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September 24, 2008
File No.: 04.02.06.02
Project No. 357891

Mr. Che McFarlin, Project Manager
California Energy Commission
Systems Assessment and Facilities Siting Division
1516 9th Street, MS 15
Sacramento, CA 95814-5504

RE: Supplemental Data Response, Set 1D
Ivanpah Solar Electric Generating System (07-AFC-5)

Dear Mr. McFarlin:

On behalf of Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, LLC, and Solar Partners VIII, LLC, please find attached one original and 12 hard copies of the Supplemental Data Response, Set 1D, which provides supplemental responses to Staff's questions raised at the June 23, 2008 Workshop in Primm, Nevada.

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier, J.D.
Program Manager

Enclosure
c: POS List
Project File

Ivanpah Solar Electric Generating System (ISEGS)

(07-AFC-5)

Supplemental Data Response, Set 1D

(Responses to: Biological Resources)

Submitted to the

California Energy Commission

Submitted by

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC

September 24, 2008

With Assistance from

CH2MHILL
2485 Natomas Park Drive
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Introduction

Attached are supplemental responses (Set 1D) by Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (Applicant) to the California Energy Commission (CEC) Staff's data requests for the Ivanpah Solar Electric Generating System (Ivanpah SEGS) Project (07-AFC-5). These data requests are the result of the workshop discussion held at Primm, Nevada on June 23, 2008.Within each discipline area, the responses are presented in alphabetical order and are numbered for tracking and reference convenience. New graphics or tables are numbered in reference to the Supplemental Data Request number. For example, if a table were used in response to Data Request AQ-1, it would be numbered Table AQ1-1. The first figure used in response to Data Request AQ-1 would be Figure AQ1-1, and so on. AFC figures or tables that have been revised have "R1" following the original number, indicating revision 1.

Additional tables, figures, or documents submitted in response to a supplemental data request (supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of a discipline-specific section and may not be sequentially page-numbered consistently with the remainder of the document, though they may have their own internal page numbering system.

The Applicant looks forward to working cooperatively with the CEC and Bureau of Land Management (BLM) staff as the Ivanpah SEGS Project proceeds through the siting process. We trust that these responses address the Staff's questions and remain available to have any additional dialogue the Staff may require.

Biological Resources (BR-2)

BR-3 Please provide a report on the spring 2008 botany surveys of the optimized project design and include a figure showing the locations surveyed in 2007 and those surveyed in 2008.

Response: The botany survey report is provided as Attachment BR3-1A. It includes a figure (Figure 2) showing the 2007 and 2008 survey areas.

Attachment BR3-1A

Technical Report: Botanical Resources of the Ivanpah Solar Electric Generating System

Solar Partners I, Solar Partners II, Solar Partners VIII, and Solar Partners IV

Ivanpah Valley,
San Bernardino County, California

Prepared by:

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September 2008

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Executive Summary

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners VIII, LLC, the owners of the three separate solar plants, and Solar Partners IV, LLC, the owner of shared facilities required by the three solar plants (the "Applicant") are proposing to develop a solar facility (together referred to as the Ivanpah Solar Electric Generating System, or Ivanpah SEGS) in the eastern Mojave Desert of Southern California. The proposed Ivanpah SEGS site is located in eastern San Bernardino County, in the Ivanpah Valley, 4.5 miles southwest of the town of Primm, Nevada.

Protocol-level surveys for special-status plants were conducted throughout the project area in 2008 and 2007. The location of the site elements is shown on figures provided in Appendix A. Small adjustments to the project boundary were made in 2008; therefore, the 2008 survey boundary differs slightly from the boundaries shown on the 2007 maps. An area designated as the *one-mile buffer* surrounds the Property Boundary and extends out in all directions from it to a distance of one mile. Reconnaissance-level surveys of the *one-mile buffer* area were performed in 2007. The components of the Ivanpah SEGS project for 2008 have been organized into the following six project features:

- Ivanpah 1 – the southern site
- Ivanpah 2 – the middle site
- Ivanpah 3 – the northern site, which includes for the purposes of this report the proposed sites for relocating a BLM dirt road and a mining claim access road
- Colosseum Road – the access road to the project area, which includes the segment from the easternmost paved road south of Primm Valley Golf Club to the eastern boundary of Ivanpah 2
- Construction Logistics Area – between Ivanpah 1 and 2. It includes the substation, Administration Building, water supply wells, monitoring well, and detention ponds.
- Utility Corridor – including only the section extending north from the northern boundary of Ivanpah 3

The project area is located within the Mojave Desert, and its biogeography and climate are typical of that region. The project area is located on an alluvial fan, or bajada, that extends eastward from the base of the Clark Mountain Range toward Ivanpah Dry Lake. The alluvial fan is dissected by many ephemeral wash drainage features.

In 2007, a site-specific vegetation classification was developed for the project area, based on field observations and other sources of information. A reconnaissance-level survey of the one-mile buffer was completed in 2007. The vegetation types of the project area are based on Holland (1986), and include: Mojave Creosote Bush Scrub (including four

subtypes), Mojave Yucca – Nevada Ephedra Scrub and Mojave Wash Scrub. The predominant vegetation throughout the project area is the Larrea-Ambrosia subtype of Mojave Creosote Bush Scrub. Limestone features, which occur mainly in the one-mile buffer, are vegetated by the limestone-associated Larrea scrub subtype and Mojave Yucca – Nevada Ephedra Scrub. Larger ephemeral wash drainage features are vegetated with Mojave Wash Scrub.

Invasive weeds were searched for and documented in 2007 and 2008. Few weeds were found in 2007 because it was a very dry year. In 2008, a wetter year, five species of weeds were mapped and documented. Red brome (*Bromus madritensis* ssp. *rubens*) was the most commonly encountered weed. It was widespread throughout the project area, but dense concentrations were found only in the northern and northwestern parts of the project area. The other four weed species (Saharan mustard (*Brassica tournefortii*), cheat grass (*Bromus tectorum*), Russian thistle (*Salsola* sp.), and London rocket (*Sisymbrium irio*)) were each found in fewer than five locations, in low numbers.

Nine special-status plant species were identified in the project area. None of these are federally or state-listed. Eight special-status plant species were found during protocol-level surveys in 2008, including: small-flowered androstephium (*Androstephium breviflorum*), Mojave milkweed (*Asclepias nyctaginifolia*), desert pincushion (*Coryphantha chlorantha*), Utah vine milkweed (*Cynanchum utahense*), nine-awned pappus grass (*Enneapogon desvauxii*), Parish's club-cholla (*Grusonia (=Opuntia) parishii*), Utah mortonia (*Mortonia utahensis*) and Rusby's desert mallow (*Sphaeralcea rusbyi* var. *eremicola*). Four of these species (desert pincushion, Utah vine milkweed, Parish's club-cholla, and one non-specific locality of Mojave milkweed) also were detected in 2007. In addition to the eight special-status plant species found during protocol-level surveys, desert portulaca (*Portulaca halimoides*), an ephemeral summer annual, was observed within the project area boundaries in October 2007, following summer rainfall, by Jim Andre during independent visits that were not a part of the protocol-level survey effort for this project. In 2007, individuals in the genus *Penstemon* were encountered that could not be identified to species because no flowers were present. Leaf characters indicated these could be a rare species of *Penstemon*. In 2008, these were determined to be Palmer's penstemon (*Penstemon palmeri),* a common and widespread species.

