluation Area (West Chocolate REEA, or the REEA). As the term "Reasonably Foreseeable Development" implies, the RFD scenario is a tool the Bureau of Land Management (BLM) can use to analyze the types of impacts that could be expected under an alternative being analyzed. A RFD is not a prediction of what would happen under a specific alternative.

The RFD scenario is intended to provide the information necessary to analyze potential cumulative impacts. The disturbance for production facility and associated infrastructure (e.g., road, pipelines, transmission lines, etc.) would be based on the facilities typical in surrounding area.

The foreseeable development described here could occur on any land within the West Chocolate REEA, regardless of surface ownership. This RFD scenario assumes that one 45-megawatt (MW) wind energy power plant would be developed. The anticipated surface disturbance for the area is summarized below (Table 1).

Table 1 Surface Disturbance for One 45-Megawatt Wind Energy Project in the West Chocolate REEA

	BLM Disturbance (acres)	Total Disturbance[1] (acres)
Initial	27	76
Final	14	40

Note:
[1] BLM and non-BLM land.

2. Available Data and Assumptions

Based on the available data and assumptions, wind energy development could occur on any land within the REEA, regardless of surface ownership. Of the 59,095 acres 57,295 acres are available for wind energy development on both private and BLM land (land withdrawn by the UBSR not included). Of this, 42 sections contain roughly 20,762 acres of surface land administered by the BLM (land withdrawn by the U.S. Bureau of Reclamation [USBR] not included), with the remainder being state or private land. To estimate the amount of anticipated development for the entire 57,295 acres which would potentially occur on BLM land, a simple ratio was developed to estimate the percentage of development that could occur on BLM-managed land. This ratio is

based on the percentage of land within the REEA that is managed by the BLM for geothermal leasing (36 percent [20,762 acres BLM/57,295 acres total]).

There are no direct data on which to base this RFD scenario. The amount of energy produced from wind energy development in the West Chocolate REEA would depend on the acreage devoted to such development and the MW output per wind turbine based on the model implemented. As part of the BLM study Final Programmatic Environmental Impact Statement (PEIS) on Wind Energy Development on BLM-Administered Lands in the Western United States (2005), the BLM and the U.S. Department of Energy (DOE) National Renewable Energy Laboratory (NREL) established a partnership to conduct assessments of wind energy on BLM-administered lands in the western United States. An initial assessment of renewable energy potential on BLM-administered lands was published in 2003. This assessment looked at an array of renewable resources, including wind. To determine where potential development might occur on the basis of land status and wind energy resources, NREL constructed a maximum potential development scenario (MPDS) using the same methodology used for the 2003 renewable energy assessment but using a different model, the Wind Deployment System (WinDS), to project the amount of wind power that might be generated over the next 20 years. Wind resource data, GIS data, and general screening criteria were used to identify the spatial distribution of the maximum possible extent of future wind energy development activities that might occur on BLM-administered lands. Maps depicting BLM-administered lands with low, medium, and high potential for wind energy development were constructed for each of the BLM Field Offices in the 11-state study area, including the El Centro Field Office. These maps were used to assess: (1) the distribution of BLM-administered lands on which wind energy development activities might be conducted; and (2) the total number of acres that might be impacted (BLM 2005).

Wind resources were assigned to seven different power classes on the basis of their resource potential, determined by a combination of wind power density and wind speed. Class 1 (Poor) had the lowest resource potential, and Class 7 (Superb) had the highest. The assembled wind resource data and GIS data, including major cities and towns, transmission lines, and major roads, were compiled and screened to construct the MPDS. The screening criteria were used to eliminate lands from the MPDS that were excluded from wind energy development by virtue of their status, classification, or some other administrative determination (BLM 2005).

Lands were then categorized into areas having a low, medium, or high potential for wind energy development over the next 20 years on the basis of their wind power classification (Table 2).

Table 2 Wind Power Classification*

Classification	Wind Potential	Economically Viable
1	Poor	No
2	Marginal	No
3	Fair	Yes in some instances. Will be fully viable upon development of low wind-speed turbines.
4	Good	Yes
5	Excellent	Yes

Table 2 Wind Power Classification*

Classification	Wind Potential	Economically Viable
6	Outstanding	Yes
7	Superb	Yes

*As wind technology develops areas that were determined to be poor or marginal may be upgraded and become an economically viable area for development.
Sources: BLM 2005, NREL 2007

The wind power estimates produced as part of the BLM's Wind Energy PEIS and based on NREL's wind power resource data (see Figure 1) show the West Chocolate REEA to have a wind potential of "Poor". These data were produced using the Mesomap system (a wind resource model) and historical weather data, and validated with available surface data by NREL and wind energy meteorological consultants (NREL 2007).

The 2009 Black & Veatch document "The Renewable Energy Transmission Initiative Phase 1B Final Report" (RETI report) identifies competitive renewable energy zones (CREZs) throughout western North America to help meet renewable energy production goals set by regions or states. The RETI report identifies the West Chocolate REEA of Imperial County as having no wind potential. The area in Imperial County closest to having viable wind energy potential is Imperial South, which has 45 MW of potential wind energy.

It is assumed that one 45-MW wind energy project would be developed. All projects on BLM-managed land are permitted by BLM using standard review methods that ensure protection of public safety and the natural environment, and are evaluated as part of the Federal Land Policy and Management Act (FLPMA) right-of-way (ROW) application and National Environmental Policy Act (NEPA) processes.

3. Activities Involved in Wind Energy Development

3.1 Exploration

As common practice, it is anticipated that meteorological (MET) towers would need to be constructed by wind energy developers on BLM-managed lands to gather meteorological and climatological data, thus determining the feasibility of wind energy development in the West Chocolate REEA.

Typically, one to three MET towers would be installed in a given area to measure the wind resource. These towers would likely be less than 200 feet in height, supported by three to four arrays of guy wires to keep them erect. The base of the MET tower is typically a concrete foundation or an anchor. MET towers are usually in place for three years recording data. The ground footprint of a MET tower would be very small—less than 1 acre for an entire site.

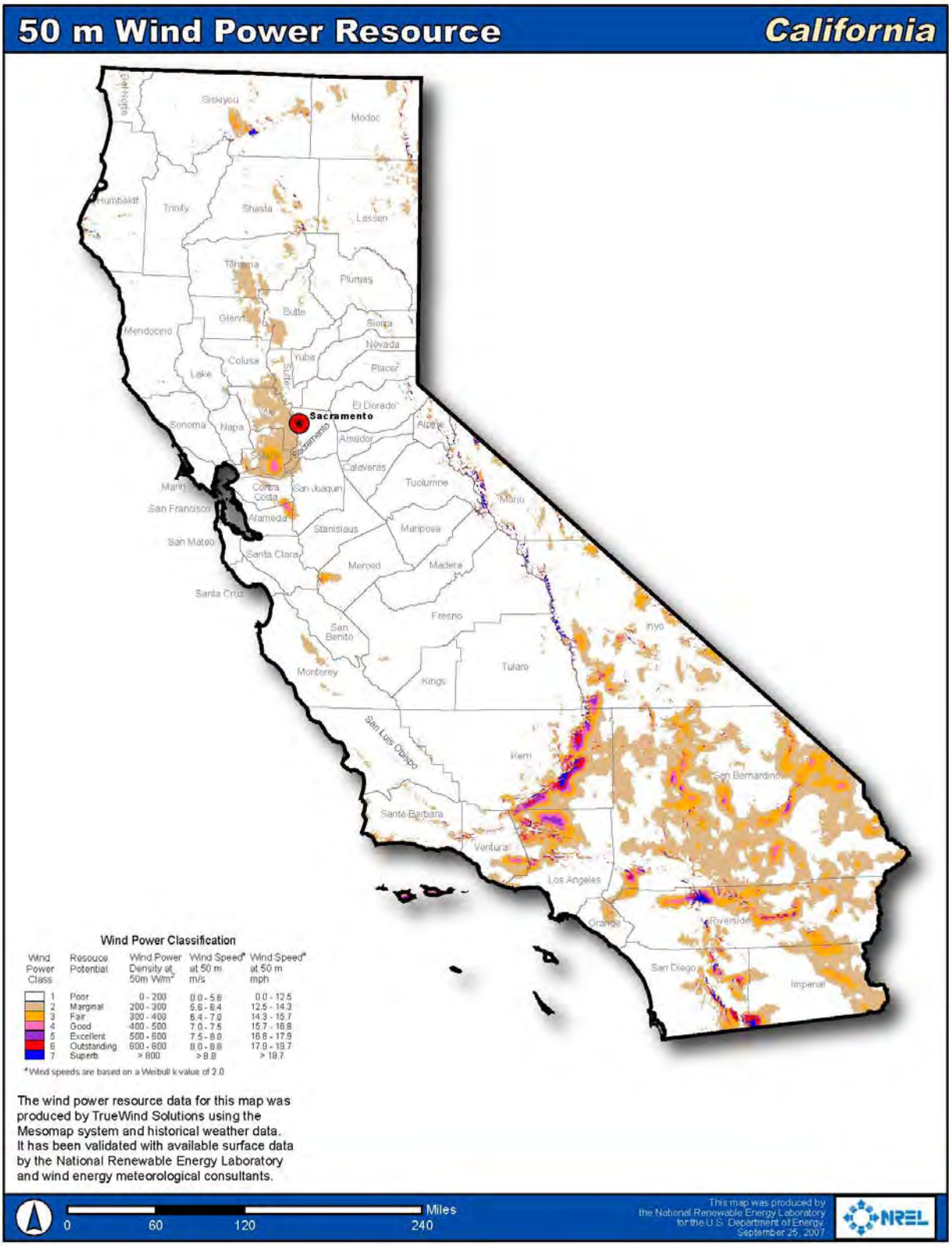

Figure 1. NREL Wind Resource Data for the West Chocolate REEA

3.2 Wind Farm Construction

Construction generally follows the sequence of planning; surveying and staking, construction of temporary use areas, and road building (30 days); foundation development and trenching for underground electrical lines (60 days); tower and turbine delivery and placement (120 days); electrical line installation (30 days); and cleanup and reclamation (30 days).

Planning Construction Workforce Numbers, Vehicles, Equipment, Timeframes

Prior to mobilization for construction, a detailed plan is usually developed to define the supervisory and technical field organizations and staffing levels required for any wind project. The number of persons on site during construction is expected to be approximately 50. Equipment anticipated during various stages of construction would include bulldozers, backhoe/loaders, tracked excavators, trenchers, concrete mixers, compactors, cable trucks and trailers, delivery trucks, tractor/trailers, boom trucks, tracked cranes, rubber tired cranes, water trucks, and other miscellaneous trucks and passenger vehicles.

Surveying, Staking, and Road Building

The first construction activities are typically surveying and staking, construction of temporary use areas, and building access roads to and throughout the site. The project perimeter would usually not be fenced; however, to minimize vandalism and theft, locked tower access doors would be installed on the turbines. Chain link fencing with concertina barbed wire may be installed at electrical substations and maintenance yards for security.

Site Plan

The layout would typically consist of roughly parallel rows of laterally spaced wind turbines, each with an adjacent pad-mounted transformer. Each row of wind turbines would be accessed by a network of new gravel roads whose alignments were chosen to minimize site grading and disturbance, while also avoiding very steep grades so that construction and operation of the site can be feasible. The alignment of the roads and turbines would follow the alignment of the topography on the site. The spacing of the wind turbines would vary somewhat from turbine to turbine, but always meet minimum spacing requirements of the turbine manufacturer so that harmful turbulence effects caused by adjacent wind turbines are minimized. This varying spacing and alignment somewhat would provide some relief from the rigid, regular spacing found at many wind projects.

Construction Temporary Use Areas Needed

During construction, staging and temporary storage of construction equipment, cable, foundation parts, components, towers, blades and nacelles would occur on small areas around the site. Construction trailers would be used at the maintenance yard during construction for contractor's management and temporary storage of parts and equipment. The maintenance yard would be fenced for security and safety purposes. The construction staging areas would be compacted and a soil stabilizer applied to prevent soil erosion and control dust. At areas outside the staging areas the ground surface and any vegetation would be protected by wooden frames, pallets or straw bales, which would be placed on the ground while the turbine components are unloaded, pre-assembled or inspected. Components, tower sections, nacelles and blades, would be delivered to

the points of installation and would be placed on wooden frames, pallets or straw bales while they are awaiting installation.

In this RFD scenario, there would be approximately six miles of new roads. On private land approximately 4.5 miles of new gravel roads will be constructed, and 1.5 miles of new gravel roads will be constructed on BLM land. Typical proposed roads would be approximately 16 feet in width plus ten feet cleared shoulders on both sides, unless topography does not permit this width. The roads would consist of 4 inches to 6 inches of gravel over compacted native material. The majority of roads would be constructed at-grade, except where roads must be elevated or lowered to provide access to turbine sites or where steeper cut slopes must be used to minimize depths of cut to blend the road into the surroundings. Crossings at low spots would be at-grade, with no culverts or extensive fill except at a few limited locations. Upon completion of construction, the on-site roads would be smoothed where low spots and ruts have occurred, and 4 inches to 6 inches of gravel would be applied. This design would facilitate movement of wildlife around the site by minimizing barriers caused by abrupt changes in grade.

Locked tower access doors would be installed on the turbines to discourage theft and vandalism, and to minimize vehicular risk to biological resources. No restriction of existing BLM Open Roads or power line access roads would occur from development of access roads.

Foundation Development and Trenching for Underground Electrical Lines

Foundation development and trenching of underground electrical lines would typically follow in an overlapping schedule. Excavation of the foundations would be completed by large tracked excavators, to a depth of approximately 10 to 25 feet, depending on foundation design and soil conditions at the turbines. Steel reinforced concrete foundations with long bolts to hold the tower would be formed and poured at each turbine site. Conduits for the electrical lines would be installed prior to pouring concrete. For the transformers, a pad mount would be installed at each turbine site. The pad also provides storage in case of a transformer leak. Blasting would not be typically required.

Tower and Turbine Delivery and Placement

Tower and turbine components would be delivered to the site by truck and trailer. The towers would be assembled and hoisted into place by cranes. The nacelle would then be placed on the tower, and the blades would be attached to the rotor hub and hoisted into place. Alternatively, the hub would be mounted on the turbine and the blades would be installed individually.

Electrical Line Installation

Electrical lines would be typically installed in trenches parallel to the roads. The electrical lines would be connected to the transformers and turbines, and a fiber optic communication system would be typically installed.

Cleanup and Reclamation

After construction, all the temporary construction and staging areas would be cleaned up and revegetated.

3.3 Spill Prevention and Hazardous Maintenance

During construction, above-ground tanks of diesel fuel, gasoline, motor oil, hydraulic fluid, and coolant would be kept on site in a location with secondary containment. The tanks would be removed and petroleum products would not be stored after construction is completed. A spill prevention control and countermeasure (SPCC) plan would be prepared and implemented in accordance with all applicable regulations.

4. Surface Disturbance

To support 45 MW of net wind generation, fifteen 3-MW wind turbine generators would need to be erected within an approximately 1,300-acre footprint. The wind turbines would have dimensions and characteristics as shown in Table 3. These specifications would be subject to modification by the turbine manufacturer.

Table 3 Wind Turbine Characteristics

Rated Output	2.3 to 3.0 MW
Tower Height (Hub)	262.5 feet
Rotor Diameter	328.1 to 331.4 feet
Total Height	426.6 to 428.5 feet
Number of Blades per Turbine	3
Tower Type	Steel monopole

Source: Daggett Ridge Wind Energy POD 2009.

The development would occur on approximately 390 acres on BLM-administered land (approximately 30 percent of the site's 1,300 acres). The project's permanent footprint on BLM land would be 40 acres (0.03percent of the total site area). Large areas of open, vacant desert exist between the individual turbines, rows of turbines, and the boundaries of the BLM parcels that could be developed for wind energy generation. Unobstructed open space is necessary for the free flow of wind, which results in efficient, safe, long-term operation of the wind turbine generators. Other uses would be compatible with the project on the site, provided those uses would not impede the flow of wind across the site, increase turbulence to the wind turbine rotors, or block access for maintenance of the wind turbines. Fiber optic line may be located within existing disturbed areas on existing rights-of-way; the disturbance footprint for these lines would be approximately 0.5 acre.

Total foreseeable surface disturbance for wind energy development is summarized below (Table 4).

Table 4 Surface Disturbance for Wind Energy Development

	BLM Property	Total Area[2]
Project Site Area	390 acres	1,300
Temporary Total Disturbance Area	10.8 acres	36
Permanent Total Project Footprint	12 acres	40
Total Disturbance Area (temporary plus permanent)	22.8 acres	76
Acreage of Access Roads	3.33 acres	9
Length of Project Roads & Access Roads	1.53 miles	4.5 miles

Source: Daggett Ridge Wind Energy POD 2009.
Notes:
[1] All numbers adjusted from the Daggett Ridge Wind Energy POD for a 50-MW project.
[2] BLM and Non BLM Land.

5. Operation and Maintenance

Routine operations and maintenance for a project this size are typically conducted by approximately four staff, using three 1½-ton pick-up trucks.

5.1 Road Maintenance

Roads would be inspected at least twice annually. Periodic blading or smoothing and application of gravel would be performed to maintain road quality. Maintenance of roads would be scheduled during times of low wind to minimize airborne dust. Vehicle speed limits of 20 mph on site would typically be posted and required of all operation and maintenance personnel to minimize airborne dust and erosion of roads and to minimize risk to desert tortoises that may be crossing roads.

5.2 Fire Protection and Site Security

All site facilities except wind turbine nacelles and blades are metal-contained, non-flammable structures. Habitable structures would not typically be built on site. Consequently, no fire protection equipment would be necessary except hand-held fire extinguishers, which are usually housed in the electrical substation utility building, maintenance yard (in a locked container), and on maintenance personnel trucks. Wind turbines, transformers, MET towers, and underground electrical facilities would be made with fire-resistant materials and are not expected to be damaged by brush fires or to increase the risk of fires in the area.

Individual wind turbines and transformers include heavy gauge steel locked doors equipped with anti-tamper locks and are very difficult to access without keys. Consequently, it would not be necessary to fence the perimeter of the site. Consequently, unauthorized trash dumping, vandalism and theft, and vehicle risk to desert tortoise would be minimized in those areas where project turbine roads are proposed. Other areas of the site would not be fenced or gated, and existing BLM Open Routes and existing power line access roads would remain open. Periodic site clean-up would be performed on an annual basis or more frequently. When routine daily maintenance is performed, the site would also be cleaned up by the maintenance personnel.

Fencing, except at substations and maintenance yards, would be designed to permit free movement of desert tortoise and other wildlife across the site. Approximately 100 to 300 feet of four-strand barbed wire fence would be placed adjacent to gated project entrances to discourage driving around gates. This type of fence is intended to allow movement of wildlife including desert tortoise. Fencing of the entire site would not be needed for site security.

6. Spill Prevention and Hazardous Materials on Site

6.1 Operation

Wind projects do not typically generate, store, use, or release any toxic substances regulated under the federal Toxic Substances Control Act (TSCA) or similar state or local laws and regulations. No hazardous chemicals or extremely hazardous substances as defined by the Emergency Planning and Community Right to Know Act (EPCRA) are present at wind projects in excess of the quantities for which reporting is required under Section 312 of EPCRA. All stockpiles of petroleum products, coolants, antifreeze, diesel fuel, gasoline, cleaning solvents, and used petroleum products would be housed and stored at the operation and maintenance facility.

Undetermined quantities of used hydraulic fluid, gear oil, and grease are typically generated annually from scheduled and unscheduled wind turbine maintenance. The used oil and grease would be collected on site and transported for recycling by a third-party contractor. The used oil would be expected to be non-hazardous and is not mixed with other substances prior to being picked up for recycling. Maintenance personnel would be trained in the procedures of spill prevention and countermeasures, and keep spill kits on their service vehicles for immediate use in case of a spill.

6.2 Secondary Containment of Oil

Wind turbine foundations and towers provide secondary containment so that if a leak occurs no petroleum products escape. Transformer foundations would be placed on grade and designed to provide containment of 125 percent of the volume of cooling oil in the transformer in the case of a leak. No petroleum products containing PCBs would be used.

7. Impacts

7.1 Noise

Possible significant increases in local noise levels could occur during the construction phase due to truck traffic to and from wind energy projects and noise resulting from the construction of the wind turbines and ancillary structures (e.g., operations and maintenance [O&M] buildings and substations). However, this increase in noise would be short term, concluding at the end of construction. The operation phase would not produce significant noise impacts.

7.2 Air Quality

Diesel engine exhaust and dust from trucks are the primary impacts to air quality from the construction of wind energy projects. Exhaust emissions can only be controlled by approved emission control devices on each vehicle, and dust emissions can be mitigated by periodic watering of roads.

7.3 Visual

Ideally, wind turbines would be sited using terrain to obstruct visual impacts to the extent possible. However, since wind turbines are tall, they are hard to conceal visually, especially in a topographically flat area. A BLM Visual Resource inventory would be performed in the West Chocolate REEA, and an interim Visual Resource Management (iVRM) class or classes would be assigned to the entire area. After iVRM class(es) are established, project-induced visual impacts would be assessed.

The project would include red lights approved by the Federal Aviation Administration (FAA) that would activate only from dusk until dawn. These lights would be synchronized to turn on and off in unison approximately once every three seconds, thereby substantially reducing the total number of times they turn on per minute and also minimizing the number of lights required. Only every third wind turbine would be lighted, and only one light would be installed per turbine. Using red lights and synchronizing the lights would greatly reduce the night sky impact of the lights. Security lights would be required at the substation; however, these lights would be hooded or directed downward to minimize stray light dispersion toward surrounding property. No other lights would be needed.

7.4 Biological Resources

Bird and bat species sustain the most significant impacts from wind energy projects, due primarily to interference with migration patterns. Special-status species of raptors, bats, and migratory birds tend to be particularly vulnerable to wind turbines, and mitigation measures (e.g., raptor ultraviolet reflectors, post construction mortality surveys) would be implemented as part of a Plan of Development (POD) at the request of the BLM. Additionally, special-status plant surveys would be necessary prior to clearing and grading activities to determine possible mitigation measures for impacts to those species.

7.5 Airspace

Wind turbines cause a particular hazard to military and civilian aeronautical activities. Consultation with the FAA would be necessary prior to construction to select a turbine layout that would mitigate potential impacts to all local aviation routes and activities.

The FAA would review the proposed project wind turbines prior to construction. Form 7460-1 would be prepared for the project and submitted to FAA to notify them that the proposed structures would exceed 200 feet in height. This action would result in a determination by FAA as to whether or not the project would constitute an obstruction or safety hazard to air navigation.

8. References

Black & Veatch. 2009. Renewable Energy Transmission Initiative (RETI) Phase 1B Final Report. January.

Bureau of Land Management (BLM). 2005. Wind Energy Final Programmatic Environmental Impact Statement (EIS), Appendix B: National Renewable Energy Laboratory Estimates Of Wind Energy Resources on BLM-Administered Lands. June.

National Renewable Energy Laboratory (NREL). 2007. 50m Wind Power Resource Map. September 25.

Plan of Development and Plan of Operation. 2009. Daggett Ridge Wind Energy Project. R/W GRANT CACA – 43088. Amended April 27.

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Appendix D

Air Emissions Summaries

GEOTHERMAL RFDS - EMISSION SUMMARIES

Year 1: Exploratory Drilling

	Annual Emissions (T/Yr)					GHG Emissions (MT/year)	
Type	PM-10	NOX	VOC	SO2	CO	CO2	CO2e
Well Drilling - Fugitive	0.02	---	---	---	---	---	---
Well Drilling - Combustion	0.47	17.55	2.97	2.77	24.30	1553	1553
Construction	31.76	52.39	4.22	3.48	11.34	1278	1278
On-road vehicles	5.08	0.09	0.01	0.00	0.10	19	19
Totals	**37.33**	**70.04**	**7.21**	**6.25**	**35.74**	**2850**	**2850**

Year 2: Full Diameter Drilling and First Power Plant (50MW)

	Annual Emissions (T/Yr)					GHG Emissions (MT/year)	
Type	PM-10	NOX	VOC	SO2	CO	CO2	CO2e
Well Drilling - Fugitive	0.03	---	---	---	---	---	---
Well Drilling - Combustion	0.63	23.40	3.96	3.69	32.40	2070	2070
Construction	113.41	226.28	18.24	15.05	48.97	931	931
On-road vehicles	15.30	1.12	0.15	0.00	0.95	210	211
Totals	**129.36**	**250.80**	**22.34**	**18.74**	**82.32**	**3212**	**3212**

Year 3: Full Diameter Drilling and Second Power Plant (50MW)

	Annual Emissions (T/Yr)					GHG Emissions (MT/year)	
Type	PM-10	NOX	VOC	SO2	CO	CO2	CO2e
Well Drilling - Fugitive	0.03	---	---	---	---	---	---
Well Drilling - Combustion	0.63	23.40	3.96	3.69	32.40	2070	2070
Construction	113.41	226.28	18.24	15.05	48.97	931	931
On-road vehicles	15.29	1.00	0.13	0.00	0.87	211	211
Totals	**129.36**	**250.68**	**22.33**	**18.74**	**82.24**	**3212**	**3212**

Year 4: Full Diameter Drilling and Third Power Plant (50MW)

	Annual Emissions (T/Yr)					GHG Emissions (MT/year)	
Type	PM-10	NOX	VOC	SO2	CO	CO2	CO2e
Well Drilling - Fugitive	0.03	---	---	---	---	---	---
Well Drilling - Combustion	0.63	23.40	3.96	3.69	32.40	2070	2070
Construction	113.41	226.28	18.24	15.05	48.97	931	931
On-road vehicles	15.29	0.89	0.12	0.00	0.80	211	211
Totals	**129.35**	**250.57**	**22.32**	**18.74**	**82.17**	**3212**	**3212**

Operational Emissions (On-road vehicles)

	Annual Emissions (T/Yr)					GHG Emissions (MT/year)	
Type	PM-10	NOX	VOC	SO2	CO	CO2	CO2e
On-road vehicles - Engine	0.003	0.021	0.024	0.000	0.219	36	36
On-road vehicles - Fugitive dust	4.271	---	---	---	---	---	---
Totals	**4.27**	**0.02**	**0.02**	**0.00**	**0.22**	**36**	**36**

Table 1: Fugitive Emissions From Drilling Exploratory Wells (Year 1)

Activity	No. of Wells	Emission Factor[1] PM-10 (lb/hole)	Total Emissions[2] PM-10 (Tons/Project)
Drilling Wells	30	1.3	**0.0195**

Notes:

1. Emission Factor from AP-42, Table 11.9-4 (5th Edition).
2. Total Emissions = No. of wells x Emission Factor/(2000 lb/Ton).

Table 2: Emissions from Drilling Rig Engines for Initial Wells (Year 1)

Average Power Rating (hp)	500	30	Number of Wells
Fuel Type	Diesel	12	Operating Hours per day/drill rig
Total Operating Hours (hr/yr)[1]	7,200	20	Drilling days per well
Load Factor	0.75		

	POLLUTANTS					GHG
	PM-10	NOX	SO2	CO	VOC	CO2
Emission Factor (lb/hp-hr)[2,3]	0.00035	0.013	0.00205	0.01800	0.0022	1.15000
Total Emissions (Tons/Project)[4]	**0.47**	**17.55**	**2.77**	**24.3**	**2.97**	**1552.50**

Notes:

1. Total operating hours of all drill rigs.
2. Emission Factors from "Emission Standards Reference Guide for Heavy-Duty and Nonroad Engines," EPA420-F-97-014, Sept 1997, Nonroad CI Engines.
3. Emission Factor for SO2 from AP-42, Table 3.3-1 (5th Edition).
4. Total emissions = Average Power Rating x Total Operating Hours x Load Factor x Emission Factor/(2000 lb/ton).

Construction Emissions: Vehicle Engine Exhaust From Grading and Material Hauling Activities (Year 1)

Input Parameters/Assumptions:

Total Building Area:	0	ft^2
Total Paved Area:	0.00	ft^2
Total Disturbed Area:	95.00	acres
Construction Duration:	0.50	years
Annual Construction Activity:	250	days/yr
Total Demolition:	0	ft^2

Area for Year 1: Exploratory Drilling Disturbance: 95 acres;

Table 3 Summary of Input Parameters

	ROG[1]	NO_x	SO_2	CO	PM_{10}
Total new acres disturbed:	95	95	95	95	95
Total new building space, ft^2:	0	0	0	0	0
Total years:	0.5	0.5	0.5	0.5	0.5
Area graded, acres:	95	95	95	95	95

Emission Factors For Equipment Engine Exhaust From Construction Activities

Activity	SMAQMD Emission Factor									
	ROG[1]		NO_x		SO_2 [2]		CO [2]		PM_{10}	
Grading Equipment[3]	2.91E-01	lbs/acre/day	2.75E+00	lbs/acre/day	0.18	lbs/acre/day	0.60	lbs/acre/day	2.32E-01	lbs/acre/day
Material Hauling[4]	4.20E-01	lbs/acre/day	6.07E+00	lbs/acre/day	0.40	lbs/acre/day	1.31	lbs/acre/day	4.30E-01	lbs/acre/day

Reference: *Air Quality Thresholds of Significance* , Sacramento Metropolitan Air Quality Management District (SMAQMD), 1994 and *Compilation of Air Pollutant Emission Factors* (USEPA AP-42).

1 ROG = VOC.

2 Factors for grading equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.

3 Grading Activities assumes the use of one tracked loader, one wheeled loader, and one motor grader for each 10 acres of disturbed area, used 8 hours per day.

4 Material Hauling Activities assumes the use of one loader and one haul truck for each 10 acres of disturbed area, used 8 hours per day.

Table 4 Total Daily Equipment Engine Exhaust Emissions From Construction Actitivies[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	27.7	261.7	17.4	56.6	22.0
Material Hauling	39.9	576.7	38.3	124.8	40.9
Total Emissions (lbs/day):	**67.6**	**838.3**	**55.7**	**181.4**	**62.9**

1 Total Emissions (lbs/day) = Emission Factor * Affected Acres

Table 5 Total Emissions from Construction Activities[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	1.73	16.35	1.09	3.54	1.38
Material Hauling	2.49	36.04	2.40	7.80	2.55
Fugitive Emissions (from page 2)					27.83
Total Emissions(tons/yr)	**4.22**	**52.39**	**3.48**	**11.34**	**31.76**

1 Total emissions (TPY) = Total emissions (lbs/day) * days of construction / 2000 lbs per ton

Construction Emissions: Fugitive Emissions From Construction Activities (Year 1)

Input Parameters / Assumptions			
Acres affected:	95.0	acres/yr	**Exp.Drilling: 95 acres**
Grading days/yr:	21	days/yr	
Exposed days/yr:	21	days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil percent silt, s:	15	%	
Soil percent moisture, M:	2	%	
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	5	ft	
Qty construction vehicles:	3	vehicles	
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)

Reference: *CEQA Air Quality Handbook* , SCAQMD, April 1993.

Equation Used To Calculate Operation Parameters

Operation Parameter	Emission Factor	Units	Equation
Grading duration per acre	1.8	hr/acre	Grading days * hours per day / acres affected
Bulldozer mileage per acre	1.7	VMT/acre	Miles traveled by bulldozer, based on dozer path width
Construction VMT per day	15	VMT/day	Number of vehicle * VMT per vehicle per day
Construction VMT per acre	3.3	VMT/acre	Construction VMT * days of construction / acres affected
			(Travel on unpaved surfaces within site)

Equations Used To Calculate Mass/Unit Emission Factors (Corrected for PM_{10})

Operation	Empirical Equation	Units	AP-42 Section (4th Edition)
Bulldozing	0.75(s^1.5)/(M^1.4)	lbs/hr	8.24, Overburden
Grading	(0.60)(0.051)S^2.0	lbs/VMT	8.24, Overburden
Vehicle Traffic	(3.72/(M^4.3))*.6	lbs/VMT	8.24, Overburden

Reference: *Compilation of Air Pollutant Emission Factors*, USEPA AP-42:
Section 8.24, Western Surface Coal Mining (4th Edition)

Emission Factors For Fugitive Emissions From Construction Activities[1]

Operation	Emission Factor (mass/ unit)		Operation Parameter		Emission Factor (lbs/acre)	
Bulldozing	16.51	lbs/hr	1.8	hr/acre	29.7	lbs/acre
Grading	0.77	lbs/VMT	1.7	VMT/acre	1.3	lbs/acre
Vehicle Traffic	0.11	lbs/VMT	3.30	VMT/acre	0.4	lbs/acre

1 Emission Factor (lbs/acre) = Emission Factor (lbs per hour or VMT) * Operation Parameter (hours of VMT per acre)

Table 6 Calculation of Annual Fugitive Emissions from Construction Activities

Source	Emission Factor		Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing[1]	29.7	lbs/acre	95.00	NA	2,822	1.41
Grading[1]	1.3	lbs/acre	95.00	NA	124	0.06
Vehicle Traffic[1]	0.4	lbs/acre	95.00	NA	38	0.02
Erosion of Graded Surface[2]	26.4	lbs/acre/day[3]	95.00	21	52,668	26.33
TOTAL					**55,651**	**27.83**

1 Total annual emissions (TPY) = Emission Factor (lbs/acre) * affected acres * 2000 lbs per ton
2 Total annual emissions (TPY) from erosion = Emission Factor (lbs/acre) * days of construction * 2000 lbs per ton
3. Reference: CEQA Air Quality Handbook, SCAQMD, April 1993.

Projected Annual Emissions During Construction from On-Road Vehicles (Year 1)

On-Road Vehicles Emission Factors

Scenario Year	Vehicle Type	EPA Category	Emission Factor (pounds/mile) CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
2012	Cars	LDGV	0.00765	0.00078	0.00080	0.00001	0.00009	0.00006	1.10153	0.00007
	Pickups	LDGT1	0.00765	0.00078	0.00080	0.00001	0.00009	0.00006	1.10153	0.00007
	Heavy Trucks	HDDV	0.01022	0.03092	0.00253	0.00004	0.00150	0.00129	4.21591	0.00012
	Trucks (3 axles)	LDDT	0.01546	0.01732	0.00224	0.00003	0.00065	0.00055	2.76628	0.00011

Source: SCAQMD 2010. Highest (Most Conservative) EMFAC2007 (version 2.3). Emission Factors for On-Road Vehicles and Heavy-Heavy-Duty Diesel Trucks

Key:

LDGV = Light-duty gasoline-fueled vehicles designated for transport of up to 12 people.

LDGT1 = Light-duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6,000 pounds or less.

LDDT = Light-duty diesel-powered trucks with a GVW of 8,500 pounds or less.

HDDV = Heavy-duty diesel-powered vehicles with a GVW exceeding 8,500 pounds.

Table 7-a Projected Criteria Air Pollutant Emissions From On-Road Vehicles

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)	Annual Emissions (lb/yr)[1] CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
	Cars	10.0	4.0	0.0	4.0	180.0	7,200.0	55.1	5.6	5.7	0.1	0.6	0.4	7,931.0	0.5
	Pickups/Light Trucks	10.0	4.0	0.0	4.0	180.0	7,200.0	55.1	5.6	5.7	0.1	0.6	0.4	7,931.0	0.5
	Trucks	5.0	4.0	0.0	4.0	180.0	3,600.0	36.8	111.3	9.1	0.1	5.4	4.7	15,177.3	0.4
Vehicle Trips/Day	Heavy Trucks	5.0	4.0	0.0	4.0	180.0	3,600.0	55.6	62.4	8.1	0.1	2.3	2.0	9,958.6	0.4
30	**Total**	**30.0**	-	-	-	-	-	**202.65**	**184.9**	**28.6**	**0.4**	**9.0**	**7.5**	**40,997.9**	**1.8**
							TOTAL TPY[2]	**0.1013**	**0.092**	**0.014**	**0.000**	**0.005**	**0.004**	**18.602**	**0.001**

Notes:

1. Annual Emissions (lb/yr) = Emission Factor x Annual Travel/(453.6 g/lb)
2. Total TPY = Annual Emissions/(2000 lb/t). CO2 and CH4 are expressed as metric tones per year = Annual Emisisons/(2204 lb/MT)

Table 7-b Road Fugitive Emissions

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)
	Cars	10.0	4.0	0.0	4.0	180.0	7,200.0
	Pickups/Light Trucks	10.0	4.0	0.0	4.0	180.0	7,200.0
	Trucks	5.0	4.0	0.0	4.0	180.0	3,600.0
Vehicle Trips/Day	Heavy Trucks	5.0	4.0	0.0	4.0	180.0	3,600.0
30	**Total**	**30.0**	-	-	-	-	-

Table 8: Fugitive Emissions From Drilling Secondary Wells (Year 2)

Activity	No. of Wells	Emission Factor[1] PM-10 (lb/hole)	Total Emissions[2] PM-10 (Tons/Project)
Full Diameter Wells	40	1.3	**0.0260**

Notes:

1. Emission Factor from AP-42, Table 11.9-4 (5th Edition).
2. Total Emissions = No. of wells x Emission Factor/(2000 lb/Ton).

Table 9: Emissions from Drilling Rig Engines for Secondary Wells (Year 2)

Average Power Rating (hp)	500	40	Number of Wells
Fuel Type	Diesel	12	Operating Hours per day/drill rig
Total Operating Hours (hr/yr)[1]	9,600	20	Drilling days per well
Load Factor	0.75		

	POLLUTANTS					GHG
	PM-10	NOX	SO2	CO	VOC	CO2
Emission Factor (lb/hp-hr)[2,3]	0.00035	0.013	0.00205	0.01800	0.0022	1.15000
Total Emissions (Tons/Project)[4]	**0.63**	**23.4**	**3.69**	**32.4**	**3.96**	**2070.0**

Notes:
1. Total operating hours of all drill rigs.
2. Emission Factors from "Emission Standards Reference Guide for Heavy-Duty and Nonroad Engines," EPA420-F-97-014, Sept 1997, Nonroad CI Engines.
3. Emission Factor for SO2 from AP-42, Table 3.3-1 (5th Edition).
4. Total emissions = Average Power Rating x Total Operating Hours x Load Factor x Emission Factor/(2000 lb/ton).

Construction Emissions: Vehicle Engine Exhaust From Grading and Material Hauling Activities (Year 2)

Input Parameters/Assumptions:

Total Building Area:	1,306,800	ft^2
Total Paved Area:	156,816	ft^2
Total Disturbed Area:	341.90	acres
Construction Duration:	0.60	years
Annual Construction Activity:	250	days/yr
Total Demolition:	0	ft^2

Area for Year 2: Wellfield (50-MW): 272 acres; Power Plant: 69.9

Table 10 Summary of Input Parameters

	ROG[1]	NO_x	SO_2	CO	PM_{10}
Total new acres disturbed:	341.9	341.9	341.9	341.9	341.9
Total new building space, ft^2:	1306800.0	1306800.0	1306800.0	1306800.0	1306800.0
Total years:	0.60	0.60	0.60	0.60	0.60
Area graded, acres:	341.9	341.9	341.9	341.9	341.9

Emission Factors For Vehicle Engine Exhaust From Construction Activities

Activity	SMAQMD Emission Factor									
	ROG[1]		NO_x		SO_2 [2]		CO [2]		PM_{10}	
Grading Equipment[3]	2.91E-01	lbs/acre/day	2.75E+00	lbs/acre/day	0.18	lbs/acre/day	0.60	lbs/acre/day	2.32E-01	lbs/acre/day
Material Hauling[4]	4.20E-01	lbs/acre/day	6.07E+00	lbs/acre/day	0.40	lbs/acre/day	1.31	lbs/acre/day	4.30E-01	lbs/acre/day

Reference: *Air Quality Thresholds of Significance* , Sacramento Metropolitan Air Quality Management District (SMAQMD), 1994 and *Compilation of Air Pollutant Emission Factors* (USEPA AP-42).

1 ROG = VOC.

2 Factors for grading equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.

3 Grading Activities assumes the use of one tracked loader, one wheeled loader, and one motor grader for each 10 acres of disturbed area, used 8 hours per day.

4 Material Hauling Activities assumes the use of one loader and one haul truck for each 10 acres of disturbed area, used 8 hours per day.

Table 11 Total Daily Vehicle Engine Exhaust Emissions From Construction Actitivies[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	99.6	941.7	62.6	203.8	79.3
Material Hauling	143.6	2075.3	138.0	449.2	147.0
Total Emissions (lbs/day):	**243.2**	**3017.1**	**200.6**	**653.0**	**226.3**

1 Total Emissions (lbs/day) = Emission Factor * Affected Acres

Table 12 Total Vehicle Engine Exhaust Emissions from Construction Activities[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	7.47	70.63	4.70	15.29	5.95
Material Hauling	10.77	155.65	10.35	33.69	11.03
Fugitive Emissions (from page 2)					96.43
Total Emissions(tons/yr)	**18.24**	**226.28**	**15.05**	**48.97**	**113.41**

1 Total emissions (TPY) = Total emissions (lbs/day) * days of construction / 2000 lbs per ton

Construction Emissions: Fugitive Emissions From Construction Activities (Year 2)

Input Parameters / Assumptions			Drilling and Power Plant (One 50-MW Project)
Acres affected:	341.9	acres/yr	**Full Drilling: 272; Plant: 69.9**
Grading days/yr:	21	days/yr	
Exposed days/yr:	21	days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil percent silt, s:	15	%	
Soil percent moisture, M:	2	%	
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	5	ft	
Qty construction vehicles:	3	vehicles	
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)

Reference: *CEQA Air Quality Handbook* , SCAQMD, April 1993.

Equation Used To Calculate Operation Parameters

Operation Parameter	Emission Factor	Units	Equation
Grading duration per acre	0.5	hr/acre	Grading days * hours per day / acres affected
Bulldozer mileage per acre	1.7	VMT/acre	Miles traveled by bulldozer, based on dozer path width
Construction VMT per day	15	VMT/day	Number of vehicle * VMT per vehicle per day
Construction VMT per acre	0.9	VMT/acre	Construction VMT * days of construction / acres affected
			(Travel on unpaved surfaces within site)

Equations Used To Calculate Mass/Unit Emission Factors (Corrected for PM_{10})

Operation	Empirical Equation	Units	AP-42 Section (4th Edition)
Bulldozing	0.75(s^1.5)/(M^1.4)	lbs/hr	8.24, Overburden
Grading	(0.60)(0.051)S^2.0	lbs/VMT	8.24, Overburden
Vehicle Traffic	(3.72/(M^4.3))*.6	lbs/VMT	8.24, Overburden

Reference: *Compilation of Air Pollutant Emission Factors,* USEPA AP-42:
Section 8.24, Western Surface Coal Mining (4th Edition)

Emission Factors For Fugitive Emissions From Construction Activities[1]

Operation	Emission Factor (mass/ unit)		Operation Parameter		Emission Factor (lbs/acre)	
Bulldozing	16.51	lbs/hr	0.5	hr/acre	8.3	lbs/acre
Grading	0.77	lbs/VMT	1.7	VMT/acre	1.3	lbs/acre
Vehicle Traffic	0.11	lbs/VMT	0.90	VMT/acre	0.1	lbs/acre

1 Emission Factor (lbs/acre) = Emission Factor (lbs per hour or VMT) * Operation Parameter (hours of VMT per acre)

Table 13 Calculation of Annual Fugitive Emissions from Construction Activities

Source	Emission Factor		Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing[1]	8.3	lbs/acre	341.90	NA	2,838	1.42
Grading[1]	1.3	lbs/acre	341.90	NA	444	0.22
Vehicle Traffic[1]	0.1	lbs/acre	341.90	NA	34	0.02
Erosion of Graded Surface[2]	26.4	lbs/acre/day[3]	341.90	21	189,549	94.77
TOTAL					**192,866**	**96.43**

1 Total annual emissions (TPY) = Emission Factor (lbs/acre) * affected acres * 2000 lbs per ton
2 Total annual emissions (TPY) from erosion = Emission Factor (lbs/acre) * days of construction * 2000 lbs per ton
3. Reference: CEQA Air Quality Handbook, SCAQMD, April 1993.

Projected Annual Emissions During Construction from On-Road Vehicles (Year 2)

On-Road Vehicle Emission Factors

Scenario Year	Vehicle Type	EPA Category	Emission Factor (pounds/mile) CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
2013	Cars	LDGV	0.00709	0.00071	0.00075	0.00001	0.00009	0.00006	1.10087	0.00007
	Pickups	LDGT1	0.00709	0.00071	0.00075	0.00001	0.00009	0.00006	1.10087	0.00007
	Heavy Trucks	HDDV	0.00932	0.02743	0.00226	0.00004	0.00134	0.00115	4.21519	0.00010
	Trucks (3 axles)	LDDT	0.01408	0.01577	0.00206	0.00003	0.00060	0.00050	2.78163	0.00010

Source: SCAQMD 2010. Highest (Most Conservative) EMFAC2007 (version 2.3). Emission Factors for On-Road Vehicles and Heavy-Heavy-Duty Diesel Trucks

Key:

LDGV = Light-duty gasoline-fueled vehicles designated for transport of up to 12 people.

LDGT1 = Light-duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6,000 pounds or less.

LDDT = Light-duty diesel-powered trucks with a GVW of 8,500 pounds or less.

HDDV = Heavy-duty diesel-powered vehicles with a GVW exceeding 8,500 pounds.

Table 14 Projected Criteria Air Pollutant Emissions From On-Road Vehicles

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)	Annual Emissions (lb/yr)[1] CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
	Cars	20.0	4.0	10.0	14.0	180.0	50,400.0	357.5	35.9	37.6	0.5	4.6	2.9	55,484.1	3.4
	Pickups/Light Trucks	20.0	4.0	10.0	14.0	180.0	50,400.0	357.5	35.9	37.6	0.5	4.6	2.9	55,484.1	3.4
	Trucks	20.0	4.0	10.0	14.0	180.0	50,400.0	469.6	1,382.4	114.1	2.1	67.4	57.8	212,445.4	5.3
Vehicle Trips/Day	Heavy Trucks	20.0	4.0	10.0	14.0	180.0	50,400.0	709.5	795.0	104.0	1.4	30.2	25.3	140,194.4	4.9
80	**Total**	**80.0**	-	-	-	-	-	**1894.04**	**2,249.1**	**293.2**	**4.5**	**106.7**	**88.9**	**463,607.9**	**16.9**
							TOTAL TPY[2]	**0.9470**	**1.125**	**0.147**	**0.002**	**0.053**	**0.044**	**210.348**	**0.008**

Notes:

1. Annual Emissions (lb/yr) = Emission Factor x Annual Travel/(453.6 g/lb)

2. Total TPY = Annual Emissions/(2000 lb/t). CO2 and CH4 are expressed as metric tones per year = Annual Emisisons/(2204 lb/MT)

Table 14-b Road Fugitive Emissions

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)
	Cars	20	4	10	14	180	50,400
	Pickups/Light Trucks	20	4	10	14	180	50,400
	Trucks	20	4	10	14	180	50,400
Vehicle Trips/Day	Heavy Trucks	20	4	10	14	180	50,400
80	**Total**	**80.0**	-	-	-	-	-

Table 15: Fugitive Emissions From Drilling Secondary Wells (Year 3)

Activity	No. of Wells	Emission Factor[1] PM-10 (lb/hole)	Total Emissions[2] PM-10 (Tons/Project)
Drilling Wells	40	1.3	**0.0260**

Notes:

1. Emission Factor from AP-42, Table 11.9-4 (5th Edition).
2. Total Emissions = No. of wells x Emission Factor/(2000 lb/Ton).

Table 16: Emissions from Drilling Rig Engines for Secondary Wells (Year 3)

Average Power Rating (hp)	500	40	Number of Wells
Fuel Type	Diesel	12	Operating Hours per day/drill rig
Total Operating Hours (hr/yr)[1]	9,600	20	Drilling days per well
Load Factor	0.75		

	POLLUTANTS					GHG
	PM-10	NOX	SO2	CO	VOC	CO2
Emission Factor (lb/hp-hr)[2,3]	0.00035	0.013	0.00205	0.01800	0.0022	1.15000
Total Emissions (Tons/Project)[4]	**0.63**	**23.4**	**3.69**	**32.4**	**3.96**	**2070.0**

Notes:
1. Total operating hours of all drill rigs.
2. Emission Factors from "Emission Standards Reference Guide for Heavy-Duty and Nonroad Engines," EPA420-F-97-014, Sept 1997, Nonroad CI Engines.
3. Emission Factor for SO2 from AP-42, Table 3.3-1 (5th Edition).
4. Total emissions = Average Power Rating x Total Operating Hours x Load Factor x Emission Factor/(2000 lb/ton).

Construction Emissions: Vehicle Engine Exhaust From Grading and Material Hauling Activities (Year 3)

Input Parameters/Assumptions:

Total Building Area:	1,306,800	ft^2
Total Paved Area:	156,816	ft^2
Total Disturbed Area:	341.90	acres
Construction Duration:	0.60	years
Annual Construction Activity:	250	days/yr
Total Demolition:	0	ft^2

Area for Year 3: Wellfield (50-MW): 272 acres; Power Plant: 69.9

Table 17 Summary of Input Parameters

	ROG[1]	NO_x	SO_2	CO	PM_{10}
Total new acres disturbed:	341.9	341.9	341.9	341.9	341.9
Total new building space, ft^2:	1306800.0	1306800.0	1306800.0	1306800.0	1306800.0
Total years:	0.60	0.60	0.60	0.60	0.60
Area graded, acres:	341.9	341.9	341.9	341.9	341.9

Emission Factors For Vehicle Engine Exhaust From Construction Activities

Activity	SMAQMD Emission Factor									
	ROG[1]		NO_x		SO_2 [2]		CO [2]		PM_{10}	
Grading Equipment[3]	2.91E-01	lbs/acre/day	2.75E+00	lbs/acre/day	0.18	lbs/acre/day	0.60	lbs/acre/day	2.32E-01	lbs/acre/day
Material Hauling[4]	4.20E-01	lbs/acre/day	6.07E+00	lbs/acre/day	0.40	lbs/acre/day	1.31	lbs/acre/day	4.30E-01	lbs/acre/day

Reference: *Air Quality Thresholds of Significance* , Sacramento Metropolitan Air Quality Management District (SMAQMD), 1994 and *Compilation of Air Pollutant Emission Factors* (USEPA AP-42).

1 ROG = VOC.

2 Factors for grading equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.

3 Grading Activities assumes the use of one tracked loader, one wheeled loader, and one motor grader for each 10 acres of disturbed area, used 8 hours per day.

4 Material Hauling Activities assumes the use of one loader and one haul truck for each 10 acres of disturbed area, used 8 hours per day.

Table 18 Total Daily Vehicle Engine Exhaust Emissions From Construction Actitivies[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	99.6	941.7	62.6	203.8	79.3
Material Hauling	143.6	2075.3	138.0	449.2	147.0
Total Emissions (lbs/day):	**243.2**	**3017.1**	**200.6**	**653.0**	**226.3**

1 Total Emissions (lbs/day) = Emission Factor * Affected Acres

Table 19 Total Vehicle Engine Exhaust Emissions from Construction Activities[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	7.47	70.63	4.70	15.29	5.95
Material Hauling	10.77	155.65	10.35	33.69	11.03
Fugitive Emissions (from page 2)					96.43
Total Emissions(tons/yr)	**18.24**	**226.28**	**15.05**	**48.97**	**113.41**

1 Total emissions (TPY) = Total emissions (lbs/day) * days of construction / 2000 lbs per ton

Construction Emissions: Fugitive Emissions From Construction Activities (Year 3)

Input Parameters / Assumptions			
Acres affected:	341.9	acres/yr	
Grading days/yr:	21	days/yr	
Exposed days/yr:	21	days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil percent silt, s:	15	%	
Soil percent moisture, M:	2	%	
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	5	ft	
Qty construction vehicles:	3	vehicles	
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)

Reference: *CEQA Air Quality Handbook* , SCAQMD, April 1993.

Equation Used To Calculate Operation Parameters

Operation Parameter	Emission Factor	Units	Equation
Grading duration per acre	0.5	hr/acre	Grading days * hours per day / acres affected
Bulldozer mileage per acre	1.7	VMT/acre	Miles traveled by bulldozer, based on dozer path width
Construction VMT per day	15	VMT/day	Number of vehicle * VMT per vehicle per day
Construction VMT per acre	0.9	VMT/acre	Construction VMT * days of construction / acres affected
			(Travel on unpaved surfaces within site)

Equations Used To Calculate Mass/Unit Emission Factors (Corrected for PM_{10})

Operation	Empirical Equation	Units	AP-42 Section (4th Edition)
Bulldozing	0.75(s^1.5)/(M^1.4)	lbs/hr	8.24, Overburden
Grading	(0.60)(0.051)S^2.0	lbs/VMT	8.24, Overburden
Vehicle Traffic	(3.72/(M^4.3))*.6	lbs/VMT	8.24, Overburden

Reference: *Compilation of Air Pollutant Emission Factors*, USEPA AP-42:
Section 8.24, Western Surface Coal Mining (4th Edition)

Emission Factors For Fugitive Emissions From Construction Activities[1]

Operation	Emission Factor (mass/ unit)		Operation Parameter		Emission Factor (lbs/acre)	
Bulldozing	16.51	lbs/hr	0.5	hr/acre	8.3	lbs/acre
Grading	0.77	lbs/VMT	1.7	VMT/acre	1.3	lbs/acre
Vehicle Traffic	0.11	lbs/VMT	0.90	VMT/acre	0.1	lbs/acre

1 Emission Factor (lbs/acre) = Emission Factor (lbs per hour or VMT) * Operation Parameter (hours of VMT per acre)

Table 20 Calculation of Annual Fugitive Emissions from Construction Activities

Source	Emission Factor		Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing[1]	8.3	lbs/acre	341.90	NA	2,838	1.42
Grading[1]	1.3	lbs/acre	341.90	NA	444	0.22
Vehicle Traffic[1]	0.1	lbs/acre	341.90	NA	34	0.02
Erosion of Graded Surface[2]	26.4	lbs/acre/day[3]	341.90	21	189,549	94.77
TOTAL					**192,866**	**96.43**

1 Total annual emissions (TPY) = Emission Factor (lbs/acre) * affected acres * 2000 lbs per ton
2 Total annual emissions (TPY) from erosion = Emission Factor (lbs/acre) * days of construction * 2000 lbs per ton
3. Reference: CEQA Air Quality Handbook, SCAQMD, April 1993.

Projected Annual Emissions During Construction from On-Road Vehicles (Year 3)

On-Road Vehicles Emission Factors

Scenario Year	Vehicle Type	EPA Category	Emission Factor (pounds/mile) CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
2014	Cars	LDGV	0.006604	0.000655	0.000702	0.000011	0.000092	0.000059	1.102572	0.000063
	Pickups	LDGT1	0.006604	0.000655	0.000702	0.000011	0.000092	0.000059	1.102572	0.000063
	Heavy Trucks	HDDV	0.008464	0.024180	0.002016	0.000041	0.001185	0.001006	4.212793	0.000093
	Trucks (3 axles)	LDDT	0.012843	0.014252	0.001896	0.000028	0.000549	0.000455	2.798455	0.000088

Source: SCAQMD 2010. Highest (Most Conservative) EMFAC2007 (version 2.3). Emission Factors for On-Road Vehicles and Heavy-Heavy-Duty Diesel Trucks

Key:

LDGV = Light-duty gasoline-fueled vehicles designated for transport of up to 12 people.

LDGT1 = Light-duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6,000 pounds or less.

LDDT = Light-duty diesel-powered trucks with a GVW of 8,500 pounds or less.

HDDV = Heavy-duty diesel-powered vehicles with a GVW exceeding 8,500 pounds.

Table 21-a Projected Criteria Air Pollutant Emissions From On-Road Vehicles

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)	Annual Emissions (lb/yr)[1] CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
	Cars	20	4	10	14	180	50,400	332.8	33.0	35.4	0.5	4.6	3.0	55,569.6	3.2
	Pickups/Light Trucks	20	4	10	14	180	50,400	332.8	33.0	35.4	0.5	4.6	3.0	55,569.6	3.2
	Trucks	20	4	10	14	180	50,400	426.6	1,218.7	101.6	2.1	59.7	50.7	212,324.8	4.7
Vehicle Trips/Day	Heavy Trucks	20	4	10	14	180	50,400	647.3	718.3	95.6	1.4	27.7	22.9	141,042.1	4.4
80	**Total**	**80**	-	-	-	-	-	**1739.54**	**2,003.0**	**268.0**	**4.5**	**96.6**	**79.6**	**464,506.2**	**15.5**
							TOTAL TPY[2]	**0.8698**	**1.001**	**0.134**	**0.002**	**0.048**	**0.040**	**210.756**	**0.007**

Notes:

1. Annual Emissions (lb/yr) = Emission Factor x Annual Travel/(453.6 g/lb)
2. Total TPY = Annual Emissions/(2000 lb/t). CO2 and CH4 are expressed as metric tones per year = Annual Emisisons/(2204 lb/MT)

Table 21-b Road Fugitive Emissions

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)
	Cars	20	4	10	14	180	50,400
	Pickups/Light Trucks	20	4	10	14	180	50,400
	Trucks	20	4	10	14	180	50,400
Vehicle Trips/Day	Heavy Trucks	20	4	10	14	180	50,400
80	**Total**	**80.0**	-	-	-	-	-

Table 22: Fugitive Emissions From Drilling Secondary Wells (Year 4)

Activity	No. of Wells	Emission Factor[1] PM-10 (lb/hole)	Total Emissions[2] PM-10 (Tons/Project)
Drilling Wells	40	1.3	**0.0260**

Notes:

1. Emission Factor from AP-42, Table 11.9-4 (5th Edition).
2. Total Emissions = No. of wells x Emission Factor/(2000 lb/Ton).

Table 23: Emissions from Drilling Rig Engines for Secondary Wells (Year 4)

Average Power Rating (hp)	500	40	Number of Wells
Fuel Type	Diesel	12	Operating Hours per day/drill rig
Total Operating Hours (hr/yr)[1]	9,600	20	Drilling days per well
Load Factor	0.75		

	POLLUTANTS					GHG
	PM-10	NOX	SO2	CO	VOC	CO2
Emission Factor (lb/hp-hr)[2,3]	0.00035	0.013	0.00205	0.01800	0.0022	1.15000
Total Emissions (Tons/Project)[4]	**0.63**	**23.4**	**3.69**	**32.4**	**3.96**	**2070.0**

Notes:
1. Total operating hours of all drill rigs.
2. Emission Factors from "Emission Standards Reference Guide for Heavy-Duty and Nonroad Engines," EPA420-F-97-014, Sept 1997, Nonroad CI Engines.
3. Emission Factor for SO2 from AP-42, Table 3.3-1 (5th Edition).
4. Total emissions = Average Power Rating x Total Operating Hours x Load Factor x Emission Factor/(2000 lb/ton).

Construction Emissions: Vehicle Engine Exhaust From Grading and Material Hauling Activities (Year 4)

Input Parameters/Assumptions:

Total Building Area:	1,306,800	ft^2
Total Paved Area:	156,816	ft^2
Total Disturbed Area:	341.90	acres
Construction Duration:	0.60	years
Annual Construction Activity:	250	days/yr
Total Demolition:	0	ft^2

Area for Year 4: Wellfied (50 MW): 272 acres; Power Plant: 69.9 acres

Table 24 Summary of Input Parameters

	ROG[1]	NO_x	SO_2	CO	PM_{10}
Total new acres disturbed:	341.9	341.9	341.9	341.9	341.9
Total new building space, ft^2:	1306800.0	1306800.0	1306800.0	1306800.0	1306800.0
Total years:	0.60	0.60	0.60	0.60	0.60
Area graded, acres:	341.9	341.9	341.9	341.9	341.9

Emission Factors For Vehicle Engine Exhaust From Construction Activities

Activity	SMAQMD Emission Factor									
	ROG[1]		NO_x		SO_2 [2]		CO [2]		PM_{10}	
Grading Equipment[3]	2.91E-01	lbs/acre/day	2.75E+00	lbs/acre/day	0.18	lbs/acre/day	0.60	lbs/acre/day	2.32E-01	lbs/acre/day
Material Hauling[4]	4.20E-01	lbs/acre/day	6.07E+00	lbs/acre/day	0.40	lbs/acre/day	1.31	lbs/acre/day	4.30E-01	lbs/acre/day

Reference: *Air Quality Thresholds of Significance* , Sacramento Metropolitan Air Quality Management District (SMAQMD), 1994 and *Compilation of Air Pollutant Emission Factors* (USEPA AP-42).

1 ROG = VOC.

2 Factors for grading equipment are calculated from AP-42 for diesel engines using ratios with the NOx factors.

3 Grading Activities assumes the use of one tracked loader, one wheeled loader, and one motor grader for each 10 acres of disturbed area, used 8 hours per day.

4 Material Hauling Activities assumes the use of one loader and one haul truck for each 10 acres of disturbed area, used 8 hours per day.

Table 25 Total Daily Vehicle Engine Exhaust Emissions From Construction Actitivies[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	99.6	941.7	62.6	203.8	79.3
Material Hauling	143.6	2075.3	138.0	449.2	147.0
Total Emissions (lbs/day):	**243.2**	**3017.1**	**200.6**	**653.0**	**226.3**

1 Total Emissions (lbs/day) = Emission Factor * Affected Acres

Table 26 Total Vehicle Engine Exhaust Emissions from Construction Activities[1]

	ROG	NO_x	SO_2	CO	PM_{10}
Grading Equipment	7.47	70.63	4.70	15.29	5.95
Material Hauling	10.77	155.65	10.35	33.69	11.03
Fugitive Emissions (from page 2)					96.43
Total Emissions(tons/yr)	**18.24**	**226.28**	**15.05**	**48.97**	**113.41**

1 Total emissions (TPY) = Total emissions (lbs/day) * days of construction / 2000 lbs per ton

Construction Emissions: Fugitive Emissions From Construction Activities (Year 4)

Input Parameters / Assumptions			
Acres affected:	341.9	acres/yr	
Grading days/yr:	21	days/yr	
Exposed days/yr:	21	days/yr graded area is exposed	
Grading Hours/day:	8	hr/day	
Soil percent silt, s:	15	%	
Soil percent moisture, M:	2	%	
Fraction of TSP, J:	0.5	(SCAQMD recommendation)	
Mean vehicle speed, S:	5	mi/hr	(On-site)
Dozer path width:	5	ft	
Qty construction vehicles:	3	vehicles	
On-site VMT/vehicle/day:	5	mi/veh/day	(Excluding bulldozer VMT during grading)

Reference: *CEQA Air Quality Handbook* , SCAQMD, April 1993.

Equation Used To Calculate Operation Parameters

Operation Parameter	Emission Factor	Units	Equation
Grading duration per acre	0.5	hr/acre	Grading days * hours per day / acres affected
Bulldozer mileage per acre	1.7	VMT/acre	Miles traveled by bulldozer, based on dozer path width
Construction VMT per day	15	VMT/day	Number of vehicle * VMT per vehicle per day
Construction VMT per acre	0.9	VMT/acre	Construction VMT * days of construction / acres affected
			(Travel on unpaved surfaces within site)

Equations Used To Calculate Mass/Unit Emission Factors (Corrected for PM_{10})

Operation	Empirical Equation	Units	AP-42 Section (4th Edition)
Bulldozing	0.75(s^1.5)/(M^1.4)	lbs/hr	8.24, Overburden
Grading	(0.60)(0.051)S^2.0	lbs/VMT	8.24, Overburden
Vehicle Traffic	(3.72/(M^4.3))*.6	lbs/VMT	8.24, Overburden

Reference: *Compilation of Air Pollutant Emission Factors*, USEPA AP-42:
Section 8.24, Western Surface Coal Mining (4th Edition)

Emission Factors For Fugitive Emissions From Construction Activities[1]

Operation	Emission Factor (mass/ unit)		Operation Parameter		Emission Factor (lbs/acre)	
Bulldozing	16.51	lbs/hr	0.5	hr/acre	8.3	lbs/acre
Grading	0.77	lbs/VMT	1.7	VMT/acre	1.3	lbs/acre
Vehicle Traffic	0.11	lbs/VMT	0.90	VMT/acre	0.1	lbs/acre

1 Emission Factor (lbs/acre) = Emission Factor (lbs per hour or VMT) * Operation Parameter (hours of VMT per acre)

Table 27 Calculation of Annual Fugitive Emissions from Construction Activities

Source	Emission Factor		Graded Acres/yr	Exposed days/yr	Emissions lbs/yr	Emissions tons/yr
Bulldozing[1]	8.3	lbs/acre	341.90	NA	2,838	1.42
Grading[1]	1.3	lbs/acre	341.90	NA	444	0.22
Vehicle Traffic[1]	0.1	lbs/acre	341.90	NA	34	0.02
Erosion of Graded Surface[2]	26.4	lbs/acre/day[3]	341.90	21	189,549	94.77
TOTAL					**192,866**	**96.43**

1 Total annual emissions (TPY) = Emission Factor (lbs/acre) * affected acres * 2000 lbs per ton
2 Total annual emissions (TPY) from erosion = Emission Factor (lbs/acre) * days of construction * 2000 lbs per ton
3. Reference: CEQA Air Quality Handbook, SCAQMD, April 1993.

Projected Annual Emissions During Construction from On-Road Vehicles (Year 4)

On-Road Emission Factors

Scenario Year	Vehicle Type	EPA Category	Emission Factor (pounds/mile) CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
2015	Cars	LDGV	0.006141	0.000602	0.000664	0.000011	0.000093	0.000060	1.101928	0.000059
	Pickups	LDGT1	0.006141	0.000602	0.000664	0.000011	0.000093	0.000060	1.101928	0.000059
	Heavy Trucks	HDDV	0.007669	0.021227	0.001786	0.000041	0.001047	0.000880	4.209022	0.000084
	Trucks (3 axles)	LDDT	0.011694	0.012850	0.001739	0.000027	0.000503	0.000413	2.812477	0.000081

Note:
Emission factors from Calculation Methods for Criteria Air Pollutant Emission Inventories (Armstrong Laboratory,1994).
Key:
LDGV = Light-duty gasoline-fueled vehicles designated for transport of up to 12 people.
LDGT1 = Light-duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6,000 pounds or less.
LDDT = Light-duty diesel-powered trucks with a GVW of 8,500 pounds or less.
HDDV = Heavy-duty diesel-powered vehicles with a GVW exceeding 8,500 pounds.

Table 28-a Projected Criteria Air Pollutant Emissions From On-Road Vehicles

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)	Annual Emissions (lb/yr)[1] CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
	Cars	20	4	10	14	180	50,400	309.5	30.3	33.4	0.5	4.7	3.0	55,537.2	3.0
	Pickups/Light Trucks	20	4	10	14	180	50,400	309.5	30.3	33.4	0.5	4.7	3.0	55,537.2	3.0
	Trucks	20	4	10	14	180	50,400	386.5	1,069.8	90.0	2.1	52.8	44.3	212,134.7	4.2
Vehicle Trips/Day	Heavy Trucks	20	4	10	14	180	50,400	589.4	647.7	87.6	1.4	25.4	20.8	141,748.8	4.1
80	**Total**	**80.0**	-	-	-	-	-	**1594.93**	**1,778.2**	**244.5**	**4.5**	**87.5**	**71.2**	**464,957.9**	**14.3**
							TOTAL TPY[2]	**0.7975**	**0.889**	**0.122**	**0.002**	**0.044**	**0.036**	**210.961**	**0.006**

Notes:
1. Annual Emissions (lb/yr) = Emission Factor x Annual Travel/(453.6 g/lb)
2. Total TPY = Annual Emissions/(2000 lb/t). CO2 and CH4 are expressed as metric tones per year = Annual Emisisons/(2204 lb/MT)

Table 28-b Road Fugitive Emissions

Group	Vehicle Type	Daily Vehicles trips (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)
	Cars	20	4	10	14	180	50,400
	Pickups/Light Trucks	20	4	10	14	180	50,400
	Trucks	20	4	10	14	180	50,400
Vehicle Trips/Day	Heavy Trucks	20	4	10	14	180	50,400
80	**Total**	**80.0**	-	-	-	-	-

Projected Annual Emissions from On-Road Vehicles During Operations

On-Road Emission Factors

Scenario Year	Vehicle Type	EPA Category	Emission Factor (pounds/mile) CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
2015	Cars	LDGV	0.006141	0.000602	0.000664	0.000011	0.000093	0.000060	1.101928	0.000059
	Pickups	LDGT1	0.006141	0.000602	0.000664	0.000011	0.000093	0.000060	1.101928	0.000059
	Heavy Trucks	HDDV	0.007669	0.021227	0.001786	0.000041	0.001047	0.000880	4.209022	0.000084
	Trucks (3 axles)	LDDT	0.011694	0.012850	0.001739	0.000027	0.000503	0.000413	2.812477	0.000081

Note:
Emission factors from Calculation Methods for Criteria Air Pollutant Emission Inventories (Armstrong Laboratory,1994).
Key:
LDGV = Light-duty gasoline-fueled vehicles designated for transport of up to 12 people.
LDGT1 = Light-duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6,000 pounds or less.
LDDT = Light-duty diesel-powered trucks with a GVW of 8,500 pounds or less.
HDDV = Heavy-duty diesel-powered vehicles with a GVW exceeding 8,500 pounds.

Table 29-a Projected Criteria Air Pollutant Emissions From On-Road Vehicles

Group	Vehicle Type	Daily Vehicles (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)	Annual Emissions (lb/yr)[1] CO	NOx	ROG	SOx	PM10	PM2.5	CO2	CH4
	Cars	59.5	4.0	10.0	14.0	60.0	49,980.0	306.9	30.1	33.2	0.5	4.6	3.0	55,074.4	3.0
	Pickups/Light Trucks	25.5	4.0	10.0	14.0	60.0	21,420.0	131.5	12.9	14.2	0.2	2.0	1.3	23,603.3	1.3
	Trucks	0.0	4.0	10.0	14.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vehicle Trips/Day	Heavy Trucks	0.0	4.0	10.0	14.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85	**Total**	**85.0**	-	-	-	-	-	**438.47**	**43.0**	**47.4**	**0.8**	**6.6**	**4.3**	**78,677.7**	**4.2**
							TOTAL TPY[2]	**0.2192**	**0.021**	**0.024**	**0.000**	**0.003**	**0.002**	**35.698**	**0.002**

Notes:
1. Annual Emissions (lb/yr) = Emission Factor x Annual Travel/(453.6 g/lb)
2. Total TPY = Annual Emissions/(2000 lb/t).