A census of all individuals of California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*) and clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*) was completed throughout the project area in 2007 and, in 2008, within any areas not included in the 2007 survey. A total of 2,869 individuals of California barrel cactus and 3,501 individuals of clustered barrel cactus were mapped within the project area.

1 Introduction

1.1 Project Description

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners VIII, LLC, the owners of the three separate solar plants, and Solar Partners IV, LLC, the owner of shared facilities required by the three solar plants (the "Applicant") are proposing to develop a solar facility (together referred to as the Ivanpah Solar Electric Generating System, or Ivanpah SEGS) in the eastern Mojave Desert of Southern California. The proposed Ivanpah SEGS site is located in eastern San Bernardino County, in the Ivanpah Valley on land administered by the Bureau of Land Management (BLM). The location of project elements is shown on figures provided in Appendix A. Small adjustments to the project element boundaries were made in 2008; therefore, the 2008 survey boundary differs slightly from the boundary shown on the 2007 maps (see Appendix A). Results of the rare plant surveys conducted in 2007 were included in the Application for Certification (AFC) submitted to the California Energy Commission (CEC) (CH2M HILL 2007). A list of the Ivanpah SEGS project features included in the protocol-level special-status plant surveys is provided in Table 1-1.

TABLE 1-1. IVANPAH SOLAR ELECTRIC GENERATING SYSTEM: LIST OF PROJECT FEATURES

Project Feature
Ivanpah 1
Ivanpah 2
Ivanpah 3
Colosseum Road
Construction Logistics Area
Utility Corridor

1.2 Environmental Setting

The project area is located within the Ivanpah Valley, an elongated north-south trending topographic basin that crosses the California-Nevada border. The project area is northwest of Interstate Highway 15 (I-15), which runs through the northern part of the Ivanpah Valley. In the valley bottom are Ivanpah Dry Lake, in California, and Roach

Lake to the north, in Nevada. The Ivanpah Valley is bounded by the Lucy Grey Range and McCullough Mountains to the east, the New York Mountains and the Mid-Hills to the south, the Ivanpah Mountains, Mescal Range, and Clark Mountain to the west, and the Clark Mountain Range and southernmost Spring Range to the north.

The project area is located within the Mojave Desert, and its biogeography and climate are typical of that region. In terms of surface water hydrology, the Ivanpah Valley has no surface outlet to the ocean, so hydrologically, it is a part of the southwestern hydrographic Great Basin. The project area is located on an alluvial fan, or bajada, that extends eastward from the base of the Clark Mountain Range toward Ivanpah Dry Lake. The alluvial fan topography slopes very gradually (3 to 5 percent grade) to the east and southeast from a high elevation of about 3,500 feet in the northwest corner to about 2,850 feet in the southeast corner. The alluvial fan is dissected by many ephemeral washes. Most of these drainage features are small (active channels 1 to 3 feet wide), but some are much larger, with bank-to-bank widths of more than 50 feet and active channels 5 to 15 or more feet wide.

Two distinct small hills arise from the alluvial fan surface. To the east is a hill composed mainly of reddish brown metamorphic rocks that, in this report, will be referred to as Metamorphic Hill. To the west is a much smaller gray limestone hill, referred to in this report as Limestone Hill. To the north and west are the foothills of the Clark Mountain Range, composed mainly of limestone in the north, and a polymineralic suite of metamorphic and igneous rocks, as well as limestone, to the west. These features are referred to in this report as the limestone slopes and ridges of the northeastern foothills of the Clark Mountain Range.

The Ivanpah Valley experiences a climate typical of the eastern Mojave Desert. It is hot and arid with extreme fluctuations in daily and seasonal temperatures. Annually, sunny days occur 85 percent of the time. Strong, dry winds are characteristic in late winter and early spring, especially in the late afternoon to early evening. The average annual temperature is 70º F, with an average low of 55º F and an average high of 80º F. Monthly temperature maxima and minima range from 10º F to 120º F. Typically, there are 70 days each year with a maximum daily temperature of 100º F or above, usually between June and August. The average annual precipitation for Baker, California, approximately 45 miles to the west, is 4.14 inches, and for Las Vegas, Nevada, approximately 45 miles to the north, it is 4.49 inches. Precipitation in the project area will be somewhat greater since it lies at higher elevation than either of these sites. Precipitation falls primarily as winter rainfall between January and March, and as summer thunderstorms that occur between July and September. April, May and June are the driest months. On average, there are more than 300 days per year with no measurable precipitation. During the 2006-2007 rainfall season, precipitation was well below average, with 2.3 inches in 2006, and only 0.1 inch from January through June of 2007.

2 Methods

2 1 Introduction

This section describes the methods for the 2008 surveys, and summarizes the methods for the 2007 surveys, including tasks performed only in 2007. More details on the methods for the 2007 surveys can be found in Section 5.2 of the Application for Certification (CH2M HILL 2007). Plant surveys for the Ivanpah SEGS project were conducted in spring (April) of 2008, and in spring and early summer (late March through early June) of 2007. In both years, protocol-level surveys for special-status plants, counts of two species of barrel cacti, and weed surveys were completed, although the methods were slightly different in each year. In 2007, a detailed reconnaissance of the one-mile buffer was completed, and a site-specific vegetation classification based on field observations was developed for the project area.

Protocol-level rare plant surveys were conducted with the goal of locating and mapping special-status plants throughout the Ivanpah SEGS project area. The 2007 surveys targeted shrubs and herbaceous perennials because rainfall was very low during the 2006-2007 winter rainy season and very few live annuals were present in spring of 2007. The project area received significant amounts of rainfall during storms in August 2007 and during the winter of 2007-2008, resulting in an active growing season for summer annuals in late 2007, and for winter annuals, herbaceous perennials, and shrubs in spring of 2008. The protocol-level surveys for special-status plants were floristic in nature and, when taking into account all of the surveys performed in 2007 and 2008, followed the U.S. Fish and Wildlife Service's (USFWS) *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS *Guidelines*) (USFWS 1996a) and the recommendations of the botanical survey guidelines of the California Department of Fish and Game (CDFG 2000), and those of the California Native Plant Society (CNPS 2001).

In 2008, a larger survey team (38 total field staff) and more survey crews were used, compared to 2007. To assure consistency and accuracy of survey results with a larger team, pre-field preparations were enhanced and field training was increased. Each crew member was given project-specific photo guides of common and rare plant species and a preliminary species list for pre-field review. Field training included a one-day session on plant identification, followed by a half-day session on protocols for special-status plant, cactus and weed surveys. GPS operators received project-specific instruction on all aspects of data collection and quality control. The survey effort used from one to six field crews each day, each crew consisting of two to seven individuals. To assure crew

safety and data quality, each crew was led by a crew leader who received written crew leader instructions and specialized training in safety procedures, data collection, data quality control, and record keeping. These procedures allowed completion of all of the Ivanpah SEGS 2008 training and surveys within 18 days of work, using from 2 to 25 staff per day.

The purpose of the 2008 and 2007 barrel cactus census was to count and map all individuals of California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*) and clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*) within the project area. In 2008, this census was limited to a few small sites that were added to the project area after the 2007 surveys had been completed (see Figure 1-3, Appendix A). In 2007, all sites where project components were proposed, and their buffer areas, were included in the census.

In 2007, detailed reconnaissance surveys within the one-mile buffer were completed. These included meandering (non-protocol) surveys that provided site-specific qualitative data on vegetation that was used to describe the vegetation of the Ivanpah SEGS site and the one-mile buffer and to determine the likelihood of special-status plants occurring within the one-mile buffer. In addition, during the one-mile buffer reconnaissance, the characteristics of major drainage features were recorded. No additional surveys within the one-mile buffer were completed in 2008.

2.2 Pre-Field Preparations

In 2008 and 2007, pre-field research was conducted to determine which special-status plant species had potential to occur within the project area. For each potentially occurring species, information was compiled on conservation status, distribution, blooming time, habitat characteristics, presence in the project region, including nearest known locations, and characters to use in field identification.

For both years, a plant was considered to be of special status if it met one or more of the following criteria:

- Federally or state-listed, proposed, or candidate for listing, as rare, threatened or endangered (USFWS 1996b, 2008; CNDDB 2007a, 2008a); or

- Special Plant as defined by the California Natural Diversity Database (CNDDB 2007a, 2008a); or

- Designated by the California Native Plant Society in its *Inventory of Rare and Endangered Plants of California* (CNPS 2001, 2007, 2008); or

- Designated by the BLM as a Sensitive plant on the California BLM Special Status Plants list (BLM 2004, 2007).

A species was determined to have potential to occur within the project area if its known or expected geographic range includes the project area or the vicinity of the project area, and if its known or expected habitat is found within or near the project area.

In 2007, a preliminary list of potentially occurring special-status plants was compiled from the results of eight-quadrangle searches of the CNDDB RareFind3 database (CNDDB 2007b) and the CNPS on-line Inventory (CNPS 2007), a review of the Nevada Natural Heritage Program special-status plant data for the Roach and State Line Pass 7.5' U.S. Geological Survey (USGS) quadrangles, and a review of the California BLM Special Status Plants list (BLM 2004, 2007). The project is located within the Ivanpah Lake 7.5' USGS quadrangle. Therefore, the CNDDB and CNPS eight-quad searches included these 7.5' USGS quadrangles: Ivanpah Lake, State Line Pass, Mesquite Lake, Clark Mountain, Mescal Range, Mineral Hill, Nipton, and Desert. In 2007, the preliminary list of potentially occurring special-status plants was revised after reviewing habitat and distribution information from several sources, as described in the AFC (CH2M HILL 2007). In 2008, the CNDDB (2008b) and CNPS (2008) searches were repeated to check for changes in conservation status and range, and to determine if any additional species should be added to the potentials list, based on new information.

Several species were added to the revised 2007 potentials list, based on new information from the 2008 eight-quad searches, and the recommendations of Jim Andre, Director of the U.C. Sweeney Granite Mountains Research Station, and Andrew Sanders, Director of the U.C. Riverside Herbarium, both of whom are experts on the flora of the eastern Mojave Desert. Table B-1 (Appendix B) is a list that compiles all species from the 2007 evaluation and the new species added in 2008 as well as information on flowering time, conservation status, habitat preferences, geographic distribution, elevation, and known locations in the vicinity of the project area. Table B-1 summarizes information on 55 special-status plants that have potential to occur within the project area. This information was compiled from the sources described above, and other sources (Parfitt 1980).

Surveyors received project-specific training prior to field surveys in 2007 and 2008. Training included plant identification and instruction in survey protocols. In 2007, surveyors were given information packets on selected special-status plants that included descriptions, keys, drawings and photographs from a variety of sources. In 2008, surveyors were given photo guides to the special-status and common plants of the project area that were compiled by Jim Andre. Also in 2008, surveyors were trained in the field by Andrew Sanders and Jim Andre to recognize all of the common annuals (including summer annuals from skeletons of the previous year), herbaceous perennials, and shrubs. Unknown plants found during surveys were checked or

identified by Andrew Sanders, Jim Andre or Mark Bagley. Crew leaders assisted the field supervisors (Ann Howald and Mark Bagley), and helped to ensure consistent methods. Crew leaders received special training in safety, data collection, quality control, and record keeping. Appendix C contains the names of staff that performed surveys during 2008. The names of staff that performed surveys in 2007 are included in Table 5.2-8 of the AFC (CH2M HILL 2007).

2.3 Field Survey Methods

In 2008, field surveys were conducted on April 3-18, and 21 and 22, for a total of 18 work days and 283 person-days (excluding travel days) (see Table C, Appendix C). In 2007, field surveys were conducted on March 28-30, April 16-22 and 25-30, May 1-4, 23-25 and 29-31, and June 1-10, 2007, for a total of 117 person-days.

Field survey methods for special-status plants, non-native invasive plants and barrel cacti are described separately below. In 2007, very few annual plants were observed due to unusually dry conditions. Therefore, the 2007 surveys focused on cacti, shrubs, and herbaceous perennial special-status plants. In 2008, a wetter year, annual plant species were present throughout the entire project area, and herbaceous perennials were much more abundant than in 2007. Perennial special-status plant locations were mapped and documented only if they were newly detected in 2008 or if they occurred outside of areas surveyed in 2007. In 2008, the special-status plant locations mapped in 2007 were displayed on the GPS units to avoid double-counting. All weeds observed throughout the project area were mapped in 2008. In 2007, weeds were searched for, even though it was a dry year (see AFC; CH2M HILL 2007). In 2008, barrel cacti were counted only in areas that were not previously surveyed in 2007.

2.3.1 Reconnaissance Surveys and Reference Site Visits

Reference site visits to known special-status plant populations were performed in 2007 and 2008 to determine the progress of the growing season and to orient key team members to characteristics necessary for correct identification. Photographs of many of the special-status plants reviewed during the reference checks are provided in Appendix D. Reconnaissance surveys and reference site visits completed in 2007 are described in Section 5.2 of the AFC (CH2M HILL 2007).