Table 29-b Road Fugitive Emissions

Group	Vehicle Type	Daily Vehicles trips (/day)	Daily Travel - Per Vehicle At Plant (VMT)	Off-Plant (VMT)	Total (VMT)	Travel Days (days/yr)	Annual Travel (VMT/yr)
	Cars	60.0	4.0	10.0	14.0	60.0	50,400.0
	Pickups/Light Trucks	25.0	4.0	10.0	14.0	60.0	21,000.0
	Trucks	0.0	4.0	10.0	14.0	60.0	0.0
Vehicle Trips/Day	Heavy Trucks	0.0	4.0	10.0	14.0	60.0	0.0
85	**Total**	**85.0**	-	-	-	-	-

Table 1

Summary of Daily Emissions

45-MW Wind Energy Project

Activity	Emission Source	Daily Emissions (lb/day)								
		ROG	CO	NOx	SO2	PM10 (Exh)	(Exh)	(Dust)	(Dust)	CO2
Site Preparation	Exhaust Emissions - Nonroad Equipment	6.7	22	53	0.05	2.4	2.4	-	-	4,820
	Exhaust Emissions - Onroad Vehicles	1.8	17	2	0.04	0.03	0.03	-	-	721
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	13	1.3	-
	Subtotal	**8.5**	**39**	**55**	**0.09**	**2.4**	**2.4**	**13**	**1.3**	**5,541**
Foundation Construction / Electrical	Exhaust Emissions - Nonroad Equipment	3.3	15	27	0.027	1.4	1.4	-	-	2,530
	Exhaust Emissions - Onroad Vehicles	9.9	93	8.9	0.117	0.075	0.072	-	-	3,206
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	56	5.7	-
	Subtotal	**13**	**108**	**36**	**0.144**	**1.5**	**1.5**	**56**	**5.7**	**5,737**
Turbine Installation and Delivery	Exhaust Emissions - Nonroad Equipment	11	36	96	0.094	4.2	4.2	-	-	8,781
	Exhaust Emissions - Onroad Vehicles	7.5	71	7.7	0.108	0.077	0.075	-	-	2,607
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	46	4.6	-
	Subtotal	**18**	**107**	**104**	**0.20**	**4.3**	**4.3**	**46**	**4.6**	**11,388**
Electrical Trenching	Exhaust Emissions - Nonroad Equipment	2.6	9.7	22	0.023	1.1	1.1	-	-	2,031
	Exhaust Emissions - Onroad Vehicles	3.0	28	3.29	0.0474	0.0356	0.0348	-	-	1,071
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	19	1.9	-
	Subtotal	**5.6**	**38**	**26**	**0.070**	**1.2**	**1.2**	**19**	**1.9**	**3,101**
All Activities	Fugitive Dust Emissions - Earth Moving Activities	**-**	**-**	**-**	**-**	**-**	**-**	**450**	**63**	**-**
TOTAL		**45**	**292**	**221**	**0.51**	**9.3**	**9.3**	**583**	**76**	**25,767**

Table 2
Summary of Total Emissions
45-MW Wind Energy Project

Activity	Emission Source	Emissions (tons)									GHG Emissions (metric tons)
		ROG	CO	NO_x	SO_2	PM_{10} (Exh)	$PM_{2.5}$ (Exh)	PM_{10} (Dust)	$PM_{2.5}$ (Dust)	CO_2	CO_2
Site Preparation	Exhaust Emissions - Nonroad Equipment	0.055	0.18	0.42	0.00042	0.020	0.020	-	-	39	35
	Exhaust Emissions - Onroad Vehicles	0.016	0.15	0.02	0.0003	0.0003	0.0003	-	-	6	6
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	0.1	0.01	-	-
	Subtotal	**0.071**	**0.33**	**0.45**	**0.0008**	**0.02**	**0.02**	**0.11**	**0.01**	**45**	**41**
Foundation Construction / Electrical	Exhaust Emissions - Nonroad Equipment	0.11	0.50	0.90	0.00091	0.046	0.046	-	-	85	77
	Exhaust Emissions - Onroad Vehicles	0.47	4.5	0.43	0.0056	0.00358	0.00346	-	-	154	140
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	2.7	0.3	-	-
	Subtotal	**0.58**	**5.0**	**1.3**	**0.0065**	**0.05**	**0.05**	**2.7**	**0.27**	**238**	**216**
Turbine Installation and Delivery	Exhaust Emissions - Nonroad Equipment	0.14	0.48	1.3	0.0012	0.054	0.054	-	-	118	107
	Exhaust Emissions - Onroad Vehicles	0.23	2.1	0.23	0.0032	0.00232	0.00226	-	-	78	71
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	1.4	0.1	-	-
	Subtotal	**0.36**	**2.6**	**1.5**	**0.0045**	**0.06**	**0.06**	**1.4**	**0.14**	**197**	**178**
Electrical Trenching	Exhaust Emissions - Nonroad Equipment	0.093	0.34	0.78	0.00080	0.039	0.039	-	-	71	64
	Exhaust Emissions - Onroad Vehicles	0.112	1.1	0.123	0.00178	0.00133	0.00130	-	-	40	36
	Fugitive Dust Emissions - Roads	-	-	-	-	-	-	0.7	0.1	-	-
	Subtotal	**0.20**	**1.4**	**0.90**	**0.0026**	**0.04**	**0.04**	**0.70**	**0.07**	**111**	**101**
All Activities	Fugitive Dust Emissions - Earth Moving Activities	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**0.2**	**-**	**-**
TOTAL		**1.2**	**9.3**	**4.2**	**0.0143**	**0.17**	**0.17**	**6**	**0.7**	**592**	**537**

Table 3
Nonroad Equipment Exhaust Emission Factors
45-MW Wind Energy Project

Equipment Type	Fuel Type	Engine Size Range	Emission Factor[a] (g/hp-hr)					
			ROG	CO	NO_x	SO_2	PM_{10}	CO_2
Rubber Tire Dozers	Diesel	0<hp≤175	0.622	2.251	4.635	0.004	0.269	335.598
	Diesel	250<hp≤500	0.458	2.198	4.059	0.003	0.173	335.598
Graders	Diesel	120<hp≤175	0.489	2.075	3.794	0.004	0.220	346.974
	Diesel	250<hp≤500	0.325	1.135	3.205	0.003	0.122	346.974
Scrapers	Diesel	175<hp≤250	0.511	1.438	4.854	0.005	0.196	409.544
	Diesel	250<hp≤500	0.464	1.928	4.361	0.004	0.176	409.544
Excavators	Diesel	175<hp≤250	0.297	0.803	3.056	0.004	0.106	324.222
Cranes	Diesel	120<hp≤175	0.369	1.486	2.834	0.003	0.164	244.589
	Diesel	175<hp≤250	0.271	0.754	2.700	0.003	0.102	244.589
	Diesel	250<hp≤500	0.247	0.898	2.406	0.002	0.093	244.589
Off-Highway Trucks	Diesel	250<hp≤500	0.297	0.897	2.762	0.003	0.104	324.222
Rough Terrain Forklifts	Diesel	50<hp≤120	0.664	2.431	4.007	0.004	0.370	341.286
	Diesel	120<hp≤175	0.449	1.996	3.523	0.004	0.205	341.286
Tractors/Loaders/Backhoes	Diesel	120<hp≤175	0.377	1.815	2.982	0.004	0.174	312.846
	Diesel	175<hp≤250	0.259	0.735	2.827	0.004	0.095	312.846
Rollers	Diesel	120<hp≤175	0.436	1.847	3.544	0.004	0.194	318.534

Notes:

a. Emission factors from Sacramento Metro AQMD Roadway Construction Model for Year 2010.

Table 4
Nonroad Equipment Exhaust Emissions
45-MW Wind Energy Project

Phase	Equipment Type	No of Units	Equipment Engine Size (hp)	Fuel Type	Daily Operation of All Units (hrs/day)	Load Factor[a]	Total Working Days per Unit (days)	Daily Emissions (lb/day)							Emissions (tons)						
								ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Site Preparation	16H Motor Grader	1	275	Diesel	9	0.61	18	2.1	6.0	9.9	0.012	0.6	0.6	1,041	0.018	0.054	0.089	0.0001	0.005	0.005	9.4
	613 Scraper	1	181	Diesel	18	0.59	18	2.2	6.1	20.6	0.020	0.8	0.8	1,736	0.020	0.055	0.185	0.0002	0.007	0.007	15.6
	623 Scraper	1	330	Diesel	9	0.56	12	1.7	7.1	16.0	0.015	0.6	0.6	1,502	0.010	0.042	0.096	0.0001	0.004	0.004	9.0
	CP563C Roller	1	153	Diesel	9	0.56	18	0.7	3.1	6.0	0.006	0.3	0.3	542	0.007	0.028	0.054	0.0001	0.003	0.003	4.9
	Subtotal							**6.67**	**22.3**	**52.5**	**0.052**	**2.39**	**2.39**	**4,820**	**0.05**	**0.2**	**0.4**	**0.0004**	**0.02**	**0.02**	**39**
Foundation Construction / Electrical	65 Ton Rough Terrain Crane	1	152	Diesel	5	0.43	20	0.3	1.1	2.0	0.002	0.1	0.1	176	0.003	0.011	0.020	0.00002	0.001	0.001	1.8
	330L Excavator	2	222	Diesel	16	0.07	60	0.2	0.4	1.7	0.002	0.1	0.1	178	0.005	0.013	0.050	0.0001	0.002	0.002	5.3
	966C Loader	1	140	Diesel	8	0.68	80	0.6	3.0	5.0	0.006	0.3	0.3	525	0.025	0.122	0.200	0.0002	0.012	0.012	21.0
	D6H Dozer	1	275	Diesel	8	0.59	60	1.3	6.3	11.6	0.009	0.5	0.5	960	0.039	0.189	0.348	0.0003	0.015	0.015	28.8
	CAT Forklists	2	153	Diesel	20	0.3	80	0.9	4.0	7.1	0.008	0.4	0.4	691	0.036	0.162	0.285	0.0003	0.017	0.017	27.6
	Subtotal							**3.28**	**14.9**	**27.5**	**0.027**	**1.38**	**1.38**	**2,530**	**0.11**	**0.5**	**0.9**	**0.0009**	**0.05**	**0.05**	**85**
Turbine Installation and Delivery	75 Ton Rough Terrain Crane	2	250	Diesel	18	0.43	14	1.2	3.2	11.5	0.012	0.4	0.4	1,043	0.008	0.023	0.081	0.0001	0.003	0.003	7.3
	90 Ton Rough Terrain Crane	5	250	Diesel	40	0.43	14	2.6	7.1	25.6	0.026	1.0	1.0	2,319	0.018	0.050	0.179	0.0002	0.007	0.007	16.2
	Manitowoc 777 Crane	2	330	Diesel	11	0.43	55	0.9	3.1	8.3	0.008	0.3	0.3	842	0.023	0.085	0.228	0.0002	0.009	0.009	23.1
	Manitowoc 2250 Crane	2	450	Diesel	12	0.43	55	1.3	4.6	12.3	0.012	0.5	0.5	1,252	0.035	0.126	0.339	0.0003	0.013	0.013	34.4
	CAT Forklists	3	60	Diesel	60	0.03	40	0.2	0.6	1.0	0.001	0.1	0.1	81	0.003	0.012	0.019	0.00002	0.002	0.002	1.6
	14G Motor Grader	2	165	Diesel	10	0.61	20	1.1	4.6	8.4	0.009	0.5	0.5	770	0.011	0.046	0.084	0.0001	0.005	0.005	7.7
	D6H Dozer	2	140	Diesel	20	0.59	20	2.3	8.2	16.9	0.014	1.0	1.0	1,222	0.023	0.082	0.169	0.0001	0.010	0.010	12.2
	LR 1400 Crane	2	450	Diesel	12	0.43	25	1.3	4.6	12.3	0.012	0.5	0.5	1,252	0.016	0.057	0.154	0.0002	0.006	0.006	15.7
	Subtotal							**10.61**	**36.0**	**96.3**	**0.094**	**4.23**	**4.23**	**8,781**	**0.14**	**0.5**	**1.3**	**0.0012**	**0.05**	**0.05**	**118**
Electrical Trenching	14G Motor Grader	2	165	Diesel	9	0.61	70	1.0	4.1	7.6	0.008	0.4	0.4	693	0.034	0.145	0.265	0.0003	0.015	0.015	24.3
	D6H LGP Dozer	1	140	Diesel	9	0.59	70	1.0	3.7	7.6	0.006	0.4	0.4	550	0.036	0.129	0.266	0.0002	0.015	0.015	19.3
	966C Loader	1	210	Diesel	8	0.68	70	0.7	1.9	7.1	0.009	0.2	0.2	788	0.023	0.065	0.249	0.0003	0.008	0.008	27.6
	Subtotal							**2.65**	**9.7**	**22.3**	**0.023**	**1.12**	**1.12**	**2,031**	**0.09**	**0.3**	**0.8**	**0.001**	**0.04**	**0.04**	**71**
TOTAL								**23.21**	**82.94**	**199**	**0.20**	**9.12**	**9.12**	**18,162**	**0.4**	**1.5**	**3.4**	**0.003**	**0.2**	**0.2**	**312.81**

Table 5
Onroad Vehicle Activity
45-MW Wind Energy Project

Activity	Vehicle	No. of Units[a]	Round Trips per Day	Travel Distance per Roundtrip		Total Working Days per Unit	VMT per Day			Total VMT for Construction Period		
				Paved Roads	Unpaved Roads		Paved Roads	Unpaved Roads	Total	Paved Roads	Unpaved Roads	Total
Site Preparation	Trucks	2	2	14	2	18	56	8	64	1,008	144	1,152
	Diesel Vehicle - Subtotal						**56**	**8**	**64**	**1,008**	**144**	**1,152**
	Worker Vehicles	9	1	58	2	18	522	18	540	9,396	324	9,720
	Gasoline Vehicle - Subtotal						**522**	**18**	**540**	**9,396**	**324**	**9,720**
	Total						**578**	**26**	**604**	**10,404**	**468**	**10,872**
Foundation Construction / Electrical	Trucks	3	2	14	2	96	84	12	96	8,064	1,152	9,216
	Diesel Vehicle - Subtotal						**84**	**12**	**96**	**8,064**	**1,152**	**9,216**
	Worker Vehicles	50	1	58	2	96	2,900	100	3,000	278,400	9,600	288,000
	Gasoline Vehicle - Subtotal						**2,900**	**100**	**3,000**	**278,400**	**9,600**	**288,000**
	Total						**2,984**	**112**	**3,096**	**286,464**	**10,752**	**297,216**
Turbine Installation and Delivery	Trucks	4	2	14	2	60	112	16	128	6,720	960	7,680
	Diesel Vehicle - Subtotal						**112**	**16**	**128**	**6,720**	**960**	**7,680**
	Worker Vehicles	38	1	58	2	60	2,204	76	2,280	132,240	4,560	136,800
	Gasoline Vehicle - Subtotal						**2,204**	**76**	**2,280**	**132,240**	**4,560**	**136,800**
	Total						**2,316**	**92**	**2,408**	**138,960**	**5,520**	**144,480**
Electrical Trenching	Trucks	2	2	14	2	75	56	8	64	4,200	600	4,800
	Diesel Vehicle - Subtotal						**56**	**8**	**64**	**4,200**	**600**	**4,800**
	Worker Vehicles	15	1	58	2	75	870	30	900	65,250	2,250	67,500
	Gasoline Vehicle - Subtotal						**870**	**30**	**900**	**65,250**	**2,250**	**67,500**
	Total						**926**	**38**	**964**	**69,450**	**2,850**	**72,300**

Notes:
a. It was assumed that the number of worker vehicles was based on a 50% carpool/vanpool rate for workers.

Table 6
Onroad Vehicle Exhaust Emission Factors
45-MW Wind Energy Project

Equipment Type	Fuel Type	Emission Factor[a] (g/VMT)						
		NO_x	ROG	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Gasoline Vehicles	Gasoline	1.09	1.49	14.05	0.0127	0.0059	0.0055	440
Diesel Vehicles	Diesel	8.06	0.28	1.10	0.158	0.17	0.17	1,400

Notes:

a. Emission factors for gasoline worker vehicles from "Emission Facts: Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks (EPA420-F-05-22, EPA 2005). It was assumed that the vehicle make-up included 50% cars and 50% light-duty trucks/SUVs. SO2 emission factor calculated from gasoline consumption rate and a sulfur content of 80 ppm.

b. Emission factors for diesel worker and delivery vehicles (except SO2 and CO2) from "Assessing the Effects of Freight Movement on Air Quality at the National and Regional Level- Final Report" (U.S. Federal Highway Administration 2005).

c. CO_2 and SO_2 emission factors for diesel worker and delivery vehicles from "Greenhouse Gas Protocol - Corporate Accounting and Reporting Standard / Mobile Guide" (World Resources Institute/World Business Council for Sustainable Development 2005). SO2 emission factor calculated from diesel consumption rate and a sulfur content of 348 ppm.

d. HAP emission factors based on fractions presented in "Documentation for the Oonroad National Emissions Inventory (NEI) for Base Years 1970-2002" (EPA 2004).

Table 7
Onroad Vehicle Exhaust Emissions
45-MW Wind Energy Project

Activity	Description	Fuel Type	Daily Mileage (VMT)	Total Mileage (VMT)	Emissions (lbs/day)							Emissions (tons)						
					ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO_2	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Site Preparation	Onroad Vehicles	Gasoline	540	9,720	1.77	16.73	1.29	0.02	0.01	0.01	523.81	0.02	0.2	0.01	0.0001	0.0001	0.0001	5
	Onroad Vehicles	Diesel	64	1,152	0.04	0.16	1.14	0.02	0.02	0.02	197.53	0.000	0.001	0.01	0.0002	0.0002	0.0002	2
	Total				**1.81**	**16.9**	**2.43**	**0.037**	**0.031**	**0.030**	**721**	**0.02**	**0.2**	**0.02**	**0.000**	**0.0003**	**0.0003**	**6**
Foundation Construction / Electrical	Onroad Vehicles	Gasoline	3,000	288,000	9.82	92.92	7.18	0.08	0.039	0.036	2910.05	0.47	4.5	0.34	0.0040	0.0019	0.0017	140
	Onroad Vehicles	Diesel	96	9,216	0.06	0.23	1.71	0.03	0.036	0.036	296.30	0.003	0.01	0.1	0.0016	0.0017	0.0017	14
	Total				**9.88**	**93.2**	**8.9**	**0.1171**	**0.075**	**0.072**	**3206**	**0.47**	**4.5**	**0.43**	**0.0056**	**0.0036**	**0.0035**	**154**
Turbine Installation and Delivery	Onroad Vehicles	Gasoline	2,280	136,800	7.46	70.62	5.45	0.06	0.029	0.027	2211.64	0.224	2.12	0.164	0.0019	0.0009	0.0008	66
	Onroad Vehicles	Diesel	128	7,680	0.08	0.31	2.27	0.04	0.048	0.048	395.06	0.0024	0.009	0.07	0.0013	0.0014	0.0014	12
	Total				**7.543**	**70.93**	**7.73**	**0.1082**	**0.077**	**0.075**	**2607**	**0.226**	**2.13**	**0.23**	**0.0032**	**0.0023**	**0.0023**	**78**
Electrical Trenching	Onroad Vehicles	Gasoline	900	67,500	2.95	27.88	2.15	0.03	0.012	0.011	873.02	0.11	1.0	0.08	0.0009	0.0004	0.0004	33
	Onroad Vehicles	Diesel	64	4,800	0.04	0.16	1.14	0.02	0.024	0.024	197.53	0.001	0.006	0.04	0.0008	0.0009	0.0009	7
	Total				**2.99**	**28.0**	**3.29**	**0.047**	**0.036**	**0.035**	**1071**	**0.11**	**1.1**	**0.12**	**0.0018**	**0.0013**	**0.0013**	**40**

Table 8
Road Fugitive Dust Emissions from Onroad Vehicles
45-MW Wind Energy Project

Activity	Road Type	Daily Mileage (VMT)	Total Mileage (VMT)	Emission Factor[a] (lb/VMT)		Uncontrolled Daily Emissions (lb/day)		Uncontrolled Emissions (tons)		Controlled Daily Emissions (lb/day)		Controlled Emissions (tons)	
				PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Site Preparation	Paved Roads	578	10,404	0.0068	0.0007	4.0	0.43	0.036	0.0038	2.0	0.21	0.018	0.0019
	Unpaved	26	468	0.82	0.082	21	2.1	0.19	0.019	11	1.07	0.10	0.010
	Subtotal					**25**	**2.6**	**0.23**	**0.023**	**13**	**1**	**0.11**	**0.012**
Foundation Construction / Electrical	Paved Roads	2,984	286,464	0.0068	0.0007	20.43	2.20	0.98	0.11	10.2	1.10	0.490	0.053
	Unpaved	112	10,752	0.82	0.082	92	9.2	4.4	0.44	46	4.6	2.2	0.22
	Subtotal					**112**	**11.4**	**5.4**	**0.55**	**56**	**5.7**	**2.7**	**0.273**
Turbine Installation and Delivery	Paved Roads	2,316	138,960	0.0068	0.0007	15.9	1.71	0.48	0.051	7.9	0.85	0.24	0.026
	Unpaved	92	5,520	0.82	0.082	75	8	2.3	0.23	38	3.8	1.1	0.11
	Subtotal					**91**	**9**	**2.7**	**0.28**	**46**	**4.6**	**1.4**	**0.14**
Electrical Trenching	Paved Roads	926	69,450	0.0068	0.0007	6.3	0.68	0.238	0.0256	3.17	0.34	0.12	0.013
	Unpaved	38	2,850	0.82	0.082	31	3.1	1.17	0.117	16	1.6	0.58	0.058
	Subtotal					**38**	**3.8**	**1.41**	**0.142**	**19**	**1.9**	**0.70**	**0.071**

Notes:
a. See emission factor derivation table below.

Paved Roads - Emission Factor Derivation Table

$E = (k(sL/2)^{0.65}(W/3)^{1.5}-C)$ AP-42 Section 13.2.1 (11/06 version)

where:

E = particulate emission factor (lb/VMT)
k = particle size multiplier
sL = road surface silt loading (g/m^2)
W = average vehicle weight (tons)
C = emission factor for 1980's vehicle fleet exhaust, break wear and tire wear

Parameter	Units	PM_{10}	$PM_{2.5}$	Reference
Mean Vehicle Weight	tons	3	3	Assumption
k factor	lb/VMT	0.016	0.0024	Table 13.2-1.1
Silt Loading, sL	g/m^2	0.6	0.6	Table 13.2.1-3
Emission factor, C	lb/VMT	0.00047	0.00036	Table 13.2.1-2

Unpaved Roads - Emission Factor Derivation

$E = k(s/12)^a(W/3)^b$ AP-42 Section 13.2.2 (11/06 version)

Controlled E = E * ((100-CE)/100)

where:

E = particulate emission factor (lb/VMT)
k, a, b = empirical constants for industrial roads
s = surface material silt content (%)
W = average vehicle weight (tons)

Parameter	Units	PM_{10}	$PM_{2.5}$	Reference
Mean Vehicle Weight	**tons**	4.25	4.25	Assumption
Constant, k	lb/VMT	1.8	0.18	Table 13.2.2-2 (worst case)
Constant, a		1	1	Table 13.2.2-2 (worst case)
Constant, b		0.45	0.45	Table 13.2.2-2 (worst case)
Silt content, s	%	8.5	8.5	Table 13.2..2-1 (construction sites)
Control Efficiency, CE	**%**	45	45	Assumption based on regular watering

Table 9
Fugitve Dust Emissions from Earth Moving Activities
45-MW Wind Energy Project

Construction Activity	Disturbance[a] (acres/day)	Duration of Activity (months)	Controlled Emission Factor[a] (ton/acre/month)		Controlled Daily Emissions[c] (lbs/day)		Controlled Emissions (tons)	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
All Activities	5	6	0.2	0.0	450.0	63.0	1.4	0.2

Notes:

a. Area of disturbance is listed as average disturbance area for a typical work day, considering 2 acres/day and 3 additional acres of disturbance for other activities

b. See emisison factor derivation table below

Emission Factor Derivation Table

Parameter	Units	TSP[1]	PM_{10}[(2)]	$PM_{2.5}$[(3)]
Uncontrolled Emission Factor[1] (based on 30 days/month)	ton/acre/month	1.2	0.9	0.126
Controlled Emission Factor[5] (based on 24 days/month)	ton/acre/month	0.3	0.225	0.0315

Notes:

1. Emission factor from AP-42 Section 13.2.3 for TSP.
2. PM_{10} emission factor calculated by multiplying TSP emission factor by 0.75 (AP-42 Section 11.9, Table 11.9-1)
3. $PM_{2.5}$ emission factor calculated by multiplying TSP emission factor by 0.105 (AP-42 Section 11.9, Table 11.9-1)
4. Calculated by multiplying 30-day emission factor by 0.8 (24 days/ 30 days).
5. Conservatively assumed dust 75% control factor based on maximum control measures. Actual dust control effectiveness TBD based on consultation with local APCD (may be

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Appendix B
Emission Calculations for Construction Activities
West Chocolate Mountains Solar PV Development

Table No.	Table Description
Table B1-a	Total Construction Emissions - Phase I (25 MW)
Table B1-b	Total Construction Emissions - Phase II (Additional 25 MW)
Table B2-a	Summary of Daily Construction Emissions - Phase I
Table B2-b	Summary of Daily Construction Emissions - Phase II
Table 3	Non-Road Diesel Equipment Exhaust Emission Factors
Table 4-A	Total Emissions for Diesel Non-Road Equipment - Phase I
Table 4-B	Total Emissions for Diesel Non-Road Equipment - Phase II
Table 5-A	Daily Emissions for Diesel Non-Road Equipment - Phase I
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Table 6	On-Road Vehicle Usage Phases I and II
Table 7	On-Road Vehicle Exhaust Emission Factors
Table 8-A	Total and Daily Exhaust Emissions for On Road Vehicles - Phase I
Table 8-B	Total and Daily Exhaust Emissions for On Road Vehicles - Phase II
Table 9-A	Fugitve Dust Emissions - Construction Site - Phase I
Table 9-B	Fugitve Dust Emissions - Construction Site - Phase II
Table 10	Fugitive Dust Emission Factors - Roads
Table 11-A	Fugitive Dust Emissions from Road (Site and Off-Site) - Phase I
Table 11-B	Fugitive Dust Emissions from Road (Site and Off-Site) - Phase II

Table B1-a

Total Construction Emissions - Phase I (25 MW)

West Chocolate Mountains Solar PV Development

Emission Type	Source	Emissions (tons)						GHG Emissions (metric tons)
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Exhaust Emissions	Non Road Equipment	0.57	2.29	4.90	0.01	0.25	0.25	537
	On Road Vehicles	0.09	0.36	1.17	0.00	0.06	0.05	117
Fugitive Dust Emissions	Construction Activities	-	-	-	-	0.54	0.08	-
	Roads (Site and Off-Site)	-	-	-	-	5.80	0.64	-
Subtotal		**0.66**	**2.65**	**6.06**	**0.01**	**6.64**	**1.02**	**653**

Table B1-b

Total Construction Emissions - Phase II (Additional 25 MW)

West Chocolate Mountains Solar PV Development

Emission Type	Source	Emissions (tons)						GHG Emissions (metric tons)
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Exhaust Emissions	Non Road Equipment	0.57	2.29	4.90	0.01	0.25	0.25	537
	On Road Vehicles	0.09	0.36	1.17	0.001	0.06	0.05	117
Fugitive Dust Emissions	Construction Activities	-	-	-	-	0.74	0.08	-
	Roads (Site and Off-Site)	-	-	-	-	5.80	0.10	-
Subtotal		**0.66**	**2.65**	**6.06**	**0.01**	**6.84**	**0.48**	**653**

Table B2-a

Summary of Daily Construction Emissions - Phase I

West Chocolate Mountains Solar PV Development

Emission Type	Source	Emissions (lbs/day)							
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Exhaust Emissions	Non Road Equipment	7.8	30.2	63.0	0.1	3.5	3.5	6,886	0.7
	On Road Vehicles	0.8	3.0	9.7	0.01	0.5	0.4	1,070	0.04
Fugitive Dust Emissions	Construction Activities	-	-	-	-	43	6	-	-
	Roads (Site and Off-Site)	-	-	-	-	48	5	-	-
Subtotal		**9**	**33**	**73**	**0.1**	**95**	**15**	**7,957**	**1**

Table B2-b

Summary of Daily Construction Emissions - Phase II

West Chocolate Mountains Solar PV Development

Emission Type	Source	Emissions (lbs/day)							
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Exhaust Emissions	Non Road Equipment	7.8	30.2	63.0	0.1	3.5	3.5	6,886	0.7
	On Road Vehicles	0.8	3.0	9.7	0.01	0.5	0.4	1,070	0.04
Fugitive Dust Emissions	Construction Activities	-	-	-	-	58	8	-	-
	Roads (Site and Off-Site)	-	-	-	-	48	5	-	-
Subtotal		**9**	**33**	**73**	**0.1**	**110**	**17**	**7,957**	**1**

Table B3
Non-Road Diesel Equipment Exhaust Emission Factors
West Chocolate Mountains Solar PV Development

Equipment	Maximum Operating Range (hp)	Composite Emission Factor (lb/hr)						
		ROG	CO	NO_x	SO_2	PM	CO_2	CH_4
Vibratory Post Driver / Drill Rig	Composite	0.1052	0.5146	1.1331	0.0017	0.0498	165	0.0095
Crawler Tractors	Composite	0.1861	0.6409	1.3854	0.0013	0.0854	114	0.0168
Excavators	Composite	0.1483	0.5581	1.1502	0.0013	0.0638	120	0.0134
Forklifts	Composite	0.0686	0.2319	0.5161	0.0006	0.0281	54.4	0.0062
Generator Set	15	0.0172	0.0726	0.1154	0.0002	0.0069	10.2	0.0016
Graders	Composite	0.1723	0.6314	1.4338	0.0015	0.0753	133	0.0155
Rollers	Composite	0.1176	0.4212	0.7749	0.0008	0.0547	67.1	0.0106
Scrapers	Composite	0.3202	1.2424	2.9078	0.0027	0.1256	262	0.0289
Tractors/Loaders/Backhoes	Composite	0.1021	0.3930	0.6747	0.0008	0.0521	66.8	0.0092
Plate Compactor	Composite	0.0050	0.0263	0.0317	0.0001	0.0015	4.3	0.0005

Source: South Coast Air Quality Management District (SCAQMD). 2008. Off-road Mobile Source Emission Factors (Scenario Years 2007 – 2025).

Notes:

Composite emission factors have horsepower rating and load factors already built into the emission factors. SCAQMD recommends using composite factors if the CEQA practitioner does not know these two parameters when calculating off-road mobile source emissions

Table 4-A
Total Emissions for Diesel Non-Road Equipment - Phase I
West Chocolate Mountains Solar PV Development

Construction Phase	Equipment Type	Equipment Engine Size (hp) [a]	Fuel Type	Total Hourly Usage for All Units (hrs)	Criteria PollutantsTotal Emissions (tons)					GHG Total Emissions (metric tons)		
					ROG	CO	NO_x	SO_2	PM	CO_2	CH_4	CO_2e
All Construction Activities	Vibratory Post Driver	100-175	Diesel	4,050	0.213	1.042	2.295	0.004	0.101	302.8	0.0	303.2
	Crawler Tractors/Dozer	100-175	Diesel	500	0.047	0.160	0.346	0.000	0.021	25.9	0.0	25.9
	Excavators	175-300	Diesel	200	0.015	0.056	0.115	0.000	0.006	10.8	0.0	10.9
	Forklifts/Aerial Lifts/ Booms	50-100	Diesel	6,000	0.206	0.696	1.548	0.002	0.084	148.0	0.0	148.4
	Generator/Compressor	5-15	Diesel	4,000	0.034	0.145	0.231	0.000	0.014	18.5	0.0	18.6
	Graders	175-300	Diesel	80	0.007	0.025	0.057	0.000	0.003	4.8	0.0	4.8
	Rollers/Compactors	100-175	Diesel	500	0.029	0.105	0.194	0.000	0.014	15.2	0.0	15.3
	Scrapers	175-300	Diesel	40	0.006	0.025	0.058	0.000	0.003	4.8	0.0	4.8
	Tractors/Loaders/Backhoes	100-175	Diesel	160	0.008	0.031	0.054	0.000	0.004	4.8	0.0	4.9
	Vibratory Plate (hand held)	10 -- 15	Diesel	40	0.000	0.001	0.001	0.000	0.000	0.1	0.0	0.1
	TOTAL				**0.566**	**2.286**	**4.899**	**0.006**	**0.250**	**536**	**0.046**	**537**

Notes:
(a) Composite emission factors recommended by the South Coast Air Management District were used per equipment, except for Generator/Compressor (maximum hp 15).

Table 4-B
Total Emissions for Diesel Non-Road Equipment - Phase II
West Chocolate Mountains Solar PV Development

Construction Phase	Equipment Type	Equipment Engine Size (hp) [a]	Fuel Type	Total Hourly Usage for All Units (hrs)	Criteria PollutantsTotal Emissions (tons)					GHG Total Emissions (metric tons)		
					ROG	CO	NO_x	SO_2	PM	CO_2	CH_4	CO_2e
All Construction Activities	Vibratory Post Driver	100-175	Diesel	4,050	0.213	1.042	2.295	0.004	0.101	303	0.0	303
	Crawler Tractors/Dozer	100-175	Diesel	500	0.047	0.160	0.346	0.000	0.021	26	0.0	26
	Excavators	175-300	Diesel	200	0.015	0.056	0.115	0.000	0.006	11	0.0	11
	Forklifts/Aerial Lifts/ Booms	50-100	Diesel	6,000	0.206	0.696	1.548	0.002	0.084	148	0.0	148
	Generator/Compressor	5 -- 15	Diesel	4,000	0.034	0.145	0.231	0.000	0.014	19	0.0	19
	Graders	175-300	Diesel	80	0.007	0.025	0.057	0.000	0.003	5	0.0	5
	Rollers/Compactors	100-175	Diesel	500	0.029	0.105	0.194	0.000	0.014	15	0.0	15
	Scrapers	175-300	Diesel	40	0.006	0.025	0.058	0.000	0.003	5	0.0	5
	Tractors/Loaders/Backhoes	100-175	Diesel	160	0.008	0.031	0.054	0.000	0.004	5	0.0	5
	Vibratory Plate (hand held)	10-15	Diesel	40	0.000	0.001	0.001	0.000	0.000	0	0.0	0
	TOTAL				**0.57**	**2.29**	**4.90**	**0.01**	**0.25**	**536**	**0.046**	**537**

Notes:
(a) Composite emission factors recommended by the South Coast Air Management District were used per equipment, except for Generator/Compressor (maximum hp 15).

Table 5-A
Daily Emissions for Diesel Non-Road Equipment - Phase I
West Chocolate Mountains Solar PV Development

Construction Phase	Equipment Type	Equipment Engine Size (hp) [a]	Fuel Type	Total Hourly Usage for All Units (hrs)	Estimated daily usage [b] (hrs/day)	Criteria PollutantsTotal Emissions (lbs/day)					GHG Total Emissions (lbs/day)	
						ROG	CO	NO_x	SO_2	PM	CO_2	CH_4
All Construction Activities	Vibratory Post Driver	100-175	Diesel	4,050	17	1.776	8.684	19.122	0.029	0.841	2782	0.160
	Crawler Tractors/Dozer	100-175	Diesel	500	2	0.388	1.335	2.886	0.003	0.178	238	0.035
	Excavators	175-300	Diesel	200	1	0.124	0.465	0.958	0.001	0.053	100	0.011
	Forklifts/Aerial Lifts/ Booms	50-100	Diesel	6,000	25	1.714	5.798	12.902	0.015	0.702	1360	0.155
	Generator/Compressor	5 -- 15	Diesel	4,000	17	0.287	1.209	1.923	0.003	0.115	170	0.026
	Graders	175-300	Diesel	80	3	0.551	2.020	4.588	0.005	0.241	425	0.050
	Rollers/Compactors	100-175	Diesel	500	20	2.353	8.424	15.497	0.015	1.094	1341	0.212
	Scrapers	175-300	Diesel	40	2	0.512	1.988	4.653	0.004	0.201	420	0.046
	Tractors/Loaders/Backhoes	100-175	Diesel	160	1	0.068	0.262	0.450	0.001	0.035	45	0.006
	Vibratory Plate (hand held)	10 -- 15	Diesel	40	2	0.008	0.042	0.051	0.000	0.002	7	0.001
	TOTAL					**7.8**	**30.2**	**63.0**	**0.1**	**3.5**	**6,886**	**0.702**

Notes:
(a) Composite emission factors recommended by the South Coast Air Management District were used per equipment, except for Generator/Compressor (maximum hp 15).
(b) Daily usage is estimated per a composite number of equipment and based on a 240 days of total construction period.
Exception on daily usage assumption includes graders, scrapers, vibratory plates and roller/compactors, since the grading activities are intended to have a 25-day duration.

Table 5-B
Daily Emissions for Diesel Non-Road Equipment - Phase II
West Chocolate Mountains Solar PV Development

Construction Phase	Equipment Type	Equipment Engine Size (hp) [a]	Fuel Type	Total Hourly Usage for All Units (hrs)	Estimated daily usage [b] (hrs/day)	Criteria PollutantsTotal Emissions (lbs/day)					GHG Total Emissions (lbs/day)	
						ROG	CO	NO_x	SO_2	PM	CO_2	CH_4
All Construction Activities	Vibratory Post Driver	100-175	Diesel	4,050	17	1.776	8.684	19.122	0.029	0.841	2781.90	0.160
	Crawler Tractors/Dozer	100-175	Diesel	500	2	0.388	1.335	2.886	0.003	0.178	237.54	0.035
	Excavators	175-300	Diesel	200	1	0.124	0.465	0.958	0.001	0.053	99.65	0.011
	Forklifts/Aerial Lifts/ Booms	50-100	Diesel	6,000	25	1.714	5.798	12.902	0.015	0.702	1359.89	0.155
	Generator/Compressor	5-15	Diesel	4,000	17	0.287	1.209	1.923	0.003	0.115	170.13	0.026
	Graders	175-300	Diesel	80	3	0.551	2.020	4.588	0.005	0.241	424.78	0.050
	Rollers/Compactors	100-175	Diesel	500	20	2.353	8.424	15.497	0.015	1.094	1341.05	0.212
	Scrapers	175-300	Diesel	40	2	0.512	1.988	4.653	0.004	0.201	419.998	0.046
	Tractors/Loaders/Backhoes	100-175	Diesel	160	1	0.068	0.262	0.450	0.001	0.035	44.54	0.006
	Vibratory Plate (hand held)	10-15	Diesel	40	2	0.008	0.042	0.051	0.000	0.002	6.902	0.001
	TOTAL					**7.8**	**30.2**	**63.0**	**0.1**	**3.5**	**6,886**	**0.702**

Notes: Construction of Phase II is assumed to have the same duration and equipment/vehicle list as Phase I
(a) Composite emission factors recommended by the South Coast Air Management District were used per equipment, except for Generator/Compressor (maximum hp 15).
(b) Daily usage is estimated per a composite number of equipment and based on a 240 days of total construction period, except for gradind equipment (25 days).
Exception on daily usage assumption includes graders, scrapers, vibratory plates and roller/compactors.

Table 6

On-Road Vehicle Usage Phases I and II

West Chocolate Mountains Solar PV Development

Phase I

Vehicle Type	Construction Phase	Vehicle Description	Vehicle Class	Total Working Hours	Total Working Days	Working hours per day	Estimated speed (mph)	Total Daily VMT All Units (VMT/day)			Total Overall VMT of All Units (VMT)		
								Unpaved Roads	Paved Roads	TOTAL	Unpaved Roads	Paved Roads	TOTAL
Heavy Duty Diesel Truck	All	Dump Truck	HDDV6	120	240	0.5	25	2.5	10	13	600	2,400	3,000
		Concrete Truck	HDDV6	120	240	0.5	25	2.5	10	13	600	2,400	3,000
		Tender Truck	HDDV6	120	240	0.5	25	2.5	10	13	600	2,400	3,000
		Highway Tractor	HDDV6	80	240	0.3	25	1.7	7	8	400	1,600	2,000
		Flatbed Truck	HDDV3	1000	240	4.2	25	20.8	83	104	5,000	20,000	25,000
		Water Truck	HDDV6	1000	240	4.2	25	20.8	83	104	5,000	20,000	25,000
	Subtotal	-		-	-	-	-	**51**	**203**	**254**	**12,200**	**48,800**	**61,000**

Phase II

Vehicle Type	Construction Phase	Vehicle Description	Vehicle Class	Total Working Hours	Total Working Days	Working hours per day	Estimated speed (mph)	Total Daily VMT All Units (VMT/day)			Total Overall VMT of All Units (VMT)		
								Unpaved Roads	Paved Roads	TOTAL	Unpaved Roads	Paved Roads	TOTAL
Heavy Duty Diesel Truck	All	Dump Truck	HDDV6	120	240	0.5	25	2.5	10	13	600	2,400	3,000
		Concrete Truck	HDDV6	120	240	0.5	25	2.5	10	13	600	2,400	3,000
		Tender Truck	HDDV6	120	240	0.5	25	2.5	10	13	600	2,400	3,000
		Highway Tractor	HDDV6	80	240	0.3	25	1.7	7	8	400	1,600	2,000
		Flatbed Truck	HDDV3	1000	240	4.2	25	20.8	83	104	5,000	20,000	25,000
		Water Truck	HDDV6	1000	240	4.2	25	20.8	83	104	5,000	20,000	25,000
	Subtotal	-		-	-	-	-	**51**	**203**	**254**	**12,200**	**48,800**	**61,000**

Notes: Construction of Phase II is assumed to have the same duration and equipment/vehicle list as Phase I

Table 7
On-Road Vehicle Exhaust Emission Factors
West Chocolate Mountains Solar PV Development

Equipment Type	Emission Factor[a] (pounds/VMT)							
	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH_4
Heavy Duty Diesel Trucks	0.003042	0.011955	0.038221	0.000041	0.001831	0.001601	4.211206	0.000142
Light Duty Trucks	0.002590	0.01844	0.02062	0.0000270	0.0007512	0.0006243	2.732	0.0001258
Gasoline Passenger Vehicles	0.0009140	0.00826	0.0009181	0.00001077	0.00008698	0.00005478	1.096	0.00008146
ATVs	0.0046270	0.10146	0.0009048	0.00010582	0.00014550	0.00014550	0.517	0.00000000

Notes:

a. Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks. SCAQMD (Scenario Year: 2010).

Table 8-A

Total and Daily Exhaust Emissions for On Road Vehicles - Phase I

West Chocolate Mountains Solar PV Development

Total Emissions

Vehicle Type	Total Overall Miles Travelled (VMT)	Total Emissions (tons)						Total Emissions (metric tons)	
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Heavy Duty Diesel Trucks	61,000	0.09	0.36	1.17	0.00	0.06	0.05	117	0
Total	**-**	**0.09**	**0.36**	**1.17**	**0.00**	**0.06**	**0.05**	**117**	**0**

Daily Emissions

Vehicle Type	Total Overall Miles Travelled (VMT)	Total Emissions (lbs/day)							
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Heavy Duty Diesel Trucks	61,000	1	3	10	0.01	0.5	0.4	1070	0.04
Total	**-**	**1**	**3**	**10**	**0.01**	**0.5**	**0.4**	**1070**	**0.04**

Table 8-B
Total and Daily Exhaust Emissions for On Road Vehicles - Phase II
West Chocolate Mountains Solar PV Development

Total Emissions

Vehicle Type	Total Overall Miles Travelled (VMT)	Total Emissions (tons)						Total Emissions (metric tons)	
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Heavy Duty Diesel Trucks	61,000	0.09	0.36	1.17	0.00	0.06	0.05	117	0
Total	**-**	**0.09**	**0.36**	**1.17**	**0.00**	**0.06**	**0.05**	**117**	**0**

Daily Emissions

Vehicle Type	Total Overall Miles Travelled (VMT)	Total Emissions (lbs/day)							
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Heavy Duty Diesel Trucks	61,000	1	3	10	0	0	0	1070	0
Total	**-**	**1**	**3**	**10**	**0**	**0**	**0**	**1070**	**0**

Notes: Construction of Phase II is assumed to have the same duration and equipment/vehicle list as Phase I

Table 9-A
Fugitve Dust Emissions - Construction Site - Phase I
West Chocolate Mountains Solar PV Development

Construction Activity	Average Daily Disturbance (acres)	Duration of Activity (months)	Emission Factor[a] (ton/acre/month)		Emissions (tons)		Daily Emissions (lbs/day)	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Site Clearing and Grading	7.2	0.83	0.090	0.0126	0.54	0.08	43	6
Access Roads	1.4	0.17	0.090	0.0126	0.02	0.00	8.4	1.2
Switchyard	0.0006	0.17	0.090	0.0126	0.00	0.00	0.0	0.0
Underground Power Line	0.1667	1	0.090	0.0126	0.02	0.00	1.0	0.1
Control/Maintenance Building	0.0001	4	0.090	0.0126	0.00	0.00	0.00	0.00
Parking / Laydown Area	0.1	0.17	0.090	0.0126	0.00	0.00	0.00	0.00
Total	**-**	**-**	**-**	**-**	**0.58**	**0.08**	**53**	**7**

Notes:
a. See emission factor derivation table below.
b. Total site area for Phase I: 516 acres. Total duration of grading: 25 days.

Emission Factor Derivation Table

Parameter	Units	TSP[1]	PM_{10}[(2)]	$PM_{2.5}$[(3)]
Uncontrolled Emission Factor[1] (based on 30 days/month)	ton/acre/month	0.2	0.15	0.021
Controlled Emission Factor[5] (based on 24 days/month)	ton/acre/month	0.12	0.090	0.0126

Notes:
1. Emission factor from AP-42 Section 13.2.3 for TSP.
2. PM_{10} emission factor calculated by multiplying TSP emission factor by 0.75 (AP-42 Section 11.9, Table 11.9-1)
3. $PM_{2.5}$ emission factor calculated by multiplying TSP emission factor by 0.105 (AP-42 Section 11.9, Table 11.9-1)
4. Calculated by multiplying 30-day emission factor by 0.8 (24 days/ 30 days).
4. Assume dust 40% duct control factor based on as-needed watering. Does not include any control for winter conditions.

Table 9-B
Fugitve Dust Emissions - Construction Site - Phase II
West Chocolate Mountains Solar PV Development

Construction Activity	Average Daily Disturbance (acres)	Duration of Activity (months)	Emission Factor[a] (ton/acre/month)		Emissions (tons)		Daily Emissions (lbs/day)	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Site Clearing and Grading	9.6	0.83	0.090	0.0126	0.72	0.10	58	8
Switchyard	0.0006	0.17	0.090	0.0126	0.00	0.00	0.0	0.0
Underground Power Line	0.1667	1	0.090	0.0126	0.02	0.00	1.0	0.1
Parking / Laydown Area	0.1	0.17	0.090	0.0126	0.00	0.00	0.00	0.00
Total	**-**	**-**	**-**	**-**	**0.74**	**0.10**	**59**	**8**

Notes:
a. See emission factor derivation table below.
b. Total solar array area for Phase II: 140 acres (Per POD description). Total duration of grading: 25 days.

Emission Factor Derivation Table

Parameter	Units	TSP[1]	PM_{10}[(2)]	$PM_{2.5}$[(3)]
Uncontrolled Emission Factor[1] (based on 30 days/month)	ton/acre/month	0.2	0.15	0.021
Controlled Emission Factor[5] (based on 24 days/month)	ton/acre/month	0.12	0.090	0.0126

Notes:
1. Emission factor from AP-42 Section 13.2.3 for TSP.
2. PM_{10} emission factor calculated by multiplying TSP emission factor by 0.75 (AP-42 Section 11.9, Table 11.9-1)
3. $PM_{2.5}$ emission factor calculated by multiplying TSP emission factor by 0.105 (AP-42 Section 11.9, Table 11.9-1)
4. Calculated by multiplying 30-day emission factor by 0.8 (24 days/ 30 days).
4. Assume dust 40% duct control factor based on as-needed watering. Does not include any control for winter conditions (frozen ground)

Table 10
Fugitive Dust Emission Factors - Roads

Unpaved Roads - Emission Factor Derivation

$E = k(s/12)^a(W/3)^b$ AP-42 Section 13.2.2 (11/06 version)

where:

E = particulate emission factor (lb/VMT)
k, a, b = empirical constants for industrial roads
s = surface material silt content (%)
W = average vehicle weight (tons)

Parameter	Units	PM_{10}	$PM_{2.5}$	Reference
Mean Vehicle Weight	**tons**	12	12	Assumption
Constant, k	lb/VMT	1.5	0.15	Table 13.2.2-2 (worst case)
Constant, a		0.9	0.9	Table 13.2.2-2 (worst case)
Constant, b		0.45	0.45	Table 13.2.2-2 (worst case)
Silt content, s	%	8.5	8.5	Table 13.2..2-1 (construction sites)
Uncontrolled Emission factor, E	**lb/VMT**	**2.05**	**0.205**	**Calculation**
Control Efficiency for Watering	%	0.65	0.65	Assumption
Controlled Emission factor, E	**lb/VMT**	**0.72**	**0.072**	**Calculation**

Paved Roads - Emission Factor Derivation Table

$E = (k(sL/2)^{0.65}(W/3)^{1.5}-C)$ AP-42 Section 13.2.1 (11/06 version)

where:

E = particulate emission factor (lb/VMT)
k = particle size multiplier
sL = road surface silt loading (g/m^2)
W = average vehicle weight (tons)
C = emission factor for 1980's vehicle fleet exhaust, break wear and tire wear

Parameter	Units	PM_{10}	$PM_{2.5}$	Reference
Mean Vehicle Weight	tons	12	12	Assumption
k factor	lb/VMT	0.016	0.0024	Table 13.2-1.1
Silt Loading, sL	g/m^2	0.6	0.6	Table 13.2.1-3
Emission factor, C	lb/VMT	0.00047	0.00036	Table 13.2.1-2
Uncontrolled Emission factor, E	**lb/VMT**	**0.05805**	**0.008419**	**Calculation**

Table 11-A
Fugitive Dust Emissions from Road (Site and Off-Site) - Phase I

Total Emissions

			Emissions (tons)					
	Total Overall VMT (VMT)		Unpaved Roads		Paved Roads		All Roads	
Fuel Type	**Paved Roads**	**Unpaved Roads**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Heavy Duty Diesel Trucks	12,200	48,800	4.382	0.438	1.42	0.205	5.80	0.644
Total	**-**	**-**	**4.4**	**0.4**	**1.4**	**0.21**	**5.8**	**0.64**

Daily Emissions

			Emissions (lbs/day)					
	Total Overall VMT (VMT)		Unpaved Roads		Paved Roads		All Roads	
Fuel Type	**Paved Roads**	**Unpaved Roads**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Heavy Duty Diesel Trucks	12,200	48,800	36.5	3.7	11.8	1.7	48.3	5.4
Total	**-**	**-**	**36.7**	**3.7**	**11.9**	**1.7**	**48.5**	**5.4**

Table 11-B
Fugitive Dust Emissions from Road (Site and Off-Site) - Phase II

Total Emissions

			Emissions (tons)					
	Total Overall VMT (VMT)		Unpaved Roads		Paved Roads		All Roads	
Fuel Type	**Paved Roads**	**Unpaved Roads**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Heavy Duty Diesel Trucks	12,200	48,800	4.382	0.438	1.42	0.205	5.80	0.644
Total	**-**	**-**	**4.4**	**0.4**	**1.4**	**0.21**	**5.8**	**0.64**

Daily Emissions

			Emissions (lbs/day)					
	Total Overall VMT (VMT)		Unpaved Roads		Paved Roads		All Roads	
Fuel Type	**Paved Roads**	**Unpaved Roads**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**
Heavy Duty Diesel Trucks	12,200	48,800	36.5	3.7	11.8	1.7	48.3	5.4
Total	**-**	**-**	**36.7**	**3.7**	**11.9**	**1.7**	**48.5**	**5.4**

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SCAB Fleet Average Emission Factors (Diesel)

EF-OFFROAD

Air Basin	SC

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	**MaxHP**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**
Aerial Lifts	15	0.0104	0.0529	0.0662	0.0001	0.0037	8.7	0.0009
	25	0.0210	0.0577	0.1013	0.0001	0.0065	11.0	0.0019
	50	0.0756	0.1937	0.1984	0.0003	0.0189	19.6	0.0068
	120	0.0702	0.2501	0.4502	0.0004	0.0361	38.1	0.0063
	500	0.1506	0.5801	1.9198	0.0021	0.0598	213	0.0136
	750	0.2803	1.0486	3.5605	0.0039	0.1096	385	0.0253
Aerial Lifts Composite		0.0670	0.2093	0.3600	0.0004	0.0248	34.7	0.0060
Air Compressors	15	0.0144	0.0513	0.0838	0.0001	0.0061	7.2	0.0013
	25	0.0325	0.0847	0.1397	0.0002	0.0098	14.4	0.0029
	50	0.1163	0.2813	0.2386	0.0003	0.0265	22.3	0.0105
	120	0.1014	0.3351	0.5977	0.0006	0.0545	47.0	0.0091
	175	0.1274	0.5113	1.0082	0.0010	0.0568	88.5	0.0115
	250	0.1225	0.3413	1.3983	0.0015	0.0462	131	0.0111
	500	0.1943	0.6778	2.2062	0.0023	0.0752	232	0.0175
	750	0.3054	1.0476	3.5002	0.0036	0.1179	358	0.0276
	1000	0.5203	1.8591	6.0195	0.0049	0.1809	486	0.0469
Air Compressors Composite		0.1120	0.3613	0.7320	0.0007	0.0526	63.6	0.0101
Bore/Drill Rigs	15	0.0120	0.0632	0.0754	0.0002	0.0031	10.3	0.0011
	25	0.0196	0.0660	0.1257	0.0002	0.0065	16.0	0.0018
	50	0.0545	0.2505	0.2820	0.0004	0.0194	31.0	0.0049
	120	0.0722	0.4812	0.6155	0.0009	0.0456	77.1	0.0065
	175	0.0930	0.7543	0.9148	0.0016	0.0481	141	0.0084
	250	0.0957	0.3460	1.1847	0.0021	0.0384	188	0.0086
	500	0.1488	0.5566	1.7054	0.0031	0.0614	311	0.0134
	750	0.2996	1.0997	3.4821	0.0062	0.1231	615	0.0270
	1000	0.5360	1.7074	8.3092	0.0093	0.2078	928	0.0484
Bore/Drill Rigs Composite		0.1052	0.5146	1.1331	0.0017	0.0498	165	0.0095
Cement and Mortar Mixers	15	0.0079	0.0388	0.0505	0.0001	0.0029	6.3	0.0007
	25	0.0346	0.0942	0.1633	0.0002	0.0107	17.6	0.0031
Cement and Mortar Mixers Composite		0.0101	0.0434	0.0599	0.0001	0.0035	7.2	0.0009
Concrete/Industrial Saws	25	0.0200	0.0678	0.1279	0.0002	0.0063	16.5	0.0018
	50	0.1231	0.3210	0.3070	0.0004	0.0301	30.2	0.0111
	120	0.1342	0.4976	0.8601	0.0009	0.0719	74.1	0.0121
	175	0.1927	0.8786	1.6459	0.0018	0.0864	160	0.0174
Concrete/Industrial Saws Composite		0.1270	0.4273	0.6566	0.0007	0.0552	58.5	0.0115
Cranes	50	0.1284	0.3166	0.2547	0.0003	0.0289	23.2	0.0116
	120	0.1117	0.3723	0.6542	0.0006	0.0602	50.1	0.0101
	175	0.1211	0.4880	0.9302	0.0009	0.0538	80.3	0.0109
	250	0.1243	0.3464	1.2372	0.0013	0.0470	112	0.0112
	500	0.1821	0.6625	1.7722	0.0018	0.0685	180	0.0164
	750	0.3082	1.1113	3.0564	0.0030	0.1166	303	0.0278
	9999	1.0894	4.1317	12.1879	0.0098	0.3792	971	0.0983
Cranes Composite		0.1594	0.5431	1.4515	0.0014	0.0642	129	0.0144
Crawler Tractors	50	0.1446	0.3520	0.2780	0.0003	0.0320	24.9	0.0131
	120	0.1551	0.5018	0.9038	0.0008	0.0819	65.8	0.0140
	175	0.1941	0.7597	1.4788	0.0014	0.0856	121	0.0175
	250	0.2051	0.5743	1.9440	0.0019	0.0784	166	0.0185

SCAB Fleet Average Emission Factors (Diesel)

EF-OFFROAD

Air Basin	SC

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	**MaxHP**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**
	500	0.2913	1.1931	2.7255	0.0025	0.1101	259	0.0263
	750	0.5240	2.1290	4.9881	0.0047	0.1989	465	0.0473
	1000	0.7980	3.3726	8.5998	0.0066	0.2810	658	0.0720
Crawler Tractors Composite		0.1861	0.6409	1.3854	0.0013	0.0854	114	0.0168
Crushing/Proc. Equipment	50	0.2271	0.5592	0.4700	0.0006	0.0520	44.0	0.0205
	120	0.1760	0.5956	1.0382	0.0010	0.0960	83.1	0.0159
	175	0.2367	0.9736	1.8607	0.0019	0.1068	167	0.0214
	250	0.2243	0.6225	2.5465	0.0028	0.0841	245	0.0202
	500	0.3091	1.0542	3.4510	0.0037	0.1187	374	0.0279
	750	0.4956	1.6226	5.6506	0.0059	0.1900	589	0.0447
	9999	1.3820	4.8014	16.0752	0.0131	0.4812	1,308	0.1247
Crushing/Proc. Equipment Composite		0.2152	0.7260	1.4394	0.0015	0.0935	132	0.0194
Dumpers/Tenders	25	0.0108	0.0336	0.0645	0.0001	0.0036	7.6	0.0010
Dumpers/Tenders Composite		0.0108	0.0336	0.0645	0.0001	0.0036	7.6	0.0010
Excavators	25	0.0199	0.0677	0.1261	0.0002	0.0057	16.4	0.0018
	50	0.1131	0.3145	0.2638	0.0003	0.0276	25.0	0.0102
	120	0.1398	0.5318	0.8402	0.0009	0.0781	73.6	0.0126
	175	0.1465	0.6701	1.1143	0.0013	0.0663	112	0.0132
	250	0.1451	0.3934	1.4935	0.0018	0.0519	159	0.0131
	500	0.1984	0.6161	1.9285	0.0023	0.0711	234	0.0179
	750	0.3313	1.0196	3.3023	0.0039	0.1198	387	0.0299
Excavators Composite		0.1483	0.5581	1.1502	0.0013	0.0638	120	0.0134
Forklifts	50	0.0666	0.1824	0.1530	0.0002	0.0163	14.7	0.0060
	120	0.0601	0.2243	0.3497	0.0004	0.0342	31.2	0.0054
	175	0.0738	0.3306	0.5540	0.0006	0.0337	56.1	0.0067
	250	0.0652	0.1707	0.7163	0.0009	0.0227	77.1	0.0059
	500	0.0868	0.2343	0.8909	0.0011	0.0307	111	0.0078
Forklifts Composite		0.0686	0.2319	0.5161	0.0006	0.0281	54.4	0.0062
Generator Sets	15	0.0172	0.0726	0.1154	0.0002	0.0069	10.2	0.0016
	25	0.0300	0.1033	0.1705	0.0002	0.0107	17.6	0.0027
	50	0.1117	0.2904	0.3070	0.0004	0.0284	30.6	0.0101
	120	0.1395	0.5054	0.9075	0.0009	0.0714	77.9	0.0126
	175	0.1672	0.7471	1.4780	0.0016	0.0721	142	0.0151
	250	0.1618	0.5018	2.0720	0.0024	0.0618	213	0.0146
	500	0.2305	0.8858	2.9974	0.0033	0.0917	337	0.0208
	750	0.3838	1.4300	4.9646	0.0055	0.1502	544	0.0346
	9999	1.0080	3.6008	12.1384	0.0105	0.3600	1,049	0.0909
Generator Sets Composite		0.0961	0.3293	0.6440	0.0007	0.0396	61.0	0.0087
Graders	50	0.1400	0.3584	0.2961	0.0004	0.0323	27.5	0.0126
	120	0.1553	0.5459	0.9268	0.0009	0.0849	75.0	0.0140
	175	0.1743	0.7409	1.3532	0.0014	0.0783	124	0.0157
	250	0.1761	0.4934	1.7904	0.0019	0.0662	172	0.0159
	500	0.2149	0.7523	2.1198	0.0023	0.0807	229	0.0194
	750	0.4580	1.5877	4.6098	0.0049	0.1729	486	0.0413
Graders Composite		0.1723	0.6314	1.4338	0.0015	0.0753	133	0.0155
Off-Highway Tractors	120	0.2457	0.7439	1.4200	0.0011	0.1255	93.7	0.0222
	175	0.2326	0.8561	1.7665	0.0015	0.1014	130	0.0210

SCAB Fleet Average Emission Factors (Diesel)

EF-OFFROAD

Air Basin	SC

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	**MaxHP**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**
	250	0.1881	0.5347	1.7050	0.0015	0.0735	130	0.0170
	750	0.7400	3.5496	6.8440	0.0057	0.2854	568	0.0668
	1000	1.1197	5.5155	11.4633	0.0082	0.4009	814	0.1010
Off-Highway Tractors Composite		0.2368	0.8385	1.9897	0.0017	0.0974	151	0.0214
Off-Highway Trucks	175	0.1732	0.7625	1.2796	0.0014	0.0771	125	0.0156
	250	0.1639	0.4301	1.6150	0.0019	0.0574	167	0.0148
	500	0.2492	0.7542	2.3188	0.0027	0.0872	272	0.0225
	750	0.4069	1.2210	3.8814	0.0044	0.1436	442	0.0367
	1000	0.6440	2.0615	7.3260	0.0063	0.2219	625	0.0581
Off-Highway Trucks Composite		0.2480	0.7429	2.3885	0.0027	0.0875	260	0.0224
Other Construction Equipment	15	0.0118	0.0617	0.0737	0.0002	0.0030	10.1	0.0011
	25	0.0162	0.0545	0.1039	0.0002	0.0053	13.2	0.0015
	50	0.1033	0.2930	0.2787	0.0004	0.0263	28.0	0.0093
	120	0.1320	0.5419	0.8649	0.0009	0.0740	80.9	0.0119
	175	0.1168	0.5901	0.9927	0.0012	0.0543	107	0.0105
	500	0.1705	0.6068	1.9821	0.0025	0.0678	254	0.0154
Other Construction Equipment Composite		0.1056	0.4108	1.0117	0.0013	0.0442	123	0.0095
Other General Industrial Equipmen	15	0.0066	0.0391	0.0466	0.0001	0.0017	6.4	0.0006
	25	0.0186	0.0632	0.1177	0.0002	0.0054	15.3	0.0017
	50	0.1281	0.3073	0.2413	0.0003	0.0285	21.7	0.0116
	120	0.1459	0.4647	0.8218	0.0007	0.0795	62.0	0.0132
	175	0.1516	0.5816	1.1364	0.0011	0.0676	95.9	0.0137
	250	0.1400	0.3676	1.5016	0.0015	0.0509	136	0.0126
	500	0.2500	0.8031	2.6018	0.0026	0.0919	265	0.0226
	750	0.4153	1.3236	4.4083	0.0044	0.1538	437	0.0375
	1000	0.6374	2.2063	7.1530	0.0056	0.2212	560	0.0575
Other General Industrial Equipmen Composite		0.1847	0.5948	1.6649	0.0016	0.0740	152	0.0167
Other Material Handling Equipmen	50	0.1773	0.4246	0.3355	0.0004	0.0395	30.3	0.0160
	120	0.1417	0.4524	0.8014	0.0007	0.0772	60.7	0.0128
	175	0.1914	0.7367	1.4429	0.0014	0.0856	122	0.0173
	250	0.1481	0.3917	1.6024	0.0016	0.0542	145	0.0134
	500	0.1782	0.5784	1.8750	0.0019	0.0660	192	0.0161
	9999	0.8390	2.9174	9.4509	0.0073	0.2912	741	0.0757
Other Material Handling Equipment Composite		0.1773	0.5556	1.6150	0.0015	0.0715	141	0.0160
Pavers	25	0.0278	0.0845	0.1603	0.0002	0.0092	18.7	0.0025
	50	0.1624	0.3860	0.3110	0.0004	0.0356	28.0	0.0147
	120	0.1638	0.5223	0.9693	0.0008	0.0853	69.2	0.0148
	175	0.2049	0.7959	1.6028	0.0014	0.0903	128	0.0185
	250	0.2426	0.7011	2.3337	0.0022	0.0953	194	0.0219
	500	0.2622	1.1661	2.5319	0.0023	0.1023	233	0.0237
Pavers Composite		0.1774	0.5644	0.9868	0.0009	0.0709	77.9	0.0160
Paving Equipment	25	0.0155	0.0521	0.0993	0.0002	0.0051	12.6	0.0014
	50	0.1384	0.3277	0.2654	0.0003	0.0303	23.9	0.0125
	120	0.1282	0.4084	0.7600	0.0006	0.0668	54.5	0.0116
	175	0.1599	0.6208	1.2577	0.0011	0.0704	101	0.0144
	250	0.1506	0.4363	1.4619	0.0014	0.0592	122	0.0136
Paving Equipment Composite		0.1336	0.4478	0.8963	0.0008	0.0629	68.9	0.0121

SCAB Fleet Average Emission Factors (Diesel)

EF-OFFROAD

Air Basin	SC

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	**MaxHP**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**
Plate Compactors	15	0.0050	0.0263	0.0317	0.0001	0.0015	4.3	0.0005
Plate Compactors Composite		0.0050	0.0263	0.0317	0.0001	0.0015	4.3	0.0005
Pressure Washers	15	0.0083	0.0348	0.0553	0.0001	0.0033	4.9	0.0007
	25	0.0122	0.0419	0.0691	0.0001	0.0043	7.1	0.0011
	50	0.0413	0.1143	0.1388	0.0002	0.0115	14.3	0.0037
	120	0.0388	0.1487	0.2674	0.0003	0.0193	24.1	0.0035
Pressure Washers Composite		0.0199	0.0666	0.0989	0.0001	0.0070	9.4	0.0018
Pumps	15	0.0148	0.0528	0.0862	0.0001	0.0062	7.4	0.0013
	25	0.0439	0.1142	0.1884	0.0002	0.0133	19.5	0.0040
	50	0.1339	0.3428	0.3479	0.0004	0.0333	34.3	0.0121
	120	0.1441	0.5136	0.9216	0.0009	0.0744	77.9	0.0130
	175	0.1709	0.7489	1.4815	0.0016	0.0742	140	0.0154
	250	0.1593	0.4846	1.9941	0.0023	0.0609	201	0.0144
	500	0.2450	0.9411	3.1080	0.0034	0.0973	345	0.0221
	750	0.4167	1.5559	5.2721	0.0057	0.1631	571	0.0376
	9999	1.3269	4.8008	15.8590	0.0136	0.4723	1,355	0.1197
Pumps Composite		0.0936	0.3096	0.5545	0.0006	0.0393	49.6	0.0084
Rollers	15	0.0074	0.0386	0.0461	0.0001	0.0019	6.3	0.0007
	25	0.0164	0.0551	0.1049	0.0002	0.0054	13.3	0.0015
	50	0.1270	0.3169	0.2753	0.0003	0.0292	26.0	0.0115
	120	0.1201	0.4177	0.7383	0.0007	0.0641	59.0	0.0108
	175	0.1478	0.6270	1.2022	0.0012	0.0659	108	0.0133
	250	0.1542	0.4540	1.6232	0.0017	0.0603	153	0.0139
	500	0.1987	0.7785	2.0882	0.0022	0.0783	219	0.0179
Rollers Composite		0.1176	0.4212	0.7749	0.0008	0.0547	67.1	0.0106
Rough Terrain Forklifts	50	0.1590	0.4186	0.3558	0.0004	0.0377	33.9	0.0143
	120	0.1213	0.4447	0.7326	0.0007	0.0676	62.4	0.0109
	175	0.1640	0.7302	1.2875	0.0014	0.0749	125	0.0148
	250	0.1523	0.4270	1.6632	0.0019	0.0567	171	0.0137
	500	0.2097	0.6871	2.1987	0.0025	0.0788	257	0.0189
Rough Terrain Forklifts Composite		0.1272	0.4766	0.7988	0.0008	0.0678	70.3	0.0115
Rubber Tired Dozers	175	0.2398	0.8686	1.7881	0.0015	0.1036	129	0.0216
	250	0.2776	0.7758	2.4482	0.0021	0.1071	183	0.0250
	500	0.3621	1.7411	3.2071	0.0026	0.1370	265	0.0327
	750	0.5457	2.6075	4.9024	0.0040	0.2071	399	0.0492
	1000	0.8464	4.1786	8.4813	0.0060	0.3018	592	0.0764
Rubber Tired Dozers Composite		0.3379	1.4127	2.9891	0.0025	0.1288	239	0.0305
Rubber Tired Loaders	25	0.0206	0.0697	0.1314	0.0002	0.0064	16.9	0.0019
	50	0.1560	0.4005	0.3333	0.0004	0.0361	31.1	0.0141
	120	0.1206	0.4268	0.7227	0.0007	0.0660	58.9	0.0109
	175	0.1476	0.6326	1.1513	0.0012	0.0664	106	0.0133
	250	0.1493	0.4210	1.5357	0.0017	0.0563	149	0.0135
	500	0.2172	0.7648	2.1684	0.0023	0.0819	237	0.0196
	750	0.4484	1.5625	4.5660	0.0049	0.1700	486	0.0405
	1000	0.6154	2.2308	7.1368	0.0060	0.2156	594	0.0555
Rubber Tired Loaders Composite		0.1440	0.5078	1.1537	0.0012	0.0651	109	0.0130
Scrapers	120	0.2236	0.7169	1.3034	0.0011	0.1177	93.9	0.0202

SCAB Fleet Average Emission Factors (Diesel)

EF-OFFROAD

Air Basin	SC

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	**MaxHP**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**
	175	0.2391	0.9290	1.8284	0.0017	0.1053	148	0.0216
	250	0.2618	0.7368	2.4818	0.0024	0.1006	209	0.0236
	500	0.3650	1.5182	3.4250	0.0032	0.1386	321	0.0329
	750	0.6328	2.6115	6.0373	0.0056	0.2413	555	0.0571
Scrapers Composite		0.3202	1.2424	2.9078	0.0027	0.1256	262	0.0289
Signal Boards	15	0.0072	0.0377	0.0450	0.0001	0.0017	6.2	0.0006
	50	0.1492	0.3827	0.3689	0.0005	0.0364	36.2	0.0135
	120	0.1495	0.5380	0.9446	0.0009	0.0792	80.2	0.0135
	175	0.1907	0.8437	1.6203	0.0017	0.0846	155	0.0172
	250	0.2049	0.6138	2.5094	0.0029	0.0789	255	0.0185
Signal Boards Composite		0.0224	0.0953	0.1615	0.0002	0.0091	16.7	0.0020
Skid Steer Loaders	25	0.0249	0.0700	0.1252	0.0002	0.0079	13.8	0.0022
	50	0.0785	0.2507	0.2463	0.0003	0.0217	25.5	0.0071
	120	0.0607	0.2822	0.4131	0.0005	0.0355	42.8	0.0055
Skid Steer Loaders Composite		0.0692	0.2489	0.2919	0.0004	0.0252	30.3	0.0062
Surfacing Equipment	50	0.0589	0.1520	0.1451	0.0002	0.0142	14.1	0.0053
	120	0.1192	0.4334	0.7683	0.0007	0.0624	63.8	0.0108
	175	0.1071	0.4787	0.9169	0.0010	0.0472	85.8	0.0097
	250	0.1254	0.3883	1.3783	0.0015	0.0494	135	0.0113
	500	0.1854	0.7785	2.0517	0.0022	0.0741	221	0.0167
	750	0.2960	1.2171	3.2929	0.0035	0.1173	347	0.0267
Surfacing Equipment Composite		0.1550	0.6164	1.5685	0.0017	0.0606	166	0.0140
Sweepers/Scrubbers	15	0.0124	0.0729	0.0870	0.0002	0.0033	11.9	0.0011
	25	0.0239	0.0808	0.1524	0.0002	0.0075	19.6	0.0022
	50	0.1508	0.3893	0.3297	0.0004	0.0355	31.6	0.0136
	120	0.1490	0.5329	0.8645	0.0009	0.0843	75.0	0.0134
	175	0.1856	0.8049	1.4276	0.0016	0.0854	139	0.0167
	250	0.1344	0.3643	1.5598	0.0018	0.0489	162	0.0121
Sweepers/Scrubbers Composite		0.1548	0.5380	0.8473	0.0009	0.0686	78.5	0.0140
Tractors/Loaders/Backhoes	25	0.0214	0.0681	0.1317	0.0002	0.0072	15.9	0.0019
	50	0.1257	0.3548	0.3114	0.0004	0.0312	30.3	0.0113
	120	0.0910	0.3623	0.5664	0.0006	0.0515	51.7	0.0082
	175	0.1216	0.5881	0.9646	0.0011	0.0562	101	0.0110
	250	0.1418	0.4037	1.5493	0.0019	0.0523	172	0.0128
	500	0.2630	0.8495	2.7242	0.0039	0.0980	345	0.0237
	750	0.3986	1.2725	4.2276	0.0058	0.1496	517	0.0360
Tractors/Loaders/Backhoes Composite		0.1021	0.3930	0.6747	0.0008	0.0521	66.8	0.0092
Trenchers	15	0.0099	0.0517	0.0617	0.0001	0.0023	8.5	0.0009
	25	0.0400	0.1355	0.2555	0.0004	0.0125	32.9	0.0036
	50	0.1837	0.4365	0.3620	0.0004	0.0405	32.9	0.0166
	120	0.1509	0.4840	0.9082	0.0008	0.0776	64.9	0.0136
	175	0.2254	0.8843	1.7973	0.0016	0.0990	144	0.0203
	250	0.2770	0.8161	2.6802	0.0025	0.1103	223	0.0250
	500	0.3468	1.6352	3.4013	0.0031	0.1373	311	0.0313
	750	0.6586	3.0677	6.5218	0.0059	0.2602	587	0.0594
Trenchers Composite		0.1675	0.4907	0.7598	0.0007	0.0637	58.7	0.0151
Welders	15	0.0124	0.0441	0.0720	0.0001	0.0052	6.2	0.0011

SCAB Fleet Average Emission Factors (Diesel)

EF-OFFROAD

Air Basin	SC

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	**MaxHP**	**ROG**	**CO**	**NOX**	**SOX**	**PM**	**CO2**	**CH4**
	25	0.0254	0.0661	0.1091	0.0001	0.0077	11.3	0.0023
	50	0.1231	0.3025	0.2724	0.0003	0.0287	26.0	0.0111
	120	0.0807	0.2738	0.4899	0.0005	0.0428	39.5	0.0073
	175	0.1333	0.5515	1.0896	0.0011	0.0590	98.2	0.0120
	250	0.1052	0.3022	1.2367	0.0013	0.0400	119	0.0095
	500	0.1327	0.4823	1.5648	0.0016	0.0520	168	0.0120
Welders Composite		0.0805	0.2246	0.2920	0.0003	0.0270	25.6	0.0073

Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

Vehicle Class:
Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and extracting the **Heavy-Heavy-Duty Diesel Truck (HHDT)** Emission Factors.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle/emission categories listed in the tables below, by use of the following equation:

Emissions (pounds per day) = N x TL x EF

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

The **HHDT-DSL** vehicle/emission category accounts for all emissions from heavy-heavy-duty diesel trucks, including start, running and idling exhaust. In addition, ROG emission factors account for diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors account for tire and brake wear.