During 2008, reference sites were visited for several special-status plant species known to occur at the project site, and for others considered likely to be found at the project site, based on known ranges and habitat preferences. In a few cases, reference population checks were performed in October and November of 2007, and April and May of 2008, outside of the main field survey efforts, to confirm species identifications

or view known populations of special-status plants in the project vicinity. Reconnaissance surveys to determine the progress of the 2008 growing season were made on February 23, and March 6 and 19, 2008.

In 2008, reference sites were visited for the following species:

Clark Mountain agave (*Agave utahensis* var. *nevadensis*) (see Photo 1, Appendix D). Rosettes of leaves and the remains of flower stalks from the previous growing season were observed in two populations of more than 100 individuals and more than 50 individuals on limestone slopes in the Clark Mountain Range near the Umberci Mine, at about 3,700 feet elevation, on March 6, 2008. (Clark Mountain agave was found within the one-mile buffer during surveys conducted for this project in 2007. Rare plant resources within the one-mile buffer were not mapped because this was not the objective of that survey)

Small-flowered androstephium (*Androstephium breviflorum*) (see Photo 2, Appendix D) Hundreds of individuals in flowering and fruiting condition were seen on Mormon Mesa, north of Overton, Nevada, at about 2,000 feet elevation, from March 24-30, 2008. (Small-flowered androstephium was found within the Ivanpah project area during the 2008 surveys.)

Mojave milkweed (*Asclepias nyctaginifolia*) (see Photo 3, Appendix D). One individual in vegetative condition with fruits from the previous year was observed on the south side of BLM road NN135, 3.6 miles west of Primm, Nevada. This individual was located at the base of the northeastern Clark Mountain Range, at about 2,600 feet elevation, on April 4, 2008. Twenty individuals in flowering and fruiting condition were seen in the same general area on April 30, 2008. (Mojave milkweed was found within the project area during surveys conducted for this project in 2007 and 2008.)

Scaly cloak fern (*Astrolepis cochisensis* ssp. *cochisensis*). Four individuals were observed at the base of a limestone slope in the Clark Mountain Range adjacent to the Umberci Mine access road, at 3,400 feet elevation, on March 6, 2008. More than 100 individuals were observed about one mile southwest of the Stonewall Mine in the Mojave National Preserve, at 4,850 feet elevation, on March 8, 2008.

Black grama grass (*Bouteloua eriopoda*). About 400 individuals were seen flowering in the Clark Mountain Range, along the transmission line corridor, just east of Keany Pass, in the Mesquite Wilderness. These individuals were growing in limestone gravels at about 4,030 feet elevation, and were observed on November 9, 2007.

Red grama grass (*Bouteloua trifida*). Fifteen individuals were observed on April 29, 2008, just north of the transmission line corridor, about 3 miles east of Keany Pass in the

eastern Clark Mountain Range. These plants were observed flowering on limestone cliffs at about 4,120 feet elevation.

Revolute spurge (*Chamaesyce revoluta*): About 150 individuals were seen on November 9, 2007, by technical expert and survey team member, Jim Andre, during a visit conducted independently that was not a part of the protocol-level survey effort. These plants were in flowering condition, and were observed growing in limestone gravels in the Clark Mountain Range, along the transmission line corridor, just east of Keany Pass, in the Mesquite Wilderness, at about 4,030 feet elevation.

Desert pincushion (*Coryphantha chlorantha*) (see Photo 4, Appendix D). Fifteen non-flowering individuals were observed on limestone slopes near the Umberci Mine in the Clark Mountain Range on March 6, 2008. Eighteen non-flowering individuals were seen on limestone on the southern flank of Mesquite Mountain, at 4,100 feet elevation, on March 7, 2008. (Desert pincushion was found within the project area during surveys conducted for this project in 2007 and 2008.)

Gilman's cymopterus (*Cymopterus gilmanii*). Six individuals were seen in flowering and fruiting condition on limestone gravels in the Clark Mountain Range, just north of the transmission line corridor, about 3.5 miles east of Keany Pass, in the Mesquite Wilderness, at approximately 4,020 feet elevation, on April 29, 2008.

Utah vine milkweed (*Cynanchum utahense*) (see Photo 5, Appendix D). Nine individuals were seen in flowering and fruiting condition in limestone gravels in a gravelly wash at the north end of the Ivanpah Valley, along the transmission line corridor, about 3 miles west of Primm, Nevada, at about 2,550 feet elevation, on April 30, 2008. (Utah vine milkweed was found within the project area during the 2007 and 2008 surveys.)

Nine-awned pappus grass (*Enneapogon desvauxii*) (see Photo 6, Appendix D). Approximately 1,500 flowering individuals were observed on the west side of the Ivanpah Valley near the base of Colosseum Gorge, at 3,800 feet, in limestone gravels in Mojave creosote bush scrub, on October 27, 2007. About 2,000 flowering individuals were seen in the Clark Mountain Range along the transmission line corridor, just east of Keany Pass, in limestone/gypsum gravel, at about 4,030 feet elevation, on November 9, 2007. These observations were made by Jim Andre, technical expert and survey team member, during visits conducted independently from the main survey effort for this project. (Nine-awned pappus grass was found within the project area during surveys conducted for this project in 2008.)

Polished blazing star (*Mentzelia polita*): Forty individuals in flowering and fruiting condition were seen at the north end of the Ivanpah Valley, at the base of the eastern Clark Mountain Range, just north of the transmission line corridor, in limestone gravels at about 4,020 feet elevation, on April 29, 2008.

Utah mortonia (*Mortonia utahensis*) (see Photo 7, Appendix D). More than 100 non-flowering individuals were seen on limestone slopes near the Umberci Mine, Clark Mountain Range, at about 3,700 feet elevation, on March 6, 2008. Approximately ten flowering individuals were observed on a limestone outcrop south of the transmission line corridor, at the base of the northeastern extension of the Clark Mountain Range, at about 3,500 feet elevation, on April 3, 2008. (Utah mortonia was found within the project area during surveys conducted for this project in 2008.)

Crowned muilla (*Muilla coronata*). One flowering individual was observed in the foothills of the Clark Mountain Range, in Mojave creosote bush scrub, at 3,630 feet elevation, on March 8, 2008.

Cave-dwelling evening-primrose (*Oenothera cavernae*) (see Photo 8, Appendix D). Approximately 80 flowering and fruiting individuals were seen at the north end of the Ivanpah Valley, at the base of the eastern Clark Mountain Range, just north of the transmission line corridor, about 3.5 miles east of Keany Pass, in limestone gravels at about 4,020 feet elevation, on April 29, 2008.

White-margined beardtongue (*Penstemon albomarginatus*). A population of approximately 400 flowering individuals was observed about 0.8 mile south of Jean, Nevada, south of I-15, along the road to the quarry, 0.4 mile southwest of the prison, at about 3000 feet elevation, on March 29 and April 15, 2008.

Rosy two-toned beardtongue (*Penstemon bicolor*) (see Photo 9, Appendix D). About 55 flowering individuals were seen on the road to Goodsprings, Nevada, about 4.0 miles west of Jean, Nevada, at 3,445 feet elevation, on April 26, 2008. Most individuals in this population were the yellow-flowered subspecies *bicolor*, with a few individuals of the pink-flowered form, subspecies *roseus*.

Desert portulaca (*Portulaca halimoides*). A population of about 750 flowering individuals was seen on the west side of the Ivanpah Valley near the base of Colosseum Gorge, in Mojave creosote bush scrub, at 3,800 feet elevation, on October 24, 2007. This population was observed by Jim Andre, a technical expert and survey team member for this project, on a visit conducted independently from the project survey effort.

Bee-hive cactus (*Sclerocactus johnsonii*). Approximately 50 non-flowering individuals were observed along a transmission line road about 0.25 mile east of Highway 169 on a dry ridge about three miles north of Logandale, Nevada, at about 1,500 feet elevation, on March 18, 2008.

Rusby's desert mallow (*Sphaeralcea rusbyi var. eremicola*) (see Photo 11, see Appendix D). A population of about 35 flowering and fruiting individuals was observed in the Clark

Mountain Range above Umberci Mine, about four miles east of Keany Pass, in limestone gravels, at about 3,490 feet elevation, on May 1, 2008. (Rusby's desert mallow was found within the project area during the 2008 survey).

2.3.2 Special-status Plant Survey Protocols

In 2007 and 2008, protocol-level surveys for special-status plants were conducted throughout the project area. The 2008 project area differed slightly from that of 2007, as shown on Figures 1-1 through 1-3 in Appendix A. The goal of these surveys was to census, map, photograph and record habitat data for every special-status plant encountered. Surveys in both years were floristic, meaning that all plants found in identifiable condition were identified. In 2007, a very dry year, surveyors focused on shrubs and cacti because annual plant species were not present. Details of the methodology for the 2007 surveys can be found in Section 5.2 of the AFC (CH2M HILL 2007). Late summer rains in 2007, and winter rains in 2008 provided enough moisture that both annuals and herbaceous perennials were present in much higher numbers in 2008 than in 2007. In general, plant species diversity and abundance within the project area was much higher in 2008 than in 2007 due to higher rainfall and warmer spring temperatures. The combined 2007 and 2008 protocol-level special-status plants surveys fully satisfy the recommendations of the botanical survey guidelines of the USFWS (1996a), CDFG (2000) and CNPS (2001).

The basic methods used to search for rare plants were the same in 2008 and 2007. The main differences between 2008 and 2007 were in the methods used for the intensive surveys, which required a different approach for some of the annual and perennial herbs found in 2008. These intensive survey methods are described below. Additionally, a larger number of biologists participated in the 2008 surveys than in 2007. In 2008, the ability of surveyors to distinguish common from special-status plant species was enhanced by one day of onsite training conducted by Andrew Sanders. During this training, special-status plant locations within and near the project area were visited, field characters used to distinguish special-status plants from common plants were reviewed, and many common species were reviewed to assure the accuracy of plant lists compiled by crew team botanists. All crew members used site-specific photo guides and preliminary plant lists during this orientation, as well as throughout the field surveys.

In both years, teams of two to seven surveyors walked transects spaced at 50-foot intervals. This narrow spacing was selected to permit detection of small, cryptically colored special-status plants, some of which were expected to be scarce and patchily distributed on the alluvial fan. Crew members frequently turned to look behind them to search for special-status plants tucked under the base of shrubs (as many of the desert pincushion were), as the survey team walked across the landscape. Crew members

stayed more or less together while walking each set of transects. Global Positioning System (GPS) units were used to maintain spacing between crew members. GPS methods were the same for rare plants, weeds and barrel cactus, and are discussed in Section 2.5.

Each time a special-status plant, or group of plants, was encountered, it was mapped with a GPS unit. Habitat data was recorded on CNDDB field survey forms or in the field notes of the crew leader. Habitat data included: scientific name, number of individuals, phenology (vegetative, in bud, in flower, old flowers, in fruit), substrate, vegetation type, associated species, and disturbance condition. Special-status plants were photographed in close-up view, and habitat photos were taken at most sites. While habitat data were being recorded, the other crew members completed intensive surveys extending to 100 feet in all directions from the plant initially encountered. Intensive surveys consisted of walking transects at 5- to 10-foot intervals.

For the summer annual, nine-awned pappus grass, and the herbaceous perennial, Mojave milkweed, both of which occupy distinctive microhabitats, the intensive surveys focused on the areas of suitable microhabitat in the vicinity, sometimes extending further than 100 feet from the initially detected individual, but not extending beyond the corridor being surveyed by that crew. Additional special-status plants were encountered often during intensive surveys and the intensive survey area was expanded when new individuals were found. The total number of individuals was recorded for each GPSed location. Rooted but dead individuals of the small cactus, desert pincushion, were not mapped or recorded, but intensive surveys were conducted in the vicinity.

2.3.3 Invasive Weed Survey Protocols

Invasive non-native plants (weeds) were searched for during the 2007 and 2008 field surveys. As previously described, 2007 was a very dry year and very few weeds were observed within the project area (CH2M HILL 2007). The target list of weeds for 2008 included weeds from the Cal-IPC (2006) and CDFA (2007) lists, and weeds selected from the Mojave Weed Management Plan of San Bernardino County (Mojave Resource Conservation District 2003) (Table 2-1). Species included were those that could potentially grow in any of the vegetation types of the Ivanpah SEGS project area. Target weeds were searched for during floristic surveys that covered the entire project area. When weeds were found, the location was mapped as a point with a GPS unit (see Section 2.5), and data on abundance, percent cover estimates, and disturbance were recorded.

For each weed location, the data recorded included: 1) the number of individuals, 2) the estimated absolute cover of the weed at that location, and 3) disturbance characteristics.

The number of individuals was counted or estimated, and the data were recorded by abundance class. The abundance classes used were: 1-10, 11-100, 101-500, 501-1000, 1001-5000, and > 5000. Absolute cover was estimated within a polygon formed by the outermost individuals within a local area. The area of the polygon varied in size, depending on the size of the local weed population. Absolute cover was recorded by cover class, using these classes: <1%, 1-5%, 6-25%, 26-50%, and 51-100%. In the event

TABLE 2-1. NON-NATIVE INVASIVE PLANTS (WEEDS) WITH THE POTENTIAL TO OCCUR WITHIN THE IVANPAH SEGS PROJECT AREA.

Scientific Name	Common Name	Cal-IPC rating	CDFA rating
Brassica tournefortii	Saharan mustard	High	None
Bromus diandrus	ripgut brome	Moderate	None
Bromus madritensis ssp. *rubens*	red brome	High	None
Bromus tectorum	cheat grass	High	None
Cynodon dactylon	Bermuda grass	Moderate	C
Halogeton glomeratus	Halogeton	Moderate	A
Pennisetum setaceum	fountain grass	Moderate	None
Salsola spp.	Russian thistle species	Limited to moderate	A, C or Q, depending on species
Sisymbrium irio	London rocket	Moderate	None
Tamarix ramosissima	tamarisk or saltcedar	High	None
Tribulus terrestris	puncture vine	None	C

Sources:
California Department of Food and Agriculture (CDFA 2007).
California Invasive Plant Council (Cal-IPC 2006).
Mojave Resource Conservation District. 2003.