The **HHDT-DSL, Exh** vehicle/emission category includes only the exhaust portion of PM10 & PM2.5 emissions from heavy-heavy-duty diesel trucks.

Scenario Year: **2007**
All model years in the range 1965 to 2007

HHDT-DSL (pounds/mile)	
CO	0.01446237
NOx	0.04718166
ROG	0.00372949
SOx	0.00003962
PM10	0.00230900
PM2.5	0.00204018
CO2	4.22184493

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00216752
PM2.5	0.00199491

Scenario Year: **2008**
All model years in the range 1965 to 2008

HHDT-DSL (pounds/mile)	
CO	0.01361368
NOx	0.04458017
ROG	0.00351579
SOx	0.00004136
PM10	0.00215635
PM2.5	0.00189990
CO2	4.21067145
CH4	0.00016269

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00201296
PM2.5	0.00185303

Scenario Year: **2009**
All model years in the range 1965 to 2009

HHDT-DSL (pounds/mile)	
CO	0.01282236
NOx	0.04184591
ROG	0.00329320
SOx	0.00004013
PM10	0.00199572
PM2.5	0.00175227
CO2	4.21080792
CH4	0.00015249

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00185393
PM2.5	0.00170680

Scenario Year: **2010**
All model years in the range 1966 to 2010

CO	0.01195456
NOx	0.03822102
ROG	0.00304157
SOx	0.00004131
PM10	0.00183062
PM2.5	0.00160083
CO2	4.21120578
CH4	0.00014201

PM10	0.00168861
PM2.5	0.00155435

Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

Vehicle Class:
Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

Scenario Year: **2011**
All model years in the range 1967 to 2011

HHDT-DSL (pounds/mile)	
CO	0.01112463
NOx	0.03455809
ROG	0.00279543
SOx	0.00003972
PM10	0.00166087
PM2.5	0.00144489
CO2	4.22045680
CH4	0.00012910

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00151936
PM2.5	0.00139772

Scenario Year: **2012**
All model years in the range 1968 to 2012

HHDT-DSL (pounds/mile)	
CO	0.01021519
NOx	0.03092379
ROG	0.00252764
SOx	0.00004042
PM10	0.00149566
PM2.5	0.00129354
CO2	4.21590774
CH4	0.00011651

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00135537
PM2.5	0.00124837

Scenario Year: **2013**
All model years in the range 1969 to 2013

HHDT-DSL (pounds/mile)	
CO	0.00931790
NOx	0.02742935
ROG	0.00226308
SOx	0.00004086
PM10	0.00133697
PM2.5	0.00114629
CO2	4.21518556
CH4	0.00010441

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00119623
PM2.5	0.00109863

Scenario Year: **2014**
All model years in the range 1970 to 2014

HHDT-DSL (pounds/mile)	
CO	0.00846435
NOx	0.02418049
ROG	0.00201594
SOx	0.00004092
PM10	0.00118458
PM2.5	0.00100582
CO2	4.21279345
CH4	0.00009261

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00104243
PM2.5	0.00096059

Scenario Year: **2015**
All model years in the range 1971 to 2015

HHDT-DSL (pounds/mile)	
CO	0.00766891
NOx	0.02122678
ROG	0.00178608
SOx	0.00004082
PM10	0.00104715
PM2.5	0.00087977
CO2	4.20902225
CH4	0.00008369

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00090631
PM2.5	0.00083282

Scenario Year: **2016**
All model years in the range 1972 to 2016

HHDT-DSL (pounds/mile)	
CO	0.00704604
NOx	0.01887374
ROG	0.00161035
SOx	0.00003952
PM10	0.00094448
PM2.5	0.00078443
CO2	4.21063031
CH4	0.00007508

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00080419
PM2.5	0.00073898

Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

Vehicle Class:
Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

Scenario Year: **2017**
All model years in the range 1973 to 2017

CO	0.00650533
NOx	0.01690387
ROG	0.00145203
SOx	0.00004033
PM10	0.00084894
PM2.5	0.00069721
CO2	4.20820129
CH4	0.00006722

PM10	0.00070873
PM2.5	0.00065111

Scenario Year: **2018**
All model years in the range 1974 to 2018

CO	0.00604721
NOx	0.01526414
ROG	0.00131697
SOx	0.00003934
PM10	0.00076808
PM2.5	0.00062383
CO2	4.20756838
CH4	0.00006182

PM10	0.00062758
PM2.5	0.00057700

Scenario Year: **2019**
All model years in the range 1975 to 2019

PM10	0.00056085
PM2.5	0.00051320

Scenario Year: **2020**
All model years in the range 1976 to 2020

CO	0.00532242
NOx	0.01274755
ROG	0.00110621
SOx	0.00003957
PM10	0.00064574
PM2.5	0.00050904
CO2	4.20541416
CH4	0.00005216

PM10	0.00050364
PM2.5	0.00046227

Scenario Year: **2021**
All model years in the range 1977 to 2021

CO	0.00503726
NOx	0.01179977
ROG	0.00103095
SOx	0.00004033
PM10	0.00059437
PM2.5	0.00046287
CO2	4.21495573
CH4	0.00004734

PM10	0.00045411
PM2.5	0.00041729

Scenario Year: **2022**
All model years in the range 1978 to 2022

CO	0.00478830
NOx	0.01098794
ROG	0.00096142
SOx	0.00004106
PM10	0.00055427
PM2.5	0.00042597
CO2	4.21520828
CH4	0.00004448

PM10	0.00041399
PM2.5	0.00037807

Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

Vehicle Class:
Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

Scenario Year: **2023**
All model years in the range 1979 to 2023

CO	0.00457902
NOx	0.01031407
ROG	0.00090210
SOx	0.00004009
PM10	0.00052122
PM2.5	0.00039592
CO2	4.21483461
CH4	0.00004176

PM10	0.00037922
PM2.5	0.00034915

Scenario Year: **2024**
All model years in the range 1980 to 2024

CO	0.00444444
NOx	0.00974372
ROG	0.00084009
SOx	0.00003930
PM10	0.00050766
PM2.5	0.00038320
CO2	4.19552935
CH4	0.00003930

PM10	0.00036682
PM2.5	0.00033735

Scenario Year: **2025**
All model years in the range 1981 to 2025

CO	0.00431086
NOx	0.00932573
ROG	0.00080206
SOx	0.00004018
PM10	0.00048541
PM2.5	0.00036326
CO2	4.19512979
CH4	0.00003697

PM10	0.00034397
PM2.5	0.00031664

Scenario Year: **2026**
All model years in the range 1982 to 2026

CO	0.00420297
NOx	0.00898990
ROG	0.00077178
SOx	0.00003946
PM10	0.00046717
PM2.5	0.00034564
CO2	4.19349747
CH4	0.00003630

PM10	0.00032670
PM2.5	0.00029830

Appendix C
Emission Calculations for Operation and Maintenance Activities
West Chocolate Mountains Solar PV Development

Table No.	Table Description
Table C1	Summary of Operational Emissions per 50-MW Solar PV plant
Table C2	Criteria Pollutants Emissions from Operations and Maintenance
Table C3	Fugitive Dust Emission Factors - Roads
Table C4	Fugitive Dust Emissions from Road
Table C5	GHG Emissions from Operation and Maintenance Activities

Table C1

Summary of Operational Emissions per 50-MW Solar PV plant

West Chocolate Mountains Solar PV Development

Estimation per year

Emission Type	Source	Emissions (tons/year)						GHG Emissions (metric tons/year)
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Exhaust Emissions	Heavy Duty Diesel Truck	0.000	0.001	0.001	0.005	0.000	0.000	0.5
	ATVs	17	371	3.312	0.387	0.533	0.533	0.9
Fugitive Dust Emissions	Roads	-	-	-	-	0.136	0.014	-
Subtotal		**16.9**	**371.3**	**3.3**	**0.4**	**0.7**	**0.5**	**1.3**

Estimation per day

Emission Type	Source	Emissions (tons/day)					
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Exhaust Emissions	Heavy Duty Diesel Truck	0.0001	0.0004	0.0011	0.0000	0.0001	0.0000
	ATVs	0.0004	0.0091	0.0001	0.0000	0.0000	0.0000
Fugitive Dust Emissions	Roads	-	-	-	-	0.0104	0.0011
Subtotal per day		**0.001**	**0.009**	**0.001**	**0.000**	**0.011**	**0.001**

Estimation for the first year (125 days of operations)

Emission Type	Source	Emissions (tons/year)					
		ROG	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Exhaust Emissions	Heavy Duty Diesel Truck	0.01	0.04	0.14	0.00	0.01	0.01
	ATVs	0.05	1.14	0.01	0.00	0.00	0.00
Fugitive Dust Emissions	Roads	-	-	-	-	1.31	0.13
Subtotal first yeat of operations		**0.06**	**1.19**	**0.15**	**0.00**	**1.31**	**0.14**

Table C2
Criteria Pollutants Emissions from Operations and Maintenance
West Chocolate Mountains Solar PV Development

Solar Panel Cleaning and Array Inspection (Quarterly)

Project Component	Vehicle Type	No. of Units	Weekly (days/wk)	Annual (wk/yr)	Vehicle Mileage		
					Daily per Vehicle (VMT/day)	Total Daily (VMT/day)	Total Annual (VMT/yr)
Solar PV Field	Water Truck	1	1	4	60	60	240
Solar PV Field	All-Terrain Vehicle	2	1	4	60	120	480
					-	-	-

Notes:

Vehicles Mile Traveled estimated as 60 miles per roundtrip, considering an average distance from the closest cities (Barstow, Victorville and Hesperia) to the project site.

Number of Vehicles estimated based on similar Solar PV projects

Inverter and Switchyard maintenance

Project Component	Vehicle Type	No. of Units	Weekly (days/wk)	Annual (wk/yr)	Vehicle Mileage		
					Vehicle (VMT/day)	Total Daily (VMT/day)	Total Annual (VMT/yr)
Mechanical Inspection	All-Terrain Vehicle	1	1	52	60	60	3120
Electrical Inspection	All-Terrain Vehicle	1	1	1	60	60	60
					-	-	-

Notes:

The inverter mechanical maintenance is conducted monthly and consists of: inspection of intake air ducts, cooling fans, and refrigeration units.

Electrical inspections are conducted yearly and consists of: inspection of seals, electrical connections (torque setting), and transformer and/or inductor enclosure.

Number of Vehicles estimated based on similar Solar PV projects

Emission Calculations

Pollutant	Water Truck Emission Factor[a] (lb/VMT)	ATV Emission Factor[b] (lb/VMT)	Daily Emissions (lbs/day)			Annual Emissions (tons/yr)		
			Truck Operations	ATV Operations	TOTAL	Truck Operations	ATV Operations	TOTAL
ROG	0.003042	0.0046270	0.2	0.8	1.0	0.0004	16.9	16.9
CO	0.011955	0.10146	0.7	18.3	19.0	0.0014	371.3	371
NOx	0.038221	0.0009048	2.3	0.2	2.5	0.0046	3.3	3.3
SOx	0.000041	0.00010582	0.0	0.0	0.0	0.0000	0.4	0.4
PM10	0.001831	0.00014550	0.1	0.0	0.1	0.0002	0.5	0.5
PM2.5	0.001601	0.00014550	0.1	0.0	0.1	0.0002	0.5	0.5

Notes:

a. South Coast Air Quality Management District (SCAQMD). 2008. Spreadsheet onroadEF07_26.xls.

b. Emission factors for ATVs from EPA's NONROAD model.

Table C3
Fugitive Dust Emission Factors - Roads

Unpaved Roads - Emission Factor Derivation

$E = k(s/12)^a(W/3)^b$ AP-42 Section 13.2.2 (11/06 version)

where:

E = particulate emission factor (lb/VMT)
k, a, b = empirical constants for industrial roads
s = surface material silt content (%)
W = average vehicle weight (tons)

Parameter	Units	PM_{10}	$PM_{2.5}$	Reference
Mean Vehicle Weight	**tons**	2	2	Assumption
Constant, k	lb/VMT	1.5	0.15	Table 13.2.2-2 (worst case)
Constant, a		0.9	0.9	Table 13.2.2-2 (worst case)
Constant, b		0.45	0.45	Table 13.2.2-2 (worst case)
Silt content, s	%	8.5	8.5	Table 13.2..2-1 (construction sites)
Uncontrolled Emission factor, E	**lb/VMT**	**0.92**	**0.092**	**Calculation**
Control Efficiency for Watering	%	0.65	0.65	Assumption
Controlled Emission factor, E	**lb/VMT**	**0.32**	**0.032**	**Calculation**

Paved Roads - Emission Factor Derivation Table

$E = (k(sL/2)^{0.65}(W/3)^{1.5}-C)$ AP-42 Section 13.2.1 (11/06 version)

where:

E = particulate emission factor (lb/VMT)
k = particle size multiplier
sL = road surface silt loading (g/m^2)
W = average vehicle weight (tons)
C = emission factor for 1980's vehicle fleet exhaust, break wear and tire wear

Parameter	Units	PM_{10}	$PM_{2.5}$	Reference
Mean Vehicle Weight	tons	3	3	Assumption
k factor	lb/VMT	0.016	0.0024	Table 13.2-1.1
Silt Loading, sL	g/m^2	0.6	0.6	Table 13.2.1-3
Emission factor, C	lb/VMT	0.00047	0.00036	Table 13.2.1-2
Uncontrolled Emission factor, E	**lb/VMT**	**0.00685**	**0.000737**	**Calculation**

Table C4
Fugitive Dust Emissions from Road

Annual Emissions

Fuel Type	Total VMT/year		Emissions (tons/year)					
			Unpaved Roads		Paved Roads		All Roads	
	Paved Roads	Unpaved Roads	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Heavy Duty Diesel Truck	192	48	0.008	0.001	0.001	0.000	0.01	0.001
ATVs	2,928	732	0.12	0.012	0.010	0.001	0.13	0.01
Total	**-**	**-**	**0.0077**	**0.0008**	**0.0007**	**0.0001**	**0.136**	**0.014**

Daily Emissions

Fuel Type	Total VMT/day		Emissions (tons/day)					
			Unpaved Roads		Paved Roads		All Roads	
	Paved Roads	Unpaved Roads	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Heavy Duty Diesel Truck	48	12	0.002	0.0002	0.0002	0.000	0.002	0.000
ATVs	192	48	0.008	0.001	0.001	0.0001	0.008	0.001
Total	**-**	**-**	**0.0019**	**0.0002**	**0.0002**	**0.0000**	**0.010**	**0.001**

Table C5
GHG Emissions from Operation and Maintenance Activities
Lucerne Valley Solar Project

GHG Emissions Estimation for Operation and Maintenance Activities

Emission Type	GHG	Emission Factors [a,b,c]	Emission Factor Units	Annual Emissions (lbs/yr)	Annual Emissions (tonnes/yr)	Global Warming Potential	Annual Emissions [as CO2-eq] (tonnes/yr)
Water Truck Emissions (Maintenance Activities)	CO2	4.211	lb/VMT	1,011	0.5	1	0.5
	CH4	0.000142	lb/VMT	0.034	0.00002	23	0.0
ATVs Emissions (Maintenance Activities)	CO2	0.516610	lb/VMT	1,891	0.9	1	0.9
	CH4	0.000000	lb/VMT	0	0.0	23	0.0
Electrical Consumption	CO2	0.724120	lb/kWh			1	
	CH4	0.000030	lb/kWh			23	
SF6 Leakage	SF6	0.50%	% per year per capacity			23,900	
Refrigerant Leakage	TBD	0.50%	% per year per capacity			TBD	
TOTAL	**-**	**-**	**-**	**-**	**-**	**-**	**1.3**

Notes:

a. South Coast Air Quality Management District (SCAQMD). 2008. Spreadsheet onroad EF07_26.xls: "Highest (Most Conservative) EMFAC2007 (version 2.3) Emission Factor for On-Road Passenger Vehicles & Delivery Trucks". Downloaded from SCAQMD Website.

b. U.S. Environmental Protection Agency (EPA). 2009. eGrid2007 Version 1.1 Year 2005 GHG Annual Output Emission Rates (California). Downloaded from www.epa.gov/egrid

c. Emission factors for ATVs from EPA's NONROAD model.

Equipment Type	Emission Factor[a,b] (pounds/VMT)							
	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4
Heavy Duty Diesel Trucks	0.003042	0.011955	0.038221	0.000041	0.001831	0.001601	4.211206	0.000142
Light Duty Trucks	0.002590	0.01844	0.02062	0.0000270	0.0007512	0.0006243	2.732	0.0001258
Gasoline Passenger Vehicles	0.0009140	0.00826	0.0009181	0.00001077	0.00008698	0.00005478	1.096	0.00008146
ATVs	0.0046270	0.10146	0.0009048	0.00010582	0.00014550	0.00014550	0.517	0.00000000

Notes:

a. Emission factors for trucks and vehicles from SCAQMD file "onroadEF07_26.xls".

b. Emission factors for ATVs from EPA's NONROAD model.

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Appendix E

Interim Visual Resource Management Classification West Chocolate Mountains Imperial County, California

Visual Resource Inventory

Bureau of Land Management
El Centro Field Office

September, 2010

Visual Resource Inventory

Prepared for the

U.S. Department of the Interior

Bureau of Land Management

El Centro Field Office

El Centro, California

September, 2010

Prepared by

Otak, Inc.

Mission Statement

It is the mission of the Bureau of Land Management
to sustain the health, diversity, and productivity
of the public lands for the use and enjoyment of
present and future generations.

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1. Introduction

The El Centro Field Office (ECFO) lies in southeastern California's Great Basin area (Map 1-1), and includes San Diego and Imperial Counties. The ECFO is responsible for managing more than 1.4 million acres of public lands within the planning area, which encompasses more than 2 million acres of federal, state, Tribal, and private lands (Map 1-2). The entire Field Office is within the California Desert Conservation Area.

Notable areas within the Field Office boundary include:

- Imperial Sand Dunes Recreation Area, the largest mass of sand dunes in California that extend for more than 40 miles approximately 10 miles west of Yuma, Arizona;
- Plank Road, a small remnant of the "floating" wooden road constructed across the sand dunes in the early 20th century and the Salton Sea, a 376-square-mile body of water that occupies the Salton Sink approximately 25 miles north of El Centro, California;
- Anza-Borrego Desert State Park and Wilderness, the largest state park in California located in the western portion of the Field Office;
- Cleveland National Forest, the southernmost national forest in California consisting of 460,000 acres in the southwestern portion of the Field Office; and
- Pilot Knob, a popular Long-Term Visitor Area and site of General Patton's military training camps for World War II.

Several military bases are located throughout the Field Office, including the El Centro Naval Air Facility and the Chocolate Mountain Aerial Gunnery Range.

Major cities situated within the Field Office boundary include El Centro, Brawley, Salton City, Julian, and Borrego Springs. Interstate Highway 8 runs east–west through the southern portion of the Field Office area connecting Yuma with San Diego. State Highway 78 runs east-west through the central portion of the Field Office area connecting Blythe and Julian, and continuing west to the Pacific Coast. State Highway 111 runs north from the Mexican border through El Centro and continuing to Mecca, California.

Several Scenic Byways and Historic Trails cross the western portion of the Field Office. These include: Sunrise Scenic Byway, State Route 78-Anza Borrego State Park Scenic Route, Pacific Crest National Scenic Trail, and Juan Bautista de Anza National Historic Trail. The Bradshaw National Backcountry Byway runs east-west through a small section of the northeastern corner of the Field Office.

The central part of the Field Office is primarily private agricultural land and has several population centers, including Brawly and El Centro. The eastern portion of the Field Office is sparsely populated and consists of basin and range land types. The western portion of the Field Office transitions from the agriculture land to the Peninsular Mountain Ranges which run north-south along the western edge of the Field Office. The

Devil's Canyon

transition from agricultural land to mountain ranges consists mainly of basin and range and Peninsular foothill land types.

The topography within the ECFO is varied and ranges from a low point at the Salton Sea with an elevation of approximately 277 feet below mean sea level to mountain peaks with heights reaching 1,000 to 2,500 feet above mean sea level in the eastern portion of the Field Office to mountain peaks with heights of approximately 3,000 to 6,000 feet in the western portion of the Field Office. The highest peak is Cuyapaipe Mountain at 6,378 feet which is located near the unincorporated community of Mount Laguna on the eastern edge of the Cleveland National Forest.

The principal mountain ranges in the Field Office are part of the Peninsular Ranges and consist of the Laguna, In-Ko-Pah, Jacumba, Chocolate, and Palo Verde Mountains. These mountains generally run in a north-south direction and are plutonic (granite) rocks that formed from the cooling of molten magmas deep within the earth's crust during subduction of the oceanic crustal plate converging with the North American plate. Intense heat associated with the development of the plutonic rocks metamorphosed the ancient sedimentary rocks into marble, slate, schist, quartzite, and gneiss. Over time, erosion has exposed the various rock types creating interesting visual effects. The eastern edges of the In-Ko-Pah and Laguna Mountains provide excellent views of the broad valleys to the east.

The broad valleys of the basin-and-range landscape trend generally north-south and can extend for more than 50 miles along this axis with a typical width of approximately 15 miles. Typically these valleys are defined by low, rolling hills to gently sloping landforms incised by washes. Their broad widths and lengths afford panoramic vistas of the adjacent mountain ranges. In addition to the mountain ranges, prominent visible geologic features include the Imperial Sand Dunes and the Salton Sea.

Imperial Sand Dunes

Vegetation types vary greatly throughout the Field Office with a concentration of produce and citrus agriculture land in the central Imperial Valley which runs north-south for the entire width of the Field office and encompasses the Salton Sea. The valleys in the southeastern portion of the Field Office are predominately a mixture of creosote bush and brittlebrush. The valleys in the northeastern portion of the Field Office and on the west side of the Imperial Valley leading up to the mountain ranges are slightly higher in elevation and as such the vegetation increases to include creosote bush, brittlebrush, cholla, ocotillo, barrel cactus, and yucca. In the washes that cut through the valleys, vegetation increases in density and size and includes catclaw acacia, smoke tree, palo verde, ironwood, and mesquite as well as more shrubs, perennials, and grasses. Mountain ranges introduce alpine tree, shrub, and perennial species such as pine, spruce, oak, juniper, white fir, and alpine grasses, perennials, and flowers. The variety of texture, color, and form can be visually interesting especially in mountain ranges where the forest contrasts with open rangeland and alpine meadows.

The BLM has basic stewardship responsibilities to identify and protect visual values on all public lands. In order to accomplish this, the BLM is directed to prepare and maintain an inventory of visual values on a continuing basis. This document provides complete visual resource inventory information.

Senator Wash Hills

Visual Resource Inventory Overview

The Visual Resource Inventory is a process to determine visual (scenic) values within the Field Office at a specific point in time. Visual Resource Inventories are conducted according to the guidelines in BLM Manual Handbook H-8410-1 – Visual Resource Inventory.

There are three primary components to a visual resource inventory.

- Scenic Quality Evaluation
- Sensitivity Level Analysis
- Delineation of Distance Zones

Based on these three factors, BLM-administered lands are placed into one of four Visual Resource Inventory Classes which represent the relative value of the visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV represents the least value.

Class I is assigned to areas where a management decision has been made to maintain a natural landscape and is generally assigned to special areas such as national wilderness and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape. Without the special area designation, it is not possible for lands to rate as Class I through the inventory process.

Visual Resource Inventory Classes

Visual resource *inventory* classes are assigned through the inventory process. They are informational in nature and provide the basis for considering visual values in the Visual Resource Management (RMP) process. They do not establish management direction and should not be used as a basis for constraining or encouraging surface-disturbing activities. They are considered the baseline data for existing conditions.

Visual Resource Management Classes and Objectives

Visual resource *management* classes are assigned for all BLM-administered lands through the RMP process. The assignment of visual management classes is ultimately based on the management decisions made in RMPs, which must take into consideration the value of visual resources. During the RMP process, inventory class boundaries can be adjusted as necessary to reflect resource allocation decisions made in RMPs.

For example, a landscape may be rated as Class III during the inventory process, but may be designated as Class IV through the RMP process to provide for development activities which require major modification of the existing character of the landscape.

The following Visual Resource Management Objectives have been established for each class in the BLM Manual Handbook H-8410-1 – Visual Resource Inventory:

- **Class I**—The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

- **Class II**—The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class III**— The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- **Class IV**—The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Inventory Lands

BLM-administered public lands often occur in areas with mixed land-ownership patterns. The ECFO administers areas with mixed ownership that may include BLM, state, private, Forest Service, Bureau of Reclamation, National Park Service (NPS), and Tribal lands among others. Split-estate lands that have private surface ownership and federal subsurface minerals management are included in the inventory because the BLM may administer the mineral rights.

Designated Wilderness Areas are automatically assigned to Class I and were not included in the inventory process. However, Wilderness Study Areas (WSAs) are under consideration for suitability for designation as wilderness areas and are rated because WSA status is temporary and may be changed with Congressional action.

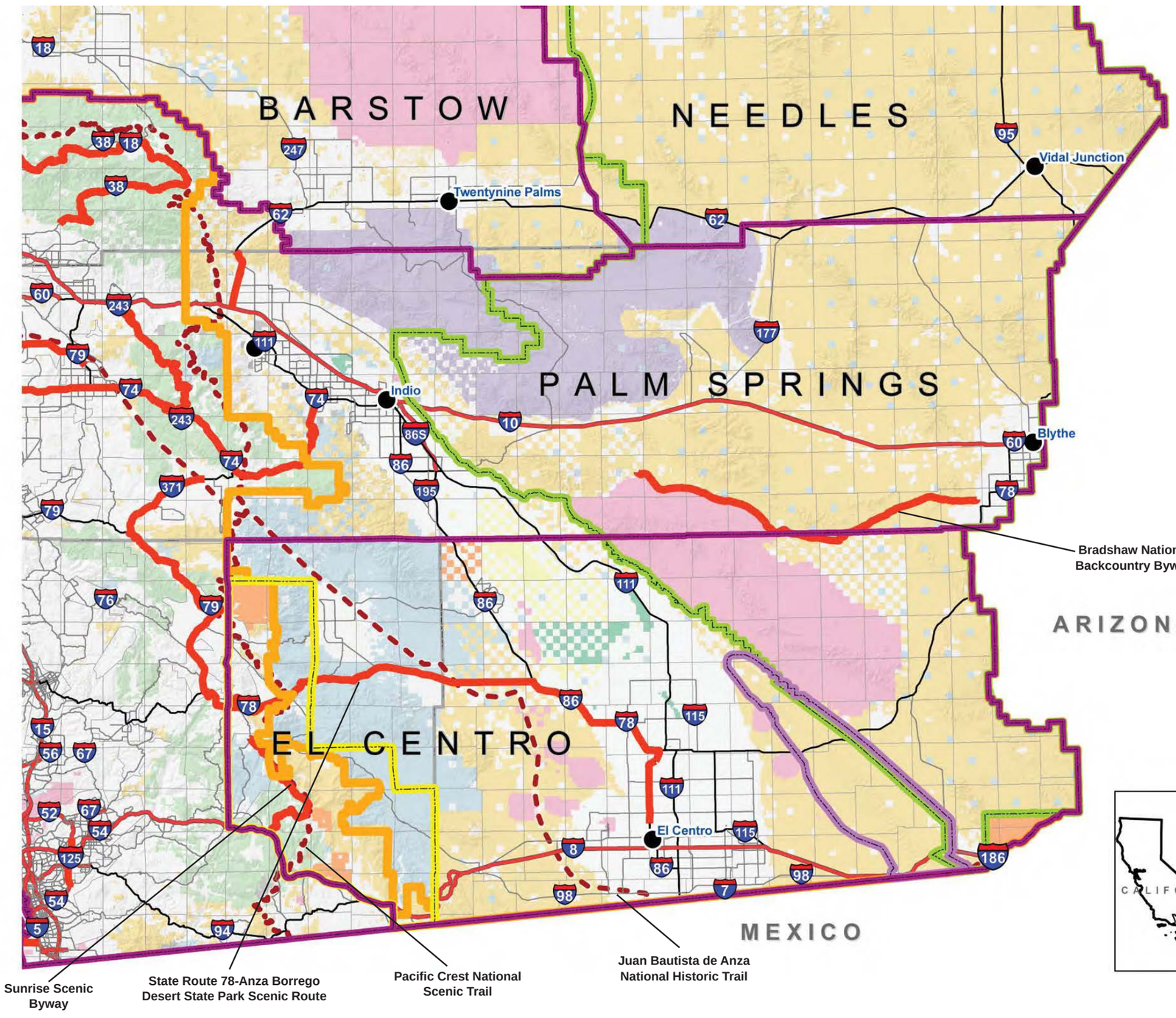
Some areas in the ECFO were not included in this inventory and are labeled as NR or "Not Rated" on the inventory maps. They include Bureau of Reclamation, military and Tribal lands, Anza-Borrego Desert State Park, and the Cleveland National Forest.

In addition, large areas of private surface and private minerals, such as the Imperial Valley, are not inventoried because the BLM does not have jurisdiction over these lands.

While the inventory is done on a landscape basis, the inventory results and the subsequent Visual Resource Management Objectives established in the RMP apply only to BLM-administered lands.

Cargo Muchacho Mountains

Map 1-1
Field Office Location



- Field Office Boundary
- California Desert NCA
- East San Diego Planning Area Boundary
- Imperial Sand Dunes Planning Area Boundary
- Northern and Eastern Colorado Desert Planning Area
- Bureau of Indian Affairs
- Bureau of Land Management
- US Forest Service
- National Park Service
- Bureau of Reclamation
- US Fish and Wildlife Service
- Military
- Other Federal
- State
- County/State/Regional
- Private/Other
- Major Road
- Scenic Byway
- Historic/Scenic Trail

0 5 10 20
Miles

N W E S

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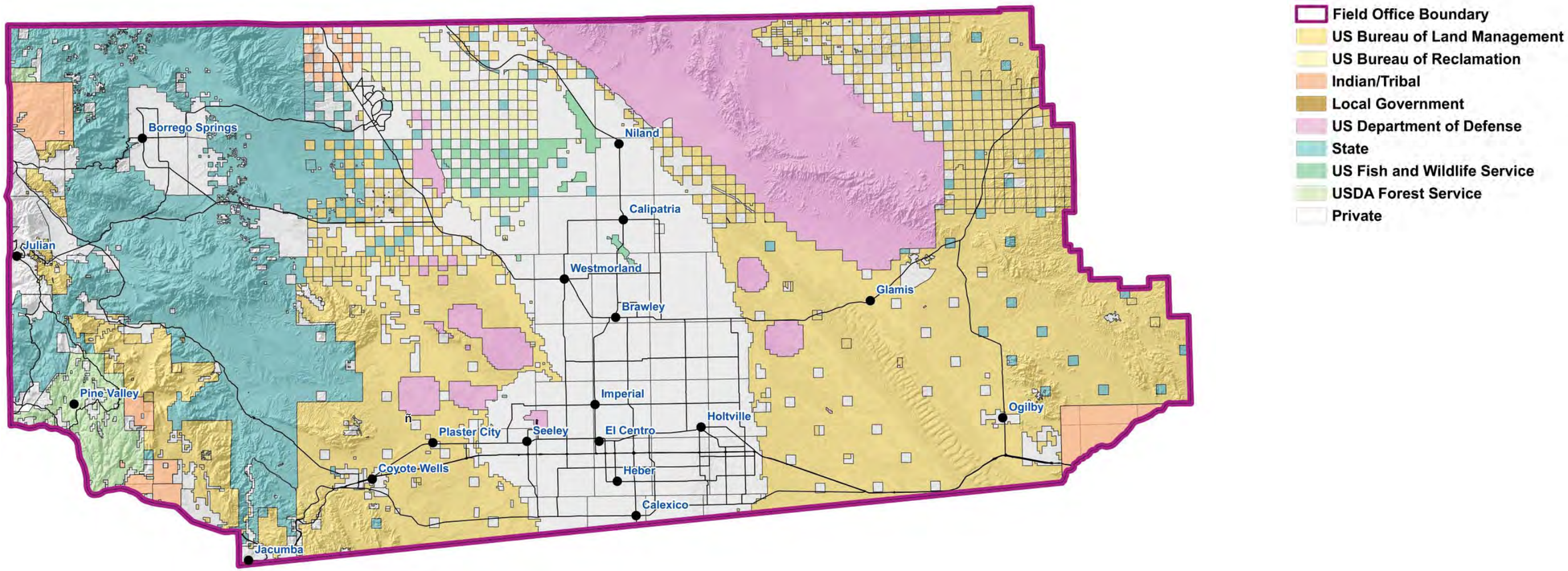
Map 1-2
Land Ownership



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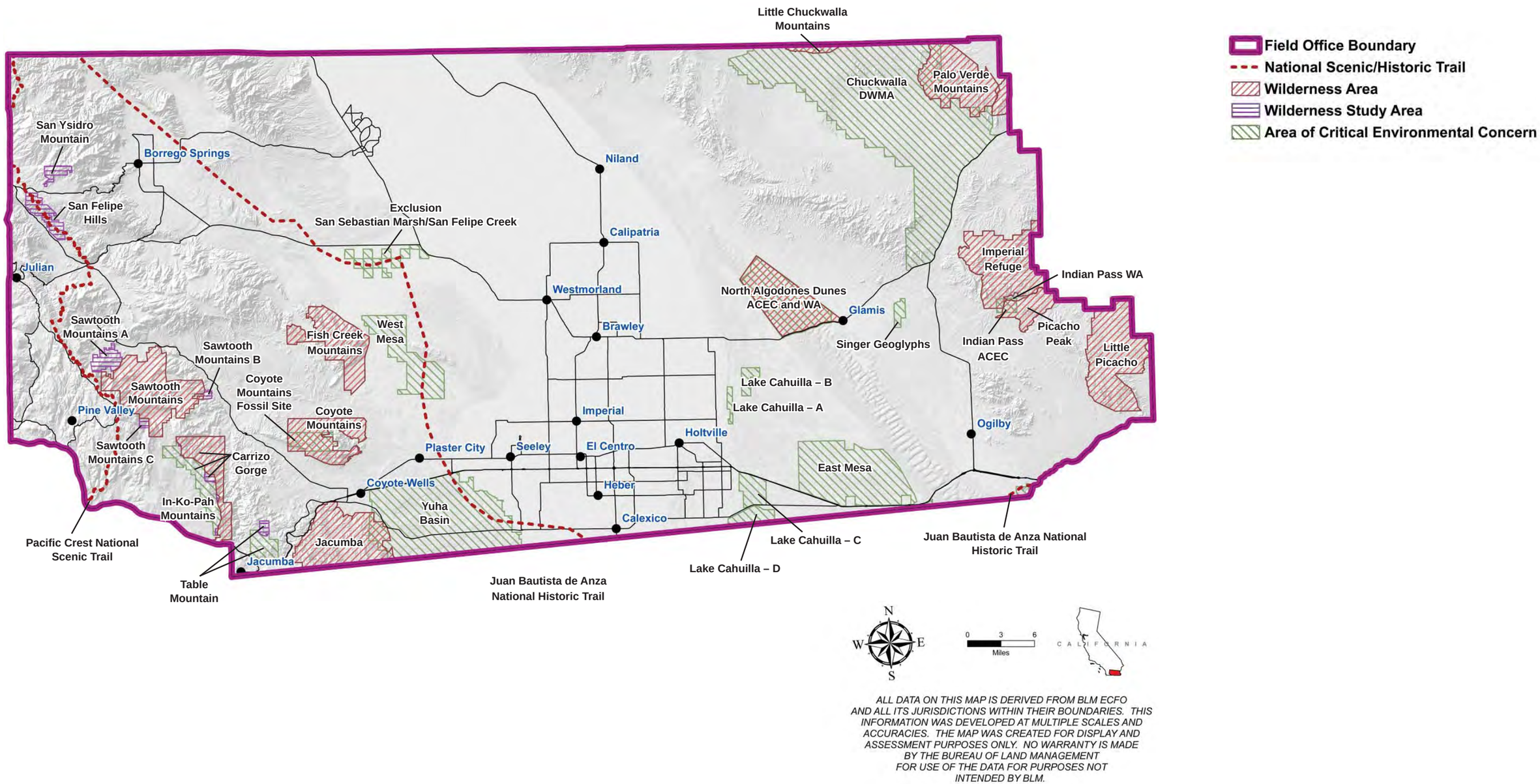
Map 1-3
Special Management Areas



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2. Scenic Quality Evaluation

Scenic Quality Evaluation measures the visual appeal of a landscape. Public lands are rated as Class A (19 points or more), Class B (12 to 18 points), or Class C (11 points or less) based on the apparent scenic quality. Lands are reviewed and rated using seven key factors, and the total score determines the rating. BLM Handbook Manual H-8410-1 – Visual Resource Inventory, provides the following information about each of the seven factors:

Landform—Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangell Mountain Range in Alaska, or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.

Vegetation—Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller-scale vegetational features which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind-beaten trees, and joshua trees).

Water—That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.

Color—Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.

Influence of Adjacent Scenery—Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance at which adjacent scenery will influence scenery within the rating unit will normally range from 0–5 miles, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

Picacho Peak

Scarcity—This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not-so-spectacular elements in the proper combination that produces the most pleasing and memorable scenery—the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

Cultural Modifications—Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement, or improve the scenic quality of a unit.

Peter Kane Bench

Each of the seven factors is rated on a comparative basis against similar features within the physiographic province in which the inventory area is located. For example, scenery in the Colorado Plateau is compared to scenery in the Colorado Plateau, not the Wyoming Basin or Southern Rocky Mountains, which means features within a Field Office will be compared to a larger region that extends beyond the Field Office boundary. In some cases this means that a feature that may be unique to the Field Office can be common within the physiographic province and therefore not receive as high a rating as may be expected by the Field Office. For the ECFO, the physiographic provinces are the Basin and Range, Pacific Border, and Lower California.

The Scenic Quality Field Inventory sheet uses the characteristics of form, line, color, and texture to describe the seven elements of the landscape. These characteristics are briefly defined as follows:

Form—The mass or shape of an object or objects which appear unified, such as a vegetative opening in a forest, a cliff formation, or a water tank.

Line—The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture. Within landscapes, lines may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.

Color—The property of reflecting light of a particular intensity and wavelength (or mixture of wavelengths), to which the eye is sensitive. It is the major visual property of surfaces.

Texture—The visual manifestations of the interplay of light and shadow created by the variations in the surface of an object or landscape.

All public lands have scenic value, but areas with the most variety and harmonious composition have the greatest scenic value. Evaluation of scenic quality is also done in relationship to the natural landscape, which does not mean that man-made features within a landscape necessarily detract from scenic value. Man-made features that complement the natural landscape may enhance the scenic value, and evaluations should avoid bias against man-made modifications to the natural landscape.

Maps 2-3 through 2-9 show the ratings of the seven factors for each unit. Map 2-10 shows the final scenic quality rating based on the combination of the seven factors.

Delineating Scenic Quality Rating Units

The ECFO was divided into preliminary Scenic Quality Rating Units (SQRUs) based on like physiographic characteristics such as geology, vegetation, hydrology, texture, color, variety, and topography (Map 2-1).

Preliminary units were drawn prior to conducting field work using high-quality aerial photographs and terrain models available on Google Earth and Google Maps. Additional tools used for this process include 1:100,000 scale topographic maps and a 25m Digital Elevation Model (DEM) provided by the BLM. These maps, aerials, and data clearly show the topographic

and visual features of the landscape which enabled the inventory team to divide the area into preliminary SQRUs. These units were then adjusted as necessary after consulting with BLM staff and verified in the field to provide an accurate boundary.

These maps were used in the field for navigational purposes, for ground-truthing the SQRU boundaries, and for recording notes and IOP locations.

The size of SQRU varies, but cannot be less than 100 acres in order to maintain managerial significance. The ECFO was divided into a total of 46 SQRUs and the sizes of the SQRUs range from 191 acres to 121,534 acres.

Scenic Quality Evaluation Process

The inventory team drove through each SQRU, stopping at Inventory Observation Points (IOPs) at multiple locations within the unit to evaluate scenic quality from several viewpoints. An IOP is a critical viewpoint that is located along designated public travel routes or other observation points. IOPs are selected in the field based on providing representative views of the landscape character of a SQRU. Photographs and GPS coordinates are recorded at each IOP for further analysis, mapping, and report documentation. A total of 157 stops were made throughout the ECFO (Map 2-2).

Some units did not have legal access through all areas which in some cases limited the extent to which the inventory team could cover the unit. However, thorough coverage of every unit was conducted to the extent practical.

All fieldwork personnel were trained in the BLM Visual Resource Inventory process. In addition, ECFO personnel accompanied the inventory teams for one of the 12 fieldwork days and participated in the rating efforts. The ratings were completed as a team, not by an individual person, and reflect the team's collective impression of a unit. The rating units were documented in the field using the standardized Scenic Quality Field Inventory Sheet.

Once the field inventory was complete, the SQRUs were reviewed by the inventory team for final adjustment before the information was digitized into GIS. Appendix A provides the following information for each SQRU:

- Scenic Quality Field Inventory sheet describing the visual characteristics of the SQRU
- Locator map showing the location of each SQRU within the Field Office and the IOPs within the SQRU
- Photos documenting the views at each IOP

Sawtooth

Scenic Quality Inventory and Evaluation Chart

Key Factors	Rating Criteria and Score		
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. 5	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3	Low, rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 5	Some variety of vegetation, but only one or two major types. 3	Little or no variety or contrast in vegetation. 1
Water	Clear and clean-appearing, still, or cascading whitewater, any of which are a dominant factor in the landscape. 5	Flowing, or still, but not dominant in the landscape. 3	Absent, or present, but not noticeable. 0
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water, or snow fields. 5	Some intensity or variety in colors and contrast of the soil, rock, and vegetation, but not a dominant scenic element. 3	Subtle color variations, contrast, or interest; generally muted tones. 1
Influence of Adjacent Scenery	Adjacent scenery greatly enhances visual quality. 5	Adjacent scenery moderately influences overall visual quality. 3	Adjacent scenery has little or no influence on overall visual quality. 0
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. 5+*	Distinctive, though somewhat similar to others within the region. 3	Interesting within its setting, but fairly common in the region. 1
Cultural Modifications	Modifications add favorably to visual variety while promoting visual harmony. 2	Modifications add little or no visual variety to the area, and introduce no discordant elements. 0	Modifications add variety but are very discordant and promote strong disharmony. -4

* A rating of greater than 5 can be given but must be supported by written justification.

Source: Visual Resource Inventory – BLM Manual Handbook 8410-1

Scenic Quality Rating Summary

Form 8400-5 UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT SCENIC QUALITY RATING SUMMARY	Date: February 2010 District: California Desert District Field Office: El Centro Field Office

1. Evaluators: J. Johnson (BLM);
B. Bielenberg, C. Brandt, G. Long, J. McGrew (Otak)

SCENIC QUALITY RATING UNITS (1)	Landform (2)	Vegetation (3)	Water (4)	Color (5)	Adjacent Scenery (6)	Scarcity (7)	Cultural Modification (8)	Total Score (9)	Scenic Quality Rating (10)	EXPLANATION (11)
01	3.5	4.5	0	3	4	3	-1	17	B	Varied landform and vegetation structure, texture. Vast, open vistas into the valley and Borrego State Park.
02	4	4.5	0	3.5	2	4.5	-0.5	18	B	Some of the most extensive, diverse vegetation and dramatic landform in the Field Office, with some presence of water.
03	1.5	3	0	3	4	3	0	14.5	B	Stunning and dramatic adjacent scenery and variety of vegetation between private lands and more natural areas.
04	4	3	0	3	4	3	0	17	B	Surrounding valleys create a nice setting for layered mountain landforms. Some variety in vegetation, inspiring views.
05	3	2.5	0	2	1	1	-0.5	9	C	Unique community set in a narrow canyon with large granite boulders. Vegetation varied within the community, sparse on the hills.
06	3.5	4	0	3.5	3	2	0	16	B	A lot of visual variety in landform and vegetation; nice color contrast between soil/landform and vegetation, though monotone.
07	2	3	0	2	2	1.5	-0.5	10	C	A large-scale, gently rolling unit with a dense, uniform cover of shrubs that obscures adjacent views.
08	3	3	0	3	3	2	0	14	B	Round Mountain, Table Mountain are dominant features. Good contrast between soil/landform and vegetation, and visual variety in vegetation.
09	1.5	2.5	0	1	3	1	-1	8	C	Adjacent scenery moderately enhances this otherwise ordinary unit; border fence and human impacts dominate some areas.
10	4	3.5	0	4	1	4	-0.5	16	B	Dominant/bold and coarse boulder feature and striking color contrast between the soil/ landform and vegetation; one of the more visually memorable areas in the Field Office.

Scenic Quality Rating Summary, continued

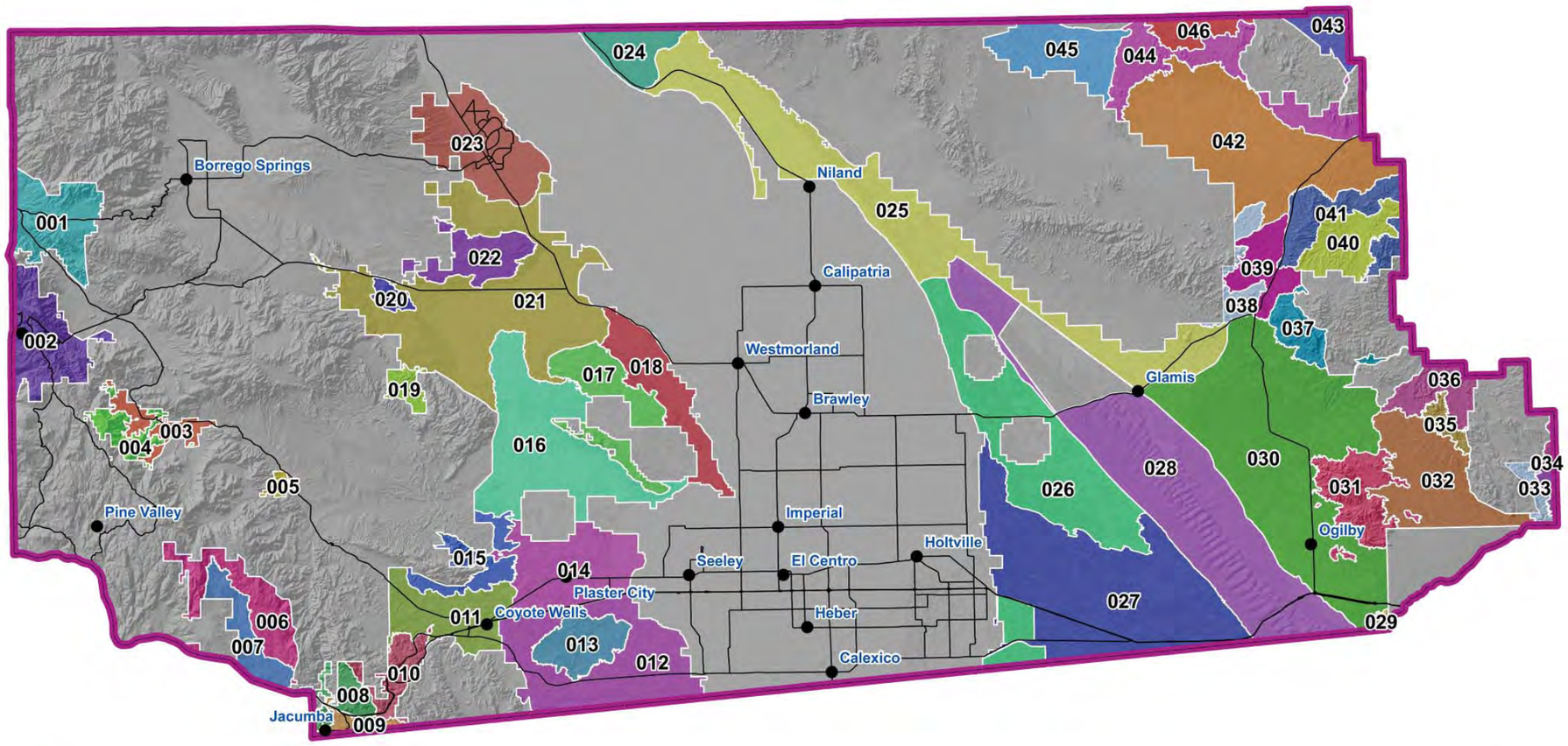
SCENIC QUALITY RATING UNITS (1)	Landform (2)	Vegetation (3)	Water (4)	Color (5)	Adjacent Scenery (6)	Scarcity (7)	Cultural Modification (8)	Total Score (9)	Scenic Quality Rating (10)	EXPLANATION (11)
11	1	3.5	0	3	3.5	2.5	-0.5	13	B	Vegetative variety/diversity and adjacent scenery stand out. Overall, less disturbance than neighboring Plaster City.
12	1	2.5	0	1.5	2	1	-0.5	7.5	C	Featureless landform with some unique areas of vegetation in the western portion, and views of wilderness area and Coyote Mountains to the west.
13	3	1	0	2.5	1	3.5	0	11	C	Interesting erosional badland-like features and colors provide a unique visual experience in the Field Office.
14	1.5	2	0	1.5	1.5	1	-1	6.5	C	The west side has more variety in landform and texture; ocotillos add some variety. Mountains to south and in Mexico, and wilderness area in the west create a nice silhouette.
15	3	2	0	3	3	2	0	13	B	Interesting erosional features with more color variation than comparable areas in the Field Office. Adjacent scenery also influences scenic quality.
16	1	1	0	2	1.5	1	0	6.5	C	Typical of many flat valley bottoms within the Colorado Desert with dull colors and sparse vegetation. Part of the unit is a Cultural Area of Critical Environmental Concern.
17	3	1	0	3	3	2	0	12	B	Superstition Mountains/Hills rising out of the valley floor add some visual variety and interest to the area. Interesting erosional patterns and colors make this unit distinctive.
18	1.5	2	0	2	1	1	-0.5	7	C	Characteristic of Colorado Desert valleys, with nothing in particular that makes it unique or memorable. Noticeable impacts from OHV use.
19	3	2	0	2	0	2	-1	8	C	Some variety in landform and texture, with muted, uniform colors. Gypsum mine contrasts with surroundings and dominates the visual experience.
20	2	2	0	2	3.5	3	-0.5	12	B	Interesting erosional patterns with a lot of development, prominent trails. Scenic quality is influenced by the vast Lower Borrego Valley and surrounding mountain ranges.
21	1.5	3.5	1	2	2	3.5	0	13.5	B	Washes and marshes add scenic variety. Due to unit scale, OHV activities are not visually dominant.
22	3	1	0	1.5	1	2	-1	7.5	C	The rolling erosional features have interesting forms and textures; the landscape is heavily impacted by OHV use.

SCENIC QUALITY RATING UNITS (1)	Landform (2)	Vegetation (3)	Water (4)	Color (5)	Adjacent Scenery (6)	Scarcity (7)	Cultural Modification (8)	Total Score (9)	Scenic Quality Rating (10)	EXPLANATION (11)
23	1	3.5	0	1.5	1	1	-1	7	C	Heavily impacted by discordant/contrasting development. Vegetation surrounding private lands adds some variety and interest.
24	1.5	2	2	1	3.5	1	-0.5	10.5	C	Views of adjacent Chocolate Mountains and Salton Sea enhance this flat valley. Bat Cave Buttes also provide some visual interest and variety.
25	1	3	0	2	1	1	-1	7	C	Overall visually pleasant with no notable features and muted colors. Power lines and structures visible in the northern portion of the unit.
26	1	2.5	0	1	3	1	0	8.5	C	Adjacent scenery moderately influences scenic quality. ACECs more closely resemble this unit versus El Centro East: these add vegetative variety and interest.
27	1	3	0	2	1	1	-1	7	C	Overall a visually pleasant area lacking visual variety and with no notable features. Few roads; mostly along the margins except for I-8 and Highway 98. Airport and geothermal power station.
28	5	2	0	3	2.5	4.5	-1	16	B	Interesting dune system with subtle color variations and tones. OHV overuse detracts from overall scenic quality.
29	4	1	0	2.5	3	2	0.5	13	B	Variety in form and texture: a series of low, rolling mounds leading up to more rugged vertical relief. Adjacent scenery of vast, open valleys and views into Mexico also enhance scenic quality.
30	2	3	0	2	3.5	1	-1.5	10	C	A common landscape for the region, with dramatic surrounding scenery. Rich vegetation in the wash. Railroad tracks, mine, utilities detract.
31	4	2	0	3	3.5	3	-0.5	15	B	Steep, vertical landforms and adjacent scenery stand out; otherwise fairly typical for the region. Criss-crossed by active mines visible from the road.
32	2	3	0	3	3.5	1	-0.5	12	B	Surrounded by dramatic mountain ranges and Colorado River plain. Similar character to Singer Valley but less cultural modification. Smaller scale makes adjacent scenery a little more prominent.
33	3.5	2.5	0	2.5	3	3	-0.5	14	B	Interesting shapes and textures in landform; color variation similar to Black Mountain with a basalt influence. Adjacent scenery also contributes to scenic quality.
34	2	4	0	4	4	3.5	0	17.5	B	Saguaro adds visual variety; nice color contrast and variety in soil/landform and vegetation. Adjacent scenery contributes.

Scenic Quality Rating Summary, continued

SCENIC QUALITY RATING UNITS (1)	Landform (2)	Vegetation (3)	Water (4)	Color (5)	Adjacent Scenery (6)	Scarcity (7)	Cultural Modification (8)	Total Score (9)	Scenic Quality Rating (10)	EXPLANATION (11)
35	4.5	3.5	0	4.5	4	4.5	-1	20	A	Dramatic/prominent focal feature with good vegetative variety. Vibrant color combinations and contrast. Mine detracts.
36	2.5	2.5	0	3	3	2	0	13	B	Interesting transitional area between valley floor and Picacho Peak/Picacho Wilderness Area to the Colorado River plain. Some good contrast, color variation; adjacent scenery moderately enhances.
37	4	4	0	4	3.5	4	-0.5	19	A	Interesting dune system with subtle color variations and tones. OHV overuse detracts from overall scenic quality.
38	4	3	0	4	4	3.5	-1	17.5	B	Bold landforms and distinct color contrast with vegetation. Noticeable cultural impacts from mining in the south.
39	2	2	0	2	3.5	2	-1	10.5	C	Common with nice adjacent scenery; a lot of contrasting disturbance created by private landowners.
40	2.5	4	0	2	3.5	3	0	15	B	Dramatic adjacent scenery from the eastern end of the unit adds to experience of driving through. Diverse, varied vegetation.
41	4.5	2.5	0	4	4	4	0	19	A	Varied landform texture, scale, form, and rich color contrast. A very natural appearance with little noticeable disturbance.
42	1	2.5	0	2	3	1	-0.5	9	C	A common landscape in the Colorado Desert. Adjacent scenery encloses and adds some value to the scenic quality. Fewer succulents, palo verde, ocotillo than Chuckwalla.
43	1.5	2	0.5	3	3.5	2	-1.5	11	C	Moderate views of adjacent scenery enhance low, rolling area with contrasting colors of desert pavement. Roads, power lines and trash detract.
44	4	3.5	0	4	4	3.5	0	19	B	Varied landform and color make this unit stand out, providing a nice scenic element along the Bradshaw Trail. Less human impact than the Chocolate Mountains.
45	2	4	0	2	3.5	2	0	13.5	B	Enclosed landscape surrounded by mountains; a diverse assortment of vegetation types, forms, and textures provide visual variety and interest.
46	1	3	0	2	4	2	0	12	B	A vast valley with homogenous landform and vegetation and dramatic adjacent scenery.

Map 2-1
Scenic Quality Rating Units



Field Office Boundary

Not Rated

N
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Miles

CALIFORNIA

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SQRU NUMBER AND NAME

001	San Felipe Hills
002	Banner
003	Vallecito Valley
004	Sawtooth Mountains
005	Canebreak
006	In-Ko-Pah
007	McCain Valley
008	Table Mountain
009	Jacumba Valley
010	Devil's Canyon
011	Ocotillo Valley
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013	Yuha Basin
014	Plaster City
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016	West Mesa
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018	Superstition Foreground
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032	Fort Yuma Valley
033	Senator Wash Hills
034	Senator Wash Valley
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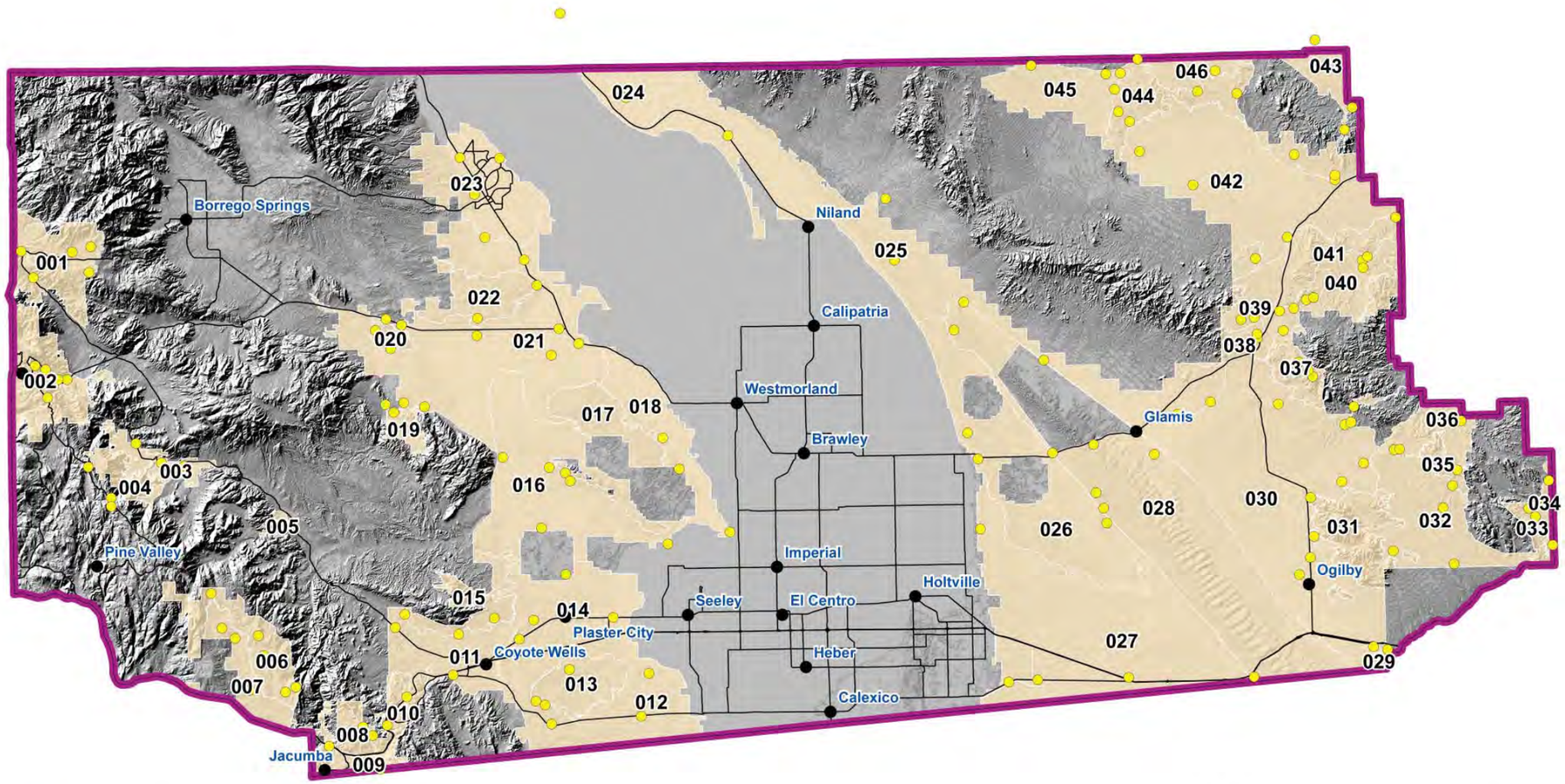
037	Black Mountain
038	Chocolate Hills
039	Peter Kane Bench
040	Vinagre Wash
041	Indian Pass Foothills
042	Milpitas Valley
043	Palo Verde Bench
044	Black Hills
045	Chuckwalla Bench
046	Chuckwalla Valley

Map 2-2
Inventory Observation Points



Field Office Boundary

Inventory Observation Points

VRI Scenic Quality Rating Unit Polygons

Not Rated

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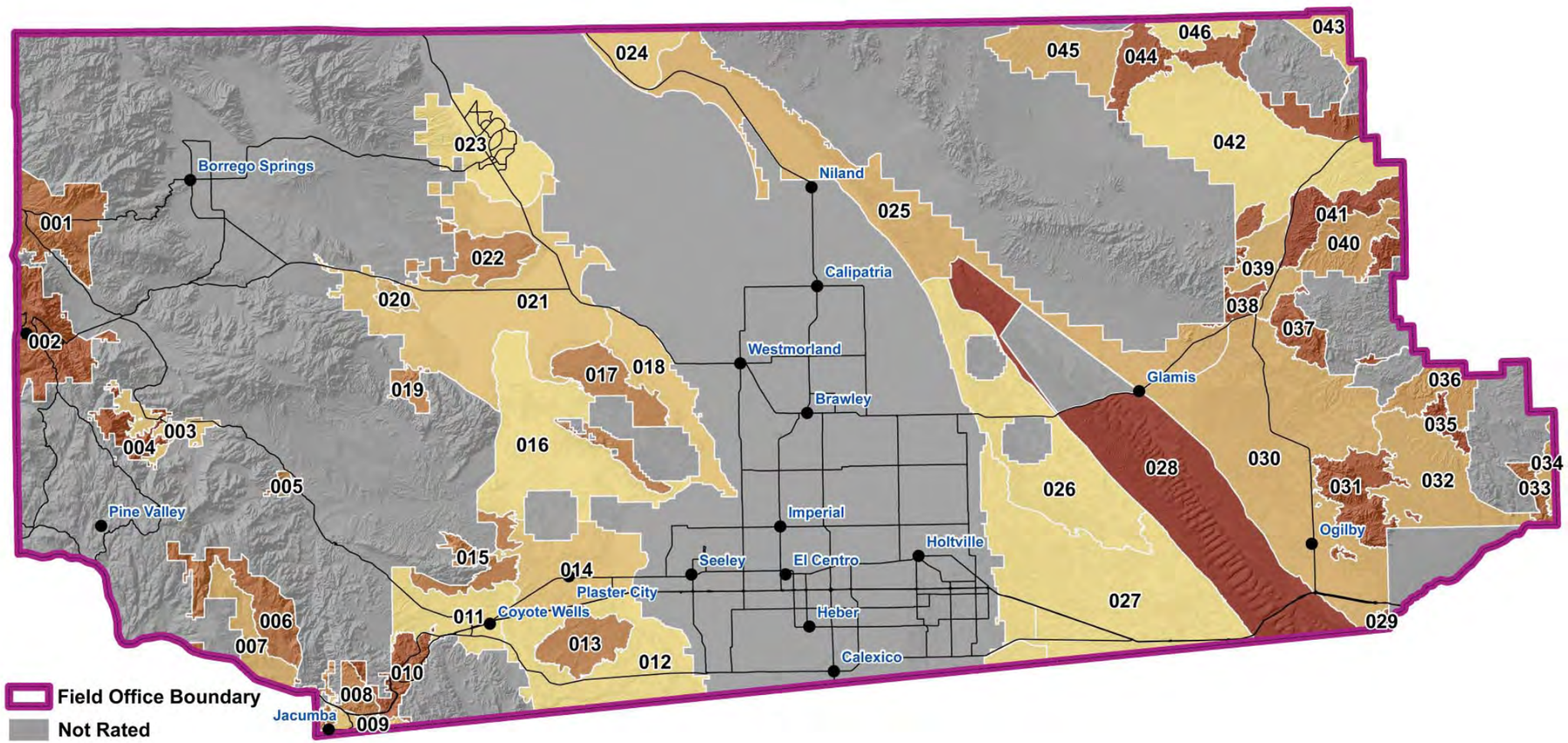
042	Milpitas Valley
043	Palo Verde Bench
044	Black Hills
045	Chuckwalla Bench
046	Chuckwalla Valley

Map 2-3
Scenic Quality Rating—Landform



Field Office Boundary

Not Rated

1	Low
1.5	
2	
2.5	
3	
3.5	
4	
4.5	

Note: Possible rating score ranges from 1 to 5.

N W E S

0 3 6 Miles

CALIFORNIA

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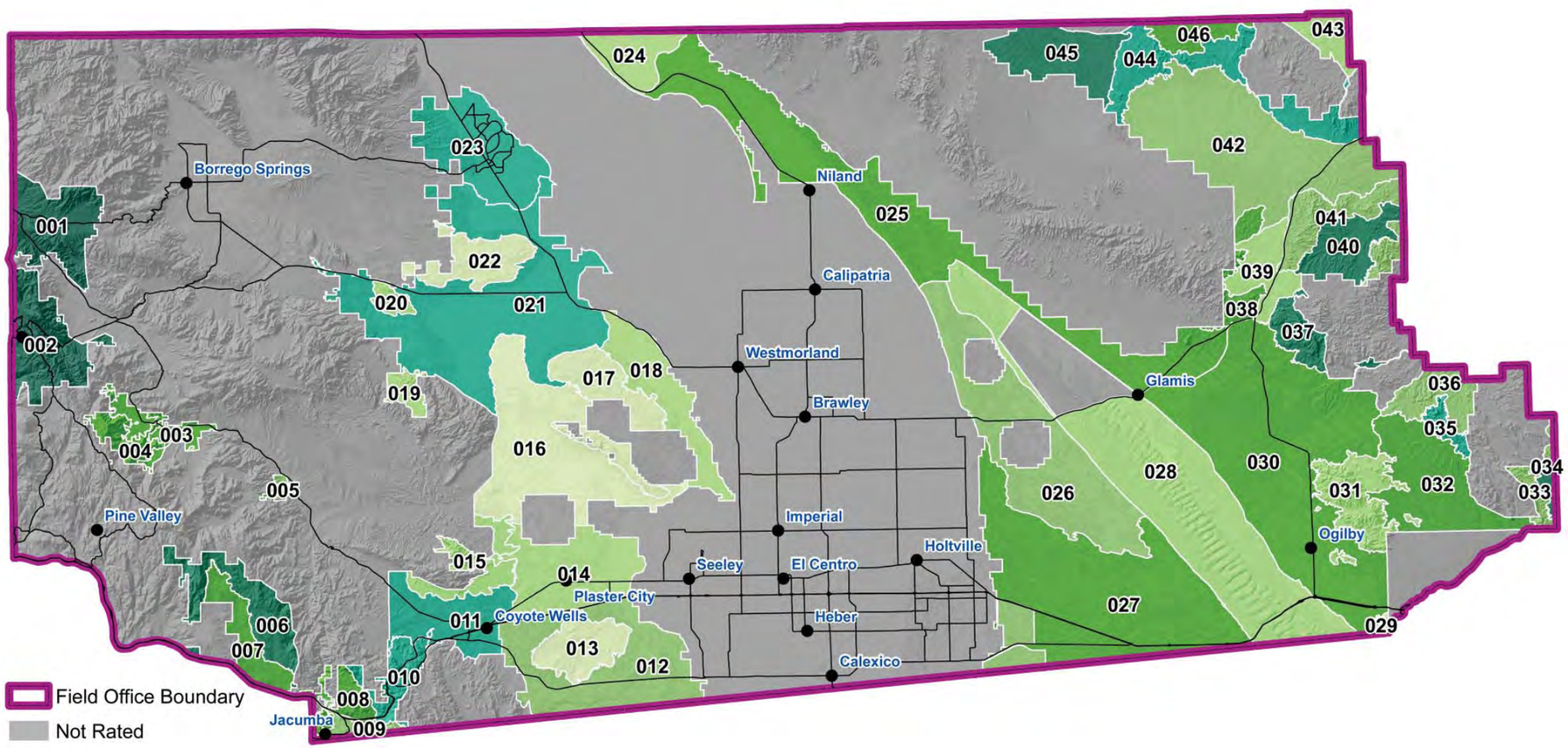
042	Milpitas Valley
043	Palo Verde Bench
044	Black Hills
045	Chuckwalla Bench
046	Chuckwalla Valley

Map 2-4
Scenic Quality Rating—Vegetation



1	Low
2	
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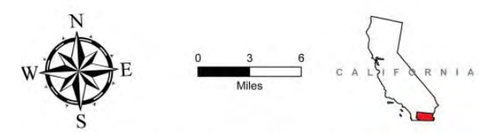
3	
3.5	
4	
4.5	High

Note: Possible rating score ranges from 1 to 5.



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042	Milpitas Valley
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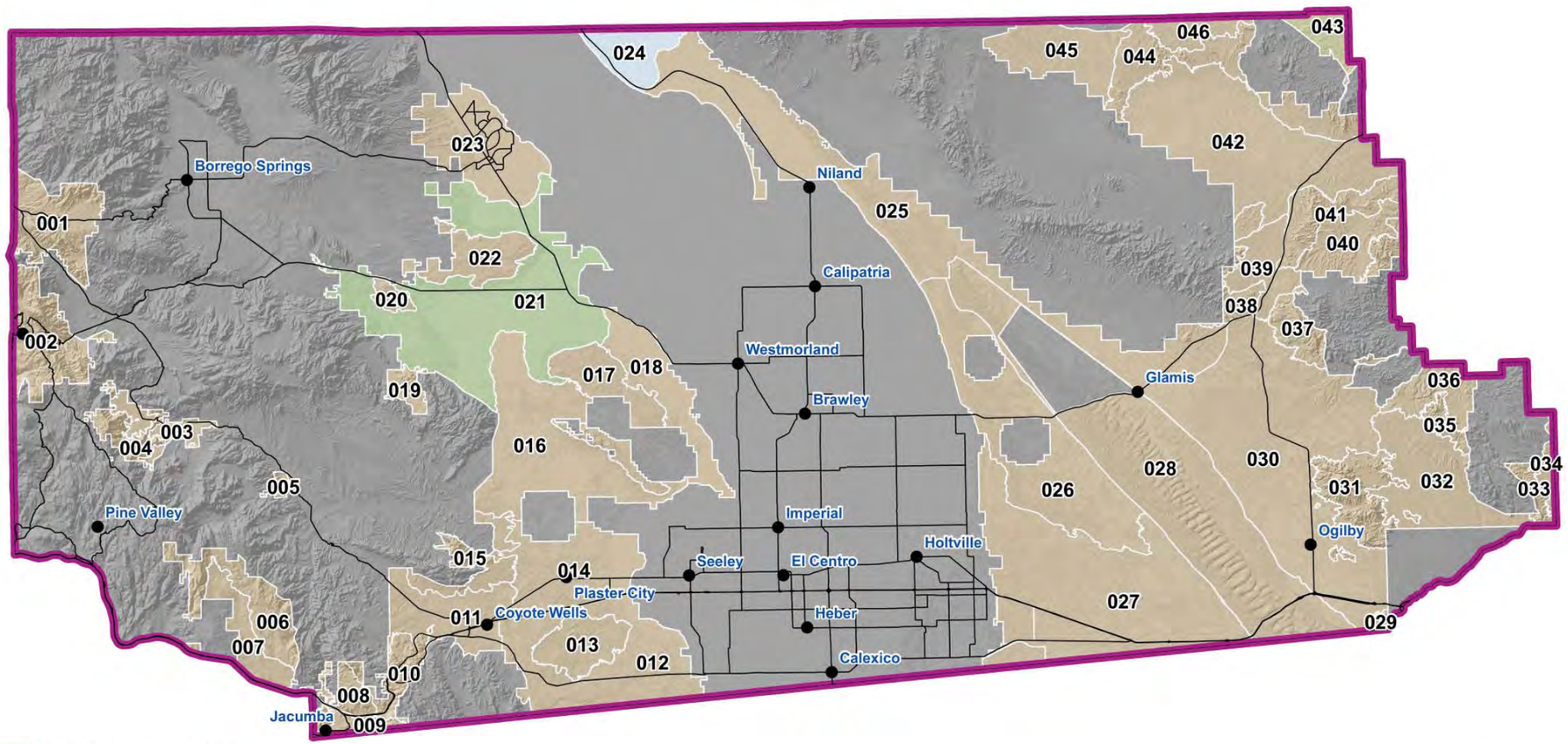
044	Black Hills
045	Chuckwalla Bench
046	Chuckwalla Valley

Map 2-5
Scenic Quality Rating—Water



Field Office Boundary

Not Rated

0 Low

0.5

1

2 High

Note: Possible rating score ranges from 0 to 5.

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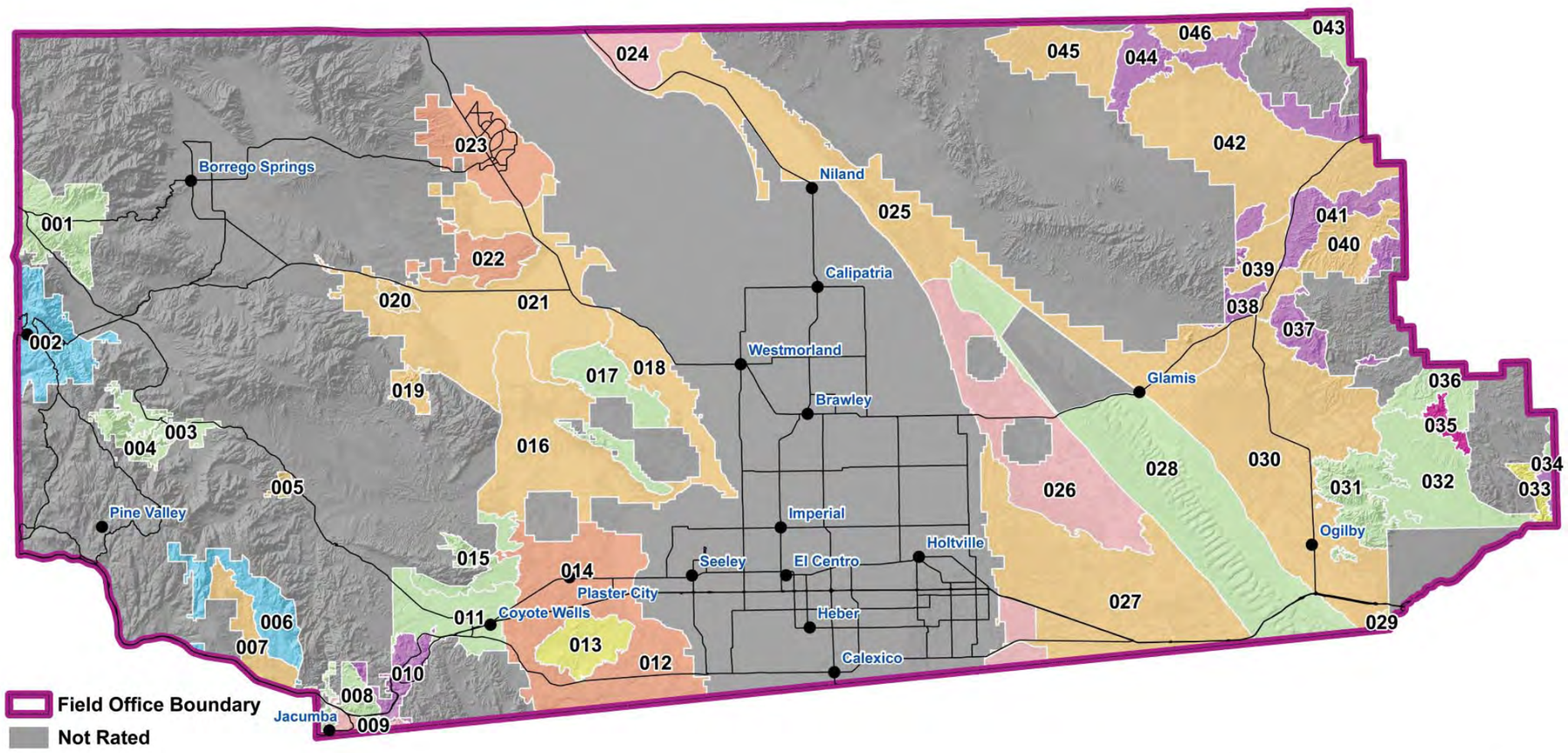
046	Chuckwalla Valley

Map 2-6
Scenic Quality Rating—Color



Field Office Boundary

Not Rated

1	Low
1.5	
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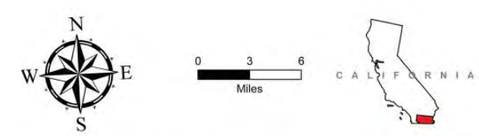
3	
3.5	
4	
4.5	High

Note: Possible rating score ranges from 1 to 5.



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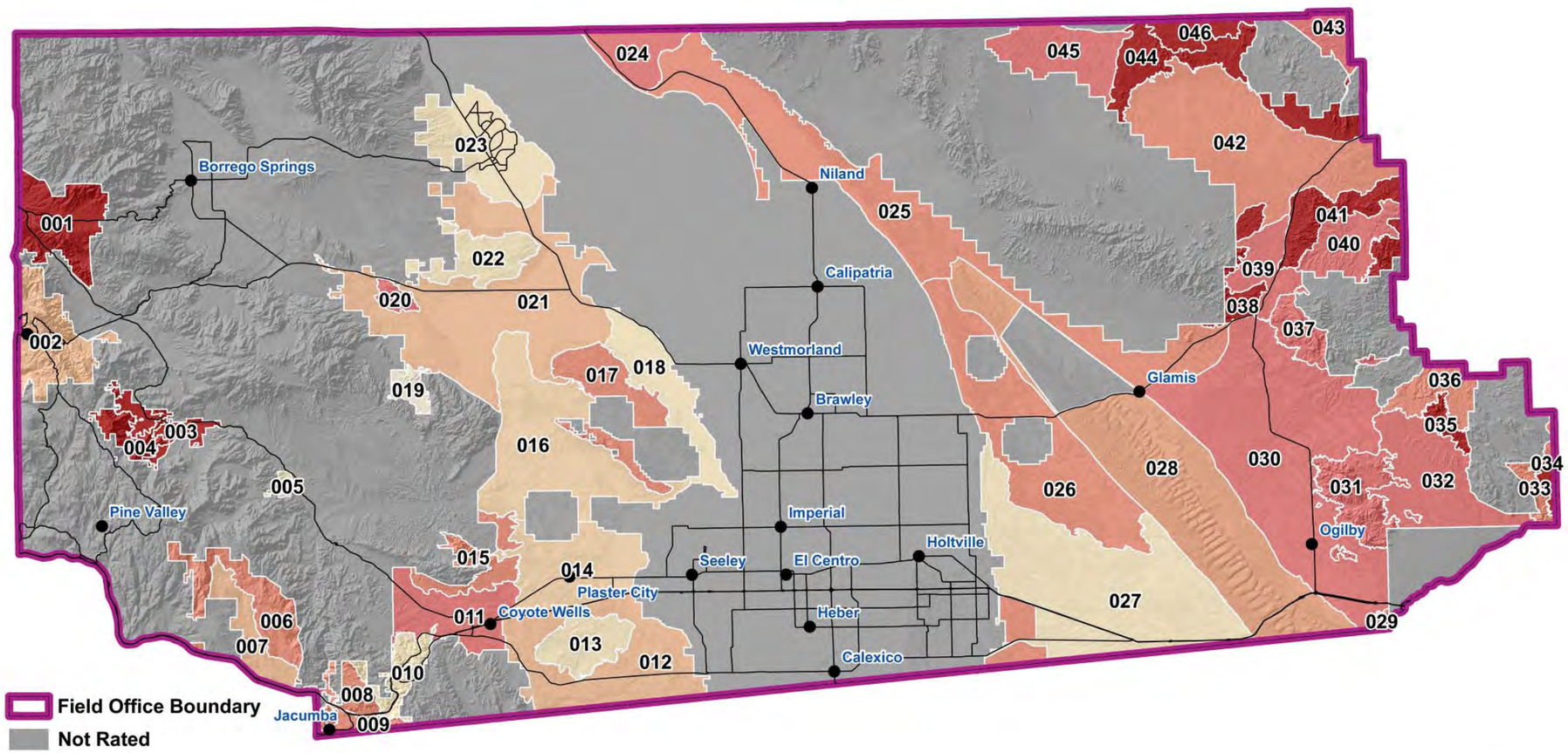
046	Chuckwalla Valley

Map 2-7
Scenic Quality Rating—Adjacent Scenery



Field Office Boundary

Not Rated

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3.5	
4	High

Note: Possible rating score ranges from 0 to 5.

N W E S

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CALIFORNIA

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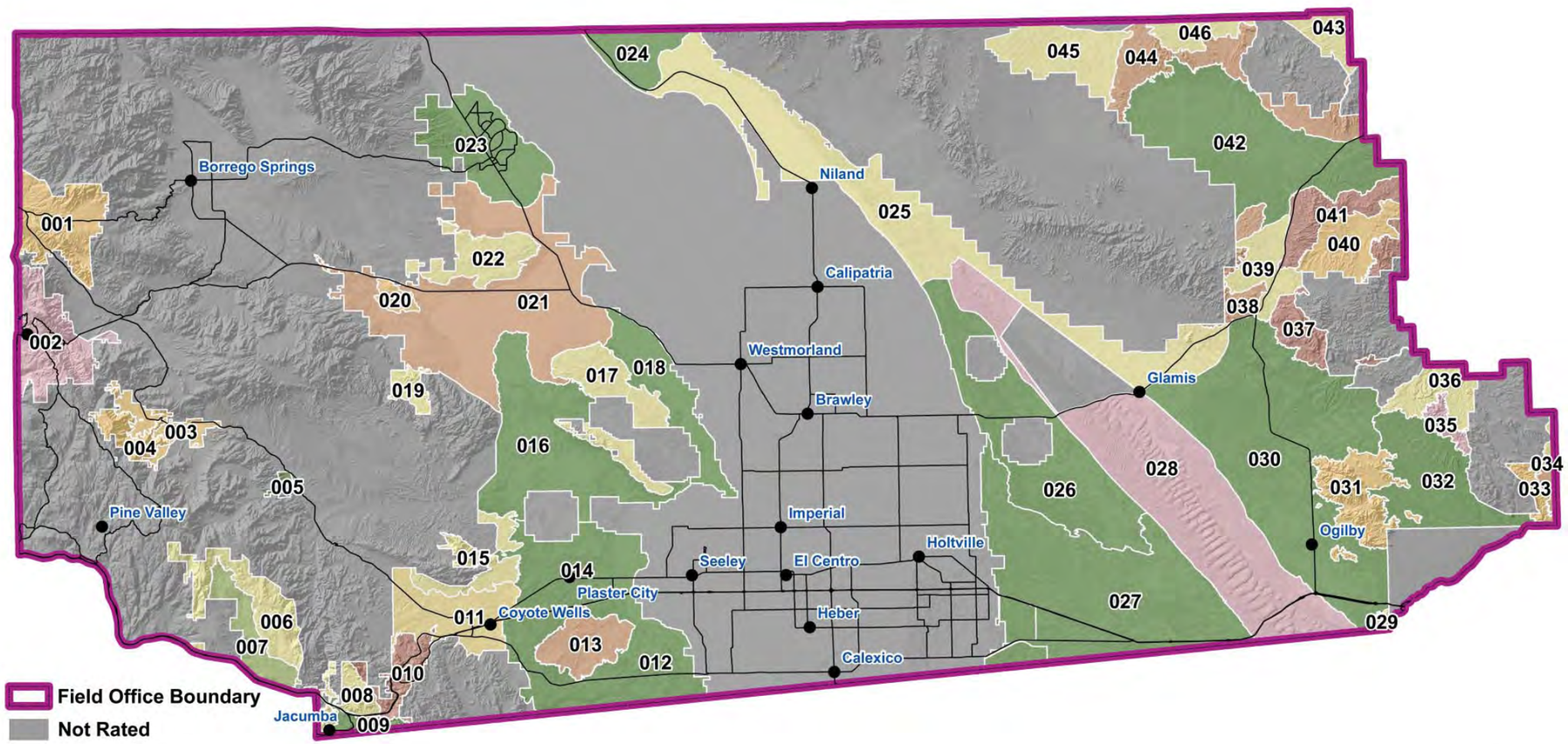
Map 2-8
Scenic Quality Rating—Scarcity



Field Office Boundary

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3.5	
4	
4.5	High

Note: Possible rating score ranges from 1 to 5.

N W E S

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CALIFORNIA

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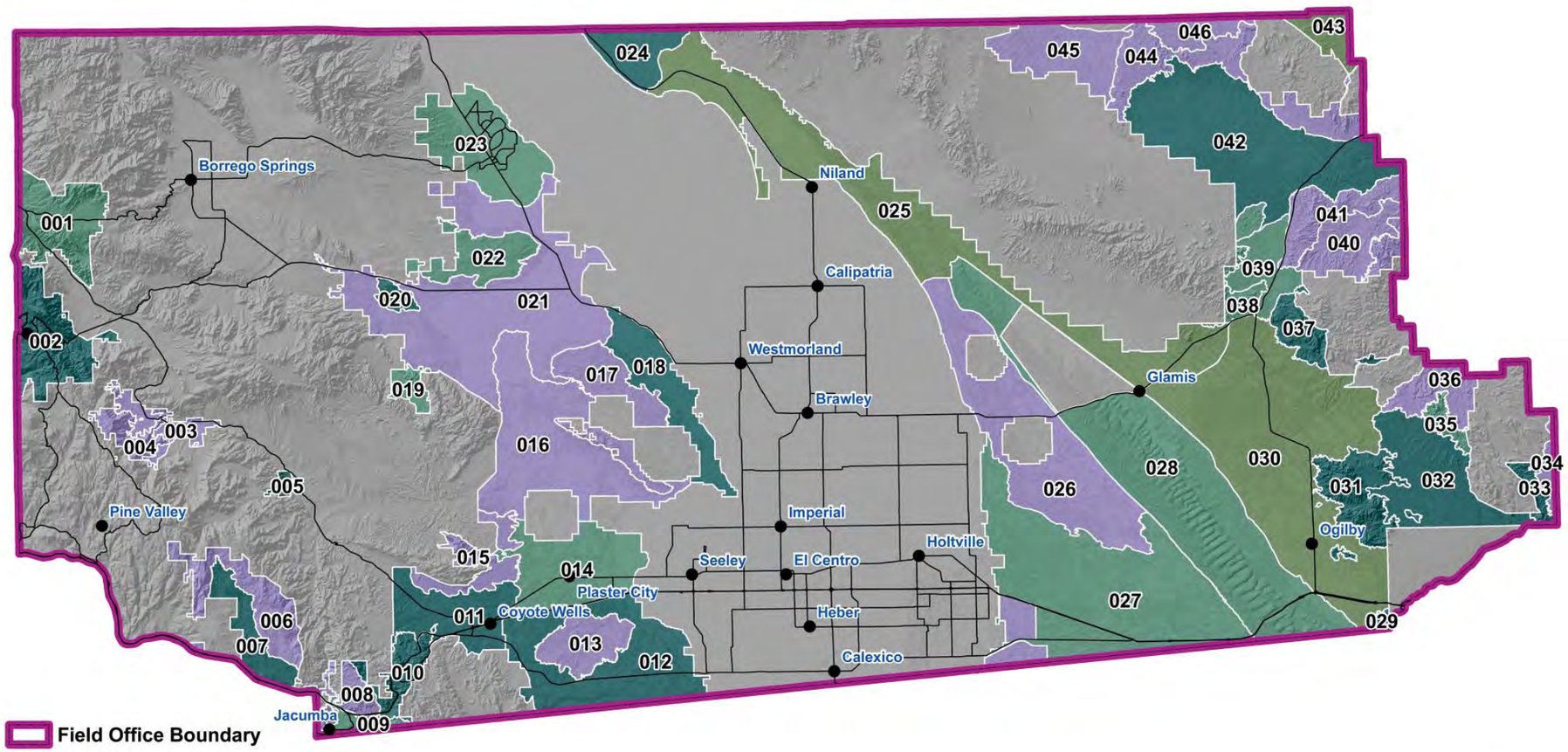
Map 2-9
Scenic Quality Rating—Cultural Modification



Field Office Boundary

Not Rated

-1.5 Low

-1

-0.5

0

0.5 High

Note: Possible rating score ranges from -4 to 2.

N W E S

0 3 6 Miles

CALIFORNIA

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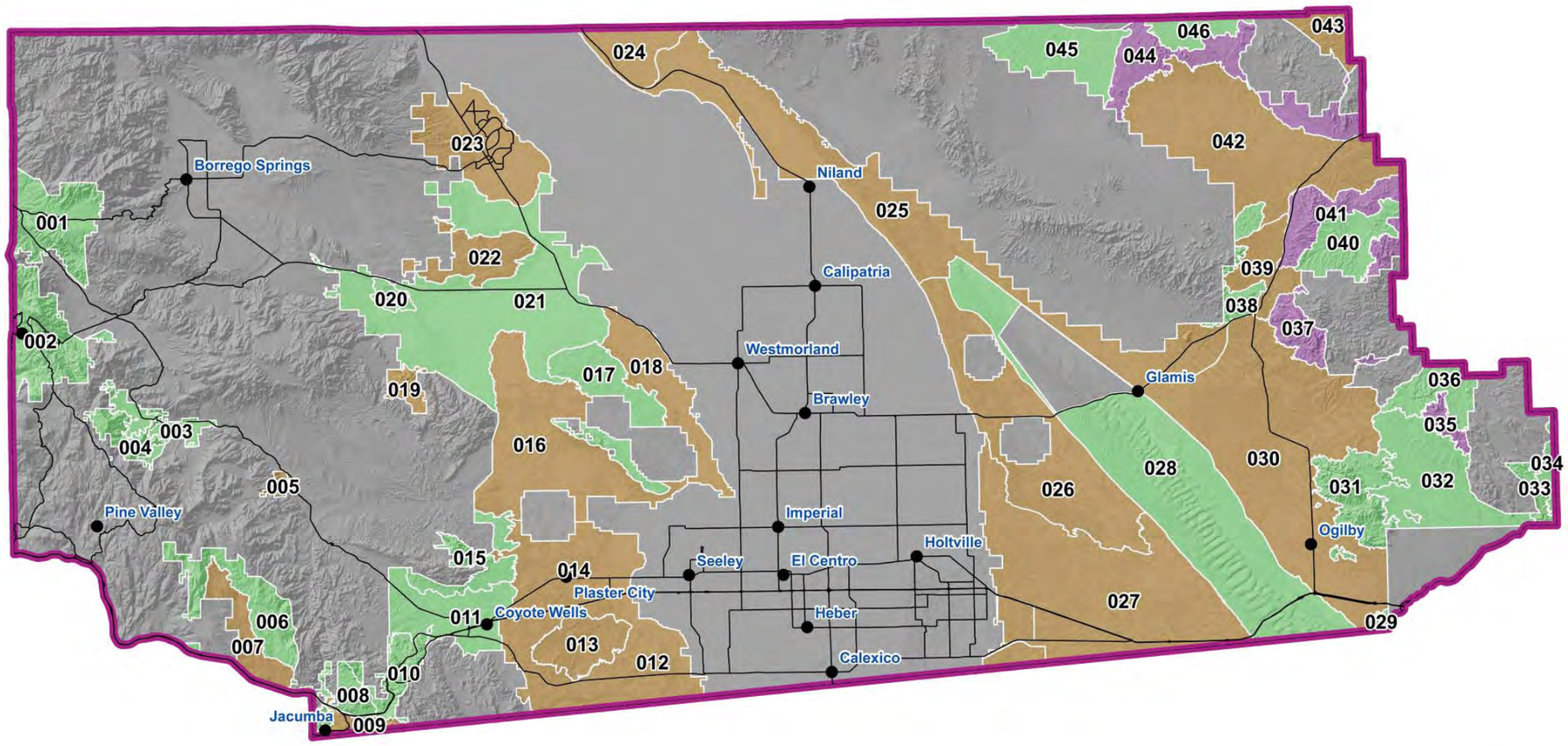
013	Yuha Basin
014	Plaster City
015	Coyote Mountain Hills
016	West Mesa
017	Superstition Mountains
018	Superstition Foreground
019	Fish Creek Mountains
020	Ocotillo Badland
021	Lower Borrego Valley
022	Arroyo Salada
023	Salton City
024	Coachella Valley
025	Mammoth
026	East Mesa
027	El Centro East
028	Imperial Sand Dunes
029	Pilot Knob
030	Singer Valley
031	Cargo Muchacho Mountains
032	Fort Yuma Valley
033	Senator Wash Hills
034	Senator Wash Valley
035	Picacho Peak
036	Bear Canyon Hills
037	Black Mountain
038	Chocolate Hills
039	Peter Kane Bench
040	Vinagre Wash
041	Indian Pass Foothills
042	Milpitas Valley
043	Palo Verde Bench
044	Black Hills
045	Chuckwalla Bench
046	Chuckwalla Valley

Map 2-10
Scenic Quality Classifications



Field Office Boundary

Not Rated

A - 19 or More Total Score for Scenic Quality

B - 12 to 18 Total Score for Scenic Quality

C - 11 or Less Total Score for Scenic Quality

N
W E
S

0 3 6
Miles

CALIFORNIA

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SQRU NUMBER AND NAME

001	San Felipe Hills
002	Banner
003	Vallecito Valley
004	Sawtooth Mountains
005	Canebreak
006	In-Ko-Pah
007	McCain Valley
008	Table Mountain
009	Jacumba Valley
010	Devil's Canyon
011	Ocotillo Valley
012	Yuha Desert
013	Yuha Basin
014	Plaster City
015	Coyote Mountain Hills
016	West Mesa
017	Superstition Mountains
018	Superstition Foreground
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040	Vinagre Wash
041	Indian Pass Foothills
042	Milpitas Valley
043	Palo Verde Bench
044	Black Hills
045	Chuckwalla Bench
046	Chuckwalla Valley

3. Sensitivity Level Analysis

Sensitivity Levels are a measure of public concern for scenic quality. Public land areas are assigned high, medium, or low sensitivity levels based on consideration of the following factors:

- **Types of Users**—Visual sensitivity will vary with the types of users. Recreation sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.

- **Amount of Use**—Areas seen and used by large numbers of people are potentially more sensitive. Protection of visual values usually becomes more important as the number of viewers increases.

- **Public Interest**—The visual quality of an area may be of concern to local, state, or national groups. Indicators of this concern are usually expressed in public meetings, letters, newspaper or magazine articles, newsletters, land-use plans, etc. Public controversy created in response to proposed activities that would change the landscape character should also be considered.

- **Adjacent Land Uses**—The interrelationship with land uses in adjacent lands can affect the visual sensitivity of an area. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be visually sensitive.

- **Special Areas**—Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas, Scenic Roads or Trails, and Areas of Critical Environmental Concern (ACEC), frequently require special consideration for the protection of visual values. This does not necessarily mean that these areas are scenic, but rather that one of the management objectives may be to preserve the natural landscape setting. The management objectives for these areas may be used as a basis for assigning sensitivity levels.

- **Other Factors**—Consider any other information such as research or studies that includes indicators for visual sensitivity.

Table Mountain

The town of Banner

Sensitivity Level Rating Units (SLRUs) may have the same boundaries as Scenic Quality Rating Units (SQRUs). However, the boundaries may be different as they are subject to the factor(s) that determine visual sensitivity, which differ from the factors that determine scenic quality. For example, a special management area and surrounding lands of similar character may be located within one SQRU. However, the unit may be broken into two or more separate SLRUs: one or more units for the special management area(s) which would have a higher sensitivity level, and another unit for the surrounding lands which have a lower sensitivity level.

Examples of SQRUs that have been split into separate SLRUs include:

- San Felipe Hills, which is divided into San Felipe Hills Private Lands SLRU and San Felipe Hills Wilderness Study Areas SLRU
- Table Mountain SQRU, which is divided into Table Mountain SLRU, Table Mountain ACEC SLRU, and Table Mountain WSA SLRU.
- Lower Borrego Valley, which is divided into Lower Borrego Valley SLRU and San Sebastian/San Felipe Marsh SLRU

SLRUs may also be delineated by using viewshed analyses from designated IOPs, including overlooks, travel corridors, or viewpoints identified in the field. The area that is visible from each viewshed analysis helps to delineate the boundary for the SLRU. Examples of a travel corridor delineated as a SLRU are:

- Highway 78 Viewshed Corridor
- Sunrise and Anza Borrego Scenic Byway viewshed.

While conducting fieldwork, the ECFO was initially divided into 65 SLRUs and evaluated using the Rating Sheet Instructions Chart on page 28. During post-fieldwork review, SLRU 38 Chocolate Hillls was overriden by SLRU 63 Highway 78 Viewshed Corridor. A total of 64 SLRUs are shown on Maps 3-1 and 3-2.

Segments of National Historic and National Scenic Trails run through the Field Office.[1] A 15-mile "offset" is shown on the Sensitivity Levels map (3-2). While this offset does not influence the underlying sensitivity rating, this may be an important

[1] National Scenic and Historic Trail GIS data provided by Deb Salt, BLM National Trails Permanent Lead for the Division of the National Landscape Conservation System; January, 2010.

consideration for review during the RMP process when developing Visual Resource Management Classes.

Sensitivity Level Ratings

The sensitivity level rating sheets for the entire Field Office are included in Appendix B, which also shows SLRU 38 Chocolate Hills.

Sensitivity ratings are completed as a team and reflect the overall impression of a unit. It is especially important to get input from BLM staff familiar with the area being evaluated. User groups and special interest groups are also valuable resources for understanding the sensitivity rating of a unit.

Each SLRU was documented in the field using the standardized Sensitivity Level Rating Sheet, following the instructions in the chart shown at right. Ratings are summarized beginning on page 29.

Ocotillo Valley

Rating Sheet Instructions Chart

1. Divide the inventory area into logical sensitivity rating units.
2. Analyze the factors which indicate visual sensitivity.
3. For each rating, rate each factor as high, moderate, or low using the following outline as a general guide:

   a. *Type of Users.* Maintenance of visual quality is:

   - a major concern for most users ..... High
   - a moderate concern for most users ..... Moderate
   - a low concern for most users ..... Low

   b. *Amount of Use.* Maintenance of visual quality becomes more important as the level of use increases (see table below):

   - high level of use ..... High
   - moderate level of use ..... Moderate
   - low level of use ..... Low

   c. *Public Interest*. Maintenance of visual quality is:

   - a major public issue..... High
   - a moderate public issue..... Moderate
   - a minor public issue ..... Low

   d. *Adjacent Land Uses*. Maintenance of visual quality to sustain adjacent land use objectives is:

   - very important ..... High
   - moderately important ..... Moderate
   - slightly important ..... Low

   e. *Special Area.* Maintenance of visual quality to sustain Special Area management objectives is:

   - very important ..... High
   - moderately important ..... Moderate
   - slightly important ..... Low

Sensitivity Level Rating Summary

Form 8400-6 UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT SCENIC QUALITY RATING SUMMARY	Date: February, 2010 District: California Desert District Field Office: El Centro Field Office
1. Evaluators: J. Johnson (BLM); B. Bielenberg, G. Long, J. McGrew (Otak)	

SENSITIVITY LEVEL RATING UNITS (1)		Type of User	Amount of Use	Public Interest	Adjacent Land Uses	Special Areas	Other Factors	Overall Rating	EXPLANATION
No.	**Name**	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
01	San Felipe Hills Private Lands	M	M	H	H	NP	H	M	Foreground to two Indian reservations and two Wilderness Study Areas, towns of San Felipe and Ranchita; Pacific Crest Trail also passes through.
02	Banner	H	H	H	M	NP	H	H	Good access to forests, Scenic Byways; Town of Julian. Pacific Crest Trail passes through the unit.
03	Vallecito Valley	H	H	M	H	NP	H	H	A more natural setting than other units in the Field Office. Residents would be highly sensitive to change.
04	Sawtooth Mountains	H	H	M	H	NP	NP	H	Backdrop to the towns of Vallecito and Mason Valley. Portions can also be viewed from the Sunrise Scenic Byway and Pacific Crest Trail.
05	Canebreak	M	M	M	M	NP	NP	M	A unique residential community with scenic quality and isolation.
06	In-Ko-Pah	H	H	H	H	H	NP	H	Heavily used recreation area with established camping and staging areas; the backyard to residents of McCain Valley and Tribal lands.
07	McCain Valley	H	H	H	H	NP	NP	H	Recreationists travel through to campgrounds and staging areas. Residents may be drawn to the area because of scenic quality and semi-isolation).
08	Table Mountain	M	M	M	M	H	NP	M	Within close proximity of Jacumba, and the foreground/middleground of I-8. Travelers, locals would be sensitive to visual changes.
09	Jacumba Valley	M	M	M	L	H	NP	M	Residents of Jacumba would be sensitive to changes in scenic quality.
10	Devil's Canyon	M	M	M	H	H	NP	M	A unique visual experience along I-8, the foreground/middleground for the entire length of the unit. Changes in scenic quality would be noticeable.
11	Ocotillo Valley	M	M	M	M	NP	M	M	Predominantly a travel corridor to other destinations and also provides access to adjacent wilderness areas. Home to the communities of Ocotillo and Coyote Wells.

SENSITIVITY LEVEL RATING UNITS (1)		Type of User	Amount of Use	Public Interest	Adjacent Land Uses	Special Areas	Other Factors	Overall Rating	EXPLANATION
No.	**Name**	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
12	Yuha Desert	H	H	H	H	H	NP	H	Culturally significant with many visually important features: Crucifixion Thorn Natural Area, De Anza Bautista National Historic Trail.
13	Yuha Basin	H	H	H	H	H	NP	H	A cultural Area of Critical Environmental Concern with unique features (geoglyphs) and history close to El Centro. Backyard to several communities.
14	Plaster City	L	M	L	M	NP	NP	L	Scenic quality is impacted by OHV activity, Plaster City drywall facility, and agricultural lands.
15	Coyote Mountain Hills	M	M	M	H	NP	NP	M	Foreground of Coyote Mountain Wilderness Area/Coyote Mountains Fossil Site ACEC. and backdrop to towns of Ocotillo and Coyote Wells.
16	West Mesa	M	M	H	M	H	H	H	Part of the unit is a cultural Area of Critical Environmental Concern and part is Superstition Mountains. The Juan Bautista National Historical Trail is also within the unit.
17	Superstition Mountains	M	M	M	M	NP	NP	M	An interesting feature visible from many locations; backyard to Imperial Valley residents.
18	Superstition Foreground	M	L	L	L	NP	NP	L	In the backyard of Imperial Valley residents. Already impacted by OHV use and agriculture.
19	Fish Creek Mountains	L	L	M	H	NP	NP	L	Predominant use is gypsum mining. Most activity is tucked away in a canyon and cannot be seen from some areas of the Lower Borrego Valley. Outside edges adjacent to wilderness are still intact.
20	Ocotillo Badland	L	M	L	L	NP	NP	L	Scarred by OHV activity and predominantly private land. Scenic quality has been impacted.
21	Lower Borrego Valley	M	M	M	M	H	H	M	Background to Imperial Valley and within the viewshed of Highway 78.
22	Arroyo Salada	L	M	L	L	NP	NP	L	Heavily impacted by OHV activity.
23	Salton City	M	M	L	L	NP	NP	L	Heavily impacted by humans and scenic quality is not intact. Sensitivity to scenic quality is low.
24	Coachella Valley	L	L	M	H	H	NP	L	People are primarily passing through, are local residents, or seeking access to Salton Sea State Park/Recreation Area. Materials used indicate preservation of scenic quality is not a priority.

Sensitivity Level Summary, continued

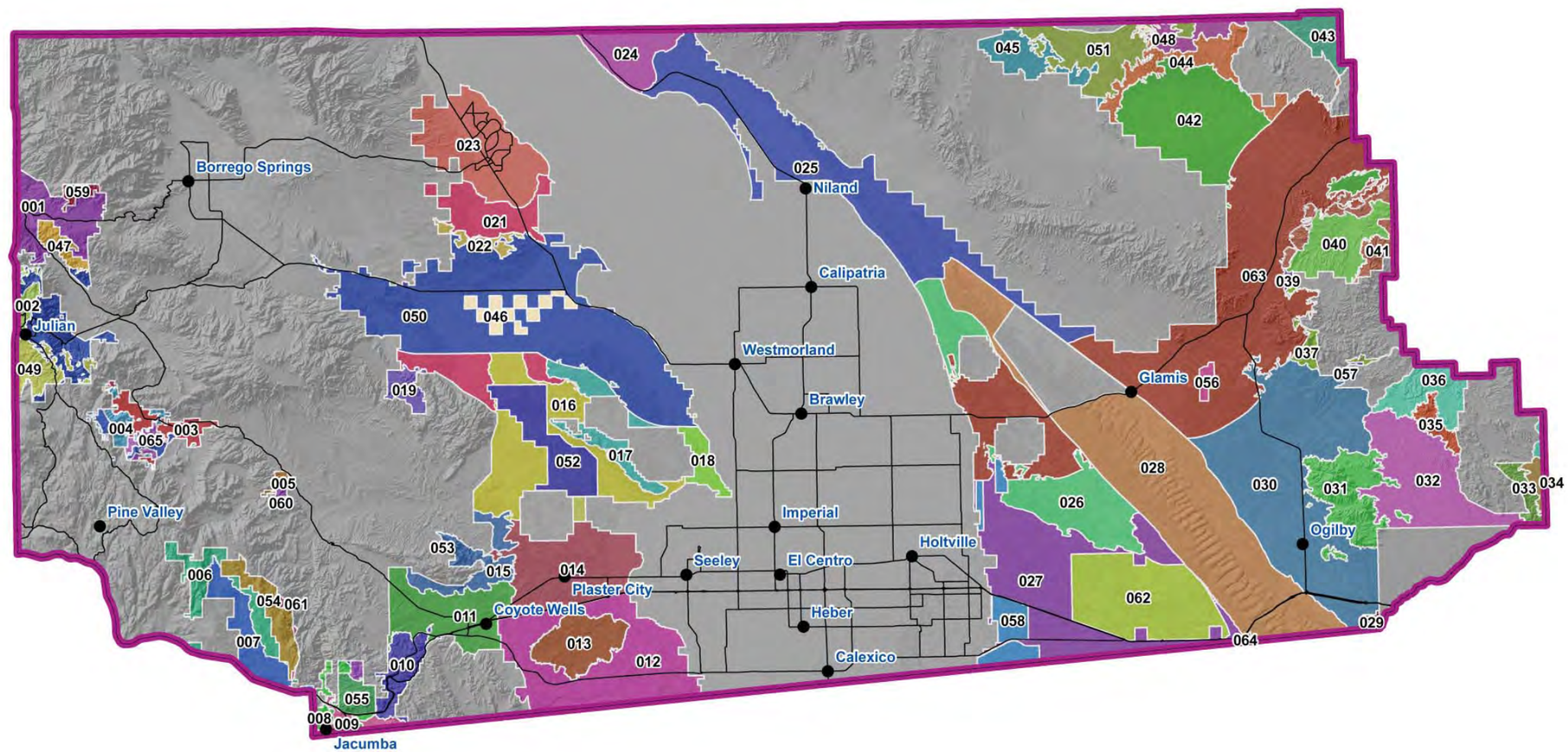
SENSITIVITY LEVEL RATING UNITS (1)		Type of User	Amount of Use	Public Interest	Adjacent Land Uses	Special Areas	Other Factors	Overall Rating	EXPLANATION
No.	Name	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
25	Mammoth	L	L	M	L	NP	NP	L	Development in the unit is haphazard and discordant; visually discordant with a lot of dumping and garbage.
26	East Mesa	M	M	M	M	NP	NP	M	The foreground to the Imperial Sand Dunes and the backyard for valley residents.
27	El Centro East	L	L	M	L	M	L	M	Part of the California Desert Conservation Area and of concern to California residents. It contains several Areas of Critical Environmental Concern and designated National Historic Trail.
28	Imperial Sand Dunes	H	H	H	H	NP	H	H	One of the most heavily used recreation areas in the Field Office and one of the main visitor attractions in the Imperial Valley.
29	Pilot Knob	M	H	H	H	H	H	H	A cultural ACEC that is highly visible from I-8 and Yuma; a landmark feature.
30	Singer Valley	H	H	M	M	H	NP	M	Heavily used recreation/staging area as well as travel corridor. Landscape does not have the capacity to absorb visual impacts.
31	Cargo Muchacho Mountains	L	M	M	M	NP	H	M	Tourists would likely be sensitive to changes to scenic quality if the setting/context for the mining history were not kept intact.
32	Fort Yuma Valley	M	M	M	M	NP	NP	M	A popular recreation area in Yuma's backyard, easy to access and for the most part intact.
33	Senator Wash Hills	H	M	H	H	NP	NP	H	Backdrop for recreation areas along the Colorado River and also visible from the roads along the Colorado River and the Indian Reservation.
34	Senator Wash Valley	H	H	H	H	NP	H	H	Heavily used camping and snowbird area in close proximity to Yuma and the Colorado River. People walk in Senator Wash Valley toward Hess Mine.
35	Picacho Peak	H	H	H	H	NP	H	H	The unit is a popular recreation area and is culturally significant to local Indian tribes. Also the backyard to the community of Yuma.
36	Bear Canyon Hills	H	H	M	H	NP	NP	H	A popular recreation area at the base of Picacho Peak and Picacho Wilderness.
37	Black Mountain	H	H	H	H	H	H	H	Unique focal-feature unlike other mountains around it, and a popular area to get an overall visual perspective of the Imperial Valley.
38	Chocolate Hills	L	M	H	H	NP	H	H	Similar to Black Hills and Indian Pass Foothills, which are on the public radar.

SENSITIVITY LEVEL RATING UNITS (1)		Type of User	Amount of Use	Public Interest	Adjacent Land Uses	Special Areas	Other Factors	Overall Rating	EXPLANATION
No.	**Name**	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
39	Peter Kane Bench	M	H	H	M	H	NP	M	Highway 78 bisects the unit and is within the foreground/middleground. Visual impacts exist predominantly from private landowners. Part of the unit is within the Chuckwalla DWMA ACEC; good opportunities for wildlife viewing.
40	Vinagre Wash	M	M	H	H	NP	H	H	The proposed bill to make this a Special Management Area and its mention on the California Wilderness Coalition website indicate public interest in maintaining scenic quality.
41	Indian Pass Foothills	M	M	H	H	NP	H	H	A unique area that is on the public radar. It is in the foreground of the Colorado River Plain, Highway 78, and Indian Pass Wilderness.
42	Milpitas Valley	M	M	H	M	H	L	L	Highway 78 bisects the unit. One access route to Hauser Geode Beds.
43	Palo Verde Bench	L	M	L	L	NP	M	L	Mostly utility access and trash dumping.
44	Black Hills	M	M	H	H	H	H	H	A unique area for wildlife viewing and rock hounding, which many websites are dedicated to.
45	Chuckwalla Bench	M	M	H	M	H	H	H	The Bradshaw Scenic Backway passes through the unit. Changes in scenic quality are often associated with changes in ecology.
46	San Sebastian/San Felipe Marsh	M	H	H	L	H	H	H	Cultural and historical significance. The existence of water/marshes is rare in the Southwest.
47	San Felipe Hills WSAs	M	M	H	H	H	H	H	Wilderness Study Areas are the foreground to Tribal lands and backdrop to local communities; also the setting for the Pacific Crest National Scenic Trail.
48	Chuckwalla Valley	L	M	M	M	M	L	M	History of low-level development of private lands, and use as a transportation and utility corridor.
49	Juan Bautista de Anza & Pacific Crest NHST	H	H	H	H	H	NP	H	Contains segments of two National Scenic and Historic Trails.
50	Sunrise & Anza Borrego Scenic Byway Viewshed	H	H	H	H	H	NP	H	Heavily used Scenic Byways that provide a "getaway" close to San Diego.
51	Bradshaw Trail Scenic Backcountry Byway Viewshed	H	H	H	H	H	NP	H	Scenic Backcountry Byway with historical significance.
52	West Mesa ACEC	H	M	M	M	H	NP	H	Cultural Area of Critical Environmental Concern with local public interest.

Sensitivity Level Summary, continued

SENSITIVITY LEVEL RATING UNITS (1)		Type of User	Amount of Use	Public Interest	Adjacent Land Uses	Special Areas	Other Factors	Overall Rating	EXPLANATION
No.	Name	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
53	Coyote Mountains Fossil Site	H	H	H	H	H	NP	H	A cultural ACEC that is a popular hiking and rock hounding area.
54	In-Ko-Pah Mountains	H	H	H	H	H	NP	H	Access to popular scenic overlooks and recreational opportunities.
55	Table Mountain ACEC	H	H	H	H	H	NP	H	Area of Critical Environmental Concern, cultural significance.
56	Singer Geoglyphs	M	M	H	M	H	NP	H	Easily accessed cultural Area of Critical Environmental Concern close to Highway 78 and the Imperial Sand Dunes.
57	Indian Pass ACEC	H	H	H	H	H	NP	H	Area of Critical Environmental Concern rich in cultural resources with stunning views.
58	Lake Cahuilla (A, B, C, D)	M	M	H	M	H	NP	H	Cultural Area of Critical Environmental Concern with remnants of Lake Cahuilla.
59	San Ysidro Mountain WSA	H	H	H	H	H	NP	H	Wilderness Study Area that provides recreational opportunities within a day's drive of major urban centers.
60	Sawtooth Mountain WSA	H	M	H	H	H	NP	H	Backdrop to local community with a variety of recreational opportunities and important cultural resources.
61	Carrizo Gorge WSA	H	M	H	H	H	NP	H	Popular scenic vistas, nature study including wildlife/wildflower viewing, opportunities for solitude.
62	East Mesa ACEC	M	M	M	H	H	NP	H	Cultural Area of Critical Environmental Concern with local and regional public interest.
63	Highway 78 Viewshed Corridor	H	H	M	M	NP	NP	H	A heavily traveled corridor providing access to the Imperial Sand Dunes.
64	Plank Road ACEC	H	H	H	H	H	NP	H	A cultural Area of Critical Environmental Concern with historical significance.
65	Table Mountain WSA	H	L	H	H	H	NP	H	Wilderness Study Area that provides recreation opportunities that coincide with State Park and State Wilderness; culturally significant.

Map 3-1
Sensitivity Level Rating Units



Field Office Boundary

Not Rated

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SLRU NUMBER AND NAME

001 San Felipe Hills Private Lands
002 Banner
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004 Sawtooth Mountains
005 Canebreak
006 In-Ko-Pah
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009 Jacumba Valley
010 Devil's Canyon
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013 Yuha Basin
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029 Pilot Knob
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032 Fort Yuma Valley
033 Senator Wash Hills
034 Senator Wash Valley
035 Picacho Peak
036 Bear Canyon Hills
037 Black Mountain
038 Chocolate Hills *
039 Peter Kane Bench
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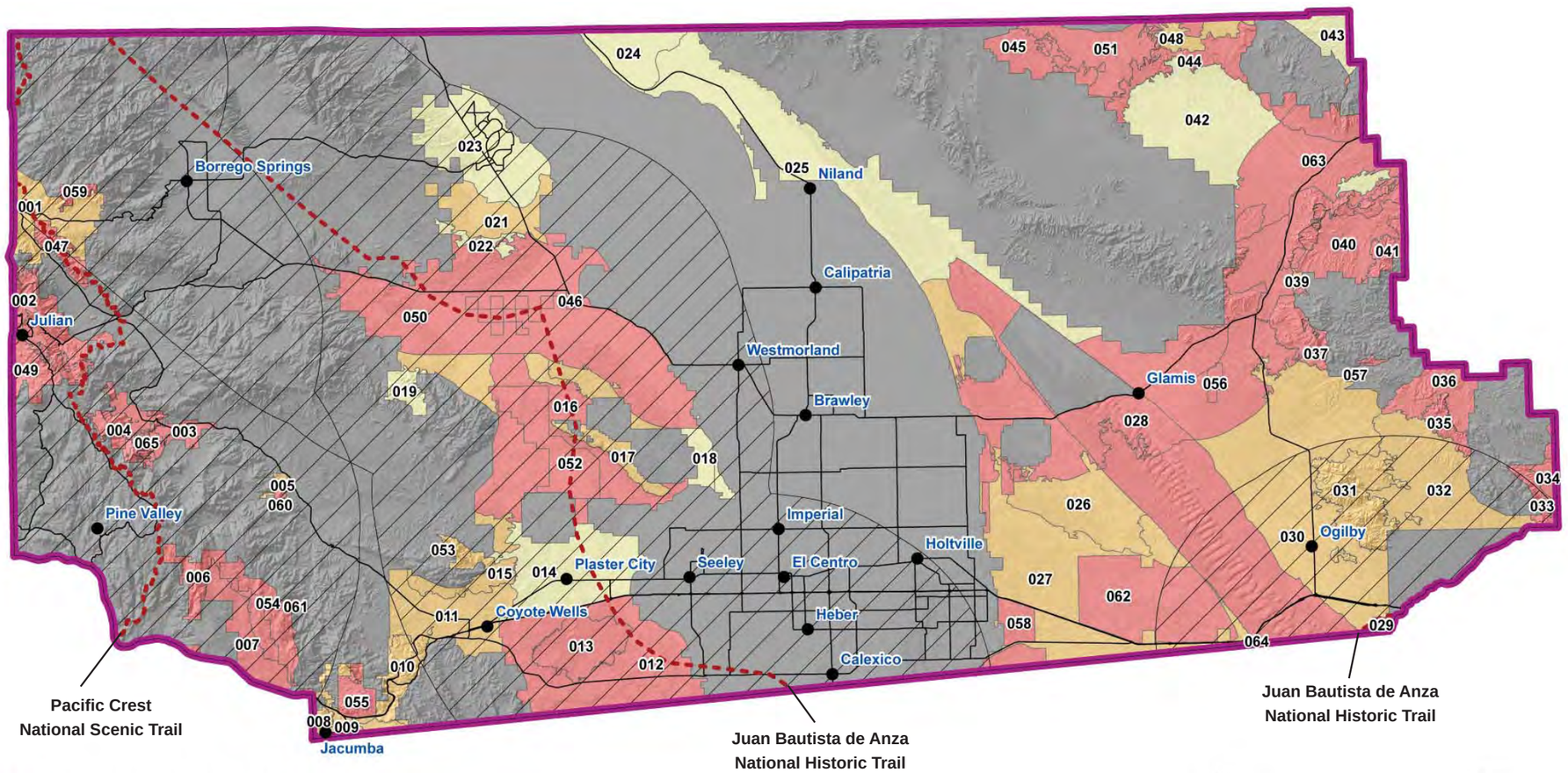
042 Milpitas Valley
043 Palo Verde Bench
044 Black Hills
045 Chuckwalla Bench
046 San Sebastian/San Felipe Marsh
047 San Felipe Hills WSAs
048 Chuckwalla Valley
049 Juan Bautista de Anza & Pacific Crest NHST
050 Sunrise & Anza Borrego Scenic Byway Viewshed
051 Bradshaw Trail Scenic Backcountry Byway Viewshed
052 West Mesa ACEC
053 Coyote Mountains Fossil Site
054 In-Ko-Pah Mountains
055 Table Mountain ACEC
056 Singer Geoglyphs
057 Indian Pass ACEC
058 Lake Cahuilla (A, B, C, D)
059 San Ysidro Mountain WSA
060 Sawtooth Mountain WSA
061 Carrizo Gorge WSA
062 East Mesa ACEC
063 Highway 78 Viewshed Corridor
064 Plank Road ACEC
065 Table Mountain WSA

*038 Chocolate Hills was combined with 063 Highway 78 Viewshed Corridor

Map 3-2
Sensitivity Levels



- National Historic/Scenic Trail
- Field Office Boundary
- Not Rated
- National Historic/Scenic Trail "15 Mile Offset"
- Maintenance of Visual Quality has High Value
- Maintenance of Visual Quality has Moderate Value
- Maintenance of Visual Quality has Low Value

N W E S

0 3 6 Miles

CALIFORNIA

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053 Coyote Mountains Fossil Site
054 In-Ko-Pah Mountains
055 Table Mountain ACEC
056 Singer Geoglyphs
057 Indian Pass ACEC
058 Lake Cahuilla (A, B, C, D)
059 San Ysidro Mountain WSA
060 Sawtooth Mountain WSA
061 Carrizo Gorge WSA
062 East Mesa ACEC
063 Highway 78 Viewshed Corridor
064 Plank Road ACEC
065 Table Mountain WSA

4. Distance Zones

The third component of the Visual Resource Inventory process is the delineation of Distance Zones (Map 4-1). Landscapes are subdivided into three distance zones based on relative visibility from travel routes or from IOPs. The three distance zones are defined as follows:

- **Foreground-Middleground Zone**—This is the area that can be seen from each travel route for a distance of 3 to 5 miles where management activities might be viewed in detail. The outer boundary of this distance zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape. In some areas, atmospheric conditions can reduce visibility and shorten the distance normally covered by each zone.

- **Background Zone**—This is the remaining area which can be seen from each travel route to approximately 15 miles. This does not include areas in the background which are so far distant that the only thing discernible is the form or outline. In order to be included within this distance zone, vegetation should be visible at least as patterns of light and dark.

- **Seldom Seen Zone**—These are areas that are not visible within the foreground-middleground and background zones and areas beyond the background zones.

Road and travel networks in the ECFO include highways, paved and gravel county roads, dirt roads (two-tracks), foot and equestrian trails, mountain bike trails, OHV trails, and railroads (Map 4-2). Analysis points were selected from the IOPs that were defined in the field and new ones were created to represent other potential observation points including roads, trailheads, and adjacent areas within the foreground/middleground zone.

Plaster City

To determine distance zones, a five-mile offset was run from all major roads within the ECFO, as well as from all secondary roads (Map 4-1) to encompass areas of the foreground/middleground. The map shows that the majority of lands are located within five miles of major travel routes, and the remainder are located within five miles of established secondary roads. Even in the roughest and most topographically diverse parts of the ECFO, roads and trails penetrate virtually all areas. In addition, areas that are not easily accessed are still visible.

Therefore, for the purpose of determining final Visual Resource Inventory Classes, only the Foreground-Middleground distance zone was used for the entire ECFO (Map 4-1).

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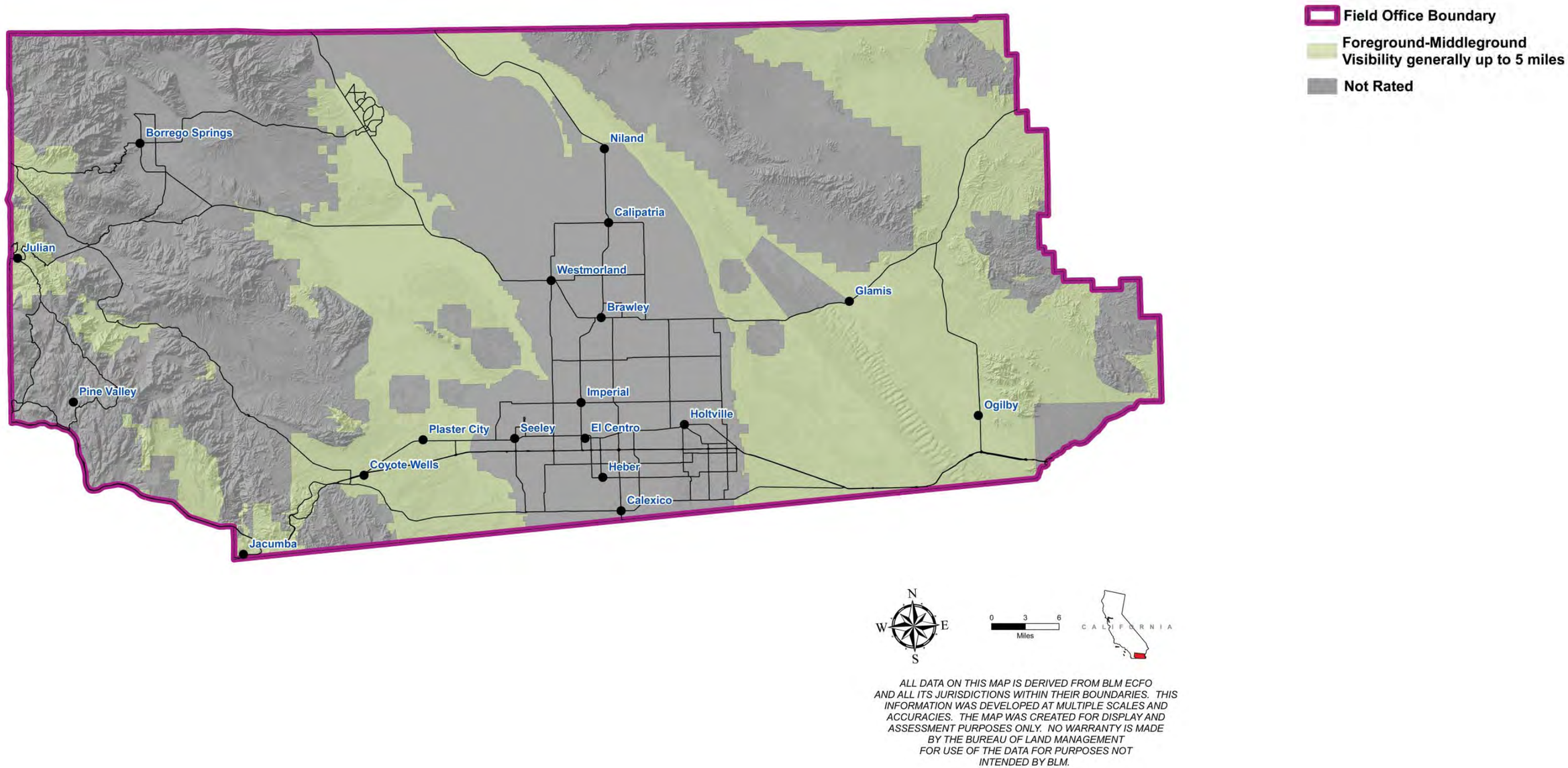
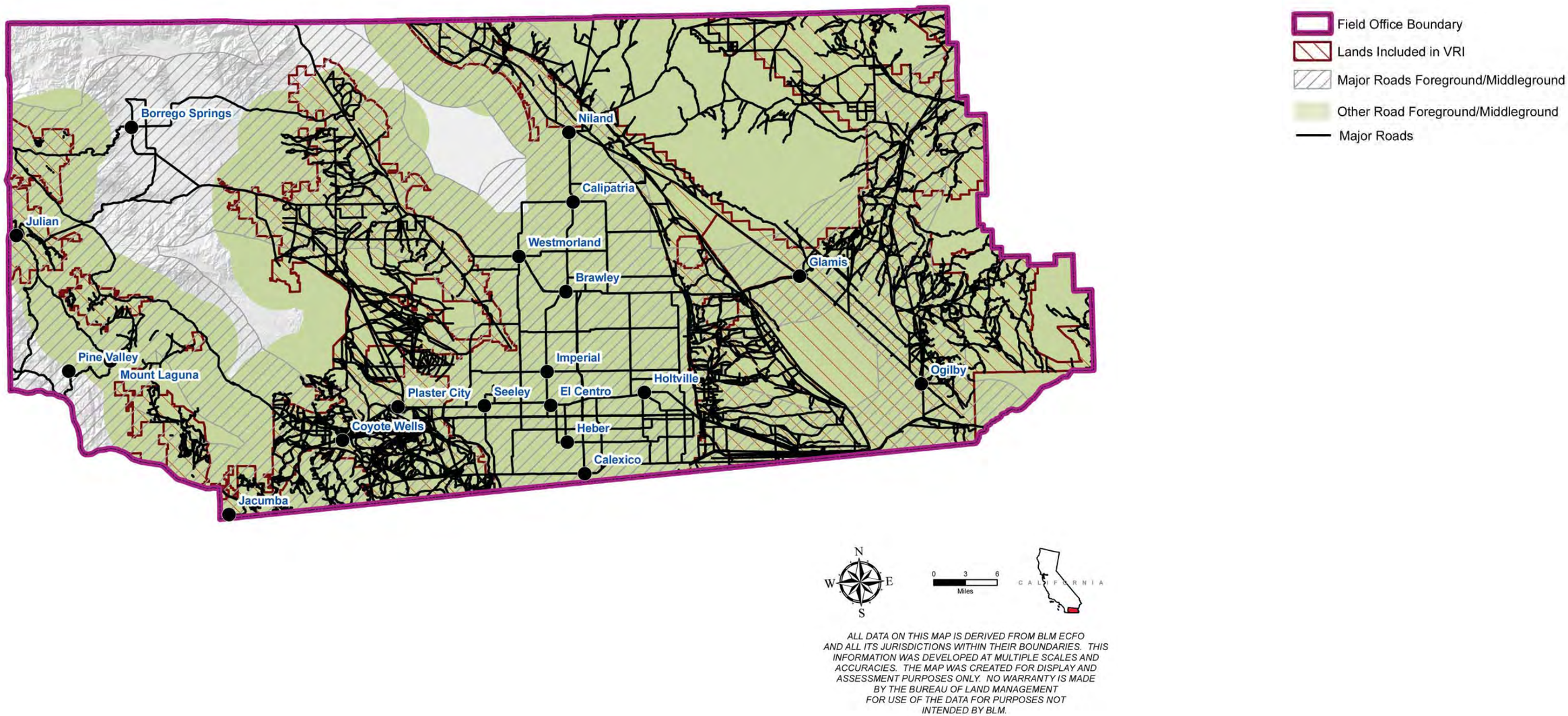
Map 4-1
Distance Zones



Map 4-2
Travel Network



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5. Visual Resource Inventory Classes

The following matrix shows how Scenic Quality, Sensitivity Level, and Distance Zones are combined to develop VRM Inventory Classes (Map 5-1).

As a general rule, lands with high scenic quality where the landscape is of concern to the public, and visible from less than five miles, are rated higher than lands with low scenic quality and for which there is little public concern for maintenance of scenic quality.

The final Visual Resource Inventory Class distribution (by acreage) for the ECFO is as follows:

	Total Acres
Class I	0
Class II	458,134
Class III	596,329
Class IV	431,713
Not Rated	2,280,290
Total	**3,766,466**

Basis for Determining
Visual Resource Inventory Classes

		Visual Sensitivity Levels						
		High			Medium			Low
Special Areas		I	I	I	I	I	I	I
Scenic Quality	A	II	II	II	II	II	II	II
	B	II	III	III / IIV*	III	IV	IV	IV
	C	III	IV	IV	IV	IV	IV	IV
		f/m	b	s/s	f/m	b	s/s	s/s
		Distance Zones						

f/m = Foreground/Middleground
b = Background
s/s = Seldom Seen

* If adjacent area is Class I, II, or III, assign Class III; if Class IV, assign Class IV.

Source: Visual Resource Inventory – BLM Manual Handbook 8410-1

Table 5-1. Visual Resource Inventory Summary

Scenic Quality Rating Units			
No.	Name	Rating	Acres*
01	San Felipe Hills	C	26,547
02	Banner	B	27,847
03	Vallecito Valley	B	9,178
04	Sawtooth Mountains	A	9,577
05	Canebreak	A	1,510
06	In-Ko-Pah	C	22,531
07	McCain Valley	B	14,230
08	Table Mountain	B	9,068
09	Jacumba Valley	B	4,772
10	Devil's Canyon	B	11,551
11	Ocotillo Valley	C	26,582
12	Yuha Desert	B	52,666
13	Yuha Basin	B	17,021
14	Plaster City	C	37,381
15	Coyote Mountain Hills	C	14,075
16	West Mesa	C	63,624
17	Superstition Mountains	B	23,345
18	Superstition Foreground	B	25,701
19	Fish Creek Mountains	A	4,951
20	Ocotillo Badland	B	3,649
21	Lower Borrego Valley	C	106,040
22	Arroyo Salada	B	16,938
23	Salton City	C	37,630
24	Coachella Valley	C	15,773
25	Mammoth	C	100,781
26	East Mesa	B	77,083
27	El Centro East	B	110,635
28	Imperial Sand Dunes	C	114,275
29	Pilot Knob	C	984
30	Singer Valley	A	139,976
31	Cargo Muchacho Mountains	B	22,804
32	Fort Yuma Valley	C	39,348
33	Senator Wash Hills	C	4,417
34	Senator Wash Valley	B	3,227
35	Picacho Peak	B	4,556
36	Bear Canyon Hills	B	15,435
37	Black Mountain	B	10,876

Scenic Quality Rating Units			
No.	Name	Rating	Acres*
38	Chocolate Hillls	C	8,688
39	Peter Kane Bench	C	15,556
40	Vinagre Wash	B	18,414
41	Indian Pass Foothills	B	21,917
42	Milpitas Valley	B	85,176
43	Palo Verde Bench	B	9,179
44	Black Hills	C	31,890
45	Chuckwalla Bench	C	26,370
46	Chuckwalla Valley	C	9,551

*Includes all BLM and non-BLM administered land

Sensitivity Level Rating Units			
No.	Name	Rating	Acres*
01	San Felipe Hills Private Lands	M	18,947
02	Banner	H	3,805
03	Vallecito Valley	H	7,960
04	Sawtooth Mountains	H	4,654
05	Canebreak	M	1,038
06	In-Ko-Pah	H	12,467
07	McCain Valley	H	13,618
08	Table Mountain	M	4,194
09	Jacumba Valley	M	4,696
10	Devil's Canyon	M	10,300
11	Ocotillo Valley	M	26,582
12	Yuha Desert	H	52,666
13	Yuha Basin	H	17,021
14	Plaster City	L	37,381
15	Coyote Mountain Hills	M	13,818
16	West Mesa	H	39,733
17	Superstition Mountains	M	12,517
18	Superstition Foreground	L	6,213
19	Fish Creek Mountains	L	4,951
21	Lower Borrego Valley	M	30,444
22	Arroyo Salada	L	3,677
23	Salton City	L	37,630
24	Coachella Valley	L	15,773
25	Mammoth	L	80,172
26	East Mesa	M	40,105
27	El Centro East	M	63,710
28	Imperial Sand Dunes	H	114,112
29	Pilot Knob	H	868
30	Singer Valley	M	104,079
31	Cargo Muchacho Mountains	M	22,804
32	Fort Yuma Valley	M	39,348
33	Senator Wash Hills	H	4,417
34	Senator Wash Valley	H	3,227
35	Picacho Peak	H	4,556
36	Bear Canyon Hills	H	15,435
37	Black Mountain	H	3,634
39	Peter Kane Bench	M	685
40	Vinagre Wash	H	18,393
41	Indian Pass Foothills	H	12,497

Sensitivity Level Rating Units			
No.	Name	Rating	Acres*
42	Milpitas Valley	L	50,753
43	Palo Verde Bench	L	9,179
44	Black Hills	H	17,266
45	Chuckwalla Bench	H	11,592
46	Chuckwalla Valley	H	7,540
47	San Felipe Hills WSAs	H	4,387
48	Chuckwalla Valley	M	6,972
49	Juan Bautista de Anza & Pacific Crest NHST	H	9,932
50	Sunrise & Anza Borrego Scenic Byway Viewshed	H	137,253
51	Bradshaw Trail Scenic Backcountry Byway Viewshed	H	23,772
52	West Mesa ACEC	H	20,290
53	Coyote Mountains Fossil Site	H	252
54	In-Ko-Pah Mountains	H	9,782
55	Table Mountain ACEC	H	5,211
56	Singer Geoglyphs	H	1,881
57	Indian Pass ACEC	H	349
58	Lake Cahuilla (A, B, C, D)	H	12,931
59	San Ysidro Mountain WSA	H	2,128
60	Sawtooth Mountain WSA	H	1,129
61	Carrizo Gorge WSA	H	894
62	East Mesa ACEC	H	42,768
63	Highway 78 Viewshed Corridor	H	169,756
64	Plank Road ACEC	H	299
65	Table Mountain WSA	H	3,716

*Includes all BLM and non-BLM administered land

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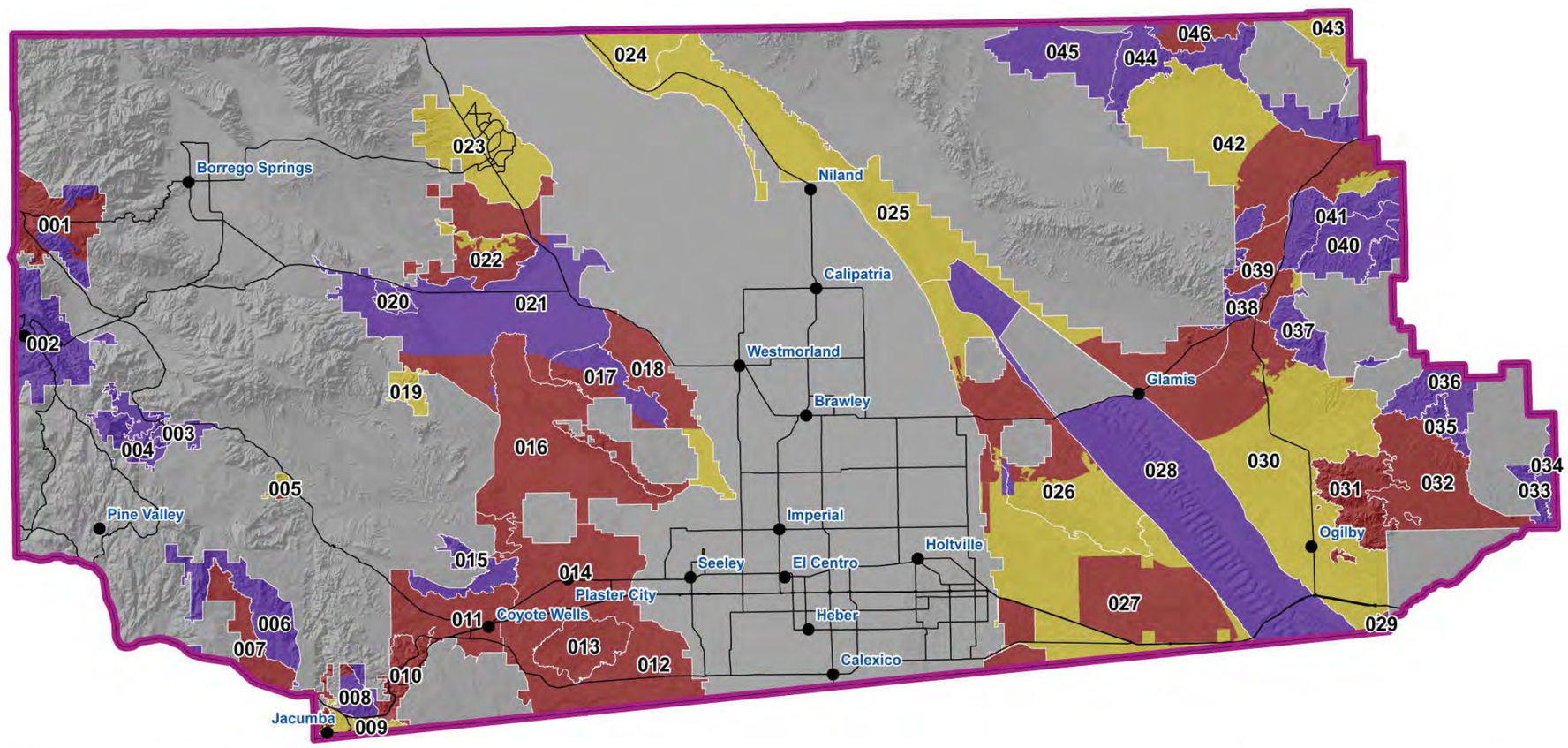
Map 5-1
Visual Resource Inventory Classes



Field Office Boundary
Not Rated (2,280,290 Acres)
VRI Class II (458,134 Acres)
VRI Class III (596,329 Acres
VRI Class IV (431,713 Acres)

Note: Acreage includes all BLM and non-BLM administered lands.

N W E S

0 3 6 Miles

CALIFORNIA

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SQRU NUMBER AND NAME

001	San Felipe Hills
002	Banner
003	Vallecito Valley
004	Sawtooth Mountains
005	Canebreak
006	In-Ko-Pah
007	McCain Valley
008	Table Mountain
009	Jacumba Valley
010	Devil's Canyon
011	Ocotillo Valley
012	Yuha Desert
013	Yuha Basin
014	Plaster City
015	Coyote Mountain Hills
016	West Mesa
017	Superstition Mountains
018	Superstition Foreground
019	Fish Creek Mountains
020	Ocotillo Badland
021	Lower Borrego Valley
022	Arroyo Salada
023	Salton City
024	Coachella Valley
025	Mammoth
026	East Mesa
027	El Centro East
028	Imperial Sand Dunes
029	Pilot Knob
030	Singer Valley
031	Cargo Muchacho Mountains
032	Fort Yuma Valley
033	Senator Wash Hills
034	Senator Wash Valley
035	Picacho Peak
036	Bear Canyon Hills
037	Black Mountain
038	Chocolate Hills
039	Peter Kane Bench
040	Vinagre Wash
041	Indian Pass Foothills
042	Milpitas Valley
043	Palo Verde Bench
044	Black Hills
045	Chuckwalla Bench
046	Chuckwalla Valley

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Scenic Quality Rating Units

No.	SQRU Name	Pages
01	San Felipe Hills	A-3
02	Banner	A-6
03	Vallecito Valley	A-10
04	Sawtooth Mountains	A-13
05	Canebreak	A-17
06	In-Ko-Pah	A-20
07	McCain Valley	A-23
08	Table Mountain	A-26
09	Jacumba Valley	A-29
10	Devil's Canyon	A-32
11	Ocotillo Valley	A-35
12	Yuha Desert	A-38
13	Yuha Basin	A-41
14	Plaster City	A-44
15	Coyote Mountain Hills	A-48
16	West Mesa	A-51
17	Superstition Mountains	A-54
18	Superstition Foreground	A-57
19	Fish Creek Mountains	A-60
20	Ocotillo Badland	A-63
21	Lower Borrego Valley	A-66
22	Arroyo Salada	A-70
23	Salton City	A-73
24	Coachella Valley	A-76
25	Mammoth	A-79
26	East Mesa	A-82
27	El Centro East	A-85
28	Imperial Sand Dunes	A-88
29	Pilot Knob	A-92
30	Singer Valley	A-95
31	Cargo Muchacho Mountains	A-98
32	Fort Yuma Valley	A-102
33	Senator Wash Hills	A-105
34	Senator Wash Valley	A-108
35	Picacho Peak	A-111
36	Bear Canyon Hills	A-114
37	Black Mountain	A-117
38	Chocolate Hills	A-121
39	Peter Kane Bench	A-124
40	Vinagre Wash	A-127
41	Indian Pass Foothills	A-130
42	Milpitas Valley	A-133
43	Palo Verde Bench	A-136
44	Black Hills	A-139
45	Chuckwalla Bench	A-143
46	Chuckwalla Valley	A-146

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Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/8/2010

Scenic Quality Rating Unit: San Felipe Hills Time (24hr format): 9:33

Unit Number: 1

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded pyramidal features with some vertical, blocky boulder fields, rock faces; gently sloping W/E	Mottled, uniform, carpet-like patchwork; low grass/perennial park land changing to wooded	Blocky, linear, cylindrical; private residences, roads, water tanks
Line	Undulating on ridgeline (series of waves); angular/slopes	Organic/irregular line in vegetation created by change in types; taller trees around private lands	Curvilinear road; rectangular
Color	Browns, grays, reds, yellowish-orange;	Green, olive green, pale yellow, yellowish-green, red, brown, dark green	White, brown, green, metallic, brown, red, tan
Texture	Medium	Smooth to medium	Smooth, vegetation absorbs structures

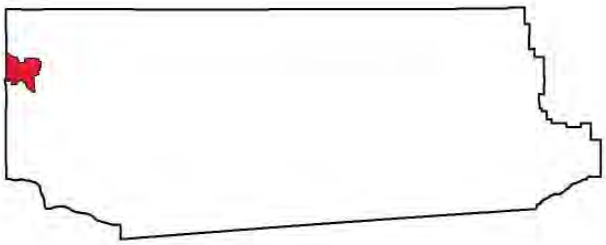
3. Narrative:

Defined by Valle de San Felipe and Volcan Mountains to the south; Field Office boundary to the west; Los Coyotes Indian Reservation to the north; Anza Borrego State Park to the east. Composed of private lands and two Wilderness Study Areas.