Notes:

Cal-IPC ratings:

High – These species have severe ecological impacts on physical processes, plant and animal communities and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed.

Moderate – These species have substantial and apparent – but generally not severe – ecological impacts on physical processes, plant and animal communities and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, although establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

CDFA ratings:

A rated weeds are those for which eradication, containment, control or other holding action is conducted at the discretion of the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.

B rated weeds are those for which eradication, containment, control or other holding action is conducted at the discretion of the County Agricultural Commissioner.

C rated weeds are those for which state-endorsed holding action and eradication is conducted only when the weed is found in a nursery; action to retard spread outside of nurseries is at the discretion of the County Agricultural Commissioner; reject only when found in a cropseed for planting or at the discretion of the commissioner.

Q rated weeds are those that receive a temporary "A" action outside of nurseries at the state-county level pending determination of a permanent rating.

that a single individual was found, the absolute cover was estimated as 100% and recorded as 51-100%. The evaluation of disturbance condition was based on observations of the area in the immediate vicinity of the weed location. The disturbance categories included: natural, human-caused, natural and human-caused, and none. Natural disturbance conditions included such things as rodent burrowing or presence of the weed in an active wash. Examples of human-caused disturbance conditions included roads, off-road vehicle tracks, and water well sites.

2 3 Barrel cactus census et odolog

In 2007, all barrel cacti encountered by surveyors during protocol-level surveys for special-status plants were mapped using GPS units (see Section 2.5). Two species of barrel cacti were mapped: California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*) and clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*). GPS points recorded single individuals or small groups of individuals (mainly 2-4, a few 5-10) of the same species growing in the immediate vicinity. For each point, the species of cactus, the number of individuals, and the vegetation type were recorded. In 2008, the same methodology was used, but barrel cacti were counted only in a few small areas that were added to the overall project footprint since the 2007 surveys. Barrel cacti are typically large individuals, obvious in the sparse vegetation of the project area, so it is unlikely that a significant number of individuals were missed during the 2007 surveys.

2 Met ods or Classi ing egetation

Vegetation within the project area was classified in 2007 using Holland's *Preliminary Descriptions of the Terrestrial Natural Communities of California* as a guide and primary reference (Holland 1986). Holland's system was selected because it includes all of the basic vegetation types found within the project area and can be applied when most data used in classification are qualitative, as they are for this project. Other systems, such as the series-based classification in *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995), and the alliance-based classification in the report "*Mojave Desert Ecosystem Program: Central Mojave Vegetation Database*" (Thomas et al. 2004) require quantitative transect data that is infeasible to obtain for large-scale projects that focus on special-status plants and other botanical resources. Site-specific information on species

composition and habitat characteristics was used to determine which Holland vegetation types were present within the project area, and to identify distinctive subtypes. Series from *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995) and alliances described in Thomas and others (2004) that are possible equivalents were identified and are listed in this report.

2 lo al ositioning S ste eogra ic In or ation S ste ata Collection ata Anal sis and ualit Assurance

For 2007 and 2008, data from surveys for special-status plants, weeds, and barrel cacti were recorded using Trimble GeoXT and GeoXH GPS units. Data collected with these GPS units is accurate to the sub-meter level after data have been post-processed. GPS units were equipped with both data files, for navigation, and data dictionaries, for data collection. Project-specific data files included 100-foot spaced transect lines within the project boundary. These transects were used to space surveyors at 50-foot intervals. Survey teams lined up so that surveyors with GPS units walked the transect lines shown on the data files and surveyors without GPS units walked between them, visually spacing themselves 50 feet between the nearest GPS-using surveyors. Each surveyor was responsible for observing 25 feet on either side. Project-specific data dictionaries were developed and used in the field to increase the efficiency of data recording and to increase data quality.

In 2007 and 2008, surveyors operating GPS units were trained by GPS technicians from CH2M HILL. In 2008, this training included an intensive pre-field training session to familiarize operators with methods specific to the project. In 2008, a GPS protocols handbook was provided to each operator. GPS training assured that polygon delineation and other data collection and data management tasks were carried out accurately and efficiently, and ensured the integrity of the special-status plant, weed and barrel cactus data sets.

In 2007 and 2008, all special-status plant, weed and barrel cactus data collected with GPS units was downloaded and backed up nightly onto laptop computers. GPS data files were transmitted to the Geographic Information System (GIS) team via email. Following collection and transfer, GPS data were post-processed by the GIS analysts and downloaded into a project GIS database. A list of data files collected each day was checked against the list of post-processed files and was compared with those in the GIS database to confirm that all GPS files collected in the field were transmitted and received by the GIS staff and that the data set was complete. Data from each survey week were mapped onto the aerial photographic base maps showing the locations of all proposed project sites, buffers, and linear features.

3 Results: Vegetation

This section includes the results of the vegetation classification developed for this project and provides summary descriptions of the vegetation within each project component. The vegetation types of the project area, including the one-mile buffer, include: Mojave Creosote Bush Scrub, Mojave Yucca – Nevada Ephedra Scrub and Mojave Wash Scrub. Characteristics of each vegetation type, including the four subtypes of Mojave Creosote Bush Scrub, are described in more detail in Appendix E. Representative photos of the vegetation types of the project area, and detailed descriptions of the vegetation observed during the 2007 surveys and vegetation identified within the one-mile buffer are provided in Appendixes 5.2A and 5.2B of the AFC (CH2M HILL 2007).

The vegetation types and vegetation patterns found within the 2008 project feature boundaries are described below. All of the 2008 proposed project features are located on the Ivanpah Valley alluvial fan. Table 3-1 lists the vegetation types found in each 2008 project feature and gives the approximate percentage of vegetation, by type, within each site feature.

The Holland system of vegetation classification (Holland 1986) was used as a primary reference in classifying the vegetation of the project area. Holland types were modified, as needed, to provide accurate descriptions of project area vegetation. The equivalent series from *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995), and related alliances from *Mojave Desert Ecosystem Program: Central Mojave Vegetation Database* (Thomas et al. 2004) are given when possible. Alliance identification requires transect data on percent cover of individual species (Thomas et al. 2004); collection of this data was beyond the scope of this project.