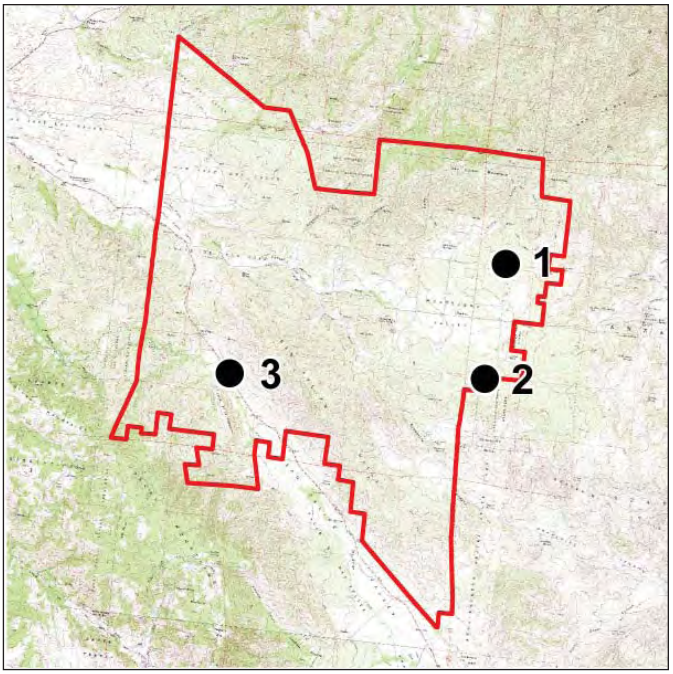
Scenic Quality Rating Unit: San Felipe Hills			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	3.5	Rock features/outcroppings; some rolling hills	☐ **A – 19 or more**
b. Vegetation	4.5	Diverse and a lot of different textures and forms	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Some intensity and variety	
e. Adjacent Scenery	4	Volcan Mountains, Los Coyotes Indian Reservation; vast, open vistas looking over the valley	
f. Scarcity	3	Distinctive but similar to others in region	☐ **Rehab**
g. Cultural Modification	-1	Structures absorbed in lower parts of valley; lighter colors make them stand out at higher elevation	☑ **Special Area**
TOTAL	17		

Comments:

This unit has a lot of variety in landform and vegetation structure and texture. The vast, open vistas into the valley and Borrego State Park also positively influence scenic quality.



SQRU Locator



• IOP Location

IOP 1. Cherry Canyon, looking southwest (IOPCAD07000196) 57_SW_SanFelipeHills_0196.jpg

IOP 2. Camel Rock, looking west (IOPCAD07000199) 58_W_SanFelipeHills_0199.jpg

IOP 3. San Felipe, looking east (IOPCAD07000187) 55_E_SanFelipeHills_0187.jpg

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Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Banner Time (24hr format): 11:00

Unit Number: 2

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded mountains, steep canyons, jagged edges; blocky	Low mounds on hills; tall vertical in canyons	Linear, straight walls; blocky, rectangular houses; straight, vertical poles
Line	Diagonal, angular, jagged	Flowing with the canyon; carpet-like on hills	Vertical, horizontal, cylindrical
Color	Browns, gray, rust, yellows, golds	Dark green, sage, yellow, pale green, reds	Browns, rust, white, metallic, yellows, blues, red
Texture	Coarse on edges; smooth, rounded	Smooth on hills; clumped, dense	Smooth, scattered

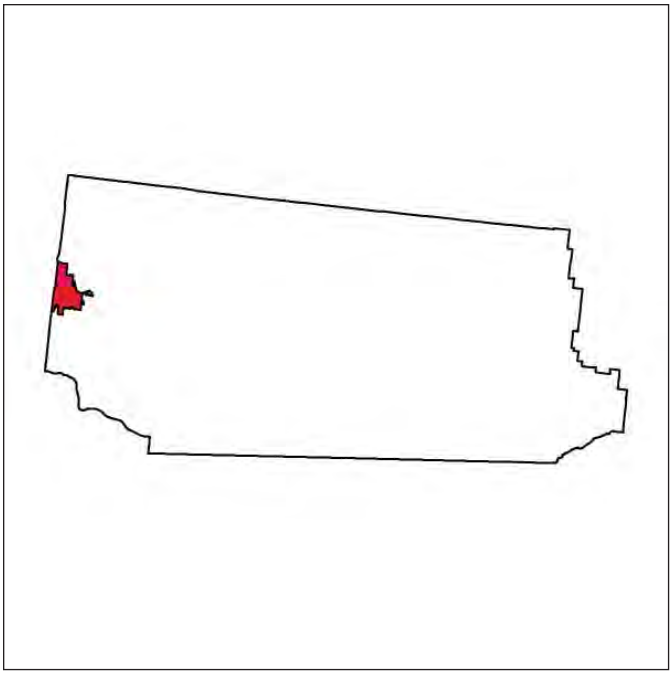
3. Narrative:

Water in the canyons. Highway 78 has a lot of traffic and a good view for viewshed. Good variety of vegetation from desert plants to canyon trees (oak, sycamore, cottonwood) to alpine shrubs, pine trees, and spruce. Heavily vegetated.

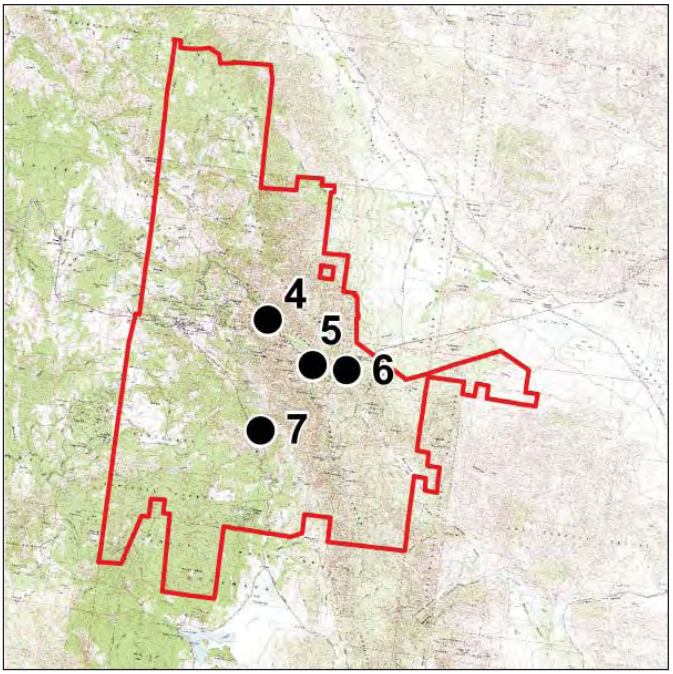
Scenic Quality Rating Unit: Banner			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	4	Dramatic effect with canyons and hills	☐ **A – 19 or more**
b. Vegetation	4.5	Extensive vegetation	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3.5	Vegetation is the dominant feature	
e. Adjacent Scenery	2	Unit is enclosed but opens out onto valleys on the east and west	
f. Scarcity	4.5	Wide variety of vegetation	☐ **Rehab**
g. Cultural Modification	-0.5	Intensity of development	☐ **Special Area**
TOTAL	18		

Comments:

Perennial streams in canyon not always noticeable, dominant. Some of the most diverse vegetation, landform in the Field Office. On edge of Colorado Desert, up to 5,000 feet in Cleveland Nat'l Forest.



SQRU Locator



• IOP Location

IOP 4. Looking northeast (IOPCAD07000127) 37_NE_Banner_0127.jpg

IOP 5. Banner overlook, looking east (IOPCAD070000118) 34_E_Banner_0118.jpg

IOP 6. Looking northeast (IOPCAD07000115)

33_NE_Banner_0115.jpg

IOP 7. Inspiration Point, looking east (IOPCAD070000205)

60_E_Banner_0205.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Vallecito Valley Time (24hr format): 10:15

Unit Number: 3

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Gently sloping, flat, concave; more pronounced on margins	Low, mounded with vertical elements in the wash and private land	Blocky, geometric, cylindrical
Line	Converging to the wash; horizontal	Horizontal, distinct break at valley edge	Vertical poles; horizontal fences and structures
Color	Yellow, gray, rust, beige, brown, red	Olive green, dark green, brown, gray, sage, yellows	Metallic, white, brown, rust
Texture	Smooth to medium; stippled in foreground	Medium, uniform low shrubs; patchy vertical elements	Smooth

3. Narrative:

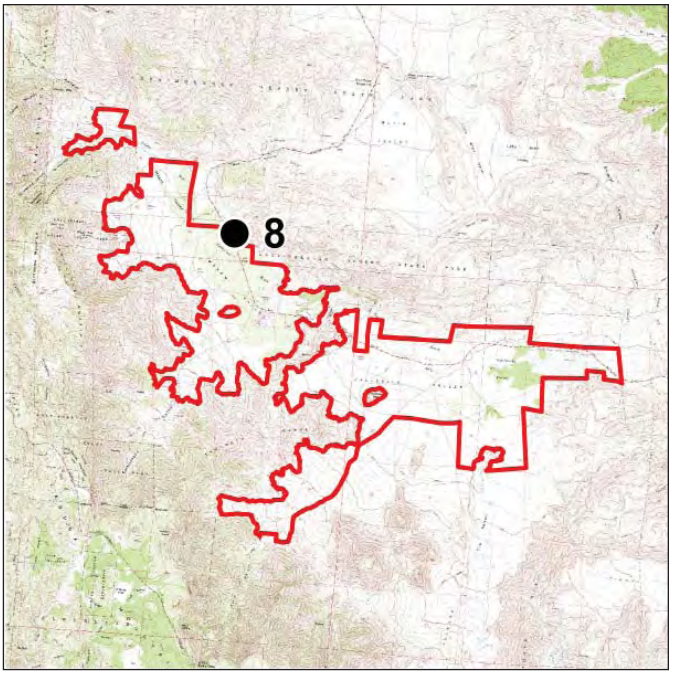
Defined by Sawtooth Mountain Wilderness to the south; Sawtooth Mountain range to the southwest and west; state lands to the northwest; Whale Peak Wilderness to the north. Predominantly private lands with some BLM land.

Scenic Quality Rating Unit: Vallecito Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1.5	Flat to gently sloping	☐ **A – 19 or more**
b. Vegetation	3	Variety created by more natural areas and private land vegetation	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Subtle color variations and contrast	
e. Adjacent Scenery	4	Surrounding mountains within close proximity greatly influence scenic quality	
f. Scarcity	3	Mountain ranges frame valley and add drama; memorable	☐ **Rehab**
g. Cultural Modification	0	Does not detract	☐ **Special Area**
TOTAL	14.5		

Comments:

Adjacent scenery is stunning and dramatic and makes this valley stand out from some of the others in the Field Office.

SQRU Locator



• IOP Location

IOP 8. Looking southeast (IOPCAD07000109)

32_SE_VallecitoValley_0109.jpg

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(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Sawtooth Mountains Time (24hr format): 11:30

Unit Number: 4

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded, conical mountains; layered, triangular-shaped ridges; non-directional	Low, patchy grasses	Not present
Line	Angular, parallel diagonal slopes; some minor vertical slopes	Patchy, irregular, soft	N/A
Color	Yellowish-brown, sandy, brownish-gray	Light green, yellow, dark green	N/A
Texture	Coarse	Fine to medium; dotted	N/A

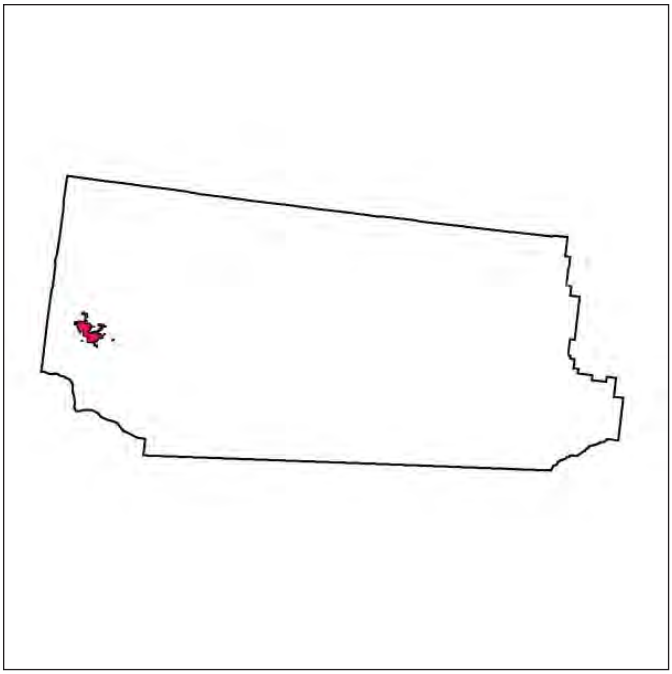
3. Narrative:

Defined by Mason/Vallecito Valley to the northeast and east; Sawtooth Wilderness, Cleveland National Forest (Laguna Mountains) to the south; Cuyamaca Rancho State Park to the west, northwest, and north. Viewed from a distance (private access).

Scenic Quality Rating Unit: Sawtooth Mountains			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	4	Rounded hills framed by valley with steeper pyramidal peaks at the top	☐ **A – 19 or more**
b. Vegetation	3	Some variety; lots of grass and few shrubs at bottom; more at top	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Land and vegetation similar in color	
e. Adjacent Scenery	4	Excellent views of Vallecito Valley with wilderness and State parks	
f. Scarcity	3	Combination of rolling hills and open valleys	☐ **Rehab**
g. Cultural Modification	0	Not present	☐ **Special Area**
TOTAL	17		

Comments:

Vallecito and Mason Valley create a nice setting for this unit. Views from Inspiration Point overlook are inspiring.



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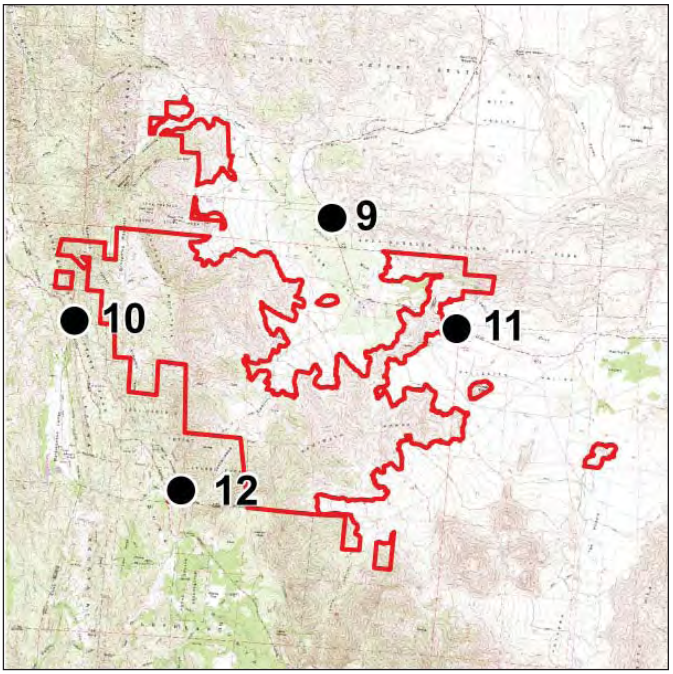


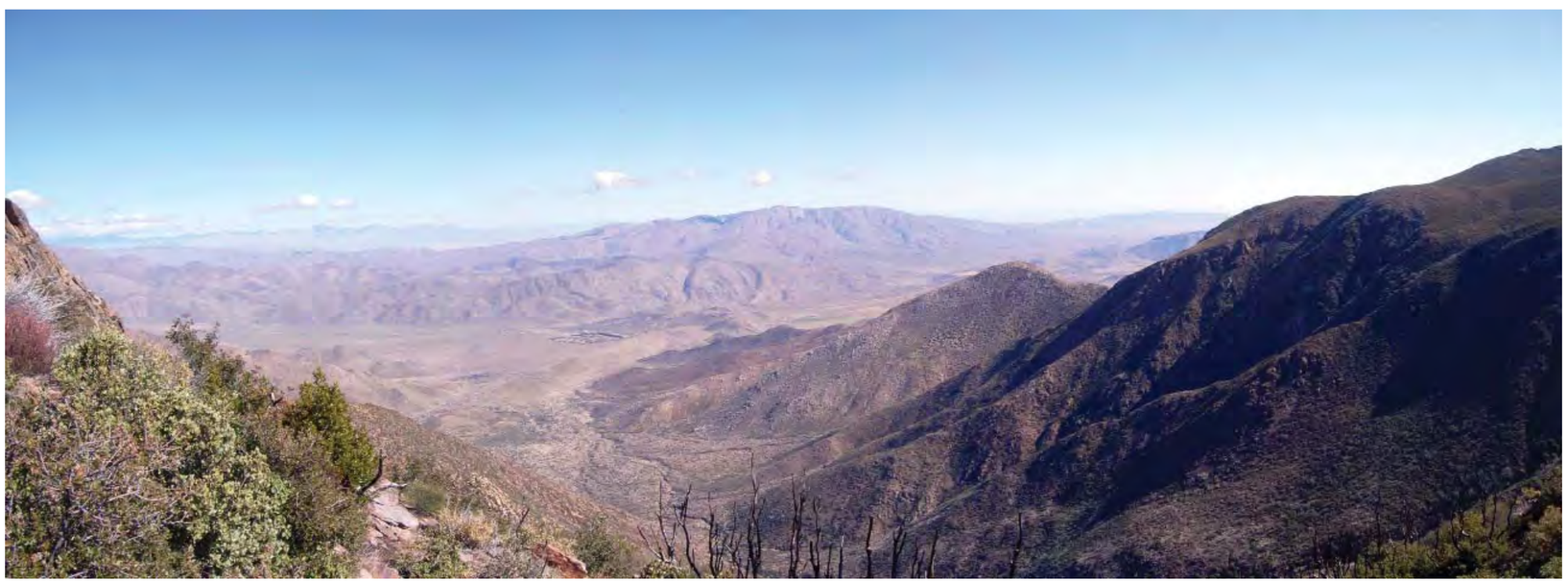
• IOP Location

IOP 9. Vallecito Wash, looking west (IOPCAD07000012) 32_W_Sawtooth_0112.jpg

IOP 10. On flamme Canyon, looking east (IOPCAD07000208) 61_E_Sawtooth_0208.jpg

IOP 11. Vallecito Ranch, looking southwest (IOPCAD07000103)

30_SW_Sawtooth_0103.jpg



IOP 12. Kwimee Point looking east (IOPCAD070000211)

62_E_Sawtooth_0211.jpg

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(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Canebreak Time (24hr format): 10:00

Unit Number: 5

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Narrow canyon with moderately steep hills forming a v-shaped valley	Spotty, vertical ocotillo with low, mounded cactus and shrubs in valleys	Blocky, geometric, jagged in the landscape
Line	Diagonal slopes; rounded mountain-tops	Directional following erosion; patchy ground cover	Horizontal, rough vertical edges and poles
Color	Browns, tans, gray, rust	Sage, green, yellow, gray, brown	Yellow, white, tan, red, brown
Texture	Coarse, directional	Medium	Smooth to rough based on material; scattered

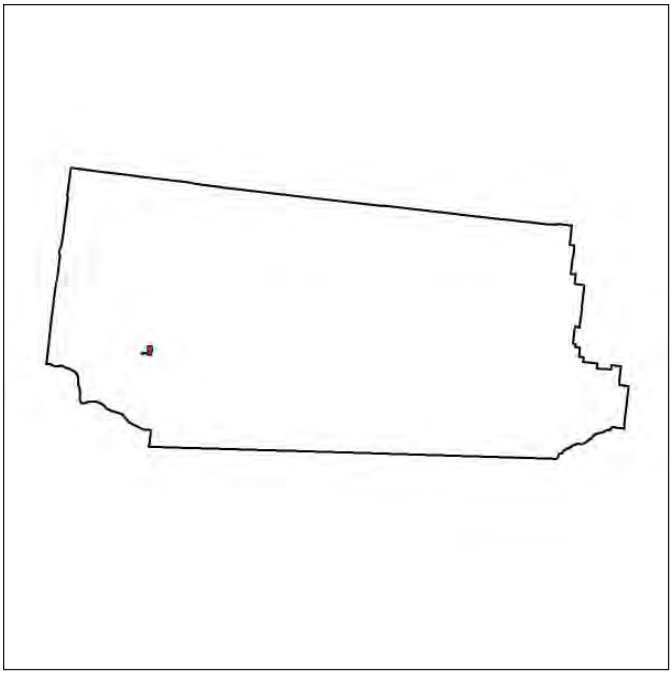
3. Narrative:

A unique little community set in the canyon. Large granite boulders and lots of vegetation within the community, and little vegetation on the hills.

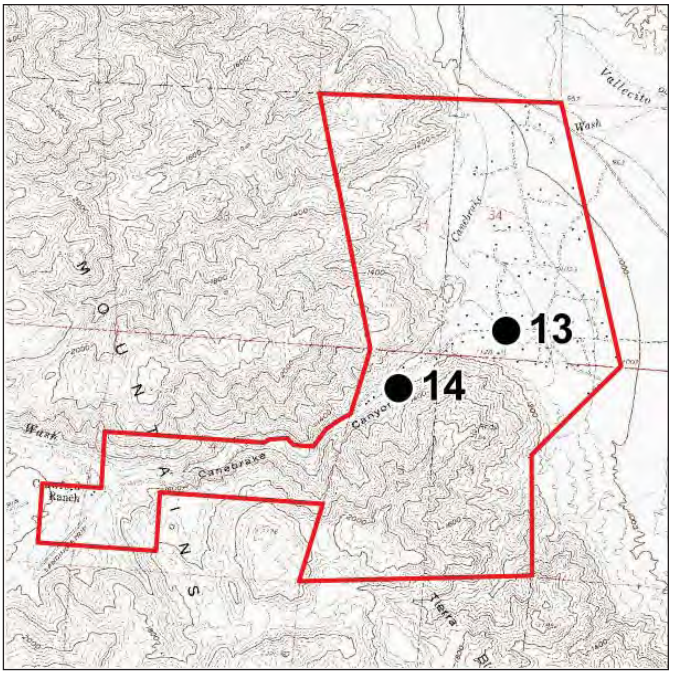
Scenic Quality Rating Unit: Canebreak			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	3	Steep hills and narrow canyon	☐ **A – 19 or more**
b. Vegetation	2.5	Variety on private land, but sparse on BLM land	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Little variety in vegetation or landform	
e. Adjacent Scenery	1	Enclosed canyon opens up on expansive valley	
f. Scarcity	1	Common	☐ **Rehab**
g. Cultural Modification	-0.5	Some	☐ **Special Area**
TOTAL	9		

Comments:

None.



SQRU Locator



• IOP Location

IOP 13. Canyon Road, looking southwest (IOPCAD07000100)

29_SW_Canebreak_0100.jpg

IOP 14. Canyon Road, looking southwest (IOPCAD070000097)

28_SW_Canebreak_0097.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/4/2010

Scenic Quality Rating Unit: In-Ko-Pah Time (24hr format): 2:30

Unit Number: 6

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rolling boulder fields transitioning into rough, rounded to pyramidal hills	Dense, patchy, clumped, rounded shrub community broken by low grass/succulent/perennial	Linear, blocky, cylindrical
Line	Diagonal, vertical, angular, undulating	Irregular between shrub/grass communities; rounded and broken	Horizontal, vertical, angular
Color	Gray, beige brown, sand, salmon	Dark green, pale yellow, pale red, gray, light green, olive green	Browns, tans (campground facilities and overlook facilities)
Texture	Medium to coarse; dense granular	Medium, random and scattered	Smooth

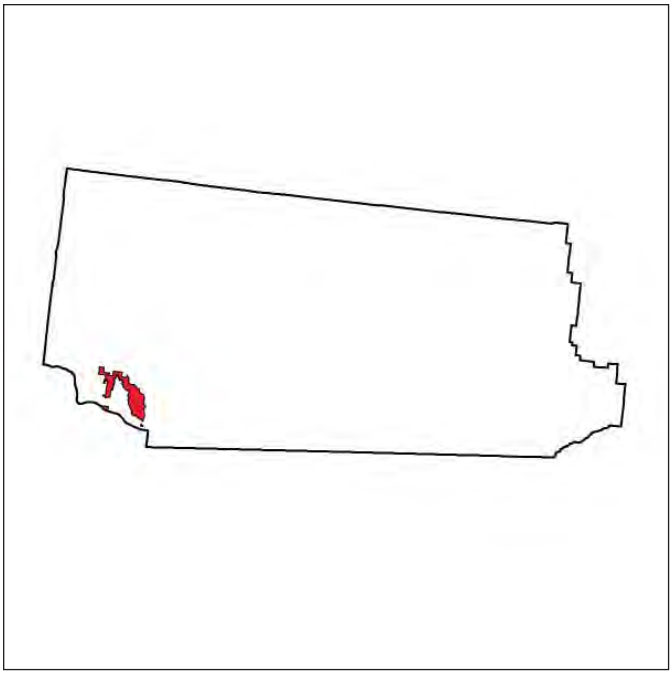
3. Narrative:

Defined by Field Office/CDCA boundary to the south; Tribal, Cleveland National Forest west; Sawtooth and Sombrero Peak Wilderness north; Carrizo Gorge Wilderness east. Sits along McCain Valley margins. More vegetative variety in boulder fields.

Scenic Quality Rating Unit: In-Ko-Pah			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	3.5	Steep but not dominant vertical elements; diverse; rolling boulder fields, mountains; varied texture	☐ **A – 19 or more**
b. Vegetation	4	Dense with a lot of variety in texture, form, and type	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3.5	Dominant with good contrast between landform, vegetation; overall monotone	
e. Adjacent Scenery	3	Inward focus; little visible outside; more influential along edges of unit	
f. Scarcity	2	Distinct because of prominent boulder fields	☐ **Rehab**
g. Cultural Modification	0	Campground and overlook facilities absorbed in landscape because of scale and texture	☑ **Special Area**
TOTAL	16		

Comments:

A lot of visual variety in landform and vegetation (manzanita, juniper, oak, century plants, rosetta agave, ephedra, cholla). Nice color contrast between soil/landform and vegetation, though monotone.



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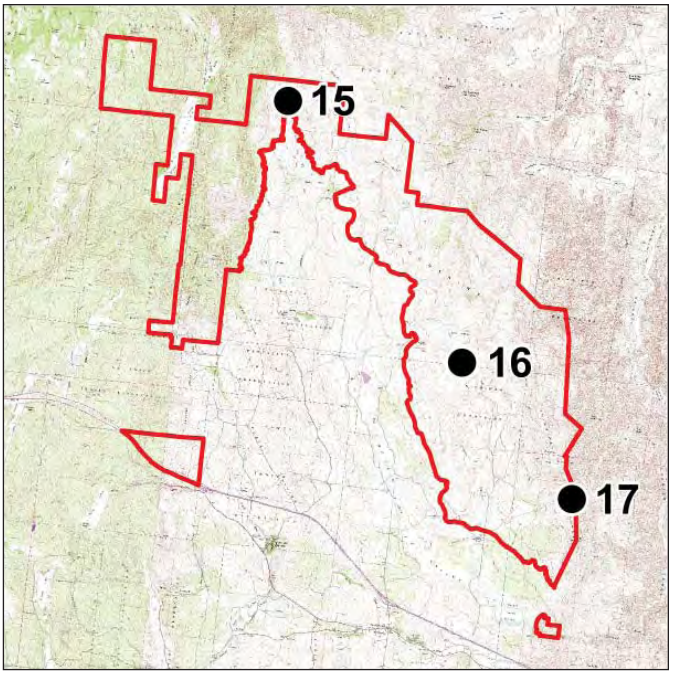
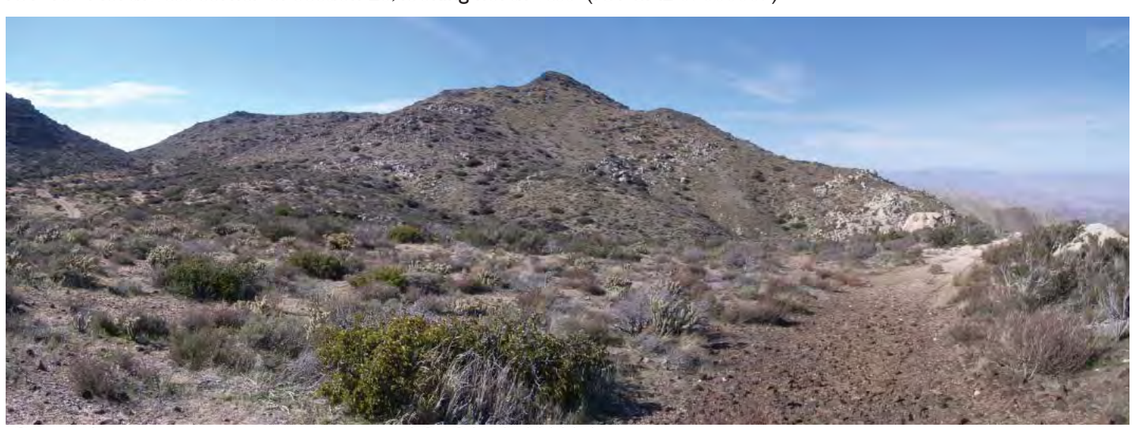


• IOP Location

IOP 15. Sawtooth Mountain Wilderness boundary, looking north (IOPCAD07000013) 5_N_InKoPah_0013.jpg

IOP 16. Northwest corner of Section 28, looking northwest (IOPCAD07000007) 3_NW_InKoPah_0007.jpg



IOP 17. Sacatone overlook, looking north (IOPCAD07000001) 1_N_InKoPah_0001.jpg

Form 8400-1
(September 1985)
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/4/2010

Scenic Quality Rating Unit: McCain Valley Time (24hr format): 16:00

Unit Number: 7

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rolling hills with sparse boulder outcroppings	Uniform, low, sea/carpet of chaparral shrub community (shrubs with open areas of grass, perennials)	Linear, blocky
Line	Horizontal to undulating line sloping/converging to the middle of the valley	Irregular between shrub community and grass/perennial community	Vertical (radio tower, power poles), horizontal, rectangular
Color	Gray, beige, salmon, sand	Monotone; greens, gray pale red, pale yellow	Metallic, gray, red, brown, white, green
Texture	Smooth to medium; fine, granular	Medium	Smooth

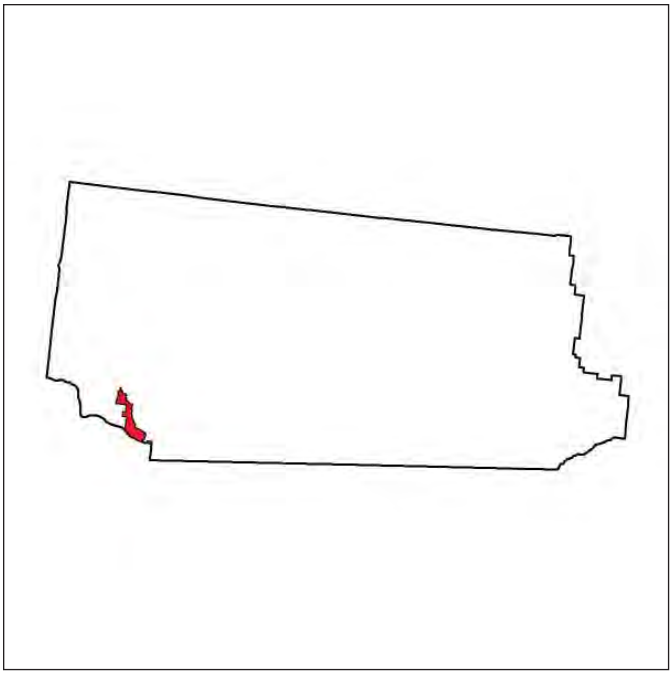
3. Narrative:

Fewer succulents than In-Ko-Pah unit; less variety than boulder fields.

Scenic Quality Rating Unit: McCain Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	2	Gently rolling with sparse boulder outcrops	☐ **A – 19 or more**
b. Vegetation	3	Some variety but only one or two types	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Montane/green, some red; little contrast	
e. Adjacent Scenery	2	Scale of unit is large and when inside it, exterior views are obscured by dense vegetation	
f. Scarcity	1.5	Common; rolling hills, chaparral community	☐ **Rehab**
g. Cultural Modification	-0.5	More development in the south prison facility; private compound, other private residences detract	☐ **Special Area**
TOTAL	10		

Comments:

The unit has a dense, uniform cover of shrubs and rolling hills, common for this part of the region.



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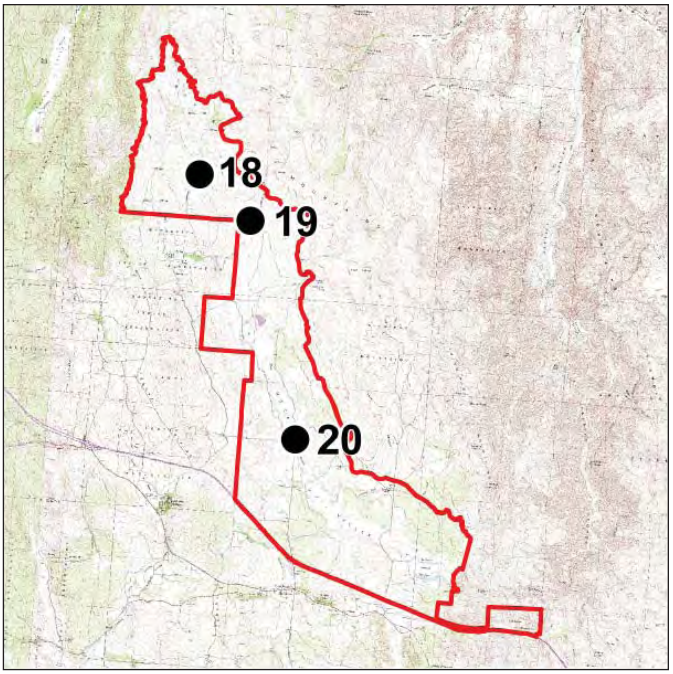


• IOP Location

IOP 18. North edge, Manzanita Indian Reservation, looking south (IOPCAD07000016) 6_S_McCainValley_0016.jpg

IOP 19. Tule Creek headwater, looking southeast (IOPCAD07000019) 7_SE_McCainValley_0019.jpg

IOP 20. Lower Tule Creek, looking west (IOPCAD07000022) 8_W_McCainValley_0022.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/5/2010

Scenic Quality Rating Unit: Table Mountain Time (24hr format): 9:48

Unit Number: 8

1. Evaluators: BBielenberg CBrandt JMcGrew JJohnson

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat mesas punctuated by conical peaks; v-shaped valleys/drainages, rolling and rounded	Clumping/mounded, scattered shrubs, yuccas, cactus	Linear railroad, power poles, lines; border fence long/linear, blocky
Line	Diagonal, vertical rock outcroppings; undulating, rounded	Indistinct grass/perennial understory follows ridges and valley	Horizontal, vertical, geometric
Color	Brown/gray, gray, rust, orange, sand, red	Yellow green, dark green, gray, pale yellow, brown	Brown/gray, rust, metallic
Texture	Medium to coarse	Dotted, clumped; medium	Smooth

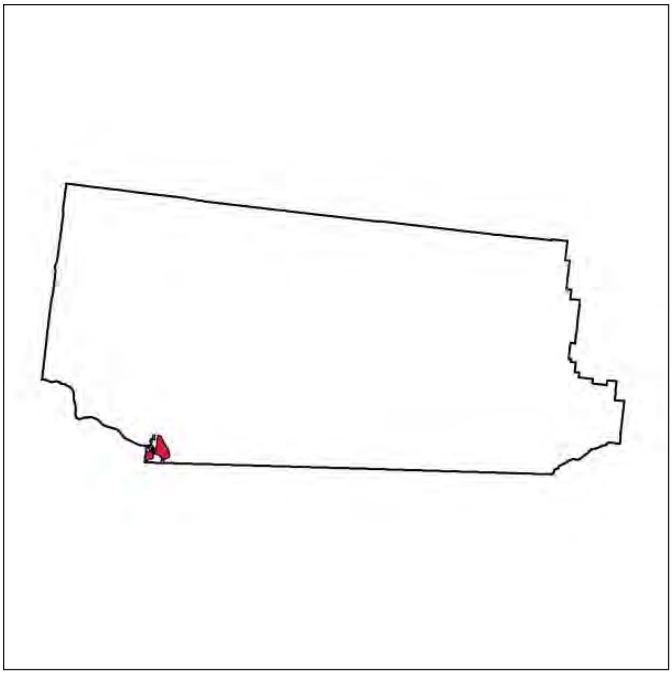
3. Narrative:

The unit includes the Table Mountain ACEC, Round Mountain and adjacent mesa-like hills, BLM lands along cherry-stem of Carrizo Gorge. Characteristic features are flat-top mesas on conical (cinder-cone). Less rocky than Jacumba Valley or Devil's Canyon.

Scenic Quality Rating Unit: Table Mountain			
4. SCORE			**SCENIC QUALITY CLASSIFICATION (check one)**
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	3	Round Mountain is a dominant feature; cinder cone	☐ **A – 19 or more**
b. Vegetation	3	Multiple types but sparse; more variety around Table Mountain	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Some striation in vertical rock faces; good contrast between land and vegetation	
e. Adjacent Scenery	3	Carrizo Gorge and Jacumba Wilderness and State Park provide good views; views of valley bottoms	
f. Scarcity	2	Very common within physiographic area; somewhat unique to immediate area	☐ **Rehab**
g. Cultural Modification	0	Nothing distinct; small piece of border fence in part of unit detracts some	☑ **Special Area**
TOTAL	14		

Comments:

Round Mountain, Table Mountain are dominant features in the unit; otherwise landform is common for the region. Good contrast between soil/landform and vegetation, and visual variety in vegetation.



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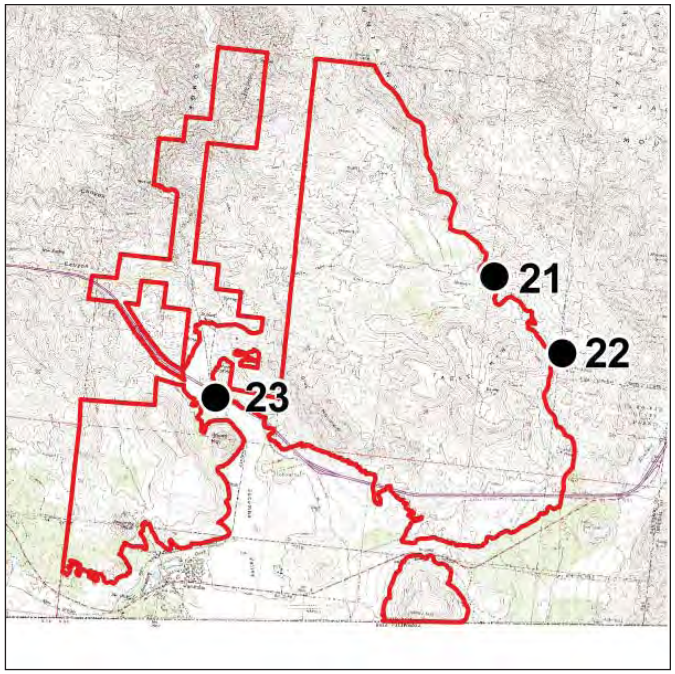


• IOP Location

IOP 21. Radio tower, looking southwest (IOPCAD07000043) 13_SW_TableMountain_0043.jpg

IOP 22. Intersection point, looking west (IOPCAD07000040) 12_W_TableMountain_0040.jpg

IOP 23. Round Mountain, looking southeast (IOPCAD07000028) 10_SE_TableMountain_0028.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/5/2010

Scenic Quality Rating Unit: Jacumba Valley Time (24hr format): 12:00

Unit Number: 9

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat valley bottom with some rounded, rolling features	Low, rounded shrubs; vertical trees in washes; long, spiky yuccas; uniform	Blocky, geometric, long; communities of Jacumba and Oasis
Line	Horizontal, sloping, converging	Flowing with washes; soft, bold, geometric with agricultural uses	Horizontal, parallel with washes; geometric, vertical poles
Color	Gray, brown, rust	Rust, dark green, yellow green, sage green, pale yellow	Browns, grays, metallic, rust
Texture	Fine to medium	Medium; dense in washes, clumped on hillside	Smooth, directional; border fence contrasts with landscape

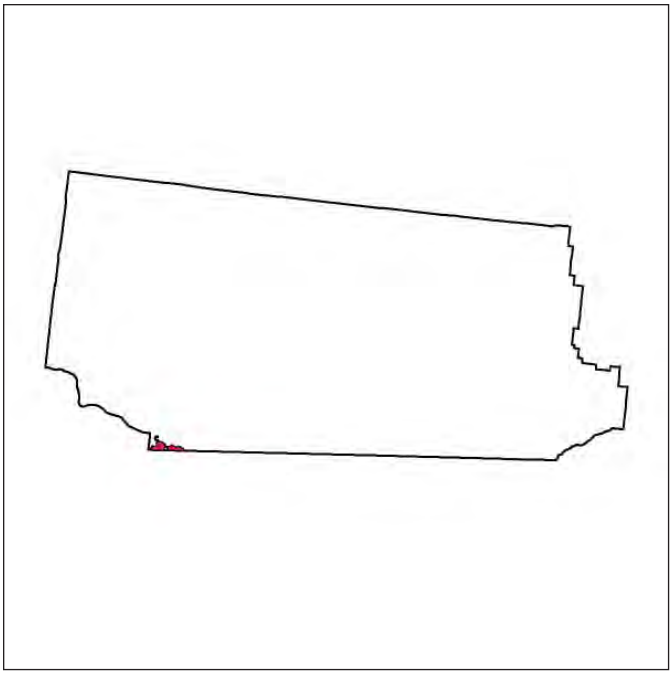
3. Narrative:

Lots of human debris: ammunition shells, grocery bags. Defined by the Mexican border to the south; Field Office boundary, state lands to the west; Anza Borrego State Park, Table Mountain, Devil's Canyon to the north; Jacumba Wilderness (BLM) to the east.

Scenic Quality Rating Unit: Jacumba Valley			
4. SCORE			**SCENIC QUALITY CLASSIFICATION (check one)**
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	1.5	Flat to gently sloping, bowl-shaped, indistinct	☐ **A – 19 or more**
b. Vegetation	2.5	Not much variety, but has trees, shrubs, succulents	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	1	Uniform, subtle; not much contrast; muted tones	
e. Adjacent Scenery	3	Conical Table Mountain and boulder field of Devil's Canyon enhance views	
f. Scarcity	1	Nothing distinct	☐ **Rehab**
g. Cultural Modification	-1	Border fence and human impacts dominate portions of the unit	☐ **Special Area**
TOTAL	8		

Comments:

Adjacent scenery moderately enhances the scenic quality of this unit; otherwise, it would be fairly ordinary.



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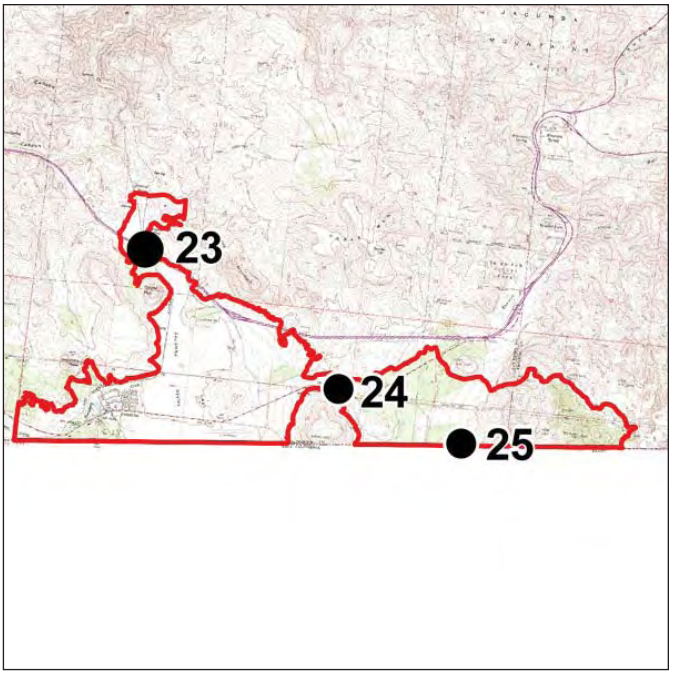


• IOP Location

IOP 23. Looking northwest (IOPCAD070000031)

10_NW_JacumbaValley_0031.jpg

IOP 24. Looking north (IOPCAD070000034)

11_N_JacumbaValley_0034.jpg

IOP 24. Looking west (IOPCAD070000037)

11_W_JacumbaValley_0037.jpg

IOP 25. Border fence, looking west (IOPCAD07000049)

14_W_JacumbaValley_0049.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/5/2010

Scenic Quality Rating Unit: Devil's Canyon Time (24hr format): 13:00

Unit Number: 10

1. Evaluators: BBielenberg CBrandt JMcGrew JJohnson

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rolling, rounded hills; non-directional, conical, complex, bold boulder arrangement	Stippled, sparse, scattered in rocks; vertical ocotillo, rounded shrubs	Long, linear roads curving with landforms; blocky
Line	Angular, undulating, rounded broken	Nondescript, irregular	Straight, curving with landform
Color	Brown, tan, rust, grays, beige, salmon	Gray, green, pale yellow, bright greens, yellow-greens, red, brown	Dark grayish-white, brown, white
Texture	Coarse, dense, granular boulder field; smooth in foreground	Medium to coarse contrasting with landform	Smooth

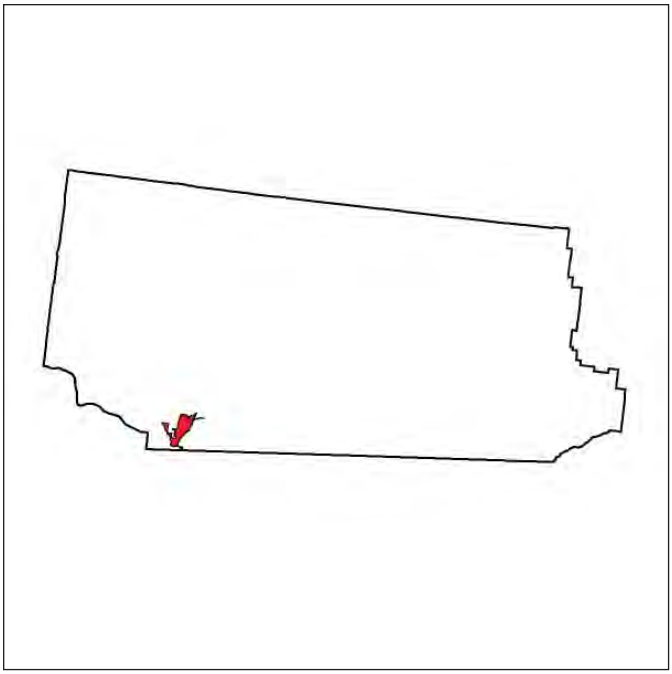
3. Narrative:

Defined by Table Mountain, state lands (Jacumba Mtn Wilderness, Anza-Borrego Desert State Park) to the west; Ocotillo Valley north; Jacumba Wilderness (BLM) east; Jacumba Valley south. Distinct from surrounding units with bold boulder-field arrangement.

Scenic Quality Rating Unit: Devil's Canyon			
4. SCORE			**SCENIC QUALITY CLASSIFICATION (check one)**
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	4	Dominant/bold to coarse rock features	☐ **A – 19 or more**
b. Vegetation	3.5	Barrel cacti; good variety; palm oasis	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	4	Good contrast and variety; striking	
e. Adjacent Scenery	1	Bowl; enclosed with views outside the unit only on the edge	
f. Scarcity	4	Good habitat for bighorn sheep, wildlife viewing; stands out as visually memorable and striking	☐ **Rehab**
g. Cultural Modification	-0.5	Road/border fence, truck stops	☑ **Special Area**
TOTAL	16		

Comments:

Dominant/bold and coarse boulder feature and striking color contrast between the soil/landform and vegetation truly make this area one of the more visually memorable in the Field Office.



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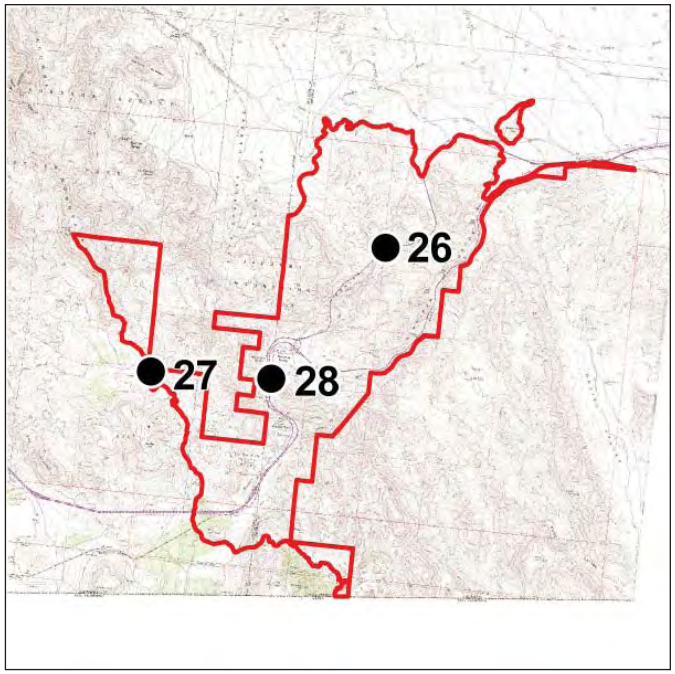


• IOP Location

IOP 26. Southeast Section 8, looking northwest (IOPCAD07000025) 9_NW_DevilsCanyon_0025.jpg

IOP 27. Looking north (IOPCAD070000046) 13_N_DevilsCanyon_0046.jpg

IOP 28. Looking northeast (IOPCAD070000055) 15_NE_DevilsCanyon_0055.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Ocotillo Valley Time (24hr format): 8:30

Unit Number: 11

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat valley, gently sloping east to west, converging in the north	Low, random mounds of creosote; non-directional	Blocky, clumped, square, geometric
Line	Horizontal	Rounded mounds punctuated by vertical cholla, ocotillo, flower stalks	Predominantly horizontal with vertical accents
Color	Sand, gray, brown	Green, yellows, olive, gray, brown	White, gray, brown, metallic, rust
Texture	Smooth to medium	Medium	Smooth, contrasting, ordered

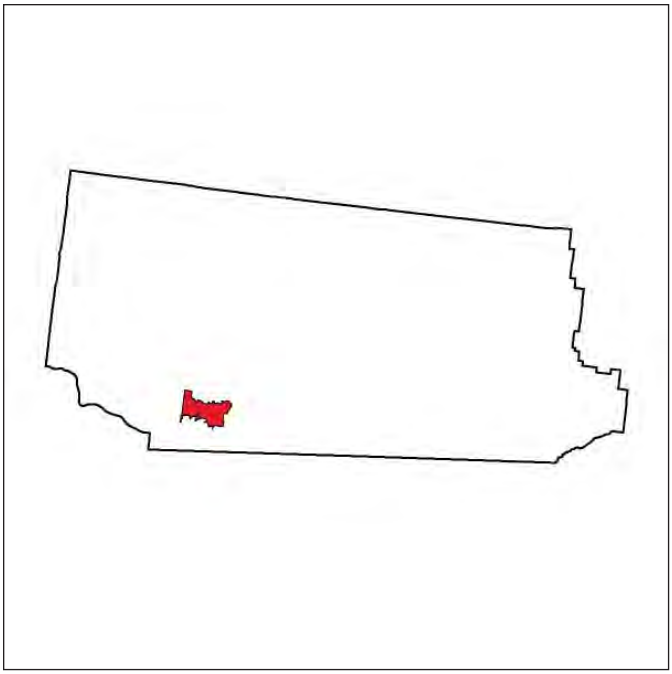
3. Narrative:

West abuts Anza-Borrego State Park; north abuts Coyote Wilderness Area; town of Ocotillo on the east; Jacumba Wilderness on the south. Good diversity of vegetation: agave, yucca, ocotillo, cholla, barrel cactus, grass, perennials, brittlebrush, creosote.

Scenic Quality Rating Unit: Ocotillo Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1	Generally flat	☐ **A – 19 or more**
b. Vegetation	3.5	Good variety of desert plants	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Good variety in vegetation; some spring flowers	
e. Adjacent Scenery	3.5	Surrounding state parks and wilderness provide good adjacent scenery	
f. Scarcity	2.5	Pretty common but nicer than other similar areas	☐ **Rehab**
g. Cultural Modification	-0.5	Town of Ocotillo is a bit dilapidated; power lines obstruct view	☐ **Special Area**
TOTAL	13		

Comments:

Vegetative variety/diversity and adjacent scenery stand out. Overall, this unit has less disturbance than neighboring Plaster City.



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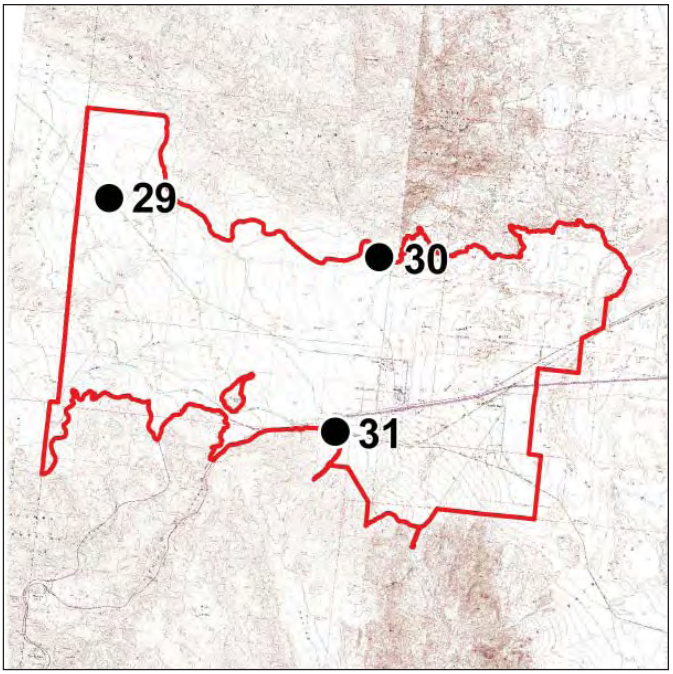


• IOP Location

IOP 29. Border Patrol checkpoint, looking northeast (IOPCAD070000094)

27_NE_OcotilloValley_0094.jpg

IOP 30. Looking southwest (IOPCAD070000088)

25_SW_OcotilloValley_0088.jpg

IOP 31. Highway 98 turnoff, looking northwest (IOPCAD07000058)

16_NW_OcotilloValley_0058.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/5/2010

Scenic Quality Rating Unit: Yuha Desert Time (24hr format): 15:30

Unit Number: 12

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Gently sloping toward rim of Yuha Basin (along north, east, south) becoming more flat to the east	Sparse, rounded, low shrubs; predominantly more clumping in washes	Linear roads, signs; geometric kiosks, lattice power poles
Line	Horizontal	Indistinct	Vertical, horizontal, angular; concave swooping power lines
Color	Sand, beige, gray, dark gray to black	Pale yellow, gray, olive green	Brown, tan, metallic
Texture	Smooth	Medium	Smooth; coarse/abrupt in the landscape

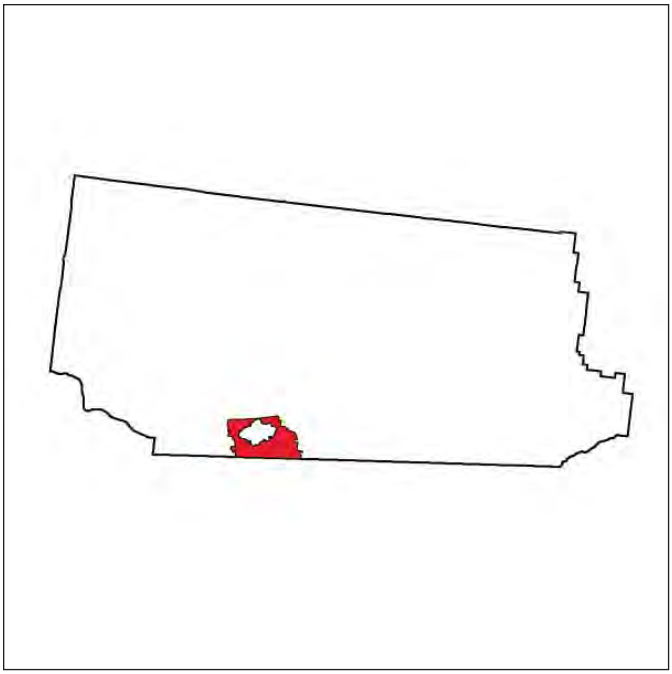
3. Narrative:

Unit defined by Yuha Basin Area of Critical Environmental Concern; different from the Yuha Basin itself. Flatter, with few to no erosional features. Vegetation is denser and more diverse toward the west.

Scenic Quality Rating Unit: Yuha Desert			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1	Flat to gently sloping	☐ **A – 19 or more**
b. Vegetation	2.5	Some unique areas, different vegetation types; Crucifixion Thorn Natural Area washes more diverse	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	1.5	Subtle; little variation or contrast	
e. Adjacent Scenery	2	Wilderness areas to west; Coyote Mountains	
f. Scarcity	1	Vastness/open valley with creosote; common	☐ **Rehab**
g. Cultural Modification	-0.5	Transformer station, power lines	☑ **Special Area**
TOTAL	7.5		

Comments:

This unit does not stand out as being unique; without adjacent scenery to the west and diversity of vegetation in the west, it would be common and ordinary.



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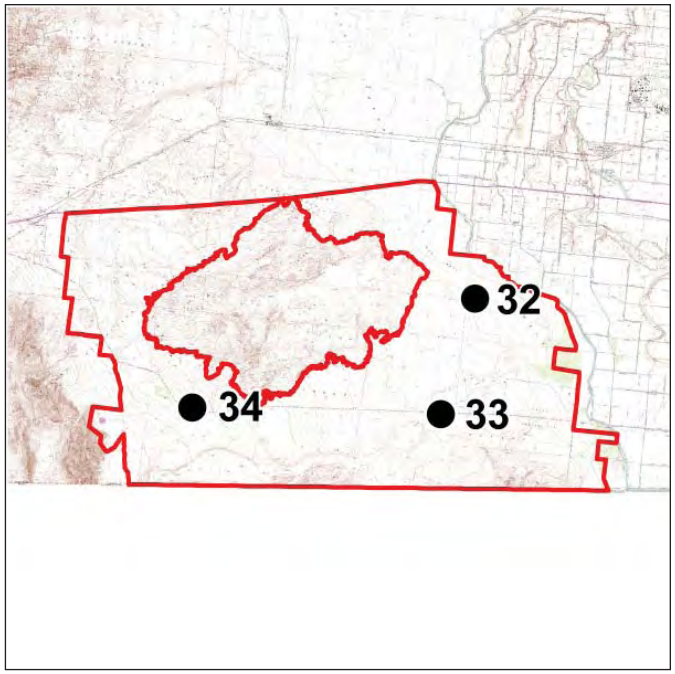

• IOP Location

IOP 32. Power line, Section 3, looking south (IOPCAD070000073) 21_S_YuhaDesert_0073.jpg

IOP 33. Quarry, looking south (IOPCAD070000076) 22_S_YuhaDesert_0076.jpg

IOP 34. Looking southwest (IOPCAD07000061) 17_SW_YuhaDesert_0061.jpg

Form 8400-1
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/5/2010

Scenic Quality Rating Unit: Yuha Basin Time (24hr format): 14:30

Unit Number: 13

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Concave basin with triangular, pyramid-shaped, steep edges; erosional features, drainages	Low, mounded with vertical accents of ocotillo	Linear roads; blocky; monument, fencing (geoglyphs)
Line	Jagged edges; vertical directional east/west basin bottom; basin converges on west, opens up on east	Broken, irregular	Horizontal, vertical, angular
Color	Brown, sand, dark gray, salmon, orange	Olive green, yellow green	Brown, metallic, tan, gray
Texture	Smooth on basin bottom; rough/coarse on edges	Scattered, sparse, patchy	Smooth

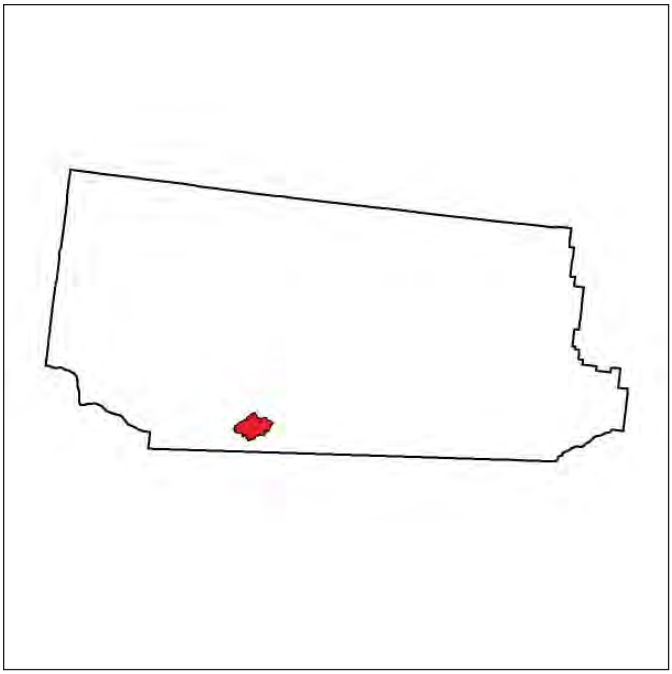
3. Narrative:

Within the Yuha Basin Area of Critical Environmental Concern, surrounded by the Yuha Desert. Dominant characteristic is badland basin from rim to base.

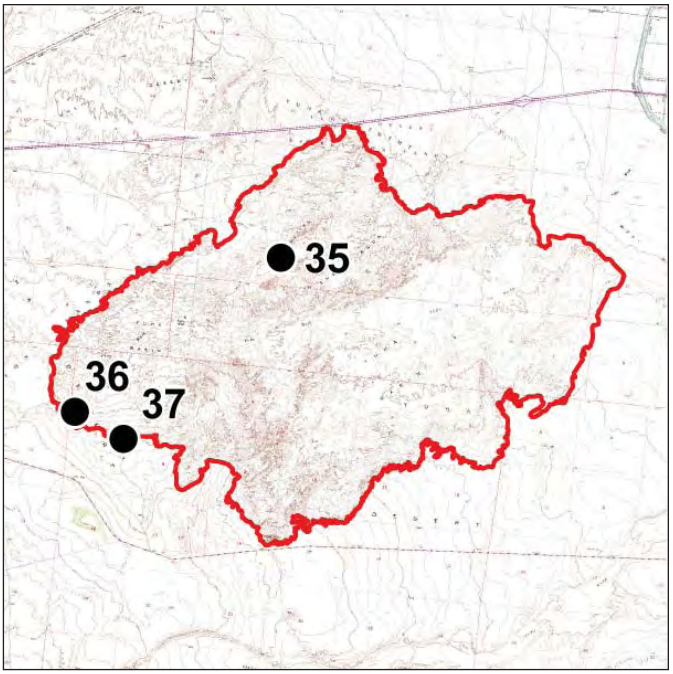
Scenic Quality Rating Unit: Yuha Basin			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	3	Concave; interesting erosional feature; badland-like	☐ **A – 19 or more**
b. Vegetation	1	Sparse and little variety	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2.5	Salmon, gray, red landform color is dominant; no contrast in vegetation	
e. Adjacent Scenery	1	Enclosed landscape	
f. Scarcity	3.5	Badland character is unique in this area	☐ **Rehab**
g. Cultural Modification	0	Does not detract	☑ **Special Area**
TOTAL	11		

Comments:

The interesting erosional badland-like features make this unit stand out in this physiographic region and provide a unique visual experience in the Field Office, within close proximity to El Centro.



SQRU Locator



• IOP Location

IOP 35. Fossil beds, looking west (IOPCAD070000070) 20_W_YuhaBasin_0070.jpg

IOP 36. De Anza overlook, looking northeast (IOPCAD070000067) 19_NE_YuhaBasin_0067.jpg

IOP 37. Basin overlook, looking north (IOPCAD07000064) 18_N_YuhaBasin_0064.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/5/2010

Scenic Quality Rating Unit: Plaster City Time (24hr format): 7:30

Unit Number: 14

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat, angular mesas with some rolling hills; triangular edges on west, flat valley bottom on east	Mounded clumps concentrated in flat valley bottoms on west; low, mounded, uniform clumps on east	Linear power lines; blocky/geometric trailers and drywall facility; cylindrical power poles
Line	Horizontal; diverging angles	Ocotillo and trees add vertical element; indistinct	Vertical, angular, horizontal
Color	Sand, gray, browns (muted)	Yellow, sage green, pale yellow, grays	Lime green, dark gray, blue, browns, metallic, rust, gray, white, Carlsbad Canyon
Texture	Smooth	Dotted, scattered, sparse medium	Smooth

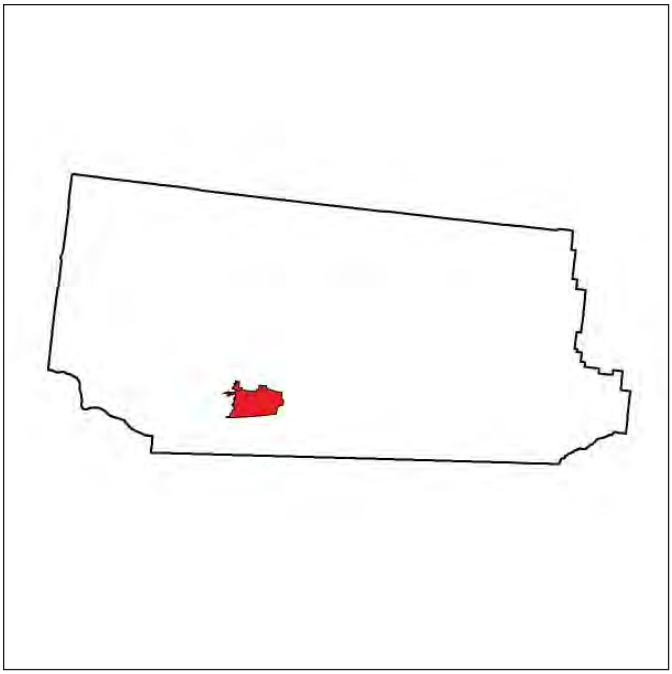
3. Narrative:

Defined by I-8 to the south; Ocotillo Valley, Coyote Mountain Hills to the west; West Mesa and military lands to the north; Imperial Valley to the east. Includes Plaster City Open Area.

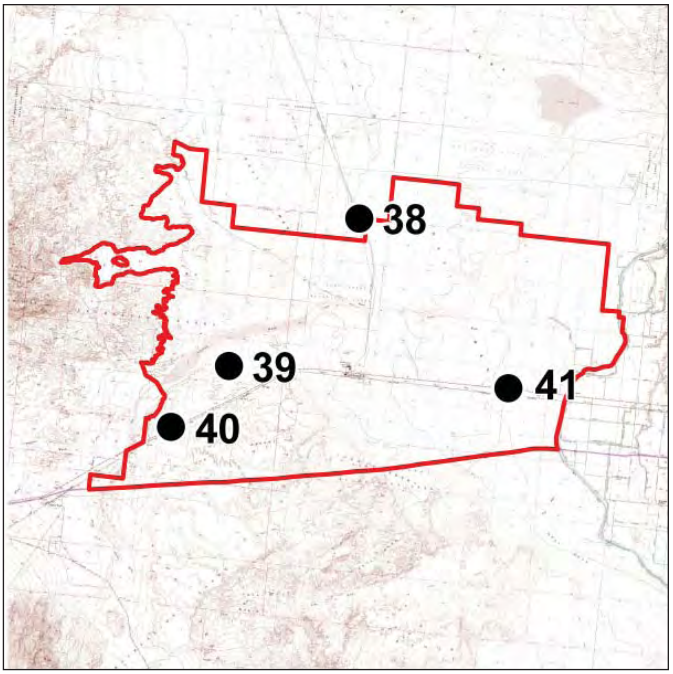
Scenic Quality Rating Unit: Plaster City			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1.5	West side adds value with extension of Yuha Basin characteristics	☐ **A – 19 or more**
b. Vegetation	2	Ocotillo and trees along drainage add some variety	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	1.5	Generally very little contrast; erosion patterns on west side provide some contrast	
e. Adjacent Scenery	1.5	Wide valley places everything very far away; views of Coyote Mountains on west	
f. Scarcity	1	Very common	☐ **Rehab**
g. Cultural Modification	-1	Roads, agriculture, OHV, Plaster City drywall facility	☐ **Special Area**
TOTAL	6.5		

Comments:

The west side has more variety in landform and texture; ocotillos add some variety. Mountains to south and in Mexico, and wilderness area in the west create a nice silhouette; otherwise ordinary.



SQRU Locator



• IOP Location

IOP 38. Road 85, south edge of military base, looking southwest (IOPCAD07000247)

74_SW_Plaster City_0247.jpg

IOP 39. West of Plaster City, west staging area, looking northwest (IOPCAD07000253)

76_NW_Plaster City_0253.jpg

IOP 40. Edge of power line, looking north (IOPCAD07000079)

23_N_Plaster City_0079.jpg

IOP 41. East open area, looking northwest (IOPCAD070000082)

24_NW_Plaster City_0082.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Coyote Mountain Hills Time (24hr format): 8:30

Unit Number: 15

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Low, pyramid-shaped hills formed by erosion; flat-tops jagged, long, finger-like	Sparse, indistinct, contrasting	Low, horizontal fences; blocky, vertical power line towers
Line	Angular, diagonal on hills tying into washes	Vertical ocotillo; low, mounded creosote	Horizontal, straight geometric
Color	Browns, salmon, murky yellow, gray, red, rust; varied soil colors exposed by random erosion	Olive green, brown, green, pale yellow	Metallic, brown
Texture	Mottled colors; jagged, medium to coarse	Scattered, discontinuous	Smooth

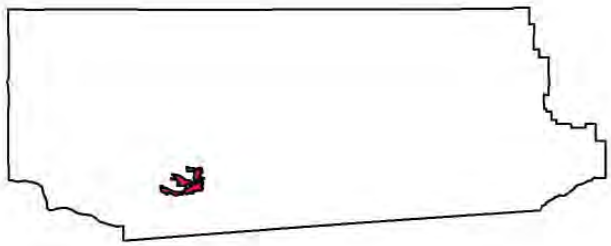
3. Narrative:

Defined by Ocotillo Valley to the south; Anza Borrego State Park to the west; Coyote Mountains Wilderness to the north; Plaster City to the east. Landfill tucked away, not very visible. Interesting erosion patterns and vertical edges on hills.