Mojave Creosote Bush Scrub is the most abundant and widespread vegetation type, found throughout the project area. It includes four subtypes: Larrea-Ambrosia scrub, Larrea mixed scrub, Larrea scrub and Limestone-associated Larrea scrub. Mojave Yucca – Nevada Ephedra Scrub is restricted to a small area of limestone pavement plain at the base of the limestone hills of the eastern extension of the Clark Mountain Range, in the north-central area of the one-mile buffer. It extends into the northern end of the utility corridor. Mojave Wash Scrub is restricted to larger washes, which are found mainly in the north and northwest areas of the project area, including within Ivanpah 2 and 3, the utility corridor, and the northern section of the one-mile buffer. Further description of these vegetation types and their distribution within the project area are provided in Appendix E. A list of all of the plant species observed within the Ivanpah SEGS project area (not including the one-mile buffer) during surveys conducted for this project is provided in Appendix F.

Several generalized vegetation patterns are discernable on the Ivanpah Valley alluvial fan. At higher elevations (approximately 3,000-3,400 feet), and especially near the bases of hills, there is higher diversity in vegetation types and subtypes, higher density of shrubs and cacti, higher diversity in shrub and cactus species, and higher density of Mojave yucca (*Yucca schidigera*). At higher elevations on the alluvial fan, especially to the northwest, there are more large drainage features, many with distinctive wash vegetation. At middle elevations (around 2,900 feet), a single subtype of Mojave Creosote Bush Scrub, Larrea-Ambrosia scrub, is predominant. Shrub and cactus density and species diversity, and Mojave yucca density, are all, in general, intermediate between the levels found at the higher and lower elevations of the alluvial fan. At lower elevations (approximately 2,700-2,850 feet), Larrea-Ambrosia scrub is, with the exception of a few acacia washes, the only vegetation type found. Shrub and cactus density and species diversity, and Mojave yucca density, are all low to very low, with few or no barrel cacti or Mojave yucca individuals found within some local areas.

TABLE 3-1. VEGETATION TYPES AND SUB-TYPES WITHIN THE PROJECT FEATURES.

Project Feature	Vegetation Type Present	Approximate Percentage of Vegetation, by Type, Within Site Feature [1]
Site Feature		
Ivanpah 1	Mojave Creosote Bush Scrub: Larrea-Ambrosia Subtype	95 - 99
	Cheesebush-dominated washes	1 - <5
Ivanpah 2	Mojave Creosote Bush Scrub: Larrea-Ambrosia Subtype	90 - 95
	Cheesebush-dominated washes	1 - <5
	Mojave Wash Scrub	1 - <5
Ivanpah 3	Mojave Creosote Bush Scrub: Larrea-Ambrosia Subtype	75 - 80
	Cheesebush-dominated washes	1 - <5
	Mojave Creosote Bush Scrub: Larrea Mixed Scrub Subtype	10 - 15
	Mojave Wash Scrub	1 - <5
Utility Corridor	Mojave Creosote Bush Scrub: Larrea-Ambrosia Subtype	60 - 65
	Cheesebush-dominated washes	1 - <5
	Mojave Creosote Bush Scrub: Larrea Mixed Scrub Subtype	20 - 25
	Mojave Wash Scrub	10 - 15
	Mojave Yucca – Nevada Ephedra Scrub	1 - <5
Construction Logistics Area	Mojave Creosote Bush Scrub: Larrea-Ambrosia Subtype	95 - 99
	Cheesebush-dominated washes	1 - <5
Colosseum Road	Mojave Creosote Bush Scrub: Larrea-Ambrosia Subtype	95 - 99
	Cheesebush-dominated washes	1 - <5

Notes:

1. Percentage ranges based on visual observations within project feature sites and examination of high-resolution aerial photographs (scale: 1" = 500').

3.1.1 Ivanpah 1 – Southernmost site

Ivanpah 1 is the southernmost site of the three proposed solar generating sites. As shown in Table 3-1, the vegetation of Ivanpah 1 consists almost entirely of the Larrea-Ambrosia subtype of Creosote Bush Scrub (see Appendix E). Within Ivanpah 1, the Larrea-Ambrosia subtype occurs mainly in a form characterized by a low density and diversity of shrubs and cacti, and a very low density of Mojave yucca. Here, the dominant shrubs of the Larrea-Ambrosia subtype are mainly less than 3 feet in height, with many less than 1 foot in height, and relatively widely spaced. Creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*) are the most common shrubs, with cheesebush (*Hymenoclea salsola*), pima ratany (*Krameria erecta*), Nevada ephedra (*Ephedra nevadensis*), Mojave Desert California buckwheat (*Eriogonum fasciculatum* ssp. *polifolium*), silver cholla (*Opuntia echinocarpa*), buckhorn cholla (*Opuntia acanthocarpa* var. *coloradensis*), beavertail cactus (*Opuntia basilaris* var. *basilaris*) and pencil cholla (*Opuntia ramosissima*) all present in much lower abundance. Barrel cacti of both species (*i.e.*, California barrel cactus and clustered barrel cactus) and Mojave yucca are present in low to very low numbers.

This site slopes very gradually in elevation from about 3,050 feet at the southwestern corner to about 2,765 feet at the northeastern corner. The topography is relatively flat, although it is broken by a number of small- to medium-sized ephemeral washes that are dominanted by cheesebush. These are called *cheesebush washes* in this report and are considered a variant of the Larrea-Ambrosia subtype of Mojave Creosote Bush Scrub. These features flow from west to east in the northern half of Ivanpah 1 and from southwest to northeast and east in the southern half of Ivanpah 1. These drainage features are, in general, not as large or abundant as the drainage features of Ivanpah 2 and 3.

3.1.2 Ivanpah 2 – Middle site

Ivanpah 2 is the middle site of the three proposed solar electric generating sites. The vegetation of Ivanpah 2 consists predominantly of the Larrea-Ambrosia subtype of Mojave Creosote Bush Scrub (Table 3-1). At Ivanpah 2, this subtype varies in shrub and cactus density and species diversity from areas that are moderate in density and diversity at the upper elevation west end to areas that are low in density and diversity at the lower elevation east end. Creosote bush and burrobush are the dominant shrubs, and are typically 1 to 4 feet in height. Associated species include: cheesebush, pima ratany, Nevada ephedra, Mojave Desert California buckwheat, silver cholla, buckhorn cholla, beavertail cactus and pencil cactus. The density of barrel cacti, including California barrel cactus and clustered barrel cactus, and Mojave yucca, is highest in the northern third of the site, moderately high in the western half of the site, and lowest in the southern half, especially to the east.

The site slopes very gradually in elevation from 3,185 feet on the western margin to 2,885 feet at the northeastern corner. The topography is relatively flat overall, but is dissected by many small- to medium-sized ephemeral washes with active channels usually less than 5 feet wide that flow from west to east in the northern half of Ivanpah 2 and trend from southwest to northeast and east in the southern half of Ivanpah 2. The vegetation of most of these is composed mainly of shrub species typical of Larrea-Ambrosia scrub. Some washes are dominated by cheesebush in higher densities than in adjacent areas, and are referred to as *cheesebush washes*. North of Colosseum Road, in the southern half of Ivanpah 2, is a large drainage complex up to 75 feet wide in some areas, although the active channels are much narrower. This large wash system supports Mojave Wash Scrub (see Appendix E), although in a form distinguished mainly by the presence of catclaw acacia (*Acacia greggii*). This form has lower shrub species diversity than the Mojave Wash Scrub observed in Ivanpah 3.