Scenic Quality Rating Unit: Coyote Mountain Hills			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	3	Interesting erosional features and patterns	☐ **A – 19 or more**
b. Vegetation	2	Some variety but sparse	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	More color variation than some of the other mountains/foothills in the Field Office	
e. Adjacent Scenery	3	Ocotillo Valley, Devil's Canyon, Plaster City valley	
f. Scarcity	2	Interesting but common	☐ **Rehab**
g. Cultural Modification	0	Landfill is tucked out of sight	☐ **Special Area**
TOTAL	13		

Comments:

More variety and contrast in the landform color compared to other areas of the Field Office. Adjacent scenery also influences scenic quality.



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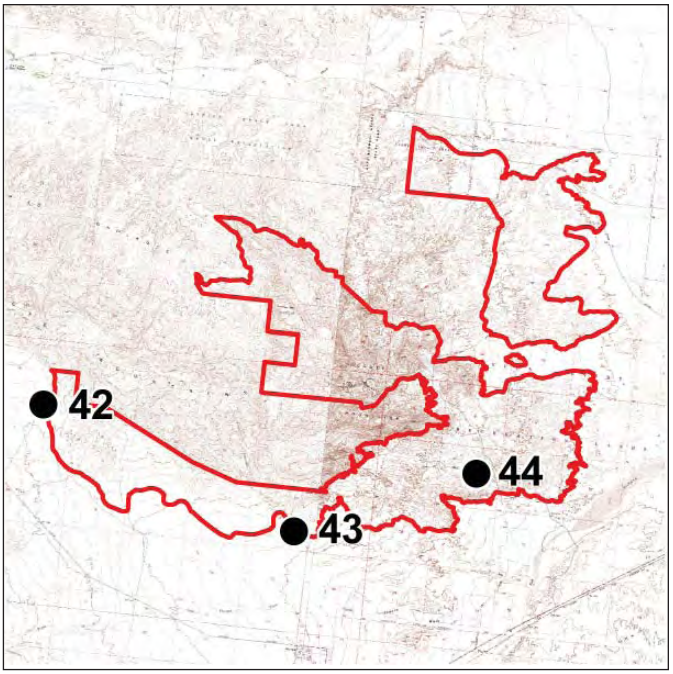
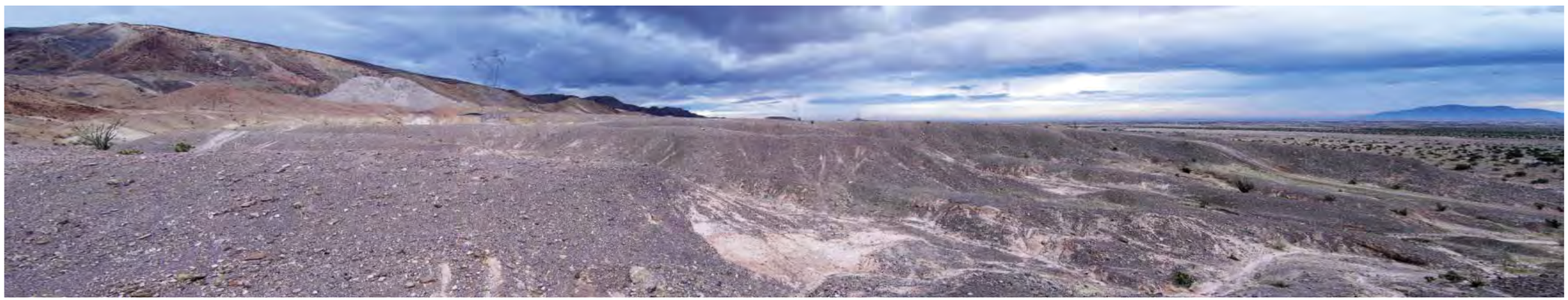


• IOP Location

IOP 42. Road 93, looking east (IOPCAD070000091) 26_E_CoyoteMountainHills_0091.jpg



IOP 43. Waste transfer site, looking east (IOPCAD07000085) 25_E_CoyoteMountainHills_0085.jpg

IOP 44. Painted Rock Road, looking west (IOPCAD070000250) 75_W_CoyoteMountainHills_0250.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/8/2010

Scenic Quality Rating Unit: West Mesa Time (24hr format): 14:30

Unit Number: 16

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat and featureless, incised erosional patterns at western margins	Sparse, spotty, low, rounded, mounded shrubs	Linear and blocky power lines and roads; old rusted cars
Line	Horizontal	Indistinct	Horizontal, vertical, angular
Color	Sand, gray, brown	Pale yellow, green, gray	Brown, gray, rust
Texture	Smooth, fine granular	Medium	Smooth

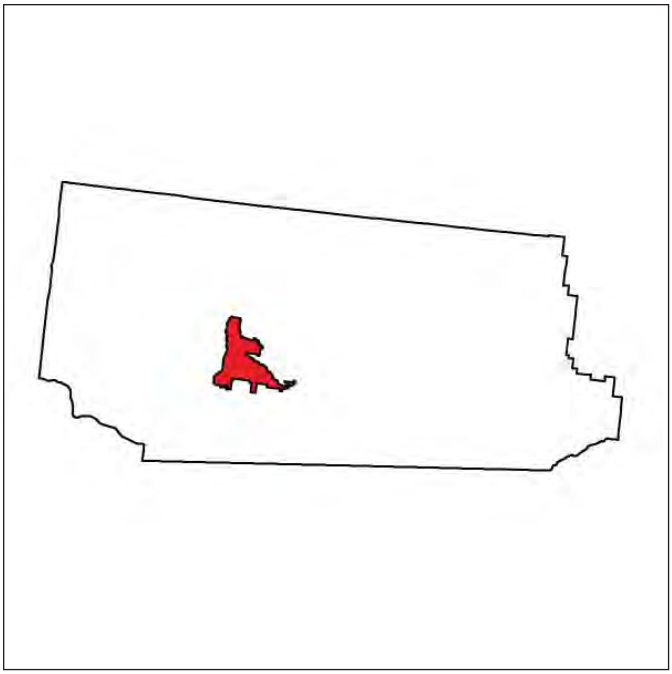
3. Narrative:

Defined by military lands, Plaster City, Coyote Mountain Hills to the south; Anza Borrego State Park, Fish Creek Mountain Wilderness, Lower Borrego Valley to the west; Lower Borrego Valley to the north; Superstition Hills/Mountains to the east.

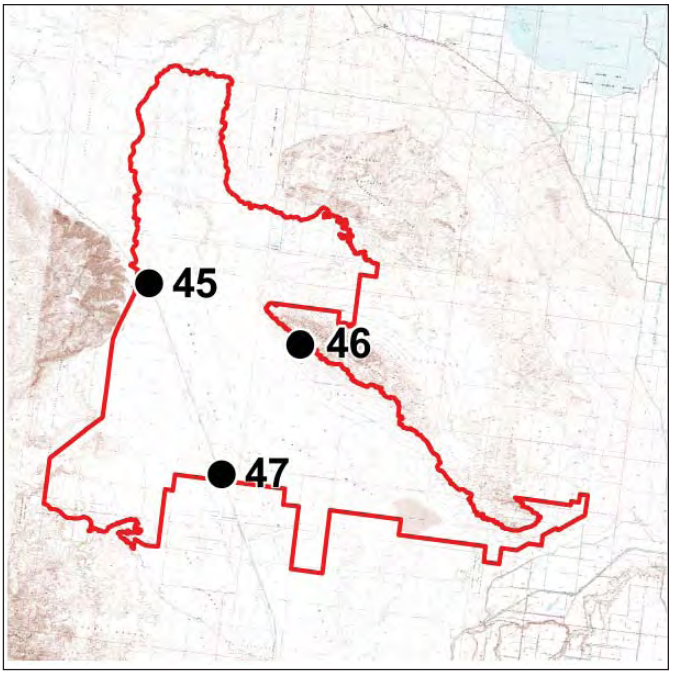
Scenic Quality Rating Unit: West Mesa			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	1	Flat and featureless	☐ **A – 19 or more**
b. Vegetation	1	Sparse; not much variety	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Dull; some patterns created between landform and vegetation	
e. Adjacent Scenery	1.5	Mountains in the distance	
f. Scarcity	1	Interesting but common in the region	☐ **Rehab**
g. Cultural Modification	0	Does not detract	☑ **Special Area**
TOTAL	6.5		

Comments:

A fairly ordinary landscape typical of many flat valley bottoms within the Colorado Desert. Part of the unit is a Cultural Area of Critical Environmental Concern.



SQRU Locator



• IOP Location

IOP 45. Carrizo Wash, looking south (IOPCAD07000232)

69_S_WestMesa_0232.jpg

IOP 46. Road 197, looking west (IOPCAD070000238)

71_W_WestMesa_0238.jpg

IOP 47. Road 85, north edge of military base, looking north (IOPCAD070000244)

73_N_WestMesa_0244.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/8/2010

Scenic Quality Rating Unit: Superstition Mountains Time (24hr format): 14:45

Unit Number: 17

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded, solid mounds with deep, jagged erosion channels at the base	Few, non-directional rounded mounds and v-shaped shrubs	Blocky, tall radio towers; cylindrical
Line	Linear, undulating mounds running northeast/southeast; convex mounds	Broken, slightly flowing with drainage features	Vertical
Color	Dark brown, sand, orange, gray	Olive green, sage, gray	White, metallic, gray
Texture	Medium to coarse in erosion areas; dense, directional mounds	Dotted, scattered, sparse	Smooth

3. Narrative:

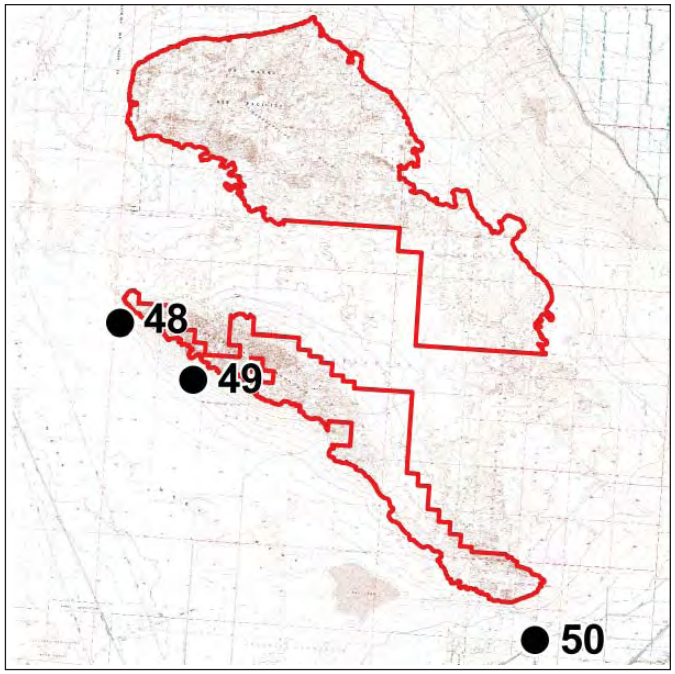
Includes the Superstition Mountains and Hills. Defined by West Mesa to the south and west, Lower Borrego Valley to the North, Superstition foreground to the east, Imperial Valley to the southeast.

Scenic Quality Rating Unit: Superstition Mountains			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	3	Rounded mounds with steep erosion channels	☐ **A – 19 or more**
b. Vegetation	1	Very sparse and little variety	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Interesting color and contrast	
e. Adjacent Scenery	3	Surrounded by vast valleys	
f. Scarcity	2	Somewhat distinctive but common	☐ **Rehab**
g. Cultural Modification	0	OHV open area; less impacted than other OHV areas in the region	☐ **Special Area**
TOTAL	12		

Comments:

The Superstition Mountains/Hills rise out of the valley floor and add some visual variety and interest to the area. The interesting erosional patterns and colors make this unit distinctive.

SQRU Locator



• IOP Location

IOP 48. Road 199, looking east (IOPCAD07000235) 70_E_SuperstitionMountains_0235.jpg

IOP 49. Road 201, looking north (IOPCAD070000241) 72_N_SuperstitionMountains_0241.jpg

IOP 50. Gravel pit on Huff Road, looking northwest (IOPCAD070000256) 77_NW_SuperstitionMountains_0256.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/9/2010

Scenic Quality Rating Unit: Superstition Foreground Time (24hr format): 12:01

Unit Number: 18

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat, incised with multiple drainages	Continuous, sparse, scattered, low, rounded/mounded shrubs	Linear roads and power lines; cylindrical power poles
Line	Subtle horizontal banding; horizontal, box- and v-shaped drainages; random patchwork of colors	Indistinct; no vertical elements except taller trees and shrubs close to private lands	Vertical, horizontal
Color	Gray, tan, brown, subtle orange, red, dark grays; graded bands of dark gray, red, orange, tan	Green, gray, pale yellow, olive green	Brown, gray
Texture	Smooth	Medium	Smooth

3. Narrative:

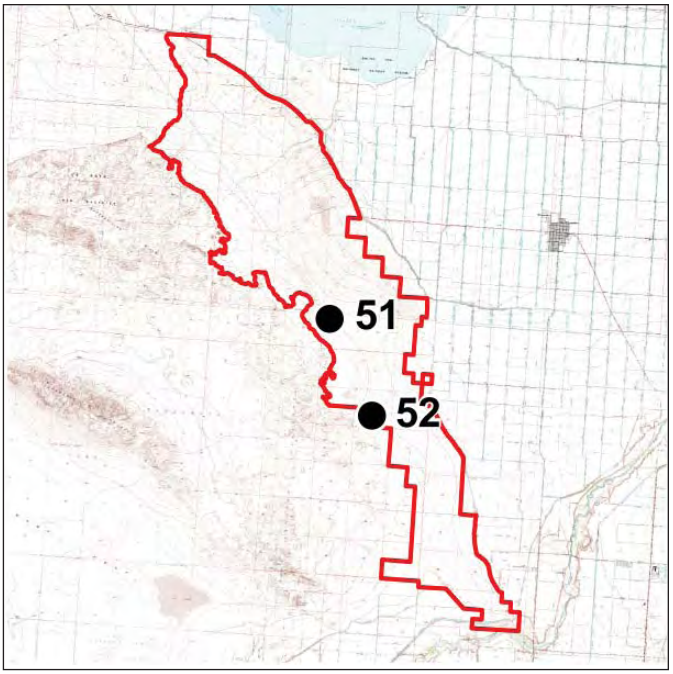
Defined by Superstition Mountains/Hills and military lands to the west; Lower Borrego Valley north; Imperial Valley east and south. Very similar to Lower Borrego Valley; a little more impacted by OHV activity. On the edge of Imperial Valley private land.

Scenic Quality Rating Unit: Superstition Foreground			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1.5	Flat, incised by deep drainages	☐ **A – 19 or more**
b. Vegetation	2	Some variety but predominantly creosote shrub community	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Subtle/muted; vegetation transition to private land adds variety, contrast	
e. Adjacent Scenery	1	Superstition Hills/Mountains visible from some locations	
f. Scarcity	1	Common valley floor feature	☐ **Rehab**
g. Cultural Modification	-0.5	Impact from OHV use	☐ **Special Area**
TOTAL	7		

Comments:

This unit has a lot of the common characteristics associated with Colorado Desert valleys. There is nothing in particular that makes it unique or memorable.

SQRU Locator



• IOP Location

IOP 51. Road 412 at power line, looking southwest (IOPCAD07000286)

87_SW_SuperstitionForeground_0286.jpg

IOP 52. Center of Section 4, looking southwest (IOPCAD07000289)

88_SW_SuperstitionForeground_0289.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/8/2010

Scenic Quality Rating Unit: Fish Creek Mountains Time (24hr format): 1:30

Unit Number: 19

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Valley canyon enclosed by directional (NW/SE) rounded, pyramidal features	Low, mounded shrubs (creosote community); sparse; washes have a little more variety	Linear railroad, power lines; flat to blocky mine, Plaster City quarry
Line	Undulating along ridgeline; angular drainages	Indistinct	Vertical, horizontal, angular mine
Color	Gray, brown, rust	Green, gray, pale yellow	Lighter gray than surroundings; metallic
Texture	Medium	Smooth to medium	Coarse; contrasts with surroundings

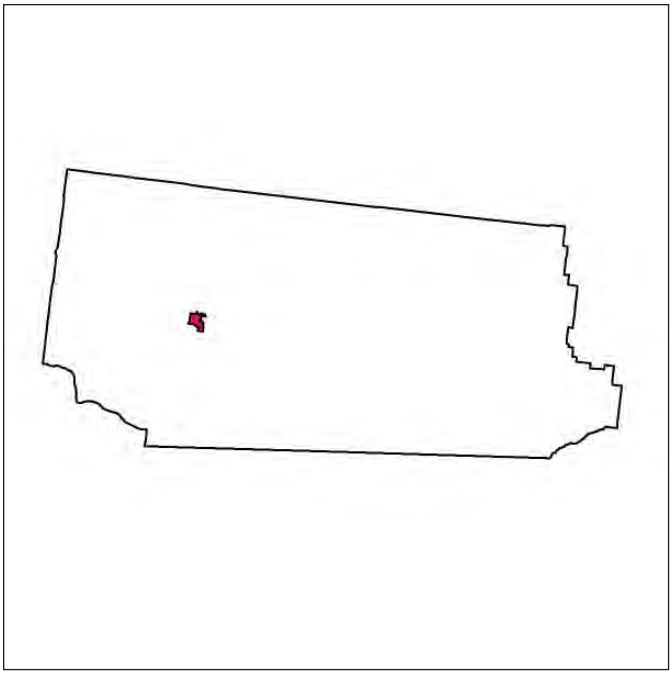
3. Narrative:

Defined by Borrego State Park, Anza Borrego Wilderness, Vallecito Mountains to the west; Lower Borrego Valley to the north; Fish Creek Mountains Wilderness to the east and south.

Scenic Quality Rating Unit: Fish Creek Mountains			
4. SCORE			**SCENIC QUALITY CLASSIFICATION (check one)**
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	3	Steep mountain slopes with rounded tops	☐ **A – 19 or more**
b. Vegetation	2	Some variety but sparse and not dominant	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Muted, uniform	
e. Adjacent Scenery	0	Enclosed landscape	
f. Scarcity	2	Interesting but common	☐ **Rehab**
g. Cultural Modification	-1	Gypsum mine stands out and is discordant with surroundings	☐ **Special Area**
TOTAL	8		

Comments:

Some variety in landform and texture, but a fairly typical Colorado Desert mountain landscape. The gypsum mine contrasts with surroundings and dominates the visual experience.



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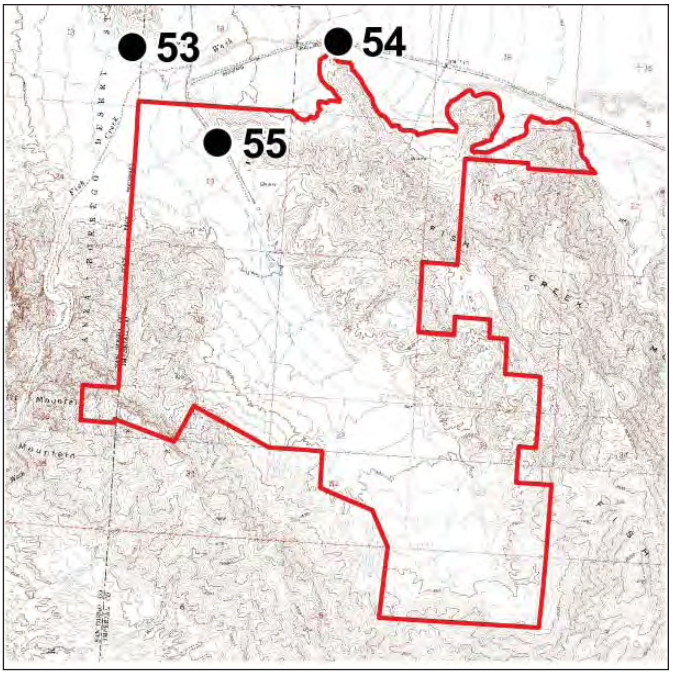


• IOP Location

IOP 53. Split Mountain Campground, looking southeast (IOPCAD070000223) 66_SE_FishCreekMountains_0223.jpg

IOP 54. Mine railroad, Section 16, looking southeast (IOPCAD070000226) 67_SE_FishCreekMountains_0226.jpg

IOP 55. Quarry, looking southwest (IOPCAD07000220) 65_SW_FishCreekMountains_0220.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Ocotillo Badland Time (24hr format): 12:29

Unit Number: 20

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Low, rounded mounds incised with jagged, irregular, diagonal erosion	Few, low, rounded shrubs with a few tall ocotillo	Irregular road network created by OHV; linear, narrow
Line	Striated lines form OHV; diagonal, angular	Non-distinct, broken, sparse	Bold, contrasting with landforms; undulating
Color	Red, yellowish-brown, gray	Olive green, green, pale yellow	Light gray
Texture	Coarse, gradational, contrasting	Patchy, random, sparse	Smooth, non-directional

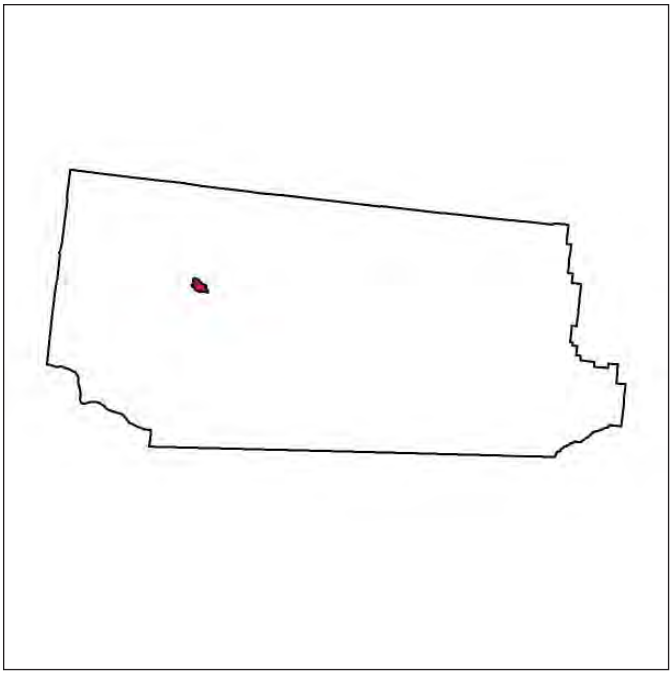
3. Narrative:

Predominantly private lands with some BLM land on eastern edge characterized by badland-like erosional features. An island sitting in the Lower Borrego Valley, it stands out as being different than the valley itself.

Scenic Quality Rating Unit: Ocotillo Badland			
4. SCORE			**SCENIC QUALITY CLASSIFICATION (check one)**
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	2	Interesting erosional patterns	☐ **A – 19 or more**
b. Vegetation	2	Ocotillo, creosote, brittlebrush, grasses/perennials; some variety	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	2	Subtle browns/grays; muted; some variation on ridges, erosion	
e. Adjacent Scenery	3.5	Surrounded by mountains and Lower Borrego Valley	
f. Scarcity	3	Distinct but common; does not stand out like other badlands in the region	☐ **Rehab**
g. Cultural Modification	-0.5	A lot of development; trails are predominant	☐ **Special Area**
TOTAL	12		

Comments:

This unit's scenic quality is influenced by the vastness of the Lower Borrego Valley and the mountain ranges that surround the valley.



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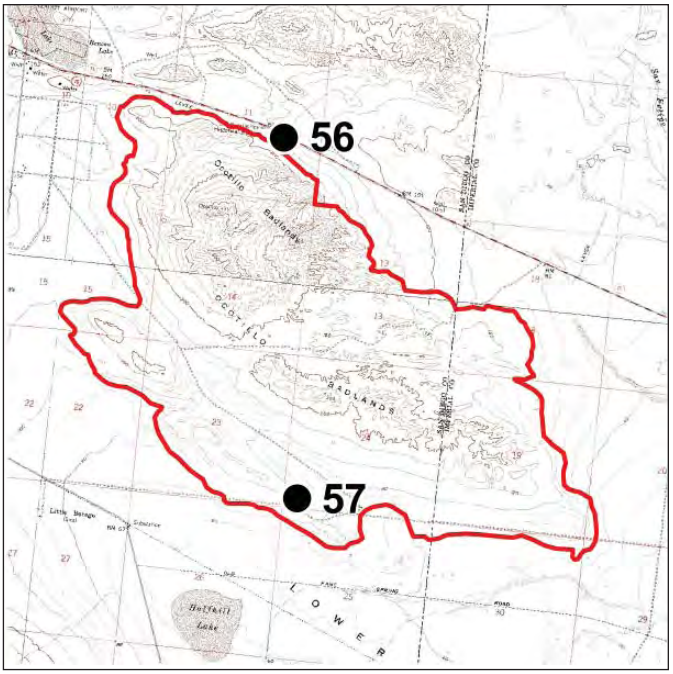


• IOP Location

IOP 56. Los Puertecitos, looking south (IOPCAD07000130)

38_S_OcotilloBadlands_0130.jpg

IOP 57. Half Hill Lake, looking north (IOPCAD07000217)

64_N_OcotilloBadlands_0217.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/6/2010

Scenic Quality Rating Unit: Lower Borrego Valley Time (24hr format): 16:00

Unit Number: 21

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat, gently sloping small pyramidal mound in center of unit; bowl-shaped to center wash	Low, rounded mounds of creosote on flat valley; tall vertical trees and shrubs in wash	Long, regular power lines with straight poles; long, straight road; blocky houses
Line	Horizontal, converging on wash	Linear, directional following washes; non-directional and weak on the valley	Horizontal road and power lines; vertical power poles
Color	Sand, light brown	Olive green, yellow, gray, brown, dark green, sage	Gray, brown, metallic, white, beige, red
Texture	Fine, granular, uniform, sandy	Medium	Smooth but coarse in the landscape

3. Narrative:

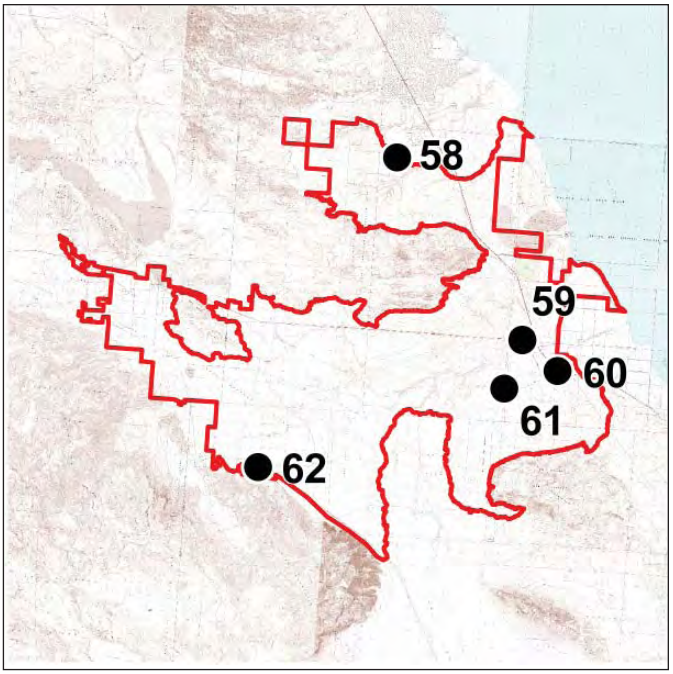
Defined by Anza Borrego State Park to the west; Fish Creek Mountains, Fish Creek Mountain Wilderness, and West Mesa to the south; West Mesa, Imperial Valley, Salton Sea to the east; Salton City to the north.

Scenic Quality Rating Unit: Lower Borrego Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1.5	Flat with minor drumlin-like features in the center	☐ **A – 19 or more**
b. Vegetation	3.5	One or two types; washes and marshes have more	☑ **B – 12 – 18**
c. Water	1	Marshes, San Felipe Creek	☐ **C – 11 or less**
d. Color	2	Muted combinations of browns/grays, greens	
e. Adjacent Scenery	2	Wide-open vastness of the Imperial Valley and mountain ranges	
f. Scarcity	3.5	History distinct and unique to region	☐ **Rehab**
g. Cultural Modification	0	Human development concentrated in small pockets (Ocotillo Wells); OHV activities along Hwy 78	☐ **Special Area**
TOTAL	13.5		

Comments:

Washes and marshes add scenic variety; otherwise the area is similar to other flat valley areas within the Field Office. Due to unit scale, OHV activities are not visually dominant.

SQRU Locator



• IOP Location

IOP 58. Duke Wash, looking southwest (IOPCAD07000274) 83_SW_LowerBorregoValley_0274.jpg

IOP 59. Section 18, looking southeast (IOPCAD07000136) 40_SE_LowerBorregoValley_0136.jpg

IOP 59. Section 18, looking northwest (IOPCAD07000039) 40_NW_LowerBorregoValley_0139.jpg

IOP 60. Kane Spring, looking southwest (IOPCAD070000145) 42_SW_LowerBorregoValley_0145.jpg

IOP 61. Harper's Well, looking west (IOPCAD070000283) 86_W_LowerBorregoValley_0283.jpg

IOP 62. Mine railroad at wash, looking north (IOPCAD07000229) 68_N_LowerBorregoValley_0229.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/9/2010

Scenic Quality Rating Unit: Arroyo Salada Time (24hr format): 11:00

Unit Number: 22

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Low, mounded hills with interesting erosional patterns incised by drainages	Devoid of much vegetation except on perimeter and along major washes; low, mounded shrubs; sparse	Blocky, linear roads
Line	Horizontal ridgelines with angular erosional drainages	Irregular around perimeter	Curvilinear
Color	Brown, gray, beige, tan, orange hue	Green, gray, pale yellow, olive green	Brown/gray, beige
Texture	Smooth to medium-fine to medium-granular	Medium	Smooth

3. Narrative:

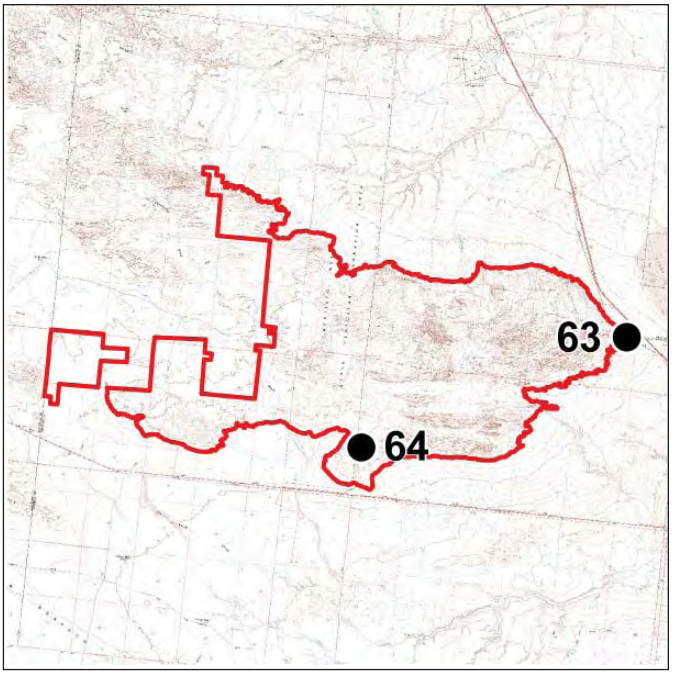
Badland-like feature that sits in the middle of Ocotillo Wells State Vehicular Recreation Area.

Scenic Quality Rating Unit: Arroyo Salada			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	3	Rolling erosional feature; interesting	☐ **A – 19 or more**
b. Vegetation	1	Devoid of most vegetation	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	1.5	Subtle/muted	
e. Adjacent Scenery	1	Surrounded by a vast valley	
f. Scarcity	2	Interesting but common	☐ **Rehab**
g. Cultural Modification	-1	A lot of disturbance and impact from OHV use	☐ **Special Area**
TOTAL	7.5		

Comments:

The rolling erosional features have interesting forms and textures; the landscape is heavily impacted by OHV use.

SQRU Locator



• IOP Location

IOP 63. Section 26, looking west (IOPCAD07000277) 84_W_ArroyoSalada_0277.jpg

IOP 64. ATV open area, looking northwest (IOPCAD07000280) 85_NW_ArroyoSalada_0280.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/9/2010

Scenic Quality Rating Unit: Salton City Time (24hr format): 10:00

Unit Number: 23

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Overall flat with no interesting landform features	Sparse, scattered, low, mounded shrub community with intermixed grasses/perennials; creosote	Cylindrical, blocky
Line	Horizontal	Indistinct, vertical element created by trees around private residences	Round, vertical, horizontal
Color	Brown, gray, tan	Green, pale yellow, gray, olive green	Beige, brown, yellow, gray
Texture	Smooth	Random, spotty, medium	Coarse in the landscape; does not have capacity to absorb visual impacts

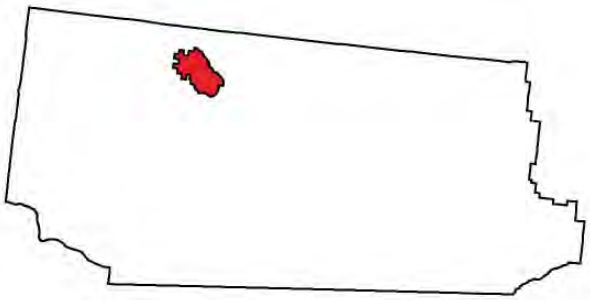
3. Narrative:

Defined by the Torres Martinez Indian Reservation to the north; Salton Sea to the east, Lower Borrego Valley and Arroyo Salada to the south; state lands to the west.

Scenic Quality Rating Unit: Salton City			
4. SCORE			**SCENIC QUALITY CLASSIFICATION** (check one)
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	1	Flat; no interesting features	☐ **A – 19 or more**
b. Vegetation	3.5	Variety provided by vegetation around private lands/residences	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	1.5	Soil/landform muted/subtle; more variety and contrast from vegetation	
e. Adjacent Scenery	1	Rosa Mountains	
f. Scarcity	1	Common in region; valleys with development	☐ **Rehab**
g. Cultural Modification	-1	A lot of development that is discordant/contrasting	☐ **Special Area**
TOTAL	7		

Comments:

A fairly typical landscape that is heavily impacted. Vegetation surrounding private lands adds some variety and interest. Overall nothing about this unit is exceptional with regard to scenic quality.



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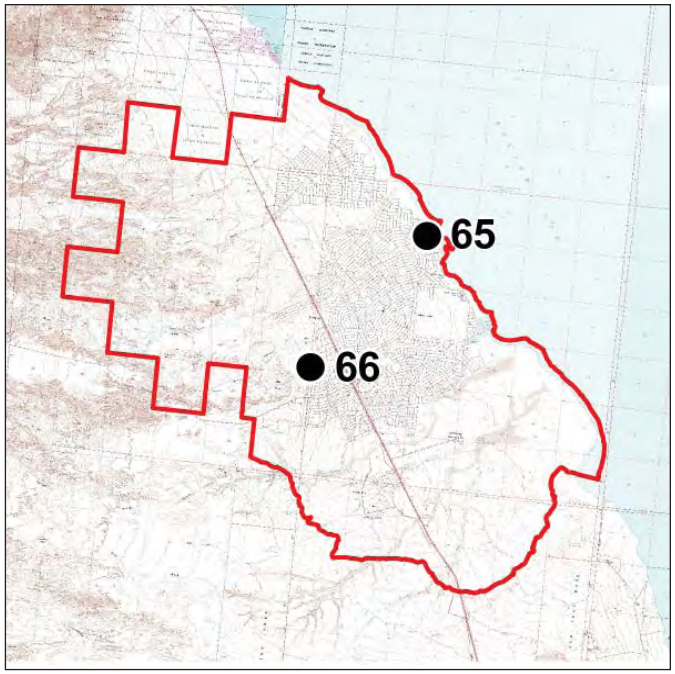


• IOP Location

IOP 65. Marina Park, looking northeast (IOPCAD07000271)

82_NE_SaltonCity_0271.jpg

IOP 66. Clay Point, looking northwest (IOPCAD07000265)

80_NW_SaltonCity_0265.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/10/2010

Scenic Quality Rating Unit: Coachella Valley Time (24hr format): 12:30

Unit Number: 24

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Concave to flat valley becoming more concave toward Bat Cave Buttes; some vertical relief	Sparse, low shrubs becoming denser toward the north and around private land; clumping in washes	Blocky, cylindrical
Line	Horizontal, subtle undulation and diagonal slope toward Chocolate Mountains	Indistinct, irregular vertical elements created by palms and vegetation surrounded private residence	Horizontal, vertical, angular
Color	Sand, gray; muted	Green, pale yellow, gray, light green	Brown, gray, tan, yellow, metallic, Carlsbad Canyon, white, green, pink
Texture	Smooth to medium	Smooth to medium	Smooth; coarse in the landscape

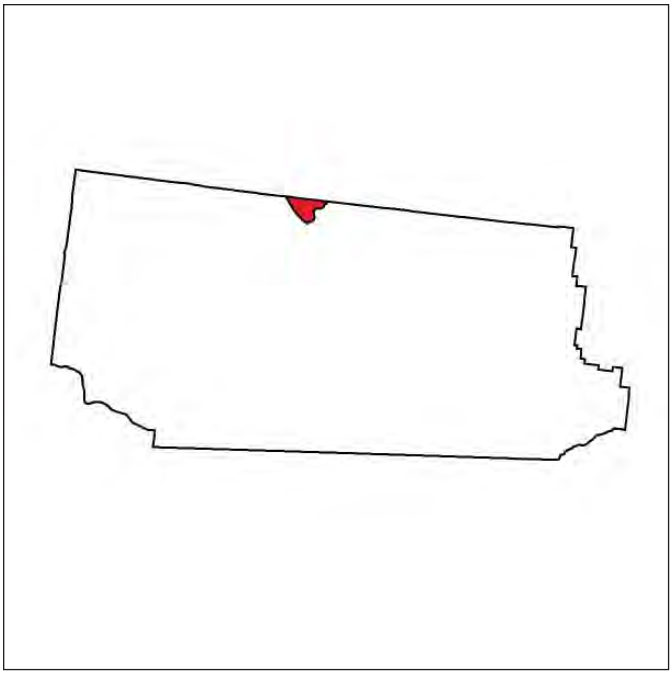
3. Narrative:

Defined by the Field Office boundary to the north, Chocolate Mountains Aerial Bombing and Gunnery Range to the east, Mammoth to the south, Salton Sea to the west. This unit extends down from Palm Springs Field Office.

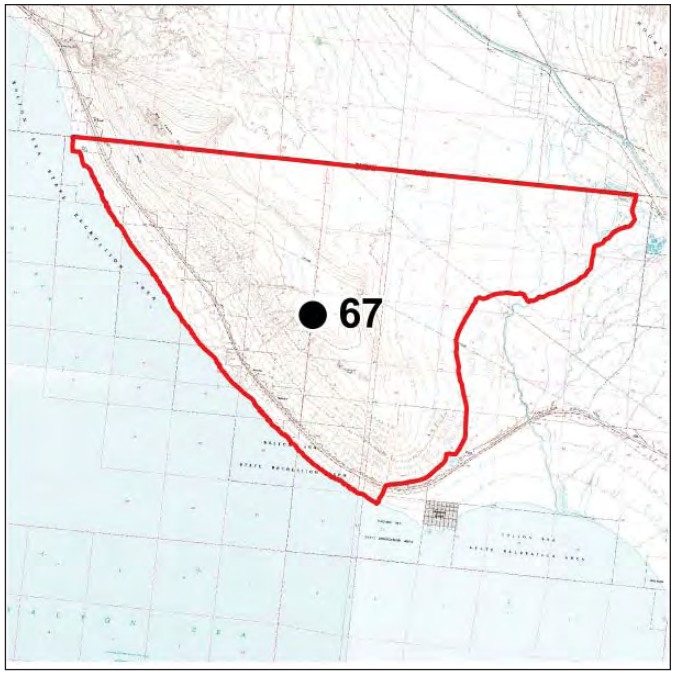
Scenic Quality Rating Unit: Coachella Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1.5	Flat valley, gently sloping from Salton Sea to Chocolate Mountains	☐ **A – 19 or more**
b. Vegetation	2	Palmas Oasis and vegetation around private development adds interest	☐ **B – 12 – 18**
c. Water	2	Not present; seeps, Salton Creek (dominant wash with water flowing)	☑ **C – 11 or less**
d. Color	1	Muted tones of brown, gray; not much contrast	
e. Adjacent Scenery	3.5	Chocolate Mountains, Salton Sea	
f. Scarcity	1	Common in region	☐ **Rehab**
g. Cultural Modification	-0.5	Private residences, Salton Sea recreation areas do not add any value	☐ **Special Area**
TOTAL	10.5		

Comments:

Adjacent Chocolate Mountains and Salton Sea add to the scenic quality of this unit; otherwise it would be less visually interesting. The Bat Cave Buttes also provide some visual interest and variety.



SQRU Locator



• IOP Location

IOP 67. Marina Park, looking northeast (IOPCAD07000154)

45_NE_CoachellaValley_0154.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/7/2010

Scenic Quality Rating Unit: Mammoth Time (24hr format): 13:30

Unit Number: 25

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Extremely flat plain gently sloping up to the east to meet the Chocolates; incised by major washes	Sparse, low, rounded shrubs; dense clusters around Frink Spring; scattered taller, rounded trees	Linear, blocky, long, cylindrical, horizontal; mesa-like tailings
Line	Very horizontal with gentle diagonal slope toward Chocolate Mountains	Sinuous following washes; otherwise indistinct vertical elements (private residences, orchards)	Horizontal, vertical, angular
Color	Rich brown (chocolate), sand, yellow-brown, gray, beige	Sage green, pale yellow-gray, bright green (orchards)	Brown, red, gray, metallic, white, multicolors (Slab City, Salvation Mountain)
Texture	Smooth, fine granular	Smooth to medium-dense patches, toe of Chocolates; sparse on plain; dense patches (orchards, palms)	Coarse in the landscape

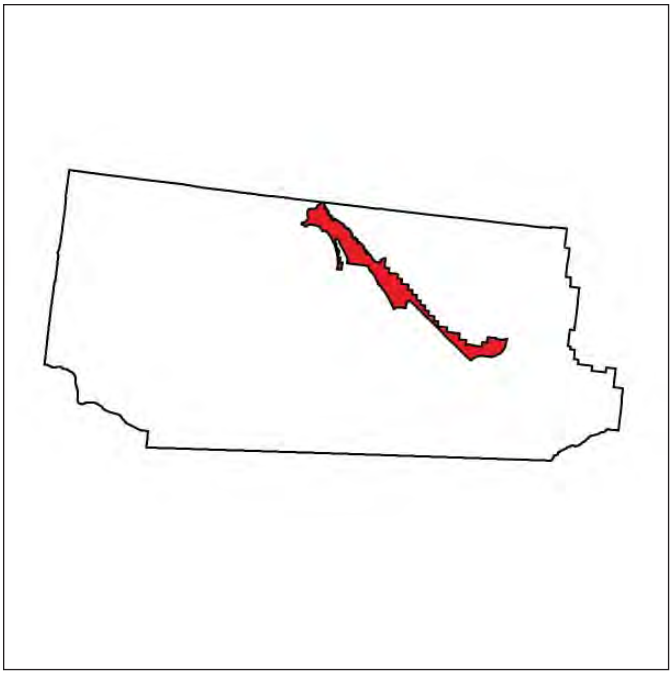
3. Narrative:

Bounded by Imperial Sand Dunes, Imperial Valley, Salton Sea to the west; Chuckwalla Valley north; Chocolate Mtn. Aerial Bombing Range east, north; Singer Valley south. Palo verde, ironwood begin to appear, add character. Checkerboard land ownership.

Scenic Quality Rating Unit: Mammoth			
4. SCORE			**SCENIC QUALITY CLASSIFICATION** (check one)
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	2	Deep, wide washes add variety	☐ **A – 19 or more**
b. Vegetation	3	Agricultural lands/orchards, vegetation near Salton Sea; paloverde, ironwood, creosote	☐ **B – 12 – 18**
c. Water	0	Frink Spring, canal but not always noticeable	☑ **C – 11 or less**
d. Color	2	Some variety	
e. Adjacent Scenery	3	Salton Sea, Chocolate Mountains, Imperial Valley	
f. Scarcity	2	Orchards, agricultural lands; deep, wide washes	☐ **Rehab**
g. Cultural Modification	-1.5	Development and mine detract	☐ **Special Area**
TOTAL	10.5		

Comments:

This unit would be ordinary if it were not for the proximity and views of the Chocolate Mountains and Salton Sea that frame the unit.



SQRU Locator

• IOP Location

IOP 68. Frink, looking southwest (IOPCAD07000148)

43_SW_Mammoth_0148.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/7/2010

Scenic Quality Rating Unit: East Mesa Time (24hr format): 14:30

Unit Number: 26

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat valley incised by washes	Uniform low, rounded/mounded shrub community with sparse taller, rounded trees	Long, linear, cylindrical
Line	Horizontal with curvilinear drainages and washes	V-shaped creosote punctuated by vertical paloverde and ironwoods	Horizontal, vertical, angular
Color	Gray, tan, sand, brown	Olive green, gray, pale yellow, sage green	White, metallic, gray
Texture	Smooth	Medium	Smooth

3. Narrative:

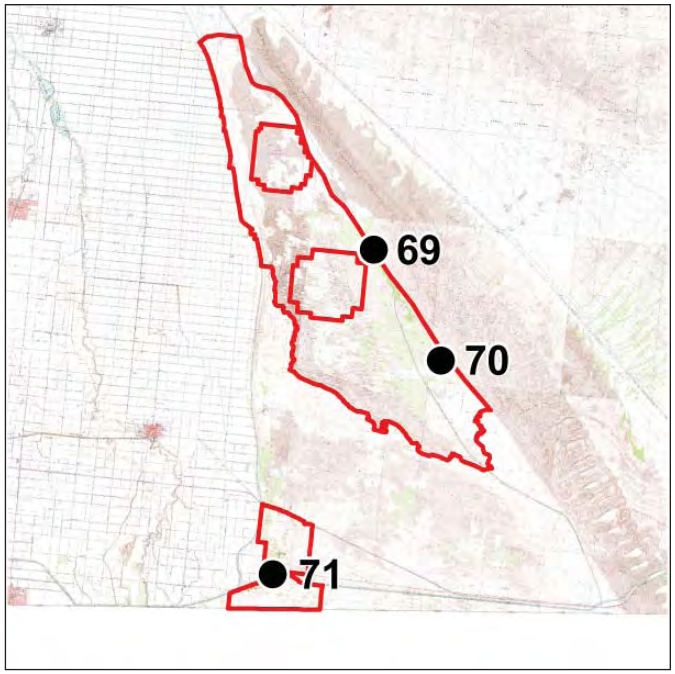
Bounded by Mammoth on the north, Imperial Sand Dunes on the east, El Centro East on the South, Imperial Valley on the west. The unit includes portion of Lake Cahuilla ACECs C and D.

Scenic Quality Rating Unit: East Mesa			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1	Flat with no interesting features	☐ **A – 19 or more**
b. Vegetation	2.5	More variety in washes and ACECs	☐ **B – 12 – 18**
c. Water	0	Evidence of existence in ACECs but not noticeable	☑ **C – 11 or less**
d. Color	1	Muted tones; little contrast	
e. Adjacent Scenery	3	Chocolate Mountains, Imperial Sand Dunes; agricultural lands in Imperial Valley	
f. Scarcity	1	Common	☐ **Rehab**
g. Cultural Modification	0	Not discordant	☐ **Special Area**
TOTAL	8.5		

Comments:

Adjacent scenery moderately influences the scenic quality of this unit. The ACECs more closely resemble this unit versus El Centro East: these add vegetative variety and interest.

SQRU Locator



• IOP Location

IOP 069. Cement Flats, looking west (IOPCAD07000169) 49_W_EastMesa_0169.jpg

IOP 70. Aqueduct weir, looking southwest (IOPCAD07000471) 140_SW_EastMesa_0471.jpg

IOP 71. Power line at Lake Cahuilla C ACEC, looking north (IOPCAD070000477) 142_N_EastMesa_0477.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 10/5/2009

Scenic Quality Rating Unit: El Centro East Time (24hr format): 12:41

Unit Number: 27

1. Evaluators: CBrandt GLong

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat with occasional hummocky surface	Rounded, clumpy	Vertical poles, road, power lines, communication towers
Line	Strongly horizontal	Horizontally aligned with landforms	Vertical poles; canal berms; horizontal roads
Color	Buff to very light brown	Olive green with gray influence	Brown
Texture	Smooth	Medium due to rounded, clumpy shrubs	Smooth surfaces; notable due to little ability to absorb development

3. Narrative:

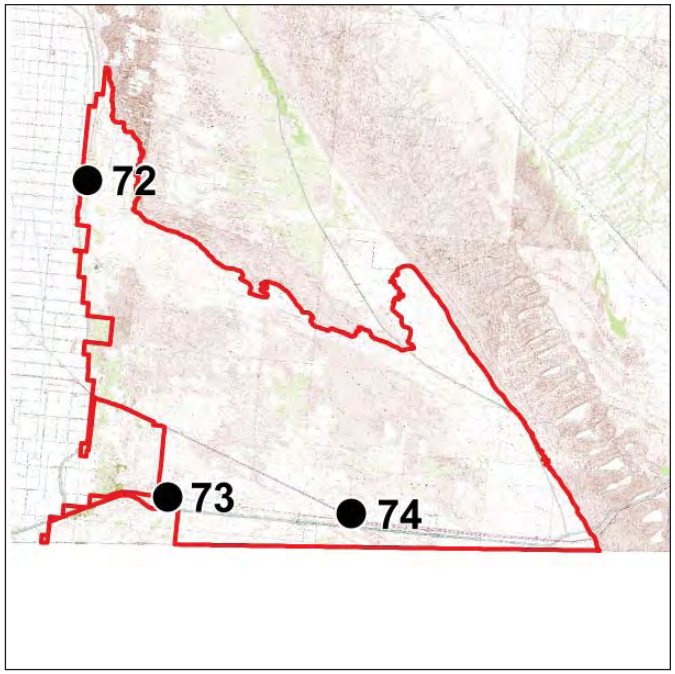
Vast, open, panoramic landscape lacking features that attract attention. Mostly natural-appearing. Structures concentrated along major roads and highways; where clustered, they detract from naturalness.

Scenic Quality Rating Unit: El Centro East			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1	Flat landscape without notable features or variety	☐ **A – 19 or more**
b. Vegetation	3	Two or more visually notable vegetative types	☐ **B – 12 – 18**
c. Water	0	Present in man-made canals but not noticeable	☑ **C – 11 or less**
d. Color	2	Mostly muted tones; little variety or contrast	
e. Adjacent Scenery	1	Minor positive influence	
f. Scarcity	1	Common landscape in the Southwest	☐ **Rehab**
g. Cultural Modification	-1	Power lines and other visible structures, particularly in northern part of unit	☐ **Special Area**
TOTAL	7		

Comments:

Overall, a visually pleasant area lacking visual variety and with no notable features. Few roads; most along the margins except for I-8 and Highway 98. Airport and geothermal power station.

SQRU Locator



• IOP Location

IOP 72. Holtville Airport, looking east (IOPCAD07006004) 6002_NE_ElCentroEast_6004.JPG

IOP 73. Looking north (IOPCAD070006007) 6003_N_ElCentroEast_6007.JPG

IOP 74. Looking north (IOPCAD07006010) 6004_N_ElCentroEast_6010.JPG

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/7/2010

Scenic Quality Rating Unit: Imperial Sand Dunes Time (24hr format): 5:00

Unit Number: 28

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Gently rolling northwest to southeast; windswept sand dunes with defined ridgelines and peaks	Sparse, random along outside margins; less to nonexistent in the center	Blocky/cubes, linear; ranger station, recreation staging areas and facilities, roads, Dumpster
Line	Undulating, rounded	Irregular along perimeter of dunes	Vertical, horizontal, angular
Color	Monotone sand, gray, yellowish/sand browns	Green, olive green, gray, pale yellow	Brown, beige, dark brown, sand gray, red
Texture	Smooth, fine granular	Smooth to medium	Smooth

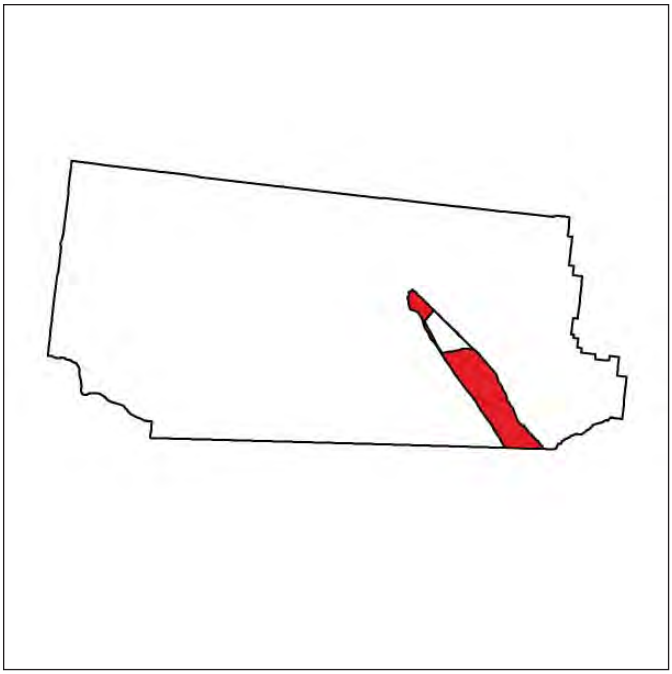
3. Narrative:

Defined by the extent of the Imperial Sand Dunes Mammoth Wash Open Area in the north and the extent of the Imperial Sand Dunes Recreation Area to the south.

Scenic Quality Rating Unit: Imperial Sand Dunes			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	5	Dune system is interesting	☐ **A – 19 or more**
b. Vegetation	2	Predominantly one type and only pockets of paloverde	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Subtle color variations and tones	
e. Adjacent Scenery	2.5	In the dunes, the viewer tends to look inward; views of Chocolates, vast Imperial Valley from on top	
f. Scarcity	4.5	The only dune system at this scale in the region	☐ **Rehab**
g. Cultural Modification	-1	OHV overuse is impacting scenic quality	☐ **Special Area**
TOTAL	16		

Comments:

If the unit had more variety in the vegetation and less impact from OHV use, it could be Class A scenery.



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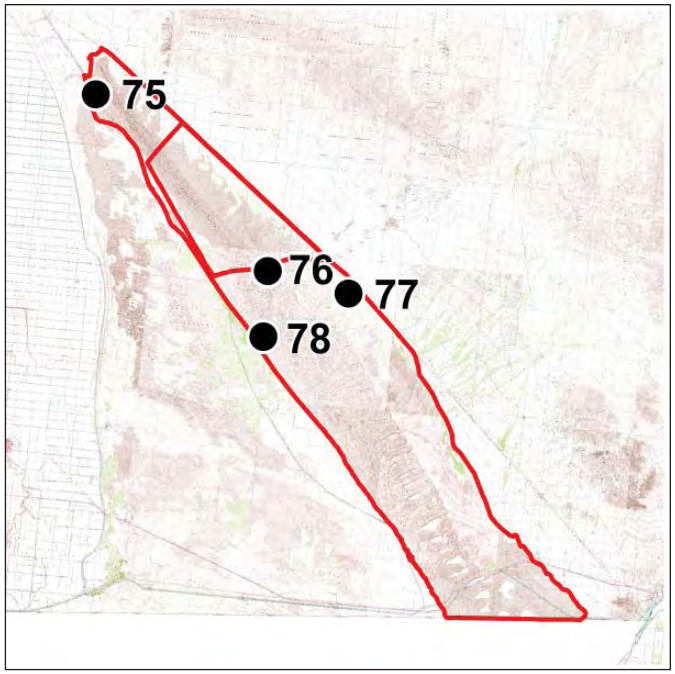


• IOP Location

IOP 75. Mammoth Wash, looking northeast (IOPCAD070000163)

48_NE_ImperialSandDunes_0163.jpg

IOP 76. Osborne overlook, looking south (IOPCAD070000175)

51_S_ImperialSandDunes_0175.jpg

IOP 77. Wash 10 Campground, looking southwest (IOPCAD07000468)

139_SW_ImperialSandDunes_0468.jpg

IOP 78. Gecko, looking north (IOPCAD07000172)

50_N_ImperialSandDunes_0172.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/12/2010

Scenic Quality Rating Unit: Pilot Knob Time (24hr format): 14:00

Unit Number: 29

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded mounds at base; directional (west to east) rounded pyramidal peaks; gradational edges	More vegetation around perimeter; low, rounded shrubs on rolling hills; sparse ground cover at base	Terraced/pyramidal
Line	Undulating ridgeline; diagonal slopes and drainages	Indistinct	Horizontal banded lines created by terraces
Color	Brown, gray beige, tan, sand	Green, gray, pale yellow	Lighter shades of surrounding landform; more grays
Texture	Coarse	Medium	Coarse; detracts/contrasts from surroundings

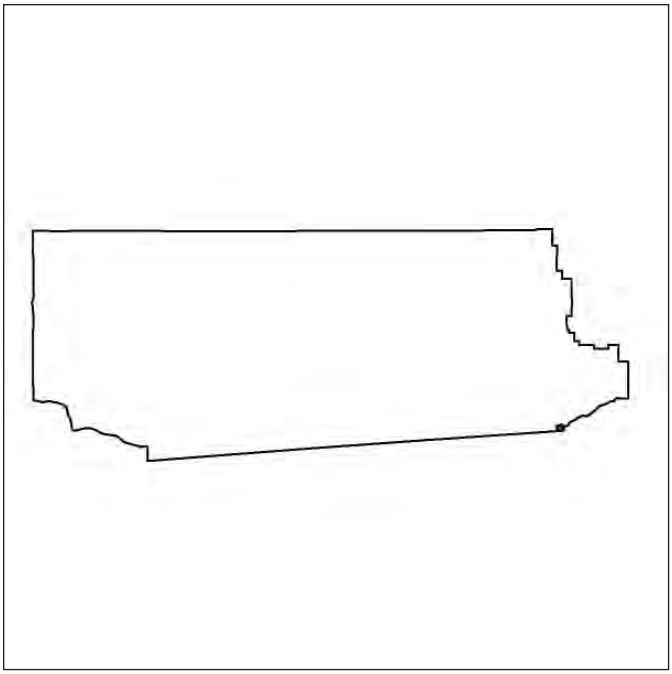
3. Narrative:

Defined by the Fort Yuma Indian Reservation to the east; Singer Valley to the north and west; and the Mexican border to the south.

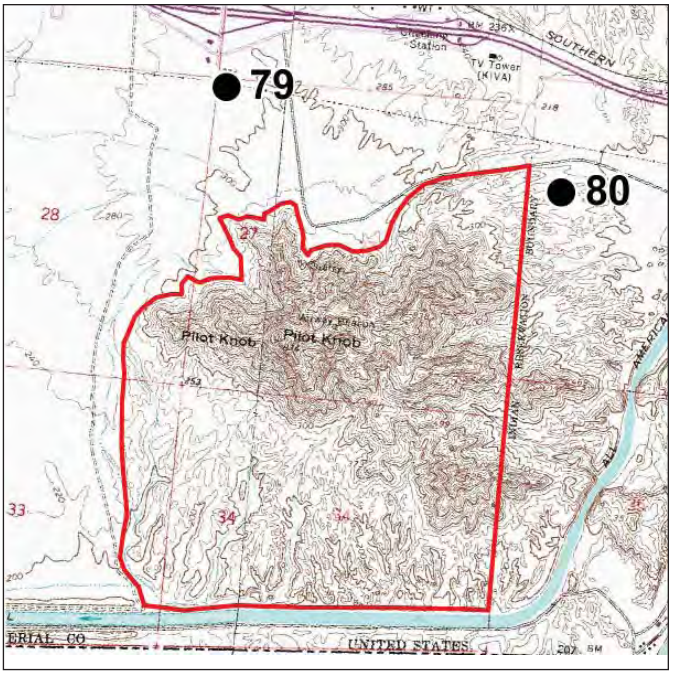
Scenic Quality Rating Unit: Pilot Knob			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	4	Blocky rocks; steep, vertical relief; rolling features at base	☐ **A – 19 or more**
b. Vegetation	1	Little vegetation except at base or in drainages	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	2.5	Muted/dark colors	
e. Adjacent Scenery	3	Surrounded by Yuma to the east, Mexico to the south.	
f. Scarcity	2	Common in region	☐ **Rehab**
g. Cultural Modification	0.5	Mine contrasts	☑ **Special Area**
TOTAL	13		

Comments:

Variety in and form and texture: a series of low, rolling mounds leading up to more rugged vertical relief. Adjacent scenery of vast, open valleys and views into Mexico also enhance scenic quality.



SQRU Locator



• IOP Location

IOP 79. Pilot Knob LTVA, looking south (IOPCAD070000486)

144_S_PilotKnob_0486.jpg

IOP 80. Indian Reservation, looking southwest (IOPCAD07000489)

145_SW_PilotKnob_0489.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/11/2010

Scenic Quality Rating Unit: Singer Valley Time (24hr format): 5:00

Unit Number: 30

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Large, expansive flat valley incised with sinuous washes and low, rolling hills	Rounded trees and shrubs randomly scattered across the land	Long, linear power lines, vertical towers; blocky, rectangular, long railroad tracks
Line	Indistinct, random, angular lines; undulating, low hills	Indistinct, irregular, sinuous along washes	Horizontal fences, power lines; vertical towers
Color	Tan, browns, black, whites	Olive green, lime green, sage, yellow and pale yellows, dark gray, gray	Metallic, white, gray, silver
Texture	Medium granular	Sparse on hills and flat valley; dense and flowing along washes	Smooth

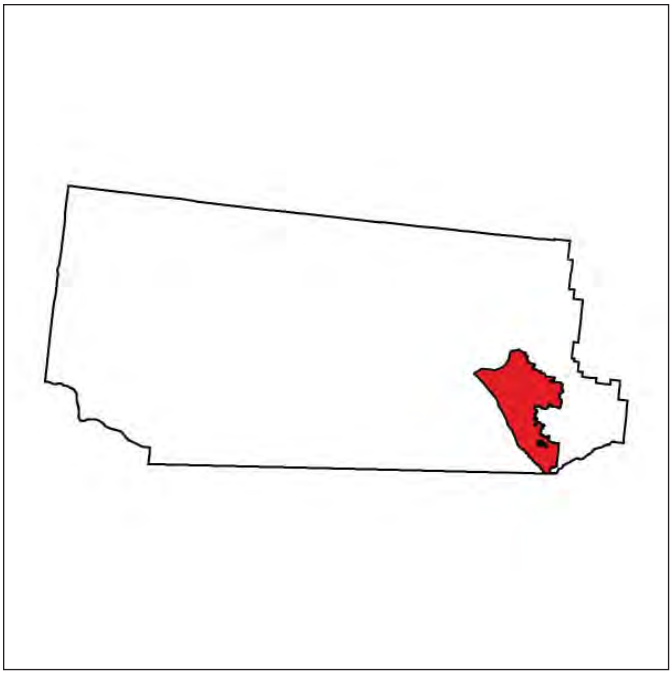
3. Narrative:

Defined by Imperial Sand Dunes to the west; Mammoth to northwest; Chocolate Hills, Black Mountains, Picacho Wilderness to north; Fort Yuma Valley, Cargo Muchacho Mountains east; Mexican border south. Singer Geoglyphs at north end of valley.

Scenic Quality Rating Unit: Singer Valley			
4. SCORE			**SCENIC QUALITY CLASSIFICATION (check one)**
	Rating	**EXPLANATION OR RATIONALE**	
a. Landform	2	Rolling hills and wash add variety to the valley	☐ **A – 19 or more**
b. Vegetation	3	Rich vegetation in the wash; sparse on hills and valleys	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Muted, uniform tones	
e. Adjacent Scenery	3.5	Lots of good mountain, wilderness views on the north, south, east; sand dunes on the west	
f. Scarcity	1	Very common for physiographic region	☐ **Rehab**
g. Cultural Modification	-1.5	Railroad tracks, mine, utilities, power lines	☐ **Special Area**
TOTAL	10		

Comments:

A common landscape for the region, with dramatic surrounding scenery. The east side has more rolling hills incised by washes; west side is flatter with wider washes running NE/SW into Imperial Valley.



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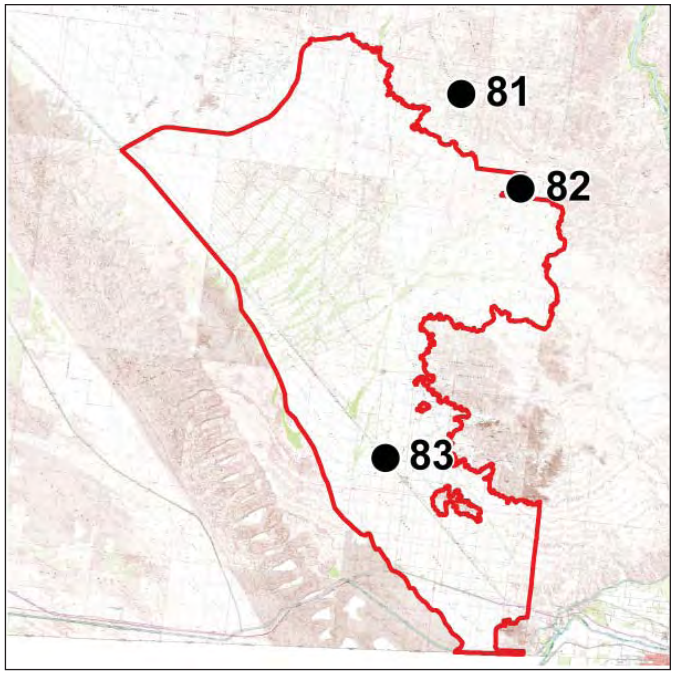


• IOP Location

IOP 81. Tower Peak, looking west (IOPCAD070000412) 122_W_SingerValley_0412.jpg

IOP 82. Picacho Peak Wilderness boundary, looking southeast (IOPCAD07000444) 132_SE_SingerValley_0444.jpg

IOP 83. American Girl Wash, looking southeast (IOPCAD07000450) 134_SE_SingerValley_0450.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/11/2010

Scenic Quality Rating Unit: Cargo Muchacho Mountains Time (24hr format): 10:00

Unit Number: 31

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Steep, jagged peaks, ridgelines with vertical cliffs; triangular/pyramid-shaped peaks, spire-like	Few round trees and shrubs in washes; vase-shaped ocotillo; scattered on hillsides	Trapezoid-shaped mesa-like tailing piles; straight, long power lines
Line	Angular, jagged with directional, diagonal lines converging with peaks; angular veins, banding	Directional between ridges	Horizontal tops; sharp, diagonal, smooth
Color	Browns, tans, black, orange, rust, reddish-brown, light gray	Olive green, light green, dark green	Gray, light gray, white
Texture	Coarse, random ridges and peaks	Sparse, dotted along valleys and washes	Smooth, striated, uniform

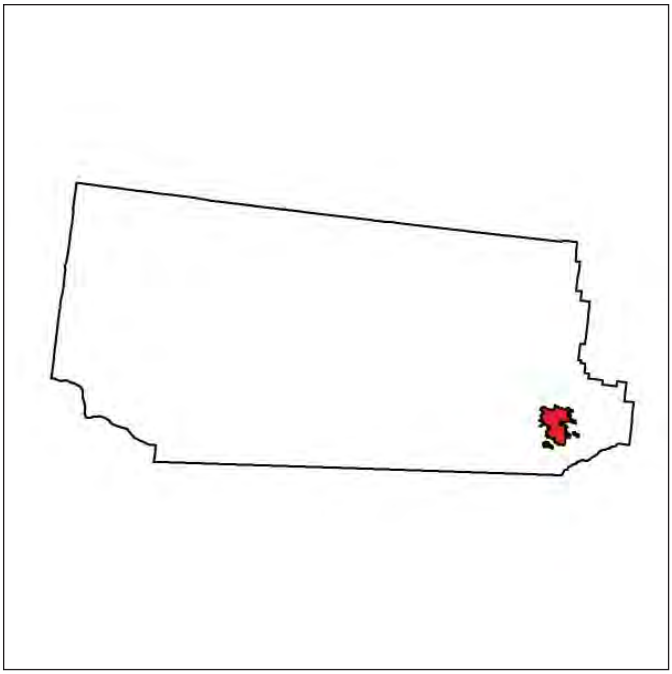
3. Narrative:

Landform shows distinct signs of uplift; some banding in rock layers. Includes Ogilby Hills. Mountains surrounded by large flat to rolling hills and valleys which flow toward the Colorado or Imperial Sand Dunes (Singer, Fort Yuma Valleys).

Scenic Quality Rating Unit: Cargo Muchacho Mountains			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	4	Steep, vertical cliff faces with spires, peaks, washes	☐ **A – 19 or more**
b. Vegetation	2	Vegetation limited to washes, and even there is sparse	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Not much contrast between soil and vegetation; more color in the rock	
e. Adjacent Scenery	3.5	Vast valley surrounding mountain; backdrop of Picachos	
f. Scarcity	3	Jagged peaks provide some distinction, but very similar to others	☐ **Rehab**
g. Cultural Modification	-0.5	A lot of mines of various sizes	☐ **Special Area**
TOTAL	15		

Comments:

The landform and adjacent scenery stand out in this unit; otherwise fairly typical for the region. Most mines are closed; the unit is criss-crossed by active mines visible from the road.



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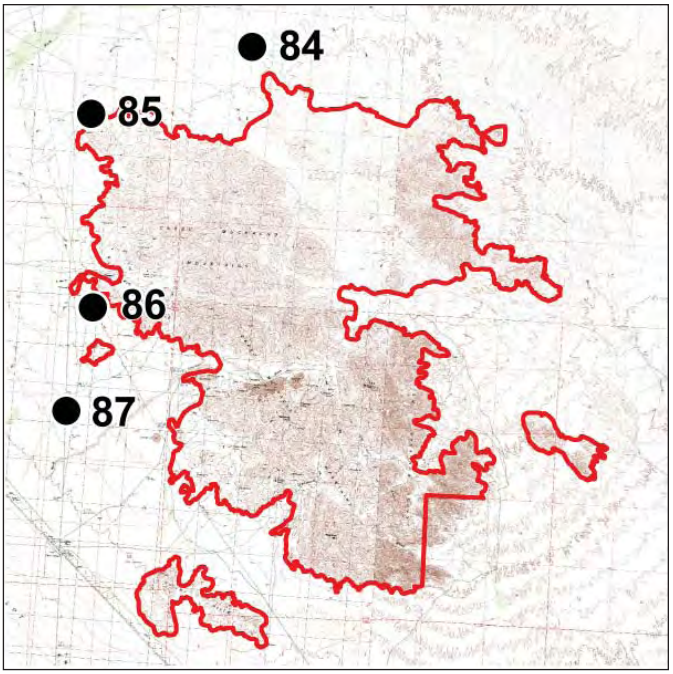


• IOP Location

IOP 84. Indian Wash, looking southwest (IOPCAD070000426)

126_SW_CargoMuchachoMountains_0426.jpg

IOP 85. La Colorado Mine, looking southeast (IOPCAD07000447)

133_SE_CargoMuchachoMountains_0447.jpg

IOP 86. Jumco, looking northeast (IOPCAD07000465)

138_NE_CargoMuchachoMountains_0465.jpg

IOP 87. Ogilby, looking northeast (IOPCAD070000456)

136_NE_CargoMuchachoMountains_0456.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/12/2010

Scenic Quality Rating Unit: Fort Yuma Valley Time (24hr format): 5:30

Unit Number: 32

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat to gently sloping valley (north to south) incised by drainages; a subtle rolling effect	Low round/mounded shrubs; scattered, sparse, more clumping in the drainages	Linear, cylindrical power lines on border with Indian reservation
Line	Horizontal with subtle convex lines created by drainage cuts	Vertical punctuation of ocotillo/trees in washes; subtle, irregular line of shrubs follows drainages	Vertical, horizontal
Color	Brown, gray, beige, dark brown	Green, pale yellow, light green, gray	Gray, metallic
Texture	Smooth	Medium	Smooth

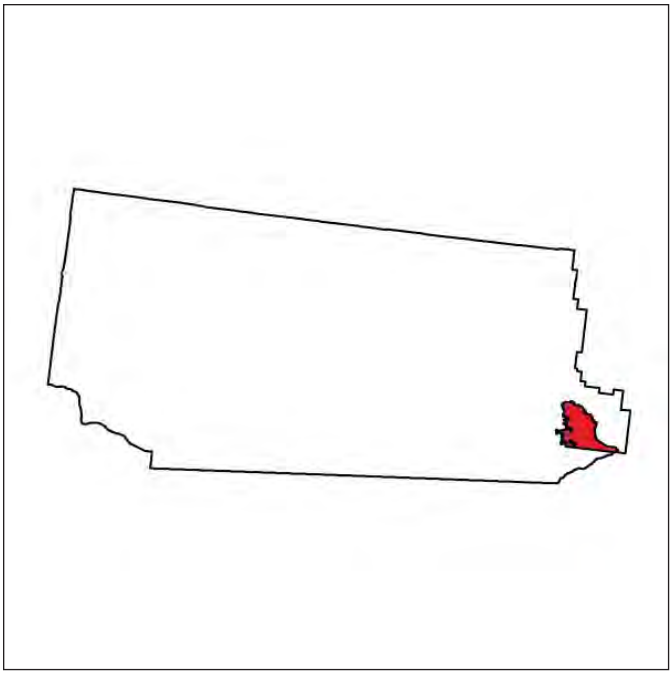
3. Narrative:

Defined by Fort Yuma India Reservation to the south; Cargo Muchacho Mountains, Singer Valley to the west; Chocolate Mountains (Picacho Wilderness, Bear Canyon Hills, Picacho Peak) to the north; Little Picacho Wilderness to the east.

Scenic Quality Rating Unit: Fort Yuma Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	2	Predominantly flat with some incised drainages	☐ **A – 19 or more**
b. Vegetation	3	Washes provide more vegetation variety	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Some variety and contrast but not a dominant feature	
e. Adjacent Scenery	3.5	Surrounded by mountains and the Colorado River plain	
f. Scarcity	1	Common in the region	☐ **Rehab**
g. Cultural Modification	-0.5	More impact from OHV use around the northern margins	☐ **Special Area**
TOTAL	12		

Comments:

Surrounded by dramatic mountain ranges and Colorado River plain. Similar character to Singer Valley but less cultural modification. Smaller scale makes adjacent scenery a little more prominent.



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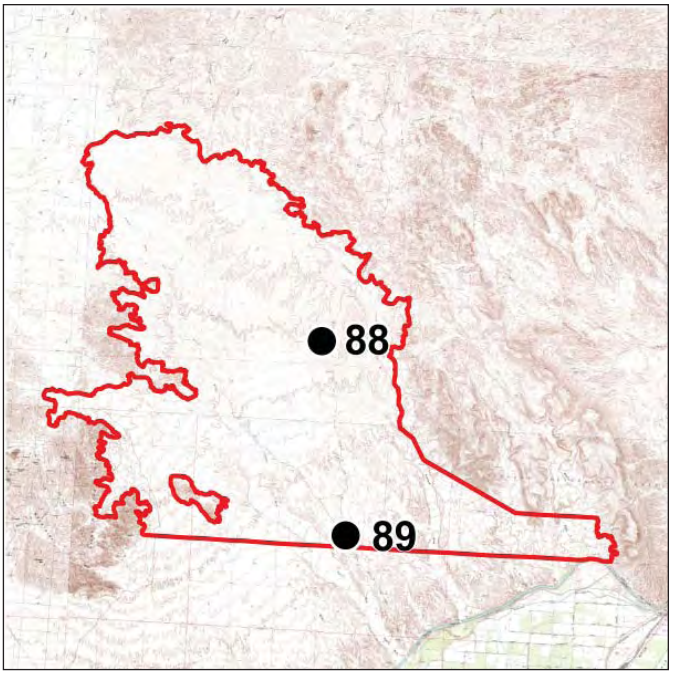
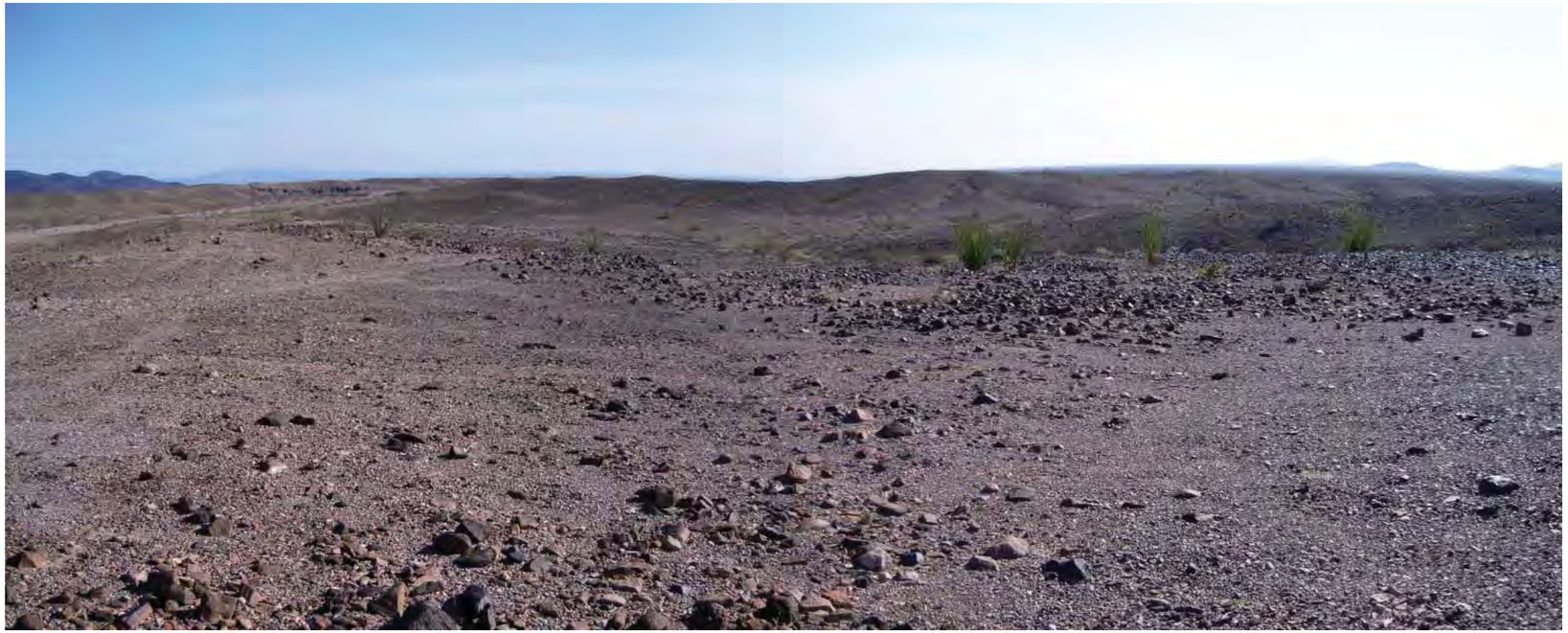


• IOP Location



IOP 88. Intersection of BLM Road 505 and 691, looking south (IOPCAD07000495)

147_S_FortYumaValley_0495.jpg

IOP 89. Intersection of BLM Roads 505 and 986, looking northeast (IOPCAD070000492)

146_NE_FortYumaValley_0492.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/13/2010

Scenic Quality Rating Unit: Senator Wash Hills Time (24hr format): 8:30

Unit Number: 33

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Directional NW/SE flat-topped mesa-like features with v-shaped canyons and drainages	V-shaped ocotillo, rounded trees; concentrated in low points, washes; low, mounded; hillsides sparse	Trapezoid/pyramids, flat-topped
Line	Horizontal, diagonal; subtle horizontal rock banding	Vertical punctuation of ocotillo and trees; irregular along washes	Distinct angular line where disturbance begins and more natural-appearing landscape ends
Color	Gray, basalt, green, brown, beige, rust	Green, light green, gray, brown, pale, yellow	Beige to off-white; lighter than surrounding landforms
Texture	Medium	Smooth to medium	Medium

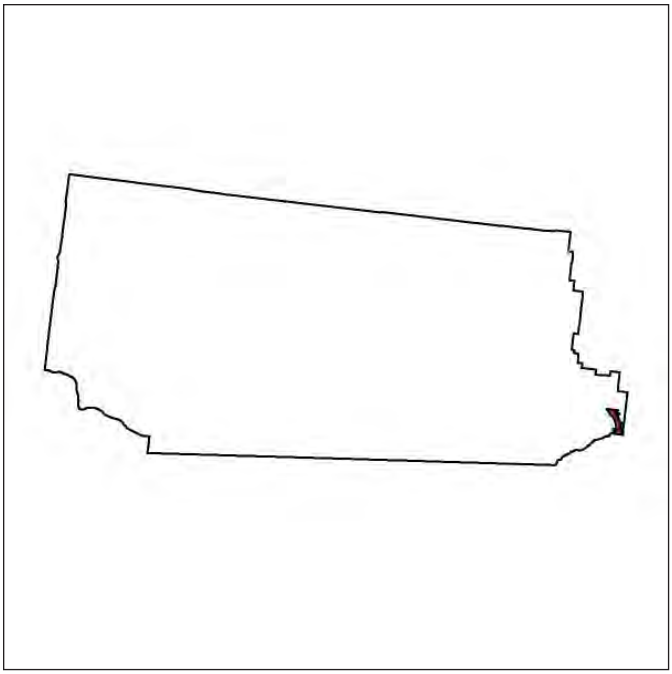
3. Narrative:

Defined by Little Picacho Wilderness to the west, Senator Wash Valley to the east and Field Office boundary to the south. Does not resemble Picacho Peak unit and thus was made a separate unit.

Scenic Quality Rating Unit: Senator Wash Hills			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	3.5	Flat-topped mesa-like features	☐ **A – 19 or more**
b. Vegetation	2.5	Vegetation concentrated in drainages; adds variety	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	2.5	Green, gray monotone; lighter colors add contrast	
e. Adjacent Scenery	3	Picacho Wilderness Area, Colorado River Valley, Senator Wash Valley	
f. Scarcity	3	Similar characteristics to Black Mountain	☐ **Rehab**
g. Cultural Modification	-0.5	Mine evident, contrasts but due to scale does not dominate view; visible from Mesa Recreation Area	☐ **Special Area**
TOTAL	14		

Comments:

The landform has interesting shapes and textures; color variation is like Black Mountain with a basalt influence. Adjacent scenery also contributes to scenic quality.



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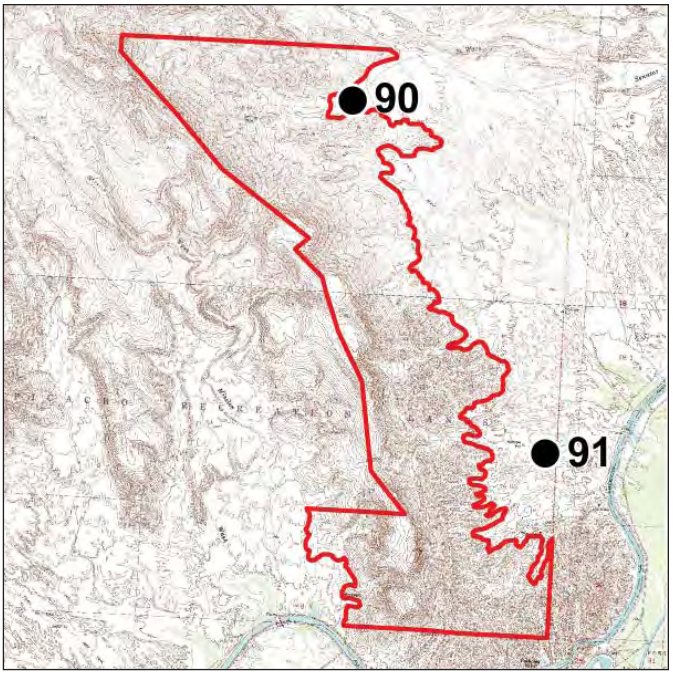


• IOP Location

IOP 90. Hess Mine, looking northeast (IOPCAD070000513)

152_NW_SenatorWashHills_0513.jpg

IOP 91. Colorado River Recreation Site, looking northwest (IOPCAD07000522)

155_NW_SenatorWashHills_0522.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/13/2010

Scenic Quality Rating Unit: Senator Wash Valley Time (24hr format): 9:30

Unit Number: 34

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat to gently sloping to Colorado River plain; some subtle rolling north to south	Low, rounded mounds of shrubs; sparse on slopes, concentrated in low points	Linear roads, trails
Line	Subtle undulation north to south, but for the most part flat	Vertical punctuation of saguaro; irregular in low points	Horizontal and curvilinear
Color	Dark gray, basalt influence; browns, tans to off-white, lime green	Vertical punctuation of ocotillo; light green, gray, olive green, pale yellow	Beige, gray
Texture	Smooth	Medium	Smooth

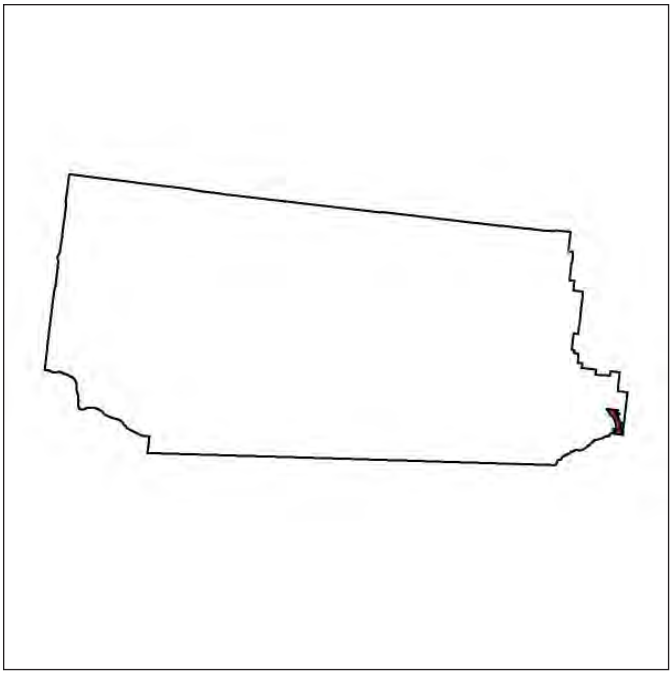
3. Narrative:

A unique unit in that it is rare to see saguaros west of the Colorado River. Defined by Little Picacho Wilderness Area to the west, Senator Wash Hills to the north, Field Office boundary to the east.

Scenic Quality Rating Unit: Senator Wash Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	2	Some rolling hills created by washes/drainage cuts	☐ **A – 19 or more**
b. Vegetation	4	Presence of saguaro is rare and adds interest to the area	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	4	Green bands of vegetation in washes; nice contrast with basalt/green in soil and rock	
e. Adjacent Scenery	4	Surrounded by mountains, Colorado River, Senator Wash Reservoir; enclosed landscape	
f. Scarcity	3.5	Presence of saguaro is unique west of the Colorado and in this Field Office	☐ **Rehab**
g. Cultural Modification	0	Trails and roads do not detract	☐ **Special Area**
TOTAL	17.5		

Comments:

Saguaro adds visual variety to vegetation. Nice color contrast and variety in soil/landform and vegetation, with basalt influence and green bands of vegetation in washes. Adjacent scenery contributes.



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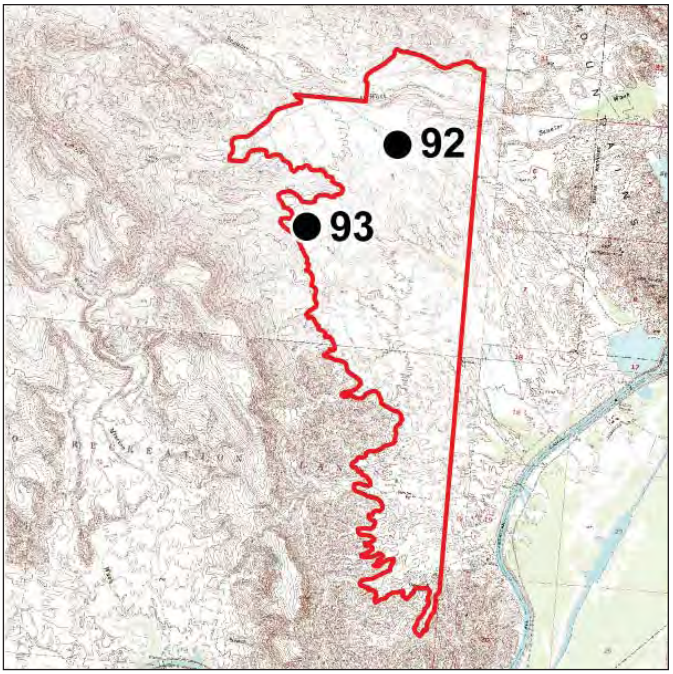


• IOP Location

IOP 92. Senator Wash Reservoir, looking south (IOPCAD070000507)

151_S_SenatorWashValley_0507.jpg

IOP 93. Midway on BLM Road 727, looking east (IOPCAD07000516)

153_E_SenatorWashValley_0516.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/11/2010

Scenic Quality Rating Unit: Picacho Peak Time (24hr format): 11:00

Unit Number: 35

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Blocky, tall spires; steep face, pyramidal peaks; tooth-like, bold, prominent	Sparse, low, rounded shrubs and succulents with v-shaped ocotillos	Blocky, cylindrical, linear
Line	Vertical peak and buttes; horizontal layers and banding of sedimentation	Vertical punctuation of ocotillo, palo verde, ironwood; irregular along drainages	Round, rectangular, vertical, horizontal, angular
Color	Dark browns, light browns, beige, gray, reddish-brown, lime green, red, purple	Green, pale yellow, olive green, gray-brown	Yellow, pink, black, white, metallic, gray
Texture	Coarse	Medium; denser in washes	Coarse; detracts from surroundings

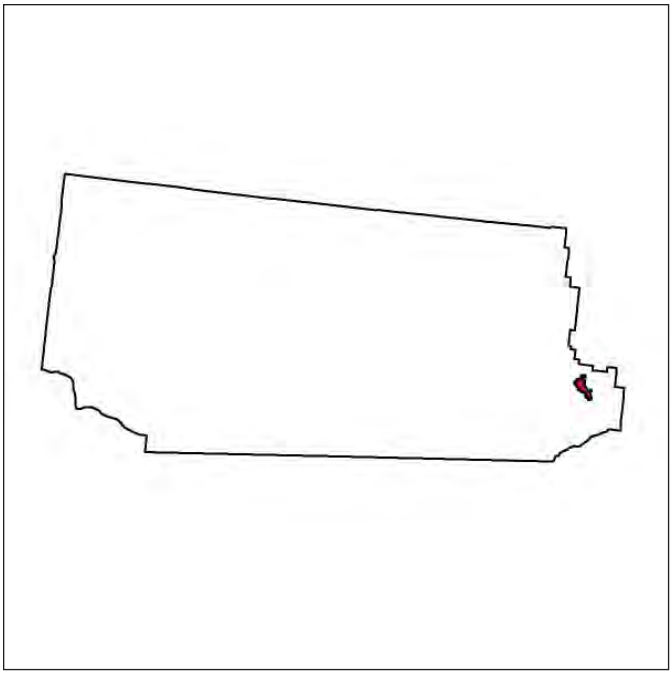
3. Narrative:

Picacho Peak is defined by its dramatic topography and is surrounded by Fort Yuma Valley to the west and south, Bear Canyon Hills to the north and northeast, and Little Picacho Wilderness to the east.

Scenic Quality Rating Unit: Picacho Peak			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	4.5	Dramatic topography; a prominent, bold focal feature	☑ **A – 19 or more**
b. Vegetation	3.5	Good variety of features	☐ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	4.5	Vibrant color combinations and contrast	
e. Adjacent Scenery	4	Picacho Wilderness, Trigo Mountains, valleys	
f. Scarcity	4.5	Most prominent focal feature in the Field Office	☐ **Rehab**
g. Cultural Modification	-1	Picacho Mine and facilities detract	☐ **Special Area**
TOTAL	20		

Comments:

A dramatic/prominent focal feature unlike any other in the Field Office. This unit stands out because of the visual variety it provides.



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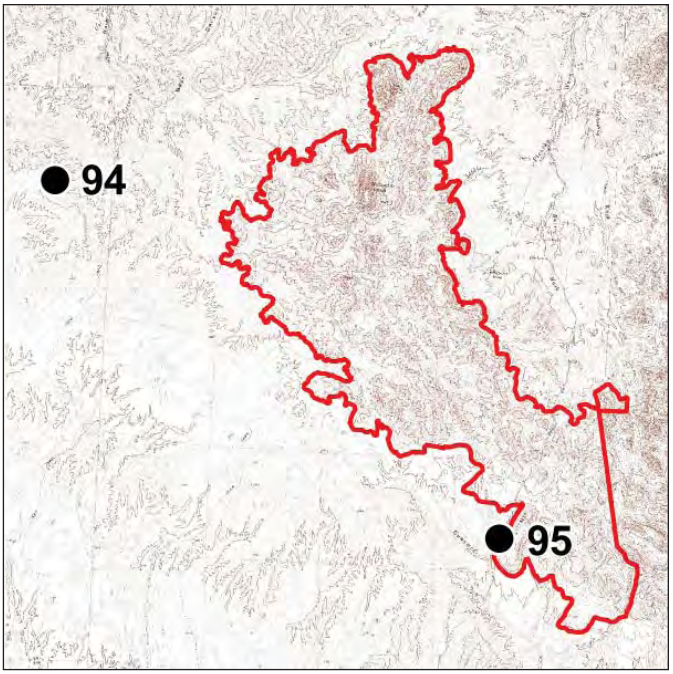


• IOP Location

IOP 94. White Wash, looking southeast (IOPCAD070000435)

129_SE_PicachoPeak_0435.jpg

IOP 95. Pebble Mountain, looking northwest (IOPCAD07000498)

148_NW_PicachoPeak_0498.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/11/2010

Scenic Quality Rating Unit: Bear Canyon Hills Time (24hr format): 12:30

Unit Number: 36

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded, rolling mounds, incised with long, sinuous washes	V-shaped ocotillo; clumpy, mounded, succulents, sparse	Low vertical sign and fencepost
Line	Random, non-directional, diagonal hillside; v-shaped washes; undulating	Indistinct on hilltops and sides; flowing, undulating with washes	Individual vertical posts, spaced far apart
Color	Gray, tan, light gray, rust, yellow, reds; intensifying in washes	Olive green, light green, gray, pink, reds	Brown, gray
Texture	Smooth to medium	Sparse, stippled, dotted	Smooth to medium

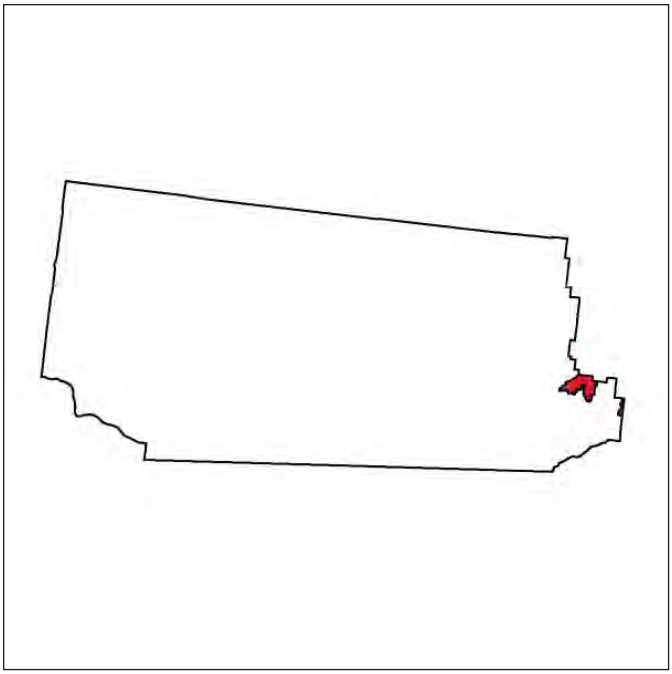
3. Narrative:

Little Picacho Wilderness, Picacho Peak to the east-southeast; Picacho State Park, Colorado River north, east; Indian Pass Wilderness north, northwest; Singer Valley, Muchacho Mountains south, southeast. Washes form some narrow, steep canyons.

Scenic Quality Rating Unit: Bear Canyon Hills			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	2.5	Rolling hills with some canyon washes	☐ **A – 19 or more**
b. Vegetation	2.5	Sparse on the hills, but good variety in washes	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	3	Red boulders; lots of mica and minerals in stone; some contrast between rock, soil and vegetation	
e. Adjacent Scenery	3	Views of Picacho Peak and Wilderness, Picacho State Park with the Colorado River	
f. Scarcity	2	Relatively common	☐ **Rehab**
g. Cultural Modification	0	Broken up by some roads and OHV areas	☐ **Special Area**
TOTAL	13		

Comments:

An interesting transitional area between valley floor and Picacho Peak/Picacho Wilderness Area to the Colorado River plain. Some good contrast, color variation; adjacent scenery moderately enhances.



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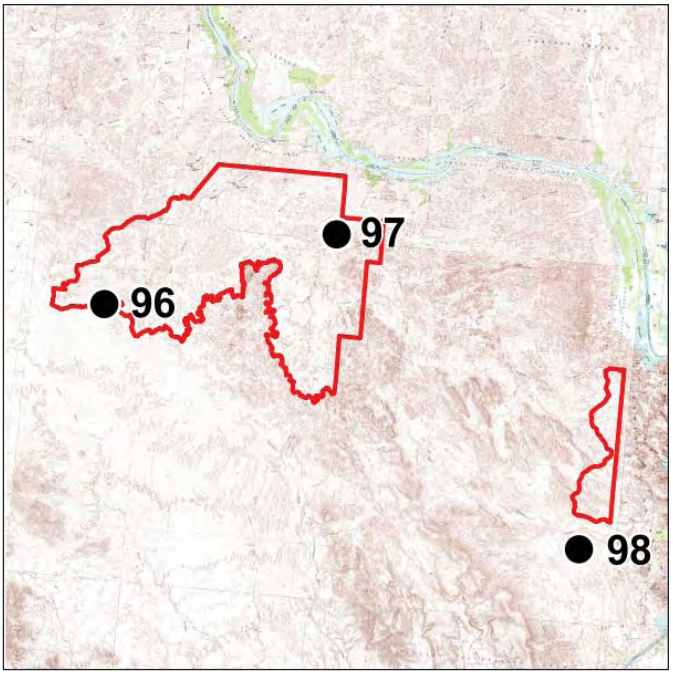


• IOP Location

IOP 96. Bear Canyon, looking northwest (IOPCAD07000432) 128_NW_BearCanyonHills_0432.jpg

IOP 97. Little Picacho Wash, looking southeast (IOPCAD07000504) 150_SE_BearCanyonHills_0504.jpg

IOP 98. Senator Wash Reservoir, looking north (IOPCAD070000510) 151_N_BearCanyonHills_0510.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/11/2010

Scenic Quality Rating Unit: Black Mountain Time (24hr format): 8:00

Unit Number: 37

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded mountain with pyramidal, trapezoid ridgelines; start low in the SE, build to crest in NW	Flowing with washes between ridgelines; tall v-shaped ocotillos on hillside	Tall, thin, geometric-shaped communication towers; spiky, rectangular buildings
Line	Directional from SE to NW; diagonal vertical cliff faces on east side and washes	Flowing, sinuous curves along washes; tall, vertical spikes on hillsides	Vertical tower, diagonal
Color	Dark brown, gray, black, red	Olive green, green, pale green, yellow, red, gray, dark brown	Yellow, brown, white, metallic, beige, pink, rust, salmon, red
Texture	Dense, coarse boulder field; random; coarse overall	Dotted; subtle; sparse but directional in washes	Contrasting, smooth, ordered, uniform

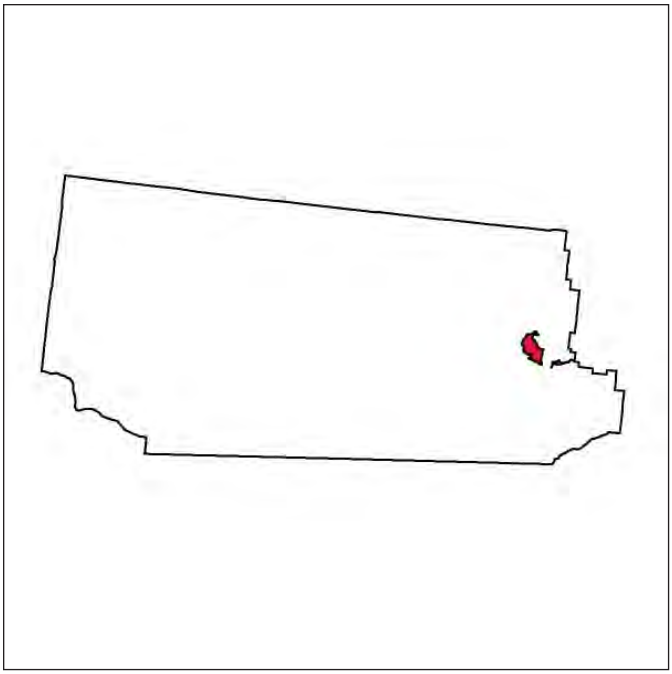
3. Narrative:

Commanding views from summit. Indian Pass Wilderness to the east, north; Singer Valley, Chocolate Mountains to the west and north; Singer Valley to the south. Good plant diversity with species differing from slopes, benches, and ridgelines to washes.

Scenic Quality Rating Unit: Black Mountain			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	4	Large, convex mesa with steep ridge and washes; dominant in the landscape	☑ **A – 19 or more**
b. Vegetation	4	Good diversity in vegetation types	☐ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	4	Excellent contrast between vegetation, landform and in different colors of landforms	
e. Adjacent Scenery	3.5	Great views from the mountain and valley provide good foreground	
f. Scarcity	4	Black rock is fairly unique and distinctive	☐ **Rehab**
g. Cultural Modification	-0.5	Towers dominate mountain but are not visible from all areas of the unit; easy access on service road	☐ **Special Area**
TOTAL	19		

Comments:

Excellent color in soil, rock, and cliff faces contrast nicely with variety of vegetation. Cacti, creosote, grasses on slopes, ridgelines; paloverde, ironwood, creosote, brittlebrush in washes.



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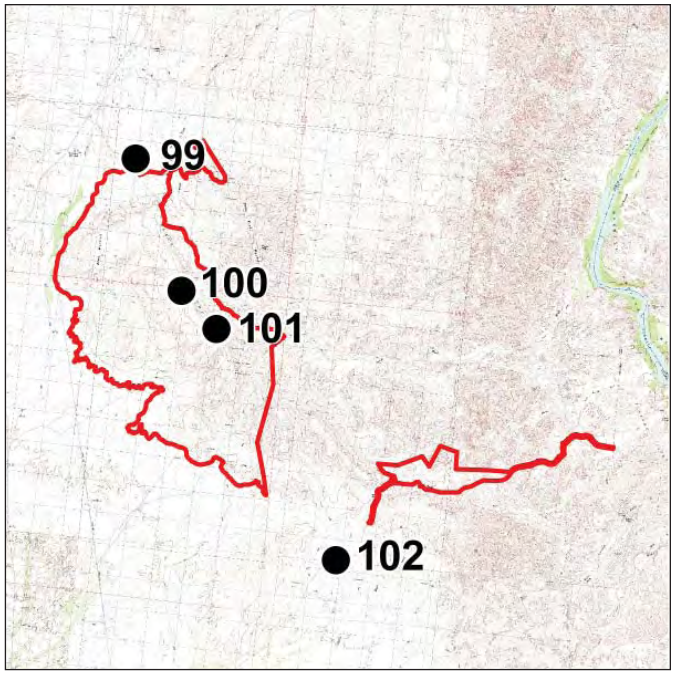


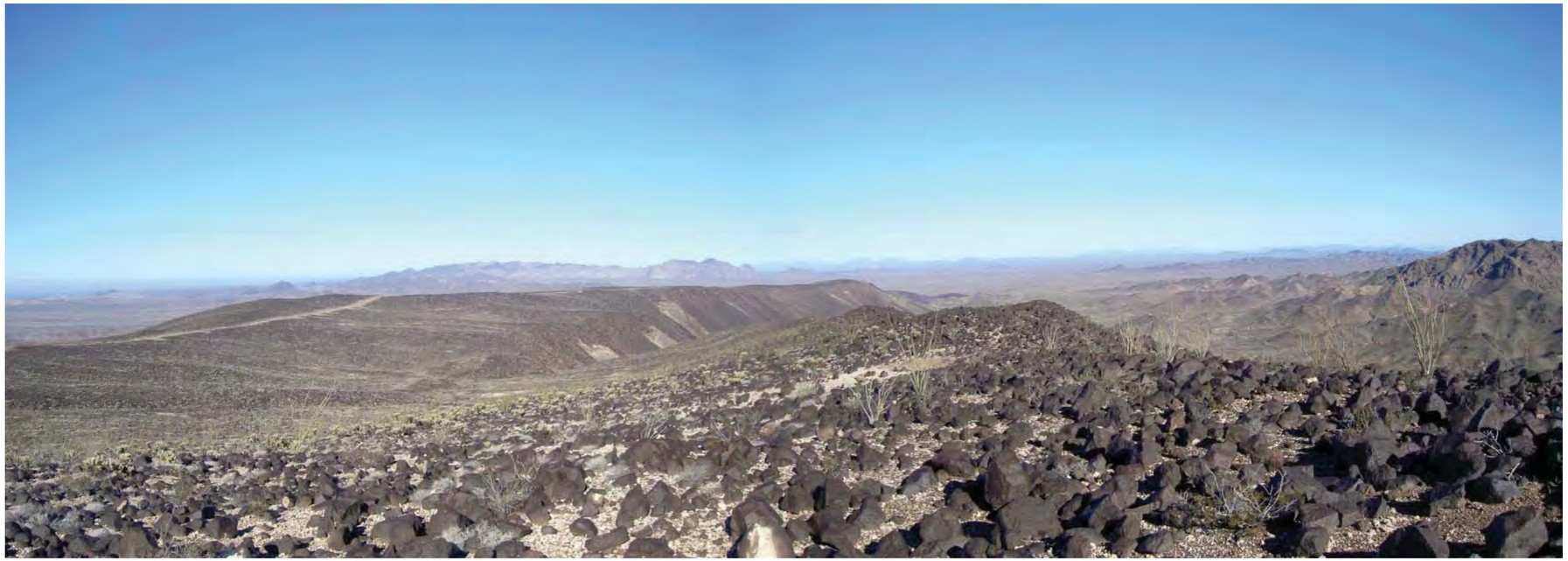
• IOP Location

IOP 99. Peter Kane waterhole, looking southeast (IOPCAD070000409)

121_SE_BlackMountain_0409.jpg

IOP 100. Road bench, looking northeast (IOPCAD070000418)

124_NE_BlackMountain_0419.jpg



IOP 101. North ridge, looking northwest (IOPCAD07000415)

123_NW_BlackMountain_0415.jpg

IOP 102. Road 649, looking north (IOPCAD07000438)

130_N_BlackMountain_0438.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/10/2010

Scenic Quality Rating Unit: Chocolate Hills Time (24hr format): 12:30

Unit Number: 38

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rocky, rounded, conical features with jagged ridges along the east	Concentrated in washes, sparse on the landform features; low ground cover	Mine fencing; geometric
Line	Angular slopes and rock outcroppings; undulating ridgelines	Vertical element of ocotillo; indistinct; irregular in washes	Vertical, horizontal, angular
Color	Gray, red, purple, beige, basalt, green, rust; rich color variations	Green, gray, pale yellow, olive green	Metallic, rust, brown
Texture	Medium to coarse	Medium	Medium to coarse

3. Narrative:

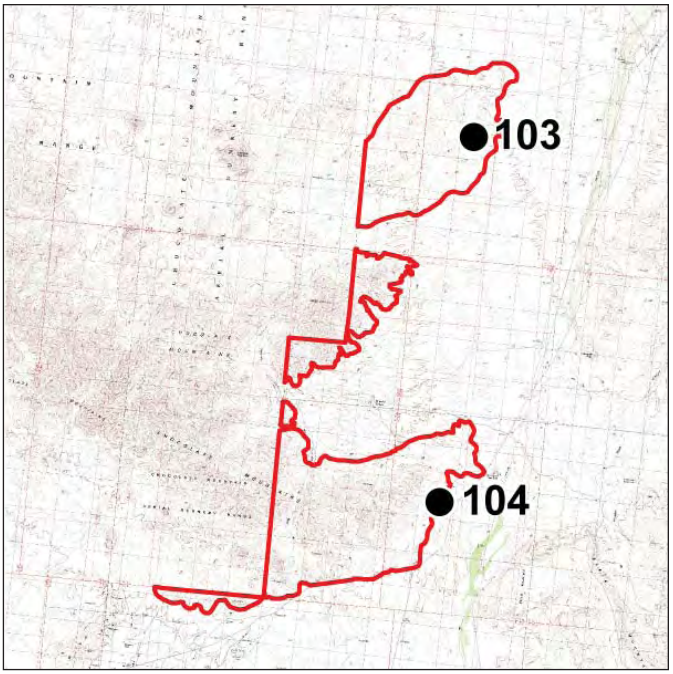
The part of the Chocolate Mountains west of Ogilby Road not included in military lands. Defined by military lands to the north and west, Milpitas Valley and Peter Kane Bench to the north and northeast, Singer Valley to the south, and Mammoth to the west.

Scenic Quality Rating Unit: Chocolate Hills			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	4	Vertical relief, erosional patterns, blocky rock features (bold)	☐ **A – 19 or more**
b. Vegetation	3	Nice variety of cacti	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	4	Nice color contrast with landform and vegetation	
e. Adjacent Scenery	4	Chocolate Mountains, Indian Pass Mountains	
f. Scarcity	3.5	Distinct colors, vegetation, and landform are a nice combination	☐ **Rehab**
g. Cultural Modification	-1	Mining in the south	☐ **Special Area**
TOTAL	17.5		

Comments:

This unit would be Class A scenery were it not for the cultural impacts from mining. Comparable to the Black Hills and Indian Pass Foothills but the natural appearance is less intact.

SQRU Locator



• IOP Location

IOP 103. Paymaster Mine, looking northeast (IOPCAD070000352)

105_NE_ChocolateHills_0352.jpg

IOP 104. Road 569, northeast corner of Section 30, looking west (IOPCAD07000367)

108_W_ChocolateHills_0367.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/10/2010

Scenic Quality Rating Unit: Peter Kane Bench Time (24hr format): 12:30

Unit Number: 39

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rolling, rounded mounds with amorphous drainage channels	Sparse, clumpy, mounded succulents; rounded, mounded shrub community	Blocky, cylindrical, cluttered; rusted-out cars, trailers, dumping on private lands
Line	Undulating, broken	Vertical punctuation with ocotillo; otherwise indistinct on rounded features; irregular	Vertical, horizontal, angular
Color	Oranges, gray, rust, brown, beige	Pale yellow, green	Metallic, white
Texture	Smooth to medium	Dotted/patches medium	Coarse in the landscape

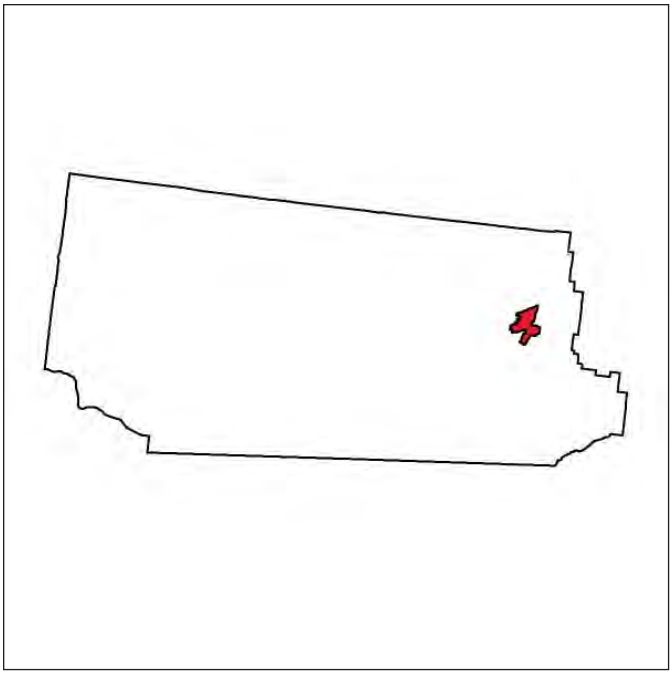
3. Narrative:

Defined by Chocolate Hills to the south and west, Milpitas Valley to the north, Indian Pass Foothills and Black Mountain, and Indian Pass Wilderness Area to the east.

Scenic Quality Rating Unit: Peter Kane Bench			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	2	Rolling hills incised by washes	☐ **A – 19 or more**
b. Vegetation	2	More variety	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Subtle; not much	
e. Adjacent Scenery	3.5	Chocolates, Indian Pass Foothills	
f. Scarcity	2	Common; a little more interesting than Milpitas Valley but not distinct	☐ **Rehab**
g. Cultural Modification	-1	More impact on private lands; discordant	☑ **Special Area**
TOTAL	10.5		

Comments:

Nice adjacent scenery, but a lot of disturbance created by private landowners contrasts with surroundings.



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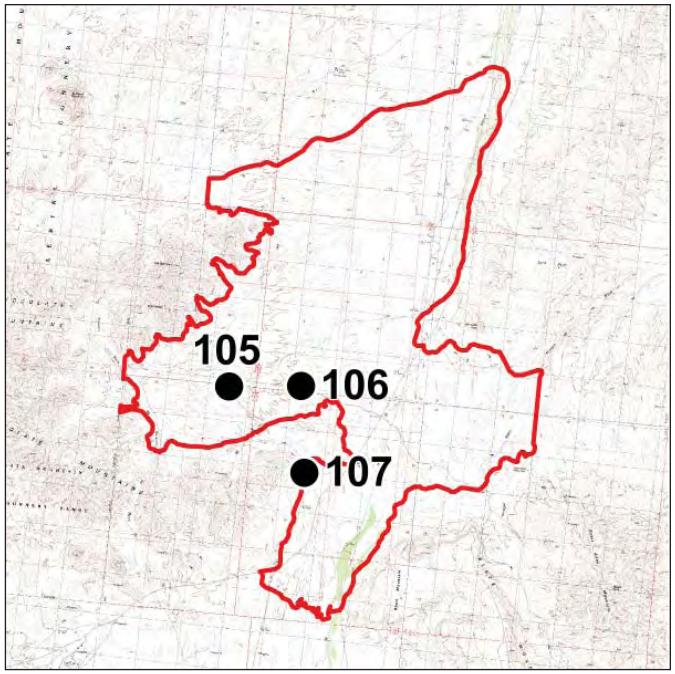


• IOP Location

IOP 105. Imperial Gables and Lowe Road, looking northeast (IOPCAD07000361) 106_NE_PeterKaneBench_0361.jpg

IOP 106. Imperial Road, looking west (IOPCAD07000364) 107_W_PeterKaneBench_0364.jpg

IOP 107. Ogilby Road looking southeast (IOPCAD070000370) 109_SE_PeterKaneBench_0370.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/10/2010

Scenic Quality Rating Unit: Vinagre Wash Time (24hr format): 14:36

Unit Number: 40

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rolling hills with a series of broad washes that open onto the Colorado River plain	Strips of rounded/mounded shrubs/succulents between landform features	Linear, cylindrical, round; roads, well, windmill, fencing
Line	Curvilinear washes with angular, v-shaped hills coming into the unit	Irregular line that follows the wash; broken diagonal	Vertical, horizontal, angular
Color	Red, gray, orange, dark brown, beige	Light green, olive green, pale yellow, gray	Brown, metallic, rust
Texture	Medium, coarse granular	Medium	Smooth

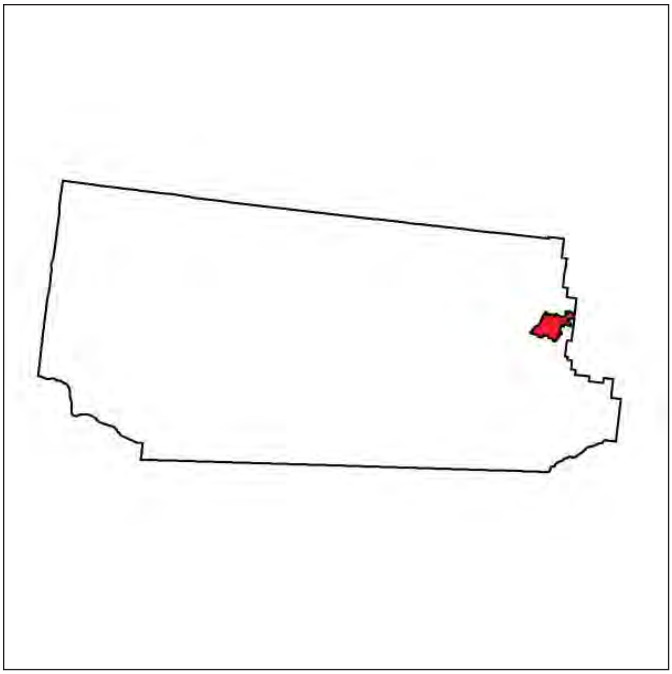
3. Narrative:

This unit encompasses low, rounded hills incised by a series of broad washes and is surrounded by the Indian Peaks Foothills.

Scenic Quality Rating Unit: Vinagre Wash			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	2.5	Rounded hills with a series of washes	☐ **A – 19 or more**
b. Vegetation	4	Variety of types/forms/textures	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	2	Subtle/muted; little contrast between vegetation and landform	
e. Adjacent Scenery	3.5	Trigo Mountains, Indian Pass Mountains	
f. Scarcity	3	Distinct because of scale but common	☐ **Rehab**
g. Cultural Modification	0	Does not detract	☑ **Special Area**
TOTAL	15		

Comments:

Dramatic adjacent scenery from the eastern end of this unit as the Indian Peak Foothills begin to pinch off the major wash; adds to experience of driving through. Diverse, varied vegetation.



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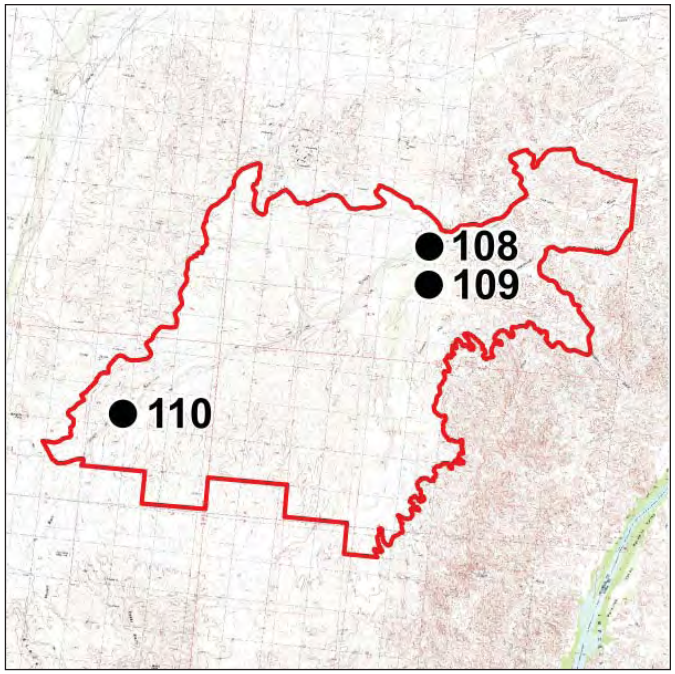


• IOP Location

IOP 108. Arrowhead Springs, looking north (IOPCAD07000385) 114_N_VinagreWash_0385.jpg

IOP 109. Looking southeast (IOPCAD07000091) 116_SE_VinagreWash_0391.jpg

IOP 110. Northwest corner, Section 6, looking northwest (IOPCAD07000379) 112_NW_VinagreWash_0379.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/10/2010

Scenic Quality Rating Unit: Indian Pass Foothills Time (24hr format): 5:00

Unit Number: 41

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Directional pyramidal features layered NW/SE, NE/SW; bold rock outcrops, cinder cone-like features	Sparse vegetation on features; denser concentrated in drainages (rounded shrubs, succulents)	Linear roads
Line	Angular, diagonal, directional (NW)	Irregular along drainages, indistinct on features; some vertical elements (ocotillo, paloverde)	Curvilinear
Color	Rich browns, gray, basalt, green, beige, red, orange, light gray to off-white	Red, light green, pale yellow, olive green	Gray, brown, beige
Texture	Medium to coarse	Medium	Smooth

3. Narrative:

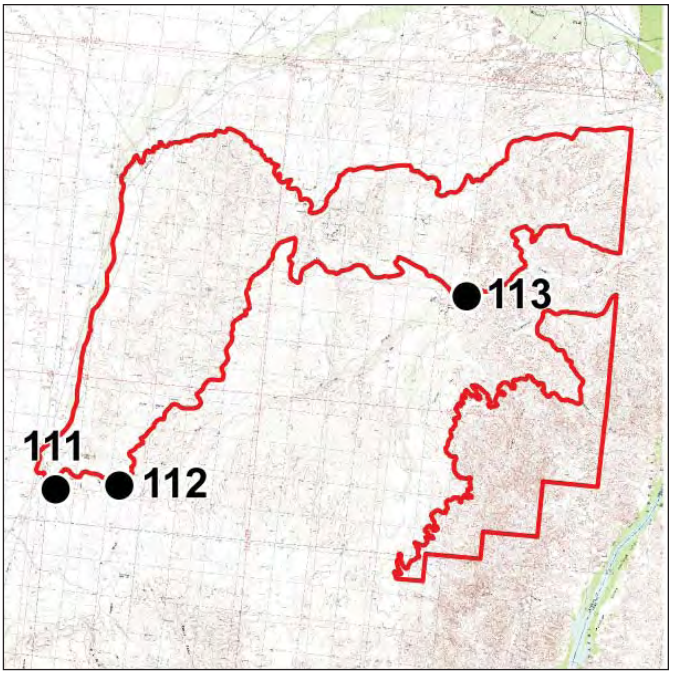
Defined by Milpitas Valley to the north, Field Office boundary east, Indian Pass Wilderness Area south, and Peter Kane Bench west. The unit is split in the middle by Vinagre Wash.

Scenic Quality Rating Unit: Indian Pass Foothills			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	4.5	Variety in form and texture, scale, and bold rock features	☑ **A – 19 or more**
b. Vegetation	2.5	Some variety but sparse on features; not as striking as Black Hills	☐ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	4	Rich color variation and contrast	
e. Adjacent Scenery	4	Vinagre Wash, Chocolate Mountains, Trigo Mountains, Colorado River plain	
f. Scarcity	4	A large-scale bold/dominant feature with rich color combinations	☐ **Rehab**
g. Cultural Modification	0	Neutral	☐ **Special Area**
TOTAL	19		

Comments:

Very similar to the Black and Chocolate Hills but with a lot more variation in landform texture, scale, form, and color variation. A very natural appearance with little noticeable disturbance.

SQRU Locator



• IOP Location

IOP 111. Buzzard Peak, Section 6, looking east (IOPCAD07000373) 110_E_IndianPassFoothills_0373.jpg

IOP 112. Buzzard Peak, looking northwest (IOPCAD07000376) 111_NW_IndianPassFoothills_0376.jpg

IOP 113. Intersection of 579 and 597, looking northwest (IOPCAD07000388) 115_NW_IndianPassFoothills_0388.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/9/2010

Scenic Quality Rating Unit: Milpitas Valley Time (24hr format): 10:30

Unit Number: 42

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	A large, broad, flat valley sloping from the Colorado River basin to the west; enclosed by mountains	Scattered, random, uniform distribution of low, mounded/rounded shrubs; taller vegetation in washes	Linear, blocky
Line	Horizontal	Overall indistinct, irregular, sinuous and vertical elements following drainages	Vertical, horizontal, angular
Color	Gray, brown, tan, sand	Olive green, green, gray, pale yellow, sage green	Brown, rust, white, gray; all varieties represented on the private lands
Texture	Smooth	Medium to coarse	Smooth; vegetation absorbs

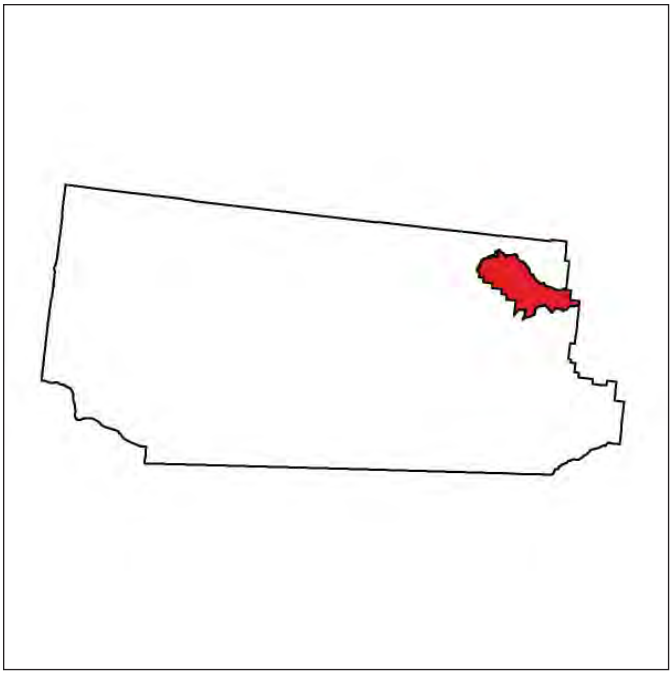
3. Narrative:

An enclosed valley with many side drainages that flow into Milpitas Wash and out to the Colorado River. Defined by Black Hills to the northeast, north; Field Office boundary to the east; Indian Pass Foothills, Peter Kane Bench south; military lands east.

Scenic Quality Rating Unit: Milpitas Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1	Flat and incised by drainages	☐ **A – 19 or more**
b. Vegetation	2.5	Vegetation in washes adds variety	☐ **B – 12 – 18**
c. Water	0	Not present	☑ **C – 11 or less**
d. Color	2	Muted tones in landform and vegetation	
e. Adjacent Scenery	3	Surrounded by mountain ranges; scale of valley is large	
f. Scarcity	1	Common in region	☐ **Rehab**
g. Cultural Modification	-0.5	Impact on private lands detracts; materials, colors and dumping detract	☑ **Special Area**
TOTAL	9		

Comments:

A common landscape in the Colorado Desert. The adjacent scenery encloses this large valley and adds some value to the scenic quality. Fewer succulents, palo verde, ocotillo than Chuckwalla.



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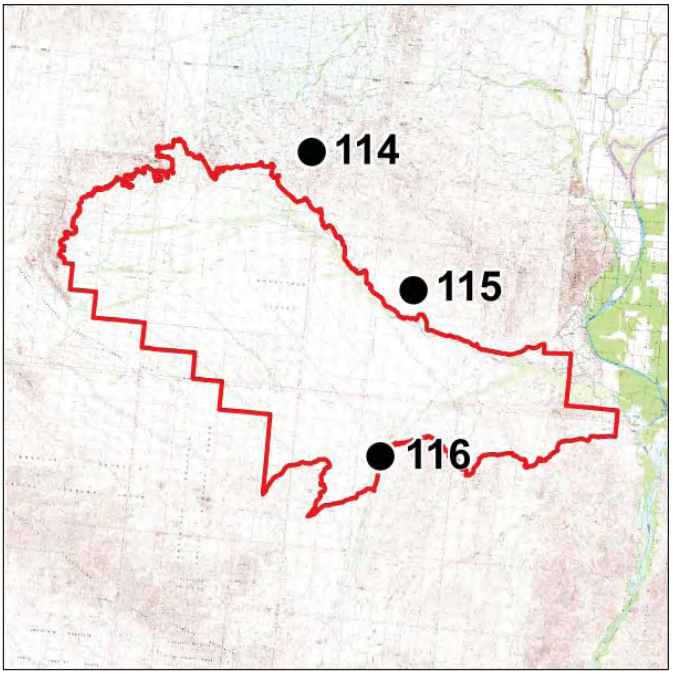
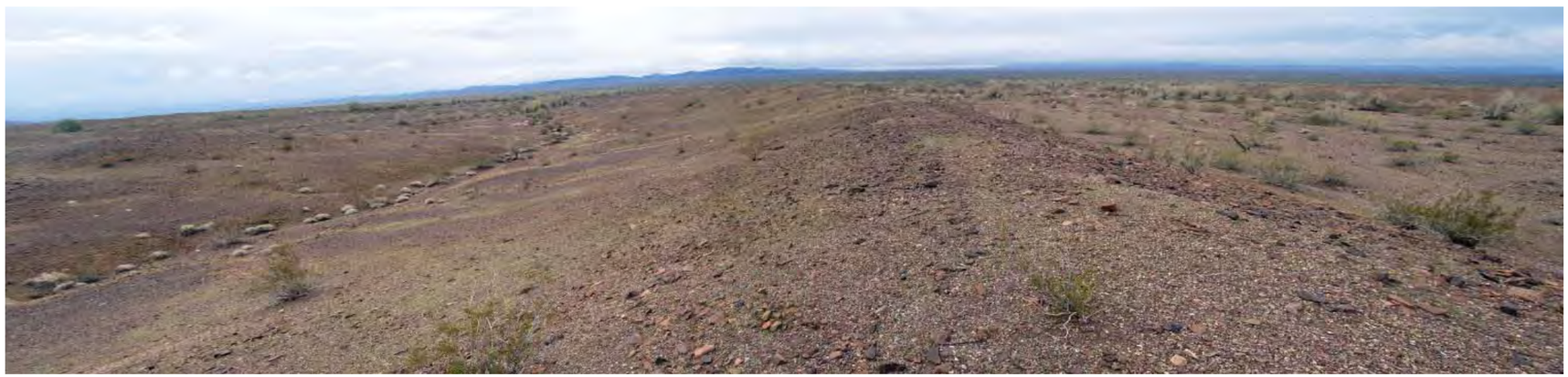


• IOP Location

IOP 114. Section 24 wilderness boundary, looking southwest (IOPCAD07000337) 101_SW_MilpitasValley_0337.jpg



IOP 115. End of Road 658, looking south (IOPCAD07000331) 100_S_MilpitasValley_0331.jpg

IOP 116. Midway well, looking northwest (IOPCAD07000346) 104_NW_MilpitasValley_0346.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 1/18/2010

Scenic Quality Rating Unit: Palo Verde Bench Time (24hr format): 13:45

Unit Number: 43

1. Evaluators: KBeatty GBrady SDixon KSchwarzler

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Rounded and domed; broken by a series of washes	Distinct, medium along washes; otherwise low, irregular	Major power lines, roads, scattered trailers
Line	Horizontal with irregular washes	Vertical, broken line along washes, otherwise indistinct	Vertical power poles; linear and curving roads
Color	Sand, desert pavement is dark; some reds, color variety	Olive, pale, dusty greens	Silver, gray, rust; roads are lighter/contrasting
Texture	Fine, smooth areas broken by coarseness	Scattered, sparse, somewhat fine in washes	Smooth

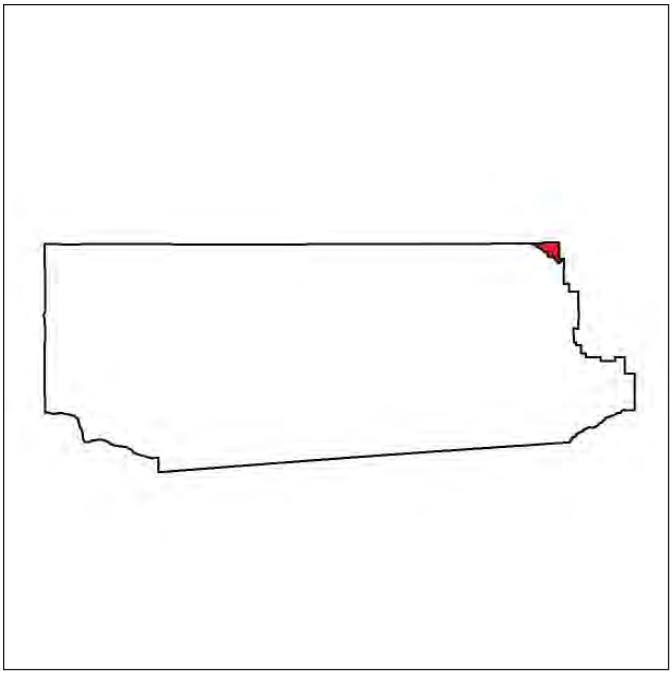
3. Narrative:

The unit is a series of washes with low, rolling, hard, rocky landforms in between. Surrounded by mountains to one side and more developed valley on the other. Area has a lot of dumping.

Scenic Quality Rating Unit: Palo Verde Bench			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	1.5	Low and rolling, washes	☐ **A – 19 or more**
b. Vegetation	2	Not a lot of variety	☐ **B – 12 – 18**
c. Water	0.5	Washes	☑ **C – 11 or less**
d. Color	3	Desert pavement contrast	
e. Adjacent Scenery	3.5	Moderate views of adjacent units	
f. Scarcity	2	Similar	☐ **Rehab**
g. Cultural Modification	-1.5	Roads, power lines, trash	☐ **Special Area**
TOTAL	11		

Comments:

None.



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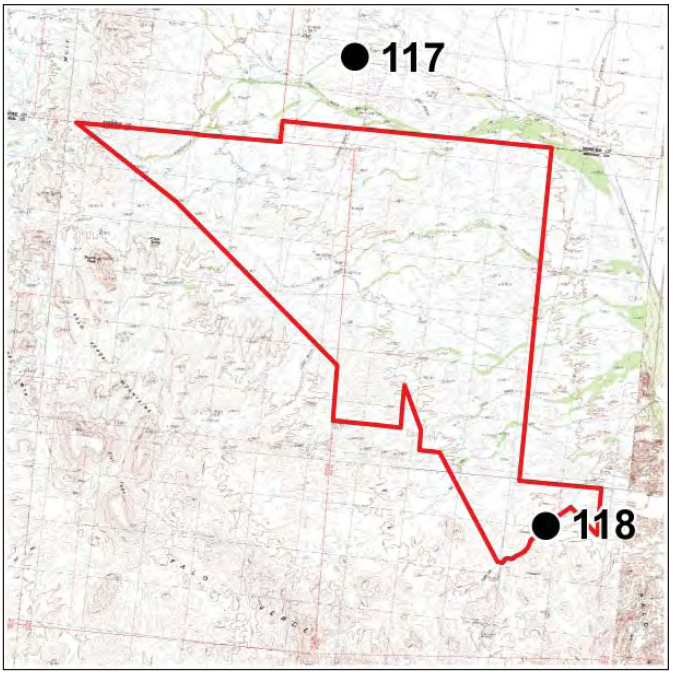


• IOP Location

IOP 117. Looking northwest (IOPCAD070009075)

9075_NW_PaloVerde_9281.jpg

IOP 118. North end of cherry stem, looking north (IOPCAD070000406)

120_N_PaloVerdeBench_0406.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/9/2010

Scenic Quality Rating Unit: Black Hills Time (24hr format): 16:00

Unit Number: 44

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Continuous, directional rounded pyramid features in clustered lands; some rock faces, outcroppings	Sparse, low, wispy, mounded clumps on hills, erosion channels, perimeter; clustered barrel cacti	Blocky trailers, shade structure; cylindrical power lines (northern edge)
Line	Rolling, undulating north to south with angular erosional drainages	Horizontal, vertical in drainages and unit perimeter	Horizontal, vertical, angular, swooping
Color	Rich browns (red), salmon, purple, gray, tans, green, subtle yellow	Green, gray, pale yellow, olive green	Brown, metallic, white
Texture	Medium overall; coarse granular with bolder rock faces	Smooth on hills; coarse in drainages and perimeter	Smooth

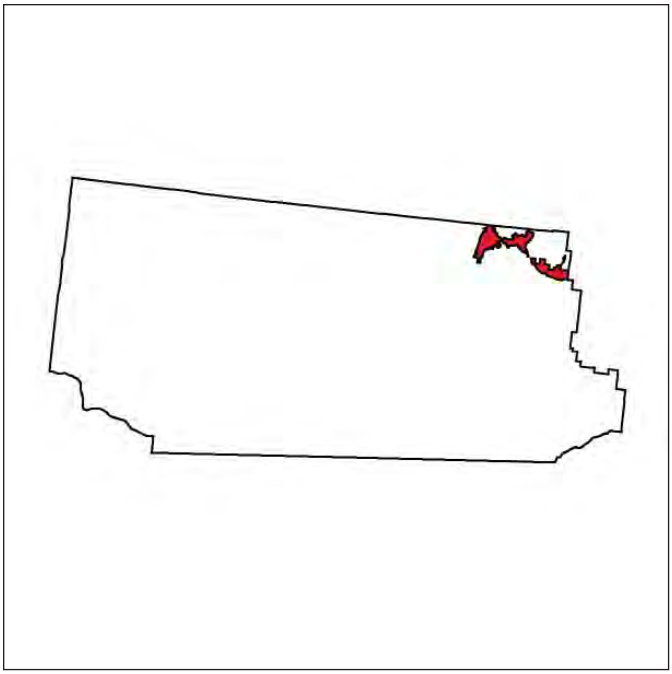
3. Narrative:

Includes Hauser Geodes and is split by Palo Verde Mountains Wilderness. Defined by Chuckwalla Bench to the west; Field Office boundary, Chuckwalla Valley to the north; Field Office boundary to the east; Milpitas Valley to the south.

Scenic Quality Rating Unit: Black Hills			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	4	Variety in texture and form	☐ **A – 19 or more**
b. Vegetation	3.5	More variety in washes and perimeter	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	4	Rich color variation and some banding in landform	
e. Adjacent Scenery	4	Chuckwalla Bench and Mountains, Palo Verde Mountains, Chocolate Mountains	
f. Scarcity	3.5	Distinctive but somewhat similar to Chocolates (on a smaller scale)	☐ **Rehab**
g. Cultural Modification	0	Does not detract	☐ **Special Area**
TOTAL	19		

Comments:

The variety in landform and color make this unit stand out. It provides a nice scenic element along the Bradshaw Trail. Landscape appears more intact than the Chocolate Mountains; less human impact.



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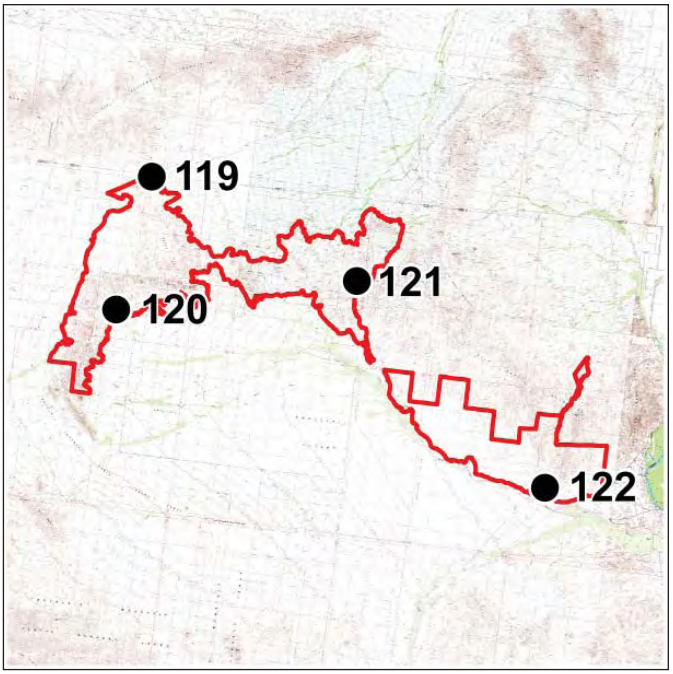


• IOP Location

IOP 119. Bradshaw Road, northeast corner of Setion 3, looking southwest (IOPCAD070000295)

90_SW_BlackHills_0295.jpg

IOP 120. Road 910, looking north (IOPCAD07000316)

96_N_BlackHills_0316.jpg

IOP 121. Section 24 wilderness boundary, looking northeast (IOPCAD070000334) 101_NE_BlackHills_0334.jpg

IOP 122. East side of Section 19, looking northwest (IOPCAD07000400) 118_NW_BlackHills_0400.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 2/9/2010

Scenic Quality Rating Unit: Chuckwalla Bench Time (24hr format): 5:00

Unit Number: 45

1. Evaluators: BBielenberg CBrandt JMcGrew

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Flat to rounded, sloping from northeast to southwest	Uniform low creosote shrubs/succulents interrupted by taller trees/ocotillos; grass understory	Blocky, cylindrical trailers, power poles, road, windmill
Line	Subtle convex	Indistinct; overall irregular along washes; vertical ocotillo, paloverde, ironwood, yucca	Horizontal, vertical, angular
Color	Gray, tan, some red; deep, rich brown; sand	Pale yellow, green, olive green, gray, light green, red (mistletoe)	Brown, gray, metallic
Texture	Smooth	Medium to coarse; dense in washes	Smooth

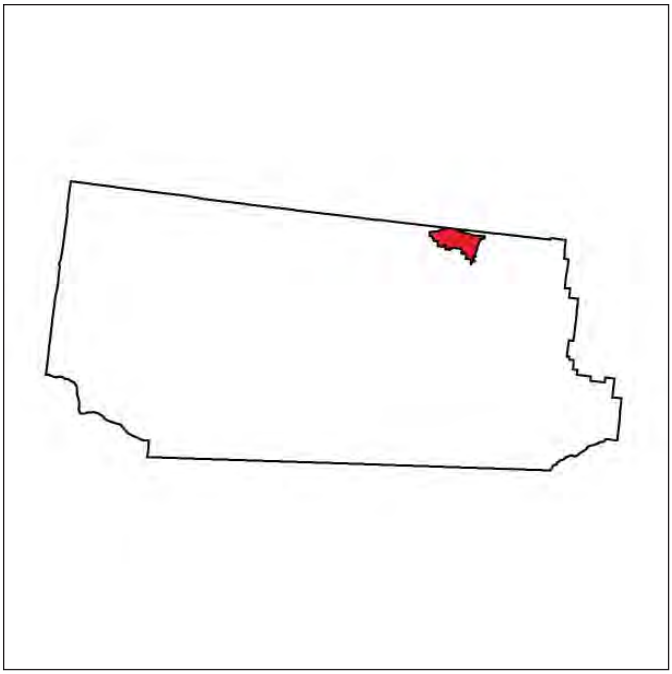
3. Narrative:

Defined by the Chocolate Mountain military base along the south and west; the Field Office boundary to the north, and the Black Hills to the east.

Scenic Quality Rating Unit: Chuckwalla Bench			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION** (check one)
a. Landform	2	Flat with some interesting features like Indian Wells	☐ **A – 19 or more**
b. Vegetation	4	Ocotillo, cholla, creosote, ironwood barrel cacti, paloverde; a lot of diversity	☑ **B – 12 – 18**
c. Water	0	Not present	☐ **C – 11 or less**
d. Color	2	Vegetation provides the most variation; landform muted except for occasional red/brown outcroppings	
e. Adjacent Scenery	3.5	Chuckwallas, Black Hills; enclosed	
f. Scarcity	2	Somewhat distinct because of vegetative variety	☐ **Rehab**
g. Cultural Modification	0	Nothing that detracts	☐ **Special Area**
TOTAL	13.5		

Comments:

The unit is an enclosed landscape surrounded by mountains and has a diverse assortment of vegetation types, forms, and textures which provide visual variety and interest.