3.1.3 Ivanpah 3 the northern site

Ivanpah 3 is the northernmost and largest of the three proposed sites. The vegetation of Ivanpah 3 is more complex than that of Ivanpah 1 and 2 (Table 3-1). The Larrea-Ambrosia scrub subtype of Mojave Creosote Bush Scrub is the most common vegetation type, and occurs throughout Ivanpah 3, covering about 75-80 percent of the site. The Larrea mixed scrub subtype of Mojave Creosote Bush Scrub occurs north and south of the Limestone Hill, along the southwest margin, and also immediately adjacent to the northern boundary of Ivanpah 3. In the western and northern parts of Ivanpah 3, Larrea mixed scrub patches alternate with patches of Larrea-Ambrosia scrub. Some of the larger drainage features, which are concentrated in the northern and western sections of Ivanpah 3, contain well-developed Mojave Wash Scrub.

Within Ivanpah 3, the Larrea-Ambrosia scrub subtype of Mojave Creosote Bush Scrub varies from the low density-low diversity form to the high density-high diversity form. The patterns are complex but, in general, vegetation with lower densities and diversity of shrubs and cacti, and lower densities of Mojave yucca, is more widespread in the southeastern section of Ivanpah 3. Larrea-Ambrosia scrub with higher densities and diversity of shrubs and cacti, and higher densities of Mojave yucca, predominates in the northern and western sections of Ivanpah 3.

Within the 2008 boundaries, the Larrea mixed scrub subtype of Mojave Creosote Bush Scrub makes up roughly 10-15 percent of Ivanpah 3, based on field observations and visual estimates from high-resolution aerial photographs (scale: 1 inch = 500 feet). Within Ivanpah 3, the Larrea mixed scrub subtype is composed of dense stands of shrubs, cacti and yucca, with most individuals 1 to 7-feet in height. This subtype is visually distinctive in the field due to plant density and to its color aspect. Larrea mixed scrub appears darker and grayer than the olive green of Larrea-Ambrosia scrub, likely due to the presence of blackbush (*Coleogyne ramosissima*), and the higher densities of

other grayish shrubs such as pima ratany and Nevada ephedra, and the lower density of olive green creosote bush. It is sometimes found on undulating terrain, and intermixes with stands of Larrea-Ambrosia scrub.

The elevation gradient within Ivanpah 3 trends very gradually downward from approximately 3,400 feet at the western margin to about 2,985 feet at the southeastern corner. The topography of Ivanpah 3 is more strongly undulating than that of Ivanpah 1 and 2 due to the presence of many small to large ephemeral wash drainage features that trend generally in a west-to-east direction. Mojave Wash Scrub is well-developed in some of the larger ephemeral wash drainage features in the northern and western sections of Ivanpah 3. These drainage features are typically 30 to 75 feet wide bank-to-bank, although the active channels occupy only a small portion of the entire feature.

Mojave Wash Scrub within Ivanpah 3 varies in density and diversity of shrubs. The dominant shrubs are drought-deciduous, and are typically 3 to 10 feet in height. The best-developed stands include many large individuals of catclaw acacia, some scattered large desert-willow (*Chilopsis linearis*), and a variety of wash-associated smaller shrubs, including: cheesebush, desert almond (*Prunus fasciculata*), black-banded rabbitbrush (*Chrysothamnus paniculatus*), bladder sage (*Salazaria mexicana*), Cooper's boxthorn (*Lycium cooperi*), and Anderson's boxthorn (*Lycium andersonii*). Cacti and Mojave yucca are not typically found in Mojave Wash Scrub, although they may be present in low densities in inactive sections of large drainage features. Some washes are dominated by cheesebush in higher densities than in adjacent upslope areas, and are referred to as *cheesebush washes*.

3 1 tilit Corridor

The utility corridor extends north from Ivanpah 3 to the vicinity of four major power lines that run in an east-west direction across the far northern end of the Ivanpah Valley. The utility corridor crosses the buried Kern River pipeline, which runs in an east-west direction south of the major power lines. The terrain within the utility corridor is flat to undulating because the corridor crosses areas of upland interspersed with many small- to medium-sized ephemeral wash drainage features.

The vegetation of the proposed utility corridor is composed of about 60-65 percent Larrea-Ambrosia scrub, 20-25 percent Larrea mixed scrub, 10-15 percent Mojave Wash Scrub, and 1 to less than 5 percent Mojave Yucca – Nevada Ephedra Scrub. The Larrea-Ambrosia scrub is of moderate shrub and cactus density and diversity, with Mojave yucca present in moderate to high densities. Most shrubs are 2 to 4 feet in height. Mojave Yucca – Nevada Ephedra Scrub is found within a small area of the northernmost part of the utility corridor. Mojave Wash Scrub vegetation is found within the larger drainage features. Smaller drainage features are dominated by cheesebush, and constitute small cheesebush washes.

The revegetated Kern River pipeline corridor, a portion of which is included in the utility corridor survey area, has not recovered the density or diversity of the adjacent natural vegetation, and it possesses some unique characteristics for the area. The terrain has a roughened texture not typical of nearby natural habitat. Cheesebush is the dominant shrub within the corridor, with creosote bush and burrobush almost completely lacking. The mature individuals of Mojave yucca appear to have been replanted, based on the presence of basins, possibly constructed to allow watering, at the base of each plant; a number have fallen over and are dead. Brittlebush (*Encelia farinosa*), which is not native to the Ivanpah Valley, is common within the corridor. Desert marigold (*Baileya multiradiata*), found in 2007 in several large stands northeast of the project area, but relatively uncommon within the project area in 2008, is very common within the Kern River pipeline corridor.

3 1 Construction ogistics Area

The vegetation within the construction logistics area (located between Ivanpah 1 and 2) consists almost entirely of the Larrea-Ambrosia subtype of Mojave Creosote Bush Scrub, mainly in a form that is moderately dense in shrub cover, but low in species diversity. Creosote bush and burrobush predominate, with a few scattered individuals of other shrubs characteristic of this vegetation subtype. Cacti are present in low diversity, although barrel cacti are relatively common, especially clustered barrel cactus. Mojave yucca occurs at low densities. Most drainage features are small, with active channels 1 to 2 feet in width, and support a higher density of cheesebush compared with the adjacent upslope vegetation.

3 1 Colosseu Road t e access road

The vegetation of the proposed access road survey corridor consists almost entirely of the Larrea-Ambrosia subtype of Mojave Creosote Bush Scrub. Within the survey corridor, Larrea-Ambrosia scrub is strongly dominated by creosote bush and burrobush, with