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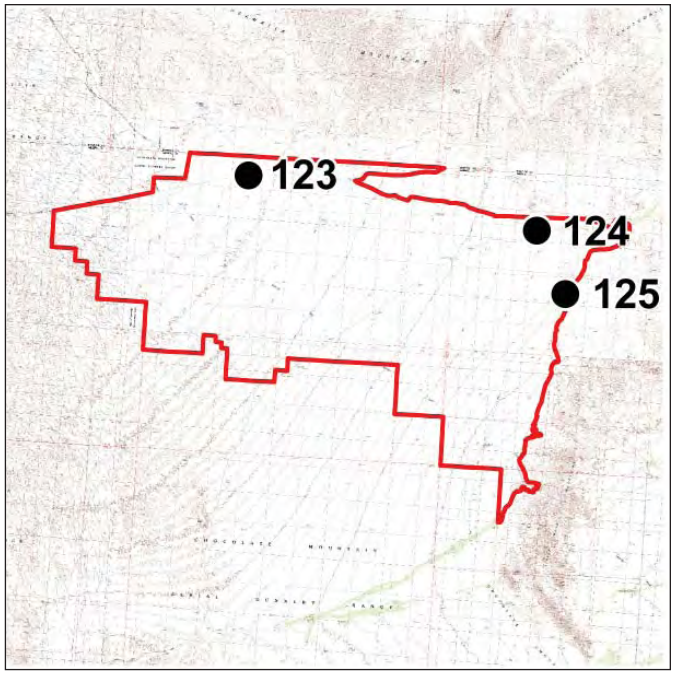


• IOP Location

IOP 123. Indian Wells, looking southeast (IOPCAD07000301)

92_SE_ChuckwallaBench_0301.jpg

IOP 124. Northwest corner of Section 8, looking southeast (IOPCAD070000307)

93_SE_ChuckwallaBench_0307.jpg

IOP 125. Southeast corner of Section 17, looking northwest (IOPCAD07000310)

94_NW_ChuckwallaBench_0310.jpg

Form 8400-1
(September 1985)
(Format Modified 2008)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Field Office: El Centro D07000 Date: 10/5/2009

Scenic Quality Rating Unit: Chuckwalla Valley Time (24hr format): 11:50

Unit Number: 46

1. Evaluators: CBrandt GLong

2. LANDSCAPE CHARACTER (Features)			
	A. Landform/Water	**B. Vegetation**	**C. Structures**
Form	Broad valley; flat to gentle slopes; very gently rolling	Rounded, clumpy, mottled form	Roads, settlements, substations, power lines, tall cylindrical poles; geometric
Line	Horizontal landscape; vast open space	Rounded, horizontally aligned	Vertical poles, buildings
Color	Light brown to buff-colored soils and rock	Brownish-green	White, beige, desert brown, silver, brown
Texture	Smooth valley floor	Mottled; medium to coarse vegetation	Smooth surfaces

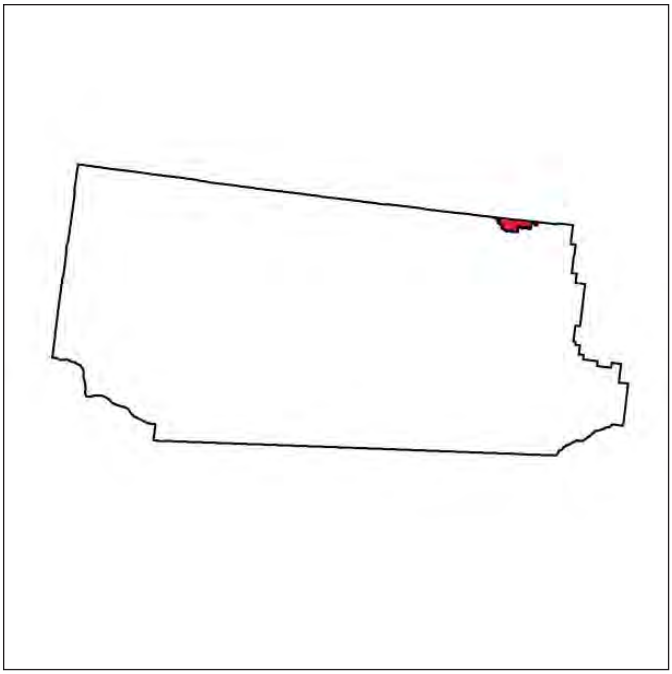
3. Narrative:

A broad, enclosed landscape surrounded on most sides by dramatic mountain ranges. Vast, natural-appearing. Vegetation is somewhat visually dominant.

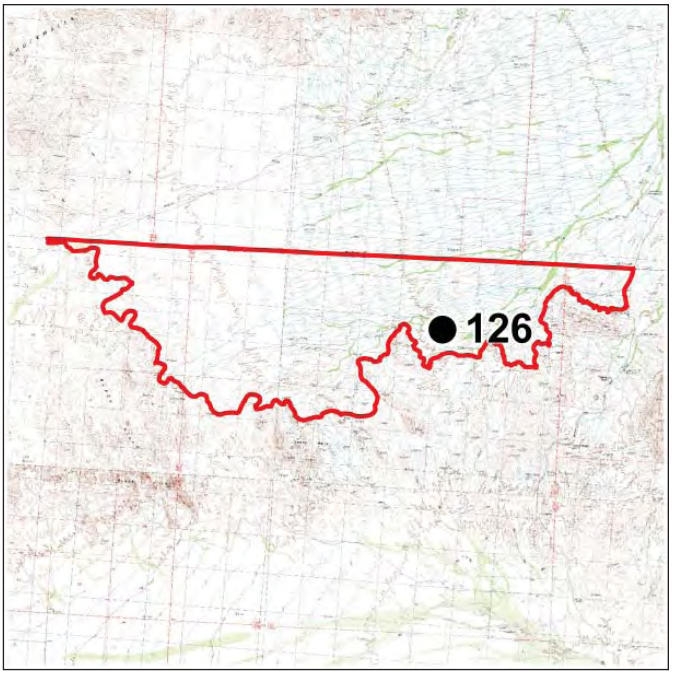
Scenic Quality Rating Unit: Chuckwalla Valley			
4. SCORE			
	Rating	**EXPLANATION OR RATIONALE**	**SCENIC QUALITY CLASSIFICATION (check one)**
a. Landform	1	Vast, low, gently rolling valley bottom	☐ **A – 19 or more**
b. Vegetation	3	Some variety of vegetation; one or two major types	☑ **B – 12 – 18**
c. Water	0	None present	☐ **C – 11 or less**
d. Color	2	Subtle variation; some contrast in soil, vegetation	
e. Adjacent Scenery	4	Dramatic mountains surrounding the area	
f. Scarcity	2	Fairly distinctive but not unusual	☐ **Rehab**
g. Cultural Modification	0	Some cultural modification but overall natural-appearing	☐ **Special Area**
TOTAL	12		

Comments:

The valley is a vast area, homogenous in terms of landforms and vegetation with no line or break to suggest subdividing into smaller units. Adjacent scenery is dramatic from all IOPs.



SQRU Locator



• IOP Location

IOP 126. Looking northeast (IOPCAD070000340)

102_NE_ChuckwallaValley_0340.jpg

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BUREAU OF LAND MANAGEMENT

SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: San Felipe Hills Private Lands

Unit Number: 1

Type of Area: Rural residential, agricultural, auto tour corridor, recreation

Predominant Types of Users: Residents, farmers, tourists/sightseers, hikers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Local residents, farming, people passing through on auto tours or Pacific Crest Trail
Amount of Use	**M**	Highway S2 probably gets more traffic than S22, which does not go all the way through Anza Borrego State Park
Public Interest	**H**	Adjacent tribes; may be some cultural significance and local residents would be sensitive; part of setting for Pacific Crest Trail
Adjacent Land Uses	**H**	Foreground to Tribal lands and Wilderness Study Areas
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	Pacific Crest Trail passes through the western end, from southeast to northwest
Overall Rating	**M**	See narrative.

Narrative:

The area is predominantly private land, but the foreground to two Indian reservations and two Wilderness Study Areas, as well as home to the communities of San Felipe and Ranchita. The Pacific Crest Trail also passes through it.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/6/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Banner

Unit Number: 2

Type of Area: Residential, recreation, travel corridor (stopping point on the way to other destinations)

Predominant Types of Users: Residents, tourists, travelers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Tourist area; residential
Amount of Use	**H**	Local residents; people en route to and from Anza Borrego State Park; Scenic Byway access
Public Interest	**H**	Residents drawn to area because of scenic quality and isolation from San Diego; tourist town of Julian is at the entrance to Anza Borrego State Park
Adjacent Land Uses	**M**	The area is already developed, concentrated around the town of Julian
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	Two scenic byways begin from this unit and the Pacific Crest National Trail passes through it; access to National Forest
Overall Rating	**H**	Entrance to Anza Borrego State Park from the west

Narrative:

Good access to forests, Scenic Byways; Town of Julian has a western mountain town appeal and history. Pacific Crest Trail passes through the unit.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/6/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Vallecito Valley

Unit Number: 3

Type of Area: Private land/residential, travel corridor

Predominant Types of Users: Residents, travelers passing through

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Travelers, residents
Amount of Use	**H**	Travel corridor, state park access
Public Interest	**M**	Local and regional interest
Adjacent Land Uses	**H**	Overlook on Sunrise National Scenic Byway, Pacific Crest Trail provides important views of valley
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	Entrance to Anza Borrego State Park; wilderness areas; State/BLM surround the unit
Overall Rating	**H**	Scenic quality is intact

Narrative:

The valley has a more natural appearance than others within the Field Office. The land is predominantly private, a nice setting, and probably what drew people. They would be highly sensitive to change.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Sawtooth Mountains

Unit Number: 4

Type of Area: Recreation, sightseeing

Predominant Types of Users: Hiking, touring

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Hiking, touring
Amount of Use	**H**	Sunrise Scenic Byway is a popular touring route that runs adjacent to the unit
Public Interest	**M**	Local and regional
Adjacent Land Uses	**H**	Backdrop to communities of Vallecito and Mason Valley; within viewshed of Scenic Byway and Pacific Crest Trail
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative.

Narrative:

The unit is the backdrop to the communities of Vallecito and Mason Valley. Portions of the unit can also be viewed from the Sunrise Scenic Byway and Pacific Crest Trail.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/6/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Canebreak

Unit Number: 5

Type of Area: Residential

Predominant Types of Users: Residents, park employees (ranger station)

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	A unique residential community and park ranger station
Amount of Use	**M**	Predominantly local residents and the occasional straggler who wanders off the beaten path
Public Interest	**M**	Local; residents are obviously drawn to the area because of its isolation and surrounding beauty
Adjacent Land Uses	**M**	Wilderness area; Anza Borrego State Park; highly visible from Highway S2 traveling through the park; residential community stands out; change could impact scenic quality
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

A unique residential community. Residents are most likely drawn to the area because of its scenic quality and isolation.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/4/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: In-Ko-Pah

Unit Number: 6

Type of Area: Recreation

Predominant Types of Users: Campers, OHV user, hikers, equestrians, sightseers/tourists (overlooks), phot

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Predominantly recreation; well-established camping facilities
Amount of Use	**H**	Easy to access from Old Highway 80
Public Interest	**H**	Tribal concerns
Adjacent Land Uses	**H**	Backyard to the residents of McCain Valley; residents highly sensitive to changes in scenic quality
Special Area Sensitivity	**H**	Part of the unit is within the In-Ko-Pah Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative

Narrative:

A heavily used recreation area with established camping and staging areas; the backyard to residents of McCain Valley and Tribal lands.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/4/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: McCain Valley

Unit Number: 7

Type of Area: Residential, institutional, grazing, agricultural

Predominant Types of Users: Residents, wildlife conservationists, mountain bikers, wildlife viewers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Residents, recreationists en route to camping areas; within viewshed of highway
Amount of Use	**H**	Recreational facilities in In-Ko-Pah unit indicate area is popular and heavily used
Public Interest	**H**	Tribal concerns; local residents, regional and state users
Adjacent Land Uses	**H**	Visitors traveling to recreation camping and staging areas pass through; changes in scenic quality may impact visitor experience
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative

Narrative:

Recreationists travel through the unit to campgrounds and staging areas. The unit also contains many private residents (people may have been drawn to the area because of scenic quality and semi-isolation).

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/5/2010

Evaluators: BBielenberg CBrandt JMcGrew JJohnson

Sensitivity Level Rating Unit: Table Mountain

Unit Number: 8

Type of Area: Private land, butterfly habitat (Round Mountain), ACEC

Predominant Types of Users: Private landowners, jeep clubs, OHV users, equestrians

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Commuters, local communities' backyard
Amount of Use	**M**	I-8 is well-traveled and passes by the unit
Public Interest	**M**	Within viewshed of I-8 and most of Jacumba Valley community; an area landmark
Adjacent Land Uses	**M**	Within viewshed of Jacumba; community would be sensitive to changes in scenic quality
Special Area Sensitivity	**H**	Part of the unit is an ACEC and Wilderness Study Area; Table Mountain proper has mining history
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

The unit surrounds Jacumba Valley and is within close proximity of the community of Jacumba, within the foreground/middleground of I-8, and highly visible. Travelers, locals would be sensitive to visual changes.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/5/2010

Evaluators: BBielenberg CBrandt JMcGrew JJohnson

Sensitivity Level Rating Unit: Jacumba Valley

Unit Number: 9

Type of Area: Residential, travel corridor, agricultural

Predominant Types of Users: Local residents, commuters

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	I-8 and Old I-80 pass through the unit; travel corridor between San Diego and El Centro
Amount of Use	**M**	I-8 is heavily traveled but less than I-10
Public Interest	**M**	Local community of Jacumba
Adjacent Land Uses	**L**	People are predominantly passing through the unit; not as many use adjacent areas
Special Area Sensitivity	**H**	Part of the unit falls within an ACEC
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

Residents of Jacumba would be sensitive to changes in scenic quality, which could affect quality of life.

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Field Office: El Centro Date: 2/5/2010

Evaluators: BBielenberg CBrandt JMcGrew JJohnson

Sensitivity Level Rating Unit: Devil's Canyon

Unit Number: 10

Type of Area: Travel corridor, recreation

Predominant Types of Users: OHV users, hikers, commuters (local communities) jeep touring

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	I-8 is a heavily used route by commuters, travelers, and border patrol. OHV use is limited annually.
Amount of Use	**M**	Permits allow six jeep runs per year (jeep clubs); other areas closed because BLM lacks equipment to maintain; I-8 passes through the unit.
Public Interest	**M**	Regional; local communities and travelers between San Diego and El Centro
Adjacent Land Uses	**H**	In the backyard of the communities of Ocotillo and Coyote Wells, and Oasis
Special Area Sensitivity	**H**	A portion falls within the Table Mountain ACEC and Wilderness Study Area
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

The unit is visually distinct and creates a unique visual experience along I-8, which receives a lot of traffic and is in the foreground/middleground for the entire length of the unit. Changes in scenic quality would be noticeable.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/6/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Ocotillo Valley

Unit Number: 11

Type of Area: Recreation, residential, travel corridor

Predominant Types of Users: OHV users, travelers, commuters, recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Predominantly a travel corridor and residential community
Amount of Use	**M**	Majority of people are passing through the area to other destinations
Public Interest	**M**	Local, regional; entrance to Anza Borrego State Park and home to communities of Ocotillo, Coyote Wells
Adjacent Land Uses	**M**	Entry to Anza Borrego State Park; part of the experience; builds anticipation while traveling through the valley
Special Area Sensitivity	**NP**	Not present
Other Factors	**M**	Highway S2 and I-8 pass through the valley; the entire valley is within the foreground/middleground of these roads
Overall Rating	**M**	See narrative.

Narrative:

The valley is predominantly a travel corridor to other destinations and also provides access to adjacent wilderness areas. It is home to the communities of Ocotillo and Coyote Wells.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/5/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Yuha Desert

Unit Number: 12

Type of Area: Recreation, wilderness access, travel corridor

Predominant Types of Users: Commuters, tourists, campers (designated spots)

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Two major highways surround the unit; heavy traffic, camping
Amount of Use	**H**	Highways receive a lot of traffic from travelers, border patrol; unit is highly visible
Public Interest	**H**	Culturally significant on a local/regional level
Adjacent Land Uses	**H**	In the backyard of Ocotillo, Plaster City
Special Area Sensitivity	**H**	Cultural Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative

Narrative:

Yuha Desert is culturally significant with many visually important features including Crucifixion Thorn Natural Area, De Anza Bautista National Historic Trail.

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Field Office: El Centro Date: 2/5/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Yuha Basin

Unit Number: 13

Type of Area: Recreation, cultural Area of Critical Environmental Concern

Predominant Types of Users: Campers, tourists, oyster shell collectors, OHV users

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Recreation, touring
Amount of Use	**H**	Designated campgrounds, road closures due to overuse/abuse
Public Interest	**H**	Cultural significance: Vista de Anza, Geoglyphs, Yuha well, oyster shell beds
Adjacent Land Uses	**H**	Backyard to community of Ocotillo
Special Area Sensitivity	**H**	Cultural Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative.

Narrative:

A cultural Area of Critical Environmental Concern with unique features (geoglyphs) and history within proximity of El Centro. Backyard to several communities.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Plaster City

Unit Number: 14

Type of Area: Recreation, industrial, agricultural, travel corridor

Predominant Types of Users: OHV users, drywall factory workers, farmers, highway travelers, campers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Plaster City drywall manufacturing facility, OHV open area, farming
Amount of Use	**M**	A heavily used OHV area and travel corridor
Public Interest	**L**	Local, some regional
Adjacent Land Uses	**M**	Surrounded by a wilderness area and two Areas of Critical Environmental Concern; I-8 provides a good barrier to OHV activity in the Yuha Desert
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative.

Narrative:

Overall this unit's scenic quality is impacted by all the OHV activity, Plaster City drywall facility, and agricultural lands, indicating that sensitivity to visual change is low.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Coyote Mountain Hillls

Unit Number: 15

Type of Area: Industrial (landfill), recreation

Predominant Types of Users: Hikers, equestrians, county landfill

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Access to wilderness area, Painted Gorge, and Coyote Mountains Fossil Site; county landfill
Amount of Use	**M**	Close to Highway S2 and Plaster City Open Area; backyard to community of Ocotillo
Public Interest	**M**	Local and regional
Adjacent Land Uses	**H**	Foreground to Coyote Mountain Wilderness
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative

Narrative:

The unit is in the foreground of Coyote Mountain Wilderness Area/Coyote Mountains Fossil Site ACEC. It is also the backdrop to the communities of Ocotillo and Coyote Wells and provides access to Painted Gorge.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: West Mesa

Unit Number: 16

Type of Area: Recreation, cultural Area of Critical Environmental Concern

Predominant Types of Users: OHV users, history buffs

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Part of the unit is within the Superstition Mountain Open Unit, a cultural Area of Critical Environmental Concern
Amount of Use	**M**	The area does not appear to be used as much as Ocotillo Wells Open Area
Public Interest	**H**	Cultural sensitivity
Adjacent Land Uses	**M**	Historic San Sebastian/San Felipe Marsh is nearby; impacts to unit may affect ecology, which could be associated with changes in scenic quality
Special Area Sensitivity	**H**	A cultural Area of Critical Environmental Concern is part of the unit
Other Factors	**H**	Juan Bautista National Historic Trail passes through the unit; part of Butterfield Overland Mail stage route
Overall Rating	**H**	See narrative.

Narrative:

Part of the unit is a cultural Area of Critical Environmental Concern and part is Superstition Mountains. The Juan Bautista National Historical Trail is also within the unit.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Superstition Mountains

Unit Number: 17

Type of Area: OHV open area

Predominant Types of Users: OHV users, campers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	OHV activity, camping
Amount of Use	**M**	Primitive camping and challenging OHV terrain; a little more difficult access and may get less use than Plaster City, Ocotillo Wells
Public Interest	**M**	Visible from many locations within the Imperial Valley
Adjacent Land Uses	**M**	Impacts to visual quality could affect West Mesa, a cultural Area of Critical Environmental Concern
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

An interesting feature that rises out of the valley and is visible from many locations; backyard to Imperial Valley residents.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/9/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Superstition Foreground

Unit Number: 18

Type of Area: Recreation, utilities, agricultural

Predominant Types of Users: OHV users, farmers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	OHV use, farming, gravel pits
Amount of Use	**L**	The area is impacted but probably more localized
Public Interest	**L**	Local; in the backyard of Imperial Valley residents
Adjacent Land Uses	**L**	Imperial Valley is heavily impacted by agriculture and most uses are concentrated within the larger valley
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative.

Narrative:

In the backyard of Imperial Valley residents. The area is already impacted by OHV use and agriculture.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Fish Creek Mountains

Unit Number: 19

Type of Area: Industrial, recreation access

Predominant Types of Users: Gypsum mining

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Mining, recreation (camping) access onto State lands
Amount of Use	**L**	Gypsum mine traffic; tucked away in the canyon
Public Interest	**M**	Gypsum mine is visible from parts of Ocotillo Wells
Adjacent Land Uses	**H**	Within view of State wilderness area campground and Fish Creek Mountains Wilderness Area; in viewshed of camping area in Anza Borrego State Park
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative.

Narrative:

Predominant use is gypsum mining. Area is already visually impacted. Most activity is tucked away in a canyon and cannot be seen from some areas of the Lower Borrego Valley. Outside edges adjacent to wilderness are still intact.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Ocotillo Badland

Unit Number: 20

Type of Area: Recreation, private land

Predominant Types of Users: Predominantly OHV users with some BLM on eastern edge

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	OHV activity dominates
Amount of Use	**M**	Heavily used area; scars/tracks are everywhere
Public Interest	**L**	Local, private landowners
Adjacent Land Uses	**L**	Just as much OHV activity occurs in adjacent units; this unit may be more visible as it sits up, out of the valley
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative

Narrative:

The unit is scarred by OHV activity and is predominantly private land. Scenic quality has been impacted.

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BUREAU OF LAND MANAGEMENT

SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/7/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Lower Borrego Valley

Unit Number: 21

Type of Area: Recreation, residential, travel corridor

Predominant Types of Users: OHV users, tourists/travelers, campers, nature viewers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	OHV, tourists/travel, camping
Amount of Use	**M**	Ocotillo Wells State Vehicular Recreation Area is in the unit; compared to sand dunes use would be lower.
Public Interest	**M**	Background to El Centro Valley residents and the community of Ocotillo Wells is within the unit
Adjacent Land Uses	**M**	Background to Imperial Valley communities
Special Area Sensitivity	**H**	San Sebastian/San Felipe Marsh ACEC is within the unit; opportunities for wildlife/nature study/viewing
Other Factors	**H**	San Felipe Trail runs through the unit; San Felipe Creek is a National Natural Landmark
Overall Rating	**M**	See narrative

Narrative:

This unit is in the background to Imperial Valley communities providing good areas for OHV activities and nature viewing. It is also within the viewshed of Highway 78.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/9/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Arroyo Salada

Unit Number: 22

Type of Area: Recreation

Predominant Types of Users: OHV users

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	OHV use
Amount of Use	**M**	Heavily impacted area indicates there is a lot of use
Public Interest	**L**	Local
Adjacent Land Uses	**L**	In the middle of Ocotillo Wells, which is heavily impacted
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative.

Narrative:

This area is heavily impacted by OHV activity. Scenic quality is affected, yet this keeps this type of activity out of areas where scenic quality is more intact.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/9/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Salton City

Unit Number: 23

Type of Area: Residential, industrial

Predominant Types of Users: Residents, tourists, commuters

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Residents, tourists, commuters
Amount of Use	**M**	Travel corridor, residential, tourists visiting the Salton Sea
Public Interest	**L**	Heavily impacted area
Adjacent Land Uses	**L**	Area is already impacted; it would be better if impacts were kept localized vs. to adjacent areas
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative.

Narrative:

This unit is heavily impacted by humans and scenic quality is not intact. Sensitivity to scenic quality is low.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/7/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Coachella Valley

Unit Number: 24

Type of Area: Recreation, residential, travel corridor (Highway 111)

Predominant Types of Users: Salton Sea recreationists, commuters, local residents

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Residential; commuters and travelers (north/south on Highway 111), locals
Amount of Use	**L**	Traffic created by locals and people passing through en route to Salton Sea State Recreation Area
Public Interest	**M**	Not a destination or attraction except Dos Palmas Preserve and nearby wildlife areas
Adjacent Land Uses	**H**	U.S. Fish and Wildlife/State Wildlife recreation areas; visitors would be sensitive to changes that affect habitat and reduce wildlife-viewing opportunities
Special Area Sensitivity	**H**	Dos Palmas Preserve to the north
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative.

Narrative:

Not a destination; people are primarily passing through, are local residents, or seeking access to Salton Sea State Park/Recreation Area. Materials used indicate preservation of scenic quality is not a priority.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/7/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Mammoth

Unit Number: 25

Type of Area: Mix of agriculture, BLM (checkerboard), utility corridor, travel corridor

Predominant Types of Users: Farmers, recreationists, residents, Highway 111 travelers, military access

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Military land access, Slab City residents, Bombay Beach residents, Salton Sea access
Amount of Use	**L**	Predominantly locals; small communities/agriculture and people passing through
Public Interest	**M**	Slab City/Salvation Mountain draws some local/regional tourists, Bombay Beach residents
Adjacent Land Uses	**L**	Salton Sea, military lands, Imperial Valley; haphazard development has no apparent effect
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**L**	See narrative.

Narrative:

Development in the unit is haphazard and discordant; no evidence of attention to scenic quality preservation. A depressed area; Slab City is visually discordant with a lot of dumping and garbage.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/7/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: East Mesa

Unit Number: 26

Type of Area: Residential, agricultural, recreation

Predominant Types of Users: Residents, recreationists en route to Sand Dunes OHV, camping, military

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Access to sand dunes and military grounds; backyard of El Centro
Amount of Use	**M**	Traffic from the west en route to the Sand Dunes passes through the unit
Public Interest	**M**	Foreground to Imperial Sand Dunes, backyard for residents of the Imperial Valley
Adjacent Land Uses	**M**	Military is probably less concerned with scenic quality than valley residents
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**M**	Moderate

Narrative:

This area is the foreground to the Imperial Sand Dunes and is the first thing people see/experience when leaving the Imperial Valley and heading toward the Dunes. Also the backyard for valley residents.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 10/5/2009

Evaluators: CBrandt GLong

Sensitivity Level Rating Unit: El Centro East

Unit Number: 27

Type of Area: Vast, open panoramic landscape

Predominant Types of Users: Highway travelers, local recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Recreation use is generally low
Amount of Use	**L**	Low use
Public Interest	**M**	Areas of Critical Environmental Concern plus California Desert Conservation Area
Adjacent Land Uses	**L**	Not an issue of importance
Special Area Sensitivity	**M**	Areas of Critical Environmental Concern plus California Desert Conservation Area
Other Factors	**L**	Highway 98 is an auto tour route for a historic trail
Overall Rating	**M**	Mostly due to California Desert Conservation Area

Narrative:

The unit is part of the California Desert Conservation Area and is of concern to California residents. It contains several Areas of Critical Environmental Concern and the auto tour route of a congressionally designated National Historic Trail.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/7/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Imperial Sand Dunes

Unit Number: 28

Type of Area: Recreation

Predominant Types of Users: OHV users, sightseers, campers, nature viewers, hikers, equestrians

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	People are attracted to the area because of recreational opportunities and scenic quality.
Amount of Use	**H**	One of the most heavily used recreation areas in the Field Office
Public Interest	**H**	One of the largest sand dune systems in North America
Adjacent Land Uses	**H**	Sand Dunes are so prominent that any changes to scenic quality could impact the economy of valley communities, as they draw a lot of visitors to the area
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	Highway 78 bisects the unit; adjacent to wilderness area
Overall Rating	**H**	See narrative

Narrative:

One of the most heavily used recreation areas in the Field Office and one of the main visitor attractions in the Imperial Valley.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/12/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Pilot Knob

Unit Number: 29

Type of Area: Area of Critical Environmental Concern; mining

Predominant Types of Users: Miners, history buffs, backcountry tourists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Touring and mining, viewshed of I-8 and Yuma
Amount of Use	**H**	I-8 is a heavily traveled route; Pilot Knob is in view for a good stretch
Public Interest	**H**	Cultural, historical
Adjacent Land Uses	**H**	Camping at the base (Singer Valley) with Pilot Knob as the backdrop
Special Area Sensitivity	**H**	Cultural ACEC (Patton's Camp)
Other Factors	**H**	Visible from Yuma and I-8
Overall Rating	**H**	See narrative.

Narrative:

A cultural ACEC that is highly visible from I-8 and Yuma; a landmark feature.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/11/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Singer Valley

Unit Number: 30

Type of Area: Travel corridor, recreation, cultural/historical (Patton's Camp, mining)

Predominant Types of Users: Campers, OHV users, commuters/travelers, history buffs

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Recreation, travelers passing through the area
Amount of Use	**H**	Highway 78 and Ogilby Road pass through the unit; a heavily used area for recreation staging and camping
Public Interest	**M**	Highly visible travel corridor that does not have the capacity to absorb visual impacts
Adjacent Land Uses	**M**	Highly visible from the top of Black Mountain
Special Area Sensitivity	**H**	Singer Geoglyphs ACEC; Pre-Columbian Trail
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

A heavily used recreation/staging area as well as travel corridor. Landscape does not have the capacity to absorb visual impacts.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/11/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Cargo Muchacho Mountains

Unit Number: 31

Type of Area: Industrial, historical

Predominant Types of Users: Gold and kyanite miners, rock hounds, history buffs, prospectors

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Mining, viewshed of Highway 78
Amount of Use	**M**	Predominantly mining and traffic passing by on Highway 78
Public Interest	**M**	Mining history is a tourist draw (one of BLM's top-10 sites to visit); cultural significance; Fort Yuma Tribal Lands
Adjacent Land Uses	**M**	Backdrop for people visiting the Imperial Sand Dunes and camping near the base of the Muchachos
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	Viewshed of Ogilby Road, I-8
Overall Rating	**M**	See narrative.

Narrative:

A lot of mining history along with more contemporary activity. Tourists would likely be sensitive to changes to scenic quality if the setting/context for the mining history were not kept intact. (In 1914 Tumco was the 2nd-largest gold mine in the U.S.)

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/12/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Fort Yuma Valley

Unit Number: 32

Type of Area: Recreation

Predominant Types of Users: OHV users, backcountry tourists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Predominantly OHV
Amount of Use	**M**	A popular recreation area
Public Interest	**M**	Adjacent to the Fort Yuma Indian Reservation
Adjacent Land Uses	**M**	In the foreground of Picacho Peak and wilderness areas; adds context to their setting; in the viewshed of Fort Yuma Indian Reservation
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

A popular recreation area in Yuma's backyard that is easy to access and for the most part intact. It has a more natural appearance than some other valley areas in the Field Office.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/13/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Senator Wash Hills

Unit Number: 33

Type of Area: Recreation, industrial (mining)

Predominant Types of Users: Hikers/walkers, miners

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	In the viewshed of camping areas and roads along the Colorado River
Amount of Use	**M**	People probably recreate at the base of the hills more than in the hills themselves.
Public Interest	**H**	Backdrop to all recreation areas along the Colorado River (local, regional, national)
Adjacent Land Uses	**H**	Eastern slope of Wilderness Area, which begins at ridgeline; unit helps enclose Senator Wash Valley where a lot of people recreate
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative

Narrative:

Backdrop for recreation areas along the Colorado River and also visible from the roads along the Colorado River and the Indian Reservation.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/13/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Senator Wash Valley

Unit Number: 34

Type of Area: Recreation

Predominant Types of Users: Hikers/walkers, bikers, sightseers, OHV, campers, dog-walkers, wilderness acc

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Hiking, biking, OHV use, walking, camping
Amount of Use	**H**	Heavily used/popular recreation area used by many snowbirds from all over the U.S.
Public Interest	**H**	In close proximity to Yuma and the Colorado River; local, regional, and national interest
Adjacent Land Uses	**H**	This unit is the backdrop for many camping areas along the Colorado River
Special Area Sensitivity	**NP**	Heavily used areas; people camp closer to the river and reservoir, but use this unit for recreation
Other Factors	**H**	Close to the Colorado River and access to Little Picacho Wilderness Area
Overall Rating	**H**	See narrative

Narrative:

Several Long-Term Visitor Areas (LTVA) are at the eastern edge of this unit; a heavily used camping and snowbird area. People walk in Senator Wash Valley toward Hess Mine. In close proximity to Yuma and the Colorado River.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/11/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Picacho Peak

Unit Number: 35

Type of Area: Recreation

Predominant Types of Users: Hikers, climbers, equestrians, OHV users, backcountry tourists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Recreation
Amount of Use	**H**	Observed jeep tours, OHV touring; evidence of equestrian activity
Public Interest	**H**	Cultural significance; prominent focal feature/landmark
Adjacent Land Uses	**H**	A lot of backcountry touring/OHV activity occurs around Picacho Peak, which provides a nice setting for these activities
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	Visible from great distances and from many locations
Overall Rating	**H**	See narrative.

Narrative:

The unit is a popular recreation area and is culturally significant to local Indian tribes. Also the backyard to the community of Yuma.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/12/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Bear Canyon Hills

Unit Number: 36

Type of Area: Recreation, industrial

Predominant Types of Users: OHV users, hikers, equestrians, wilderness access, miners

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Recreation
Amount of Use	**H**	A popular area; backyard to community of Yuma
Public Interest	**M**	Local, regional
Adjacent Land Uses	**H**	Area is used to access wilderness areas, Colorado River plain community backdrop
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative.

Narrative:

A popular recreation area at the base of Picacho Peak and Picacho Wilderness.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/11/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Black Mountain

Unit Number: 37

Type of Area: Utilities (radio/communication towers), recreation

Predominant Types of Users: Utility access, backcountry touring, wilderness access

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Backcountry touring, Wilderness and utility access, variety of different uses
Amount of Use	**H**	Popular viewpoint overlooking Imperial Valley within viewshed of Highway 78 and Ogilby Road
Public Interest	**H**	Cultural significance, prominent focal feature/landmark
Adjacent Land Uses	**H**	Within viewshed of highways in the Singer Valley
Special Area Sensitivity	**H**	Includes wilderness area cherry-stem
Other Factors	**H**	Within viewshed of Highway 78 and Ogilby Road
Overall Rating	**H**	See narrative.

Narrative:

A unique black mesa-like focal-feature unlike other mountains around it, and a popular area to get an overall visual perspective of the Imperial Valley.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/10/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Chocolate Hills

Unit Number: 38

Type of Area: Industrial

Predominant Types of Users: Mining

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	This unit primarily has mining activity
Amount of Use	**M**	Large mines in the southern portion within the viewshed of Highway 78
Public Interest	**H**	Chocolate Mountain Hills are adjacent to Black Mountain and Indian Pass Wilderness, areas on the public radar
Adjacent Land Uses	**H**	Highly visible and within the viewshed of Highway 78
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	In combination with Black Mountain and Indian Pass Wilderness, the unit provides a gateway to the Imperial Valley from the north
Overall Rating	**H**	See narrative.

Narrative:

Similar to Black Hills and Indian Pass Foothills, which are on the public radar.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/10/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Peter Kane Bench

Unit Number: 39

Type of Area: Mixture of private/public lands, part of Chuckwalla DWMA ACEC

Predominant Types of Users: Private residents, backcountry travelers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Most use is on Highway 78 and private land access; also access to Black Mountain
Amount of Use	**H**	Highway 78 is a heavily used north/south travel corridor that bisects the unit; private residences
Public Interest	**H**	Opportunities for wildlife and vegetation viewing
Adjacent Land Uses	**M**	Access to Black Mountain (cultural sensitivity)
Special Area Sensitivity	**H**	Part of the Chuckwalla DWMA ACEC
Other Factors	**NP**	Not present
Overall Rating	**M**	See narrative.

Narrative:

Highway 78 bisects the unit and is within the foreground/middleground. Visual impacts exist predominantly from private landowners. Part of the unit is within the Chuckwalla DWMA ACEC; good opportunities for wildlife viewing.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/10/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Vinagre Wash

Unit Number: 40

Type of Area: Historic gold-mining area

Predominant Types of Users:

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Recreation
Amount of Use	**M**	Not heavily used but an area of interest due to frequent mention on the internet
Public Interest	**H**	Proposed California Desert Protection Act 2010: Title I: Section 101: Title VI: Vinagre Wash Special Management Area; see narrative
Adjacent Land Uses	**H**	Surrounded by Indian Peaks Foothills
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	An area that must be experienced from within the unit
Overall Rating	**H**	Mentioned on the California Wilderness Coalition website as a popular 4-wheel-drive and hiking area that is culturally sensitive

Narrative:

The proposed bill to make this a Special Management Area and its mention on the California Wilderness Coalition website indicate this is an area on the public radar where scenic quality should be maintained.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/10/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Indian Pass Foothills

Unit Number: 41

Type of Area: Cultural, recreation, mining

Predominant Types of Users: Hikers, explorers, backcountry tourists, travelers on Highway 78

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Hiking, mining, OHV
Amount of Use	**M**	The Indian Peaks Pass Wilderness Area may get more use than the foothills
Public Interest	**H**	Area is mentioned on the internet; proposed wilderness addition, cultural
Adjacent Land Uses	**H**	In the foreground of Indian Pass Foothills Wilderness Area and the Colorado River plain; also in viewshed of Milpitas Valley
Special Area Sensitivity	**NP**	Not present
Other Factors	**H**	Highway 78 passes by the western edge
Overall Rating	**H**	See narrative.

Narrative:

A unique area that is on the public radar. It is in the foreground of the Colorado River Plain, Highway 78, and Indian Pass Wilderness.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/10/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Milpitas Valley

Unit Number: 42

Type of Area: Mixture of private/public; Chuckwalla DWMA ACEC

Predominant Types of Users: Residents, backcountry travelers, military/Highway 78 traffic, wildlife viewers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Recreation, military land access, wildlife viewing
Amount of Use	**M**	Highway 78 is heavily used but only passes through a portion of the unit; predominantly private and military access
Public Interest	**H**	Opportunities for wildlife and vegetation viewing
Adjacent Land Uses	**M**	Surrounded by military lands; impacts to scenic quality in Milpitas Valley would probably have no effect.
Special Area Sensitivity	**H**	Part of the Chuckwalla DWMA ACEC
Other Factors	**L**	Private residence materials and colors do not blend with surroundings, or are contrasting.
Overall Rating	**L**	See narrative.

Narrative:

The unit is a mixture of private and public lands. Highway 78 bisects the unit. One access route to Hauser Geode Beds.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 1/18/2010

Evaluators: KBeatty GBrady SDixon KSchwarzler

Sensitivity Level Rating Unit: Palo Verde Bench

Unit Number: 43

Type of Area: Utility, dumping, dispersed recreation

Predominant Types of Users: Utility workers, recreationists, people driving around

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Mostly utility access and dumping
Amount of Use	**M**	Fair amount, close proximity to Blythe Valley
Public Interest	**L**	Area has been trashed
Adjacent Land Uses	**L**	Blythe Valley, wilderness, ACEC
Special Area Sensitivity	**NP**	Not present
Other Factors	**M**	Bradshaw Trail (not marked on the map)
Overall Rating	**L**	The area has not been cared for

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/9/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Black Hills

Unit Number: 44

Type of Area: Part of Chuckwalla DWMA ACEC, Hauser Geobeds

Predominant Types of Users: Rock hounds, campers, backcountry tourists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Recreation, rock hounding
Amount of Use	**M**	An area where the scenic quality is intact indicating it is not heavily used
Public Interest	**H**	Part of the Chuckwalla DWMA; good opportunities for wildlife/wildflower viewing; many websites show pictures of and interest in the area
Adjacent Land Uses	**H**	Surrounds other visually sensitive areas; encloses part of Chuckwalla Bench
Special Area Sensitivity	**H**	Area of Critical Environmental Concern; opportunities for wildlife viewing and vegetation viewing
Other Factors	**H**	Nice scenic element along the Bradshaw Trail, within viewshed
Overall Rating	**H**	See narrative.

Narrative:

A unique area providing opportunities for wildlife and vegetation viewing. Also a popular area for rock hounding, which many websites are dedicated to.

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BUREAU OF LAND MANAGEMENT

SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/9/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: Chuckwalla Bench

Unit Number: 45

Type of Area: Part of Chuckwalla Division of Wildlife Management Area ACEC

Predominant Types of Users: Wildlife viewing, research, cultural, backcountry tourists, campers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Area with a more natural appearance indicating it is not used as much as others
Amount of Use	**M**	Travelers on Bradshaw Trail pass through the unit; access to military lands; two main roads
Public Interest	**H**	Diverse flora, fauna, Bradshaw Scenic Backway; reduced scenic quality may be equated with ecology
Adjacent Land Uses	**M**	Wilderness Areas (access may be more from the north versus south)
Special Area Sensitivity	**H**	Chuckwalla DWMA ACEC
Other Factors	**H**	Within viewshed of Bradshaw Trail
Overall Rating	**H**	See narrative

Narrative:

The Bradshaw Scenic Backway passes through the unit, which has a lot of opportunities for wildlife and vegetation viewing. Changes in scenic quality are often associated with changes in ecology.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: San Sebastian/San Felipe Marsh

Unit Number: 46

Type of Area: Cultural and historical Area of Critical Environmental Concern

Predominant Types of Users: Nature studies, wildlife viewers, sightseers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Recreation, wildlife viewing, nature studies
Amount of Use	**H**	Northern end within the viewshed of Highway 78
Public Interest	**H**	Opportunities for wildlife viewing; cultural significance
Adjacent Land Uses	**L**	Unit is part of the larger Lower Borrego Valley unit
Special Area Sensitivity	**H**	Cultural and historical ACEC
Other Factors	**H**	National Natural Landmark
Overall Rating	**H**	See narrative.

Narrative:

Unit has cultural and historical significance. The existence of water/marshes is rare in the Southwest.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 2/8/2010

Evaluators: BBielenberg CBrandt JMcGrew

Sensitivity Level Rating Unit: San Felipe Hills WSA

Unit Number: 47

Type of Area: Recreation, Wilderness Study Area

Predominant Types of Users: Hikers, explorers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Hiking, exploration, and backdrop/view of local residents
Amount of Use	**M**	San Felipe Hills WSA may get more use because of the Pacific Crest Trail
Public Interest	**H**	Foreground to Los Coyotes Indian Reservation and backyard to communities of Ranchita and San Felipe
Adjacent Land Uses	**H**	Cultural concerns from Tribal lands; access to Borrego State Park
Special Area Sensitivity	**H**	Wilderness Study Areas
Other Factors	**H**	Pacific Crest National Scenic Trail runs down the ridgeline of the San Felipe Hills Wilderness Study Area
Overall Rating	**H**	See narrative.

Narrative:

Wilderness Study Areas are the foreground to Tribal lands and backdrop to local communities; also the setting for the Pacific Crest National Scenic Trail.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 10/5/2009

Evaluators: CBrandt GLong

Sensitivity Level Rating Unit: Chuckwalla Valley

Unit Number: 48

Type of Area: Broad, mostly flat landscape

Predominant Types of Users: Highway travelers, some recreationists, OHV

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**L**	Modest recreational use; energy corridor, private land development
Amount of Use	**M**	High volumes of traffic on I-10, low amounts on secondary and BLM roads
Public Interest	**M**	California Desert Conservation Area
Adjacent Land Uses	**M**	Surrounded by National Park and BLM wilderness
Special Area Sensitivity	**M**	California Desert Conservation Area
Other Factors	**L**	Energy corridor, presence of development
Overall Rating	**M**	See narrative.

Narrative:

History of low-level development of private lands in the area, and use as a transportation and utility corridor. New power line currently under construction.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/29/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Juan Bautista de Anza & Pacific Crest NHST

Unit Number: 49

Type of Area: National Historic and Scenic Trail corridors

Predominant Types of Users: Recreationists, residents, travelers, National Forest access, agriculture

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Areas cover the very western and southeastern margins of the Field Office; recreational/tourism
Amount of Use	**H**	Local residents, visitors, tourists, people passing through, equestrians, hikers
Public Interest	**H**	Cultural significance locally, regionally, nationally
Adjacent Land Uses	**H**	People/visitors to adjacent units would be highly sensitive to changes
Special Area Sensitivity	**H**	National Historic and Scenic Trail
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative.

Narrative:

Per 2/1/2010 National Scenic and Historic Trails guidelines, "trails and trail landscapes, as congressionally designated units... shall have a high sensitivity rating out 15 miles, unless there is a compelling reason to extend the analysis inventory."

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/29/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Sunrise & Anza Borrego Scenic Byway Viewshed

Unit Number: 50

Type of Area: Travel corridors

Predominant Types of Users: Residents, tourists, recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Recreationists, tourists, residents, illegal immigrant trafficking, sightseeing; highly scenic
Amount of Use	**H**	Close proximity to San Diego; a "getaway" area. Anza is a major corridor though California's largest state park; both are heavily used
Public Interest	**H**	Local, regional
Adjacent Land Uses	**H**	Communities nearby and visitors to nearby public lands would be highly sensitive to changes in scenic quality
Special Area Sensitivity	**H**	Sunrise Scenic Byway has USFS designation; Anza Borrego has state designation
Other Factors	**NP**	Not present
Overall Rating	**H**	See narrative.

Narrative:

Scenic byways that are heavily used and in close proximity to San Diego, providing a "getaway" area from the urban-centered views of the Southern California desert.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Bradshaw Trail Scenic Backcountry Byway Viewshed

Unit Number: 51

Type of Area: Recreation

Predominant Types of Users: Backcountry travelers, recreationists, sightseers

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	OHV, hikers, sightseers, campers, backcountry travelers
Amount of Use	**H**	A well-maintained road, easy to travel and heavily used
Public Interest	**H**	Historic trail used to transfer miners to the gold fields at La Paz
Adjacent Land Uses	**H**	Wilderness area; people who visit gain access via Bradshaw Trail; any changes could affect visitor experience
Special Area Sensitivity	**H**	BLM-designated Scenic Backcountry Byway
Other Factors	**NP**	Not present
Overall Rating	**H**	A Scenic Backcountry Byway with historical significance

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: West Mesa ACEC

Unit Number: 52

Type of Area: Cultural and biological Area of Critical Environmental Concern

Predominant Types of Users: Recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Wildlife viewing opportunities, minimal driving for pleasure, OHV, mountain biking, some equestrian
Amount of Use	**M**	Because of accessibility (road conditions), may not be used as much as other areas nearby
Public Interest	**M**	Local
Adjacent Land Uses	**M**	Moderate sensitivity
Special Area Sensitivity	**H**	Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	Cultural Area of Critical Environmental Concern

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Coyote Mountains Fossil Site

Unit Number: 53

Type of Area: Cultural Area of Critical Environmental Concern

Predominant Types of Users: Recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Rock hounding, hiking, camping
Amount of Use	**H**	Popular rock hounding and hiking area; wilderness area access
Public Interest	**H**	Listed on Desert USA.net website; geology/history buffs
Adjacent Land Uses	**H**	Wilderness area access/staging; any changes could affect visitor experience
Special Area Sensitivity	**H**	Cultural Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	A cultural ACEC that is a popular hiking and rock hounding area

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: In-Ko-Pah Mountains

Unit Number: 54

Type of Area: Cultural and Biological Area of Critical Environmental Concern

Predominant Types of Users: Recreationists, wildlife viewing opportunities

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Camping, hiking, scenic vista overlooks
Amount of Use	**H**	Popular area to access scenic view overlooks
Public Interest	**H**	Local, regional
Adjacent Land Uses	**H**	Close proximity to McCain Valley, a community that is vocal about change
Special Area Sensitivity	**H**	Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	Cultural Area of Critical Environmental Concern

Narrative:

Access to popular scenic overlooks and recreational opportunities.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Table Mountain ACEC

Unit Number: 55

Type of Area: Cultural and biological Area of Critical Environmental Concern

Predominant Types of Users: Recreation

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Camping, hiking, rock hounding, sightseeing; views of adjacent mountains
Amount of Use	**H**	Accessible from Interstate 8 and Old Highway 8; in close proximity to community of Jacumba
Public Interest	**H**	Significant to Native Americans
Adjacent Land Uses	**H**	Backdrop to Jacumba Valley
Special Area Sensitivity	**H**	Cultural and biological Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	Area of Critical Environmental Concern, cultural significance

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Singer Geoglyphs

Unit Number: 56

Type of Area: Cultural Area of Critical Environmental Concern

Predominant Types of Users: Recreationists, tourists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Sightseeing, tourists
Amount of Use	**M**	Highway 78 is a heavily traveled road running adjacent to the Area of Critical Environmental Concern
Public Interest	**H**	Accessible from highway and well marked, significant cultural resource
Adjacent Land Uses	**M**	Adjacent lands are impacted; may not be as concerned about changes to scenic quality
Special Area Sensitivity	**H**	Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	An easily accessed cultural Area of Critical Environmental Concern

Narrative:

May get a lot of exposure and visitation because of proximity to Highway 78 and the Imperial Sand Dunes.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Indian Pass ACEC

Unit Number: 57

Type of Area: Cultural Area of Critical Environmental Concern

Predominant Types of Users: Recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Sightseeing, hiking backcountry touring, access to Picacho State Recreation Area, wilderness area access
Amount of Use	**H**	Road that travels over Indian Pass is heavily used
Public Interest	**H**	Local, regional, Tribal (rich in cultural resources)
Adjacent Land Uses	**H**	Wilderness area experience could be affected if changes were to occur
Special Area Sensitivity	**H**	Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	An Area of Critical Environmental Concern rich in cultural resources with stunning views

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/30/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Lake Cahuilla (A, B, C, D)

Unit Number: 58

Type of Area: Cultural Area of Critical Environmental Concern

Predominant Types of Users: Recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Dunes may be the destination more than this area; this area may get some use
Amount of Use	**M**	Travelers pass by on the way to Imperial Sand Dunes
Public Interest	**H**	Cultural and historic; remnants of prehistoric Lake Cahuilla, significant to local Tribes
Adjacent Land Uses	**M**	Moderately sensitive to change
Special Area Sensitivity	**H**	Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	Cultural Area of Critical Environmental Concern with remnants of Lake Cahuilla

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/31/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: San Ysidro Mountain WSA

Unit Number: 59

Type of Area: Recreation, mining

Predominant Types of Users: Recreation, hunting

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Hiking, nature study, hunting, target shooting, rock hounding, wildflower viewing (2 threatened species)
Amount of Use	**H**	Accessible and getaway area for people from urban centers
Public Interest	**H**	Local, regional
Adjacent Land Uses	**H**	Surrounding communities would be sensitive to change
Special Area Sensitivity	**H**	Wilderness Study Area
Other Factors	**NP**	Not present
Overall Rating	**H**	Wilderness Study Area

Narrative:

Provides recreational opportunities within a day's drive from major urban centers.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/31/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Sawtooth Mountain WSA

Unit Number: 60

Type of Area: Wilderness Study Area (includes A, B, C)

Predominant Types of Users: Recreation, solitude, nature study and wildlife/wildflower viewing

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Hiking, hunting, nature study backpacking; presence of Anza Borrego State Park nearby enhances opportunities
Amount of Use	**M**	Low visitation; limited legal access
Public Interest	**H**	Local, regional, cultural significance
Adjacent Land Uses	**H**	Backdrop to local communities
Special Area Sensitivity	**H**	Wilderness Study Area
Other Factors	**NP**	Not present
Overall Rating	**H**	A Wilderness Study Area

Narrative:

Backdrop to local community provides a variety of recreational opportunities and has important cultural resources.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/31/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Carrizo Gorge WSA

Unit Number: 61

Type of Area: Wilderness Study Area

Predominant Types of Users: Scenic viewing, recreation, solitude, wildlife/wildflower viewing

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Solitude; proximity of Anza Borrego Sate Park enhances opportunities; hiking, backpacking rock hounding, nature study, sightseeing, photography
Amount of Use	**M**	Low level of visitation; steepness of terrain is a limiting factor
Public Interest	**H**	Cultural resources, local/regional; within day's drive from urban centers
Adjacent Land Uses	**H**	Users of Anza Borrego State Park and In-Ko-Pah Mountains would be sensitive to change
Special Area Sensitivity	**H**	Wilderness Study Area
Other Factors	**NP**	Not present
Overall Rating	**H**	Wilderness Study Area

Narrative:

Provides popular scenic vistas and opportunities for nature study including wildlife/wildflower viewing, as well as opportunities for solitude.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/31/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: East Mesa ACEC

Unit Number: 62

Type of Area: Cultural and biological Area of Critical Environmental Concern

Predominant Types of Users: Receationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**M**	Fishing along canal banks, some equestrian; people may be more inclined to go to Imperial Sand Dunes to recreate
Amount of Use	**M**	More use in Sand Dunes
Public Interest	**M**	Local, regional
Adjacent Land Uses	**H**	Sand Dunes; people who use the area may be sensitive to change
Special Area Sensitivity	**H**	Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	Cultural Area of Critical Environmental Concern

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/31/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Highway 78 Viewshed Corridor

Unit Number: 63

Type of Area: Travel corridor from El Centro to Blythe

Predominant Types of Users: Recreationists en route to Imperial Sand Dunes, communities

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Tourists, recreationists, commuters
Amount of Use	**H**	Heavily traveled corridor
Public Interest	**M**	Local, regional
Adjacent Land Uses	**M**	Some sensitivity
Special Area Sensitivity	**NP**	Not present
Other Factors	**NP**	Not present
Overall Rating	**H**	A heavily traveled corridor providing access to the Imperial Sand Dunes

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 3/31/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Plank Road ACEC

Unit Number: 64

Type of Area: Cultural Area of Critical Environmental Concern

Predominant Types of Users: Recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	Recreation, sightseeing, history buffs
Amount of Use	**H**	Along a heavily traveled corridor and recreation area; receives a lot of visitation
Public Interest	**H**	Cultural/historical significance
Adjacent Land Uses	**H**	One of the points of interest to the Imperial Sand dunes area
Special Area Sensitivity	**H**	Area of Critical Environmental Concern
Other Factors	**NP**	Not present
Overall Rating	**H**	Cultural Area of Critical Environmental Concern with historical significance

Narrative:

None.

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SENSITIVITY LEVEL RATING SHEET

Field Office: El Centro Date: 4/1/2010

Evaluators: JMcGrew

Sensitivity Level Rating Unit: Table Mountain WSA

Unit Number: 65

Type of Area: Wilderness Study Area

Predominant Types of Users: Recreationists

	H/M/L	Explanation of Rating (Mandatory)
Type of Use	**H**	OHV, solitude, cross-country hiking, backpacking, nature study, wildlife viewing
Amount of Use	**L**	Low visitation; more in conjunction with State Park and State Park Wilderness
Public Interest	**H**	Table Mountain itself holds cultural significance
Adjacent Land Uses	**H**	May affect visitor experience in neighboring state lands
Special Area Sensitivity	**H**	Wilderness Study Area
Other Factors	**NP**	Not present
Overall Rating	**H**	Wilderness Study Area that provides recreational opportunities that concide with activities in the State Park and State Wilderness

Narrative:

None.

Appendix C. Visual Resource Inventory Methodology

The BLM Visual Resource Inventory Manual H—8410-1, BLM Technical Note 407, and the BLM Visual Resource Management Course Manual were sources used for the ECFO Visual Resource Inventory.

Inventory

Preliminary units were drawn prior to conducting field work using high-quality aerial photographs and terrain models available on Google Earth and Google Maps. Additional tools used for this process include 1:100,000 scale topographic maps and a 25m Digital Elevation Model (DEM) provided by the BLM. These maps, aerials, and data clearly show the topographic and visual features of the landscape which enabled the inventory team to divide the area into preliminary SQRUs. These units were then adjusted as necessary after consulting with BLM staff and verified in the field to provide an accurate boundary.

These maps were used in the field for navigational purposes, for ground-truthing the SQRU boundaries, and for recording notes and IOP locations.

Field work for the VRI was conducted October 5, 2009 and February 3–13, 2010 (a total of 12 days). Each SQRU was accessed by vehicle. The inventory team drove through each SQRU, stopping on multiple occasions to evaluate scenic quality. Notes and photographs were taken at each IOP to document the landscape character (as discussed in Section 2 – Scenic Quality Inventory Factors). A total of 157 stops were made throughout the ECFO. The photographs, latitude/longitude, and heading for each IOP were recorded using a Ricoh Caplio 500SE 8 MP GPS camera. The IOPs were also drawn onto the 1:100,000 scale topographic maps for tracking purposes to ensure that each SQRU was thoroughly documented. A photograph log was used to document the number of photos per SQRU.

All SQRUs were named in the field based on a significant feature, drainage, or area. Numbers were added later when all the SQRUs were finalized to ensure that the reader could easily find specific units.

GIS

All VRI GIS data was created in ArcView 9.3. The SQRUs drawn on the 1:100,000 scale topographic paper maps were made into a digital vector version by heads-up digitizing. Raster images were used as the background data and include: digital copies of the 1:100,000 scale topographic maps provided by the ECFO as well as Digital Raster Graphics (DRGS) and aerial imagery {National Agriculture Imagery Program (NAIP)} downloaded from the USDA Geospatial Data Gateway. Topology was validated by using the following ET GeoWizard functions: Clean Polygons, Clean Gaps, and Eliminate.

Visual Resource Inventory Classes

To determine the final Visual Resource Inventory Classes, the Scenic Quality, Sensitivity Level and Distance Zone GIS layers are combined as per Visual Resource Inventory Manual H—8410-1 BLM Technical Note 407, with some modification. Each Layer is converted into a raster layer and then is reclassified as follows:

Scenic Quality Rating	Assigned Value
• A	500
• B	300
• C	100
• NR or Not Rated	0

Sensitivity Level Analysis	Assigned Value
• High	50
• Medium	30
• Low	10
• NR or Not Rated	0

Distance Zone	Assigned Value
• Foreground/middleground	5
• NR or Not Rated	0

Special Areas	Assigned Value
Wilderness Areas	1,000
NR or Not Rated	0

The four raster layers are then combined and their values added.

- Values greater than or equal to 1,000 = Class I.
- Values greater than or equal to 355 but less than 1,000 = Class II.
- Values of 155, 355, and 353 = Calss III.
- The value of 351 is Class III if it is adjacent to Class III, II, or I. If adjacent to Class IV, it is Class IV.
- All other values = Class IV.

Appendix F

Water Resources Tables

Named Surface Water Features Within the West Chocolate REEA

GNIS_ID	GNIS_Name	LengthKM	FTYPE
240721	Coachella Canal	5.531	CanalDitch
241774	East Highline Canal	0.585	CanalDitch
243760	I Lateral	2.198	CanalDitch
243879	Iris Wash	1.853	StreamRiver
243945	J Lateral	2.437	CanalDitch
244189	K Lateral	3.353	CanalDitch
244379	L Lateral	3.483	CanalDitch
245332	M Lateral	4.109	CanalDitch
246422	N Lateral	12.967	CanalDitch
255665	Niland Lateral Five	3.186	CanalDitch
255664	Niland Lateral Four	5.508	CanalDitch
255663	Niland Lateral Three	6.326	CanalDitch
255662	Niland Lateral Two	3.479	CanalDitch
246693	O Lateral	11.777	CanalDitch
247059	P Lateral	4.194	CanalDitch
247843	Q Drain	10.924	CanalDitch
247844	Q Lateral	11.035	CanalDitch
247899	R Side Main Canal	0.855	CanalDitch
254268	Siphon Five	0.696	StreamRiver
254251	Siphon Fourteen	2.056	StreamRiver
254261	Siphon Seven	1.448	ArtificialPath
254266	Siphon Three	1.272	ArtificialPath
254265	Siphon Two	1.783	ArtificialPath
251121	W Lateral	0.869	CanalDitch
251834	X Drain	1.161	CanalDitch
251835	X Lateral	1.724	CanalDitch
251836	Y Lateral	5.865	CanalDitch
251897	Z Lateral	0.334	CanalDitch

Geothermal Wells Located Within the West Chocolate REEA

APINUMBER	OPERATOR	WELL TYPE	STATUS	YEAR_DRILL	SECTION	TOWNSHIP	RANGE
02590141	Freeport-McMoRan Resource Partners	TG	ABDN	1975	29	9S	13E
02590142	Freeport-McMoRan Resource Partners	TG	ABDN	1975	31	9S	13E
02590143	Freeport-McMoRan Resource Partners	TG	ABDN	1975	33	9S	13E
02590190	MCR Geothermal Corp.	EWT	ABDN	1979	15	9S	12E
02590300	Freeport-McMoRan Resource Partners	TG	ABDN	1980	6	11S	15E
02590358	Chevron U.S.A. Inc.	TG	ABDN	1981	28	10S	14E
02590395	Chevron U.S.A. Inc.	TG	ABDN	1981	26	11S	15E
02591183	Imperial Spa	CLT	ACTV	1938	2	9S	12E
02591184	Imperial Spa	CLT	ACTV	1962	2	9S	12E
02591206	Fish Partners (was FPROD - Fish Partners	CLT	IDLE	1992	12	11S	14E
02591249	Fish Partners (was FPROD - Fish Partners	CLT	ACTV	1995	12	11S	14E
02591250	Fish Partners (was FPROD - Fish Partners	CLT	ACTV	1995	12	11S	14E
02591200	Trily, J. T.	TG	ACTV	1979	13	9S	13E

Summary of Wetlands Type and Acreage

Wetland Type	Acreage	% of Total
Lacustrine Limnetic/Littoral (L1/L2)	1516.0	66
Palustrine Aquatic Bed (PAB)	1.4	0
Palustrine Emergent (PEM)	23.5	1
Palustrine Scrub-Shrub (PSS)	146.1	6
Palustrine Unconsolidated Bottom (PUB)	124.4	5
Palustrine Unconsolidated Shore (PUS)	28.4	1
Riverine Lower Perennial (R2)	288.5	13
Riverine Intermittent (R4)	158.5	7
TOTAL	**2286.7**	**100**

Source: USFWS National Wetlands Inventory.

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Appendix G

BLM Standard Lease Stipulations

STANDARD LEASE STIPULATIONS:

Cultural Resources

This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

THIS APPLIES TO ALL PARCELS

Endangered Species Act Section 7 Consultation Stipulation

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.

THIS APPLIES TO ALL PARCELS

SPECIAL LEASE STIPULATIONS:

Geothermal Special Stipulation 1 – Royalty Compliance Stipulation

Geothermal leases will be issued subject to the revised regulations at *43 CFR 3200.8 (b)(1)* and *(b)(3)*. The single non-competitive lease application (CACA 047196) within the REEA was pending on August 8, 2005. Therefore, the lease applicant must make its election, and provide written notice to the BLM of their preference for payment of royalties on production, before the lease may be issued.

Geothermal Special Stipulation 2 – Due Diligence Stipulation

Potential geothermal lessees should be aware of the revised due diligence requirements contained in the federal regulations at *43 CFR § 3207*. Leases are typically issued for an initial term of 10 years, and may be extended if diligent work requirements have been satisfied, and the BLM

believes that the lessee has made satisfactory progress in complying with the lease terms and stipulations.

The BLM may, after giving you 30 days written notice, terminate your lease if we determine that you have violated any of the requirements of *43 CFR § 3200.4*, including, but not limited to compliance with the terms and conditions of the lease, including any and all lease stipulations, the nonpayment of required annual rentals or royalties and fees (*43 CFR § 3213.17*.)

Geothermal Special Stipulation 3 – Drainage Stipulation

Serial Number CACA 047196

Parts of the lands contained in this parcel tract may potentially be subject to drainage by offset wells which may be located adjacent to this parcel in sections 2, 12, and 14, T 9 S., R 11 E., SBB&M, Imperial County, California (on Federal Lease CACA 046142.)

The lessee shall, within 6 months of the drilling and completion of any productive well on the adjacent federal lease, submit for approval by the authorized officer:

1. Plans for protecting the lease from drainage (*43 CFR § 3210.16*.) The plan must include either (a) a completed application for Geothermal Drilling Permit (GDP) for the necessary protective wells, or (b) a proposal for inclusion in an agreement for the affected portion of the lease. Any agreement should provide for an appropriate share of the production from the offending well to be allocated to the lease; or

2. Engineering, geologic and economic data to demonstrate to the authorized officer's satisfaction that no drainage has occurred or is occurring and/or that a new protective well(s) would have little or no chance of production sufficient to yield a reasonable rate of return in excess of the costs of drilling, completing and operating the well.

If no plan, agreement or data is submitted and drainage is determined to be occurring, compensatory royalty will be assessed. Compensatory royalty will be assessed on the first day following expiration of the 6-month period, and shall continue until a protective well has been drilled and placed into production status, or until the offending well ceases production, whichever occurs first.

Failure to comply with this special leasing stipulation also may subject the lease to termination under the provisions of *43 CFR § 3213.17*.

Geothermal Special Stipulation 4 – Unitization Stipulation

The lessee shall fully commit the lease to a geothermal unit acceptable to the Bureau of Land Management within 6 months of the effective date of the lease. Failure to commit the lease to a geothermal unit acceptable to the Bureau of Land Management shall subject the lease to cancellation.

EXAMPLE

Serial No. _____

CONTROLLED SURFACE USE STIPULATION WCM-REEA-CSU-1

Protected Species, All or a portion of this lease is within the range a species that is either listed as threatened or endangered, or are proposed for such listing by the U.S. Fish and Wildlife Service (USFWS).

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of:

Protection of the **Desert Tortoise,** *Gopherus agassizii*, a species listed as threatened by the USFWS, and/or for the protection of its critical habitat.

Time frames for processing applications may be delayed to allow for species surveys, and consultation or conferencing with the USFWS. Surface-disturbing activities may be moved or modified, and some activities may be prohibited during seasonal time periods.

1. Conduct project activities when desert tortoises are inactive (typically November 1 to March 14), to minimize impacts to roaming individuals.
2. Retain a desert tortoise Authorized Biologist approved by CDFG and USFWS who would be responsible for ensuring compliance with desert tortoise BMPs prior to the initiation of and during ground-disturbing activities. The Authorized Biologist should conduct clearance surveys, tortoise handling, artificial burrow construction, egg handling and other procedures in accordance with the *Guidelines for Handling Desert Tortoise during Construction Projects* (Desert Tortoise Council 1994) or the most current guidance provided by USFWS.
3. Additional conditions #3 through #15, as outlined in the *WCM REEA Draft EIS*, chapter 2, pgs. 2-31 through 2-33, inclusive.

Surface disturbing activities will only be prohibited on the lease where:

a. The proposed action is likely to jeopardize the continued existence of listed or proposed species, or
b. The proposed action is inconsistent with the recovery needs of the listed species as identified in an approved USFWS Recovery Plan.

Any changes to this stipulation, will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see Bureau of Land Management Manuals 1624 and 3101 or Forest Service Manuals 1950 and 2820.)

Form #/Date

EXAMPLE

Serial No. _____

TIMING LIMITATION

Sensitive Species, All or a portion of this lease is within the range of the following species, that is either listed as threatened or endangered, or are proposed for such listing by the California Department of Fish and Game (CDFG).

Time frames for processing applications may be delayed beyond established standards to allow for species surveys, and consultation or conferencing with the CDFG. Surface-disturbing activities may be moved or modified, and that some activities may be prohibited during seasonal time periods. Surface disturbing activities will be prohibited on the lease only where:

a. The proposed action is likely to jeopardize the continued existence of listed or proposed species, or

b. The proposed action is inconsistent with the recovery needs of a listed species as identified in an approved CDFG Recovery Plan.

Prior to the authorization of any surface disturbing activities, a preliminary environmental review will be conducted to identify the potential presence of habitat for these species. Authorizations may be delayed until completion of the necessary surveys during the appropriate time period for these species. The lessee should be aware that the timing of the surveys is critical, in that some species can only be surveyed during a brief period each year.

The BLM may need to initiate consultation or conference with the CDFG if the site inspection concludes that a listed or proposed species may be affected by the proposed activity. The CDFG has up to 135 days to render their biological opinion, and that there are provisions for an additional 60-day extension. Offsite habitat protection or enhancement for wildlife or vegetation (compensation) may be required by the CDFG when habitat is disturbed. The consultation may also result in some restrictions to the lessee's plan of development, including movement or modification of activities, and seasonal restrictions. Surface disturbing activities will be prohibited on the lease if the consultation or conference concludes that either of the conditions identified in a or b above exists.

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of:

Protection of the **Nelsons' Big Horn Sheep**, a species listed as threatened by the California Department of Fish and Game.

Any changes to this stipulation, will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see Bureau of Land Management Manuals 1624 and 3101 or Forest Service Manuals 1950 and 2820.)

Form #/Date

EXAMPLE

Serial No. _____

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (insert legal subdivision or other description):

<LEGAL_DESCRIPTIONS>

a. N ½, Sec. 32, T. 12 S., R. 9 E., SBB&M, and
b. 100 feet on either side of the center line of stream drainages containing U.S. Army Corps of Engineers (USACE) jurisdictional waters.
c. Slopes greater than 5%.

For the purpose of:

a. Protection of sensitive soils, as identified in the West Chocolate Mountains REEA Plan Amendment,
b. Avoidance of potential hazardous materials and/or unexploded ordinance from the adjacent West Chocolate Mountains Gunnery Range, or
c. Other surface uses, which may include other renewable energy (wind or solar) power generation facilities.

Any changes to this stipulation, will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see Bureau of Land Management Manuals 1624 and 3101 or Forest Service Manuals 1950 and 2820.)

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Appendix H

Legal Description for the West Chocolate Mountain REEA

West Chocolate REEA
BLM Surface Ownership
Imperial County, California

San Bernardino Meridian

T. 9 S., R., 12 E.,
section 2, E½SE¼SW¼,S½SE¼,S½NE¼SE¼ ;
section 4, lots 1 and 2 of the NE¼, lots 1 and 2 of the NW¼,SW¼,SE¼;
section 6, lots 1 and 2 of the NE¼, lots 1 and 2 of the NW¼; lots 1 and 2 of the SW¼, SE¼;
section 8,NE¼,SE¼ ;
section 18, lots 1 and 2 of the NW¼, lots 1 and 2 of the SW¼,NE¼,SE¼;
section 20, entire section;
section 24, entire section;
section 26, S½NW¼,SW¼,SE¼;
section 28, SE¼,NW¼;

T. 9 S., R. 13 E.,
section 18, lots 3-6 inclusive; E½NW¼,E½SW¼,SE¼;
section 20, SW¼NE¼,NW¼NW¼,S½NW¼,SW¼,SE¼;
section 22, S½SW¼,
section 26, SW¼NW¼,SW¼,S½SE¼;
section 28, entire section;
section 30, E½SW¼,S½SE¼;
section 32, entire section;
section 34, entire section;

T. 10 S. R. 13 E.,
section 4, lots 6,7,14 of the NW¼,SW¼;
section 6, lots 5-8 inclusive of the NE¼, lots 11-14 inclusive of the NW¼; lots 2 and 15 of the SW¼,E½SW¼,SE¼;

T. 10 S., R. 14 E.,
section 6, lots 6, 7, 13, 14 of the NW ¼, lots 15 and 18 of the SW¼, E½SW¼,W½SE¼,SE¼SE¼;
section 8, SW¼NE¼,NW¼,SW¼,SE¼;
section 22, SW¼NE¼,NW¼,SW¼,SE¼;
section 26, NE¼,N½NW¼,N½SE¼NW¼,S½SW¼SW¼,S½SW¼,SE¼;

T. 10 S., R. 15 E.,
section 32, entire section;

T. 11 S., R. 15 E.,
section 4, lots 3-6 inclusive, S½NE¼,S½NW¼,SW¼,SE¼;
section 6, lots 3-9 inclusive, S½NE¼,SE¼NW¼,E½SW¼,SE¼ ;
section 8, entire section;
section 10, entire section;

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section 11, entire section;
section 13, entire section;
section 14, entire section;
section 18, E½NE¼,E½SE¼,
section 20, NE¼,NW¼,NW¼SE¼,E½SE¼,
section 28, NE¼,NW¼,NW¼SE¼,E½SE¼;
section 34, NE¼SW¼;

T. 11 S., R. 16 E.,
section 19, lots 3-18 inclusive,NE¼,SE¼;
section 29, entire section;
section 30, lots 3-18 inclusive,NE¼,SE¼;

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Recommendations:

- Have another Realty Specialist proof this document.
- Field Offices often use minor variations in legal descriptions it might be good to have a local person make sure this legal description matches El Centro FO and the District formats for consistency with past documents.
- The legal description contained here lists only those BLM lands on the ownership map from Chapter #1, page 1-9 of the ADEIS and does not include BLM lands with subsurface mineral estate.
- Maps in ADEIS are of a scale which limits verification of subsurface minerals and some boundaries. BLM minerals shop should be able to determine BLM subsurface mineral estate within the REEA and furnish that data.
- California State Lands commission should know or be able to determine which lands they hold within the REEA and furnish that data to the BLM rather than BLM advising them. There may be lands which passed from public domain to private then to the state, which do not appear on our MTPS and the mineral estate may have changed ownership at sometime leaving the State with subsurface minerals under private and BLM probably will not have a record of this. This may need to be researched at the local courthouse by the California Lands Commission staff.
- Verify that ownership maps include correct information. There appear to be lands shown as State lands on the map that appear as private on BLM MTPS and lands shown as BLM or private that appears as State lands on BLM MTPs.
- Prepare a legal description of the entire REEA for clarity and for “the record”.

JGB 4-28-11

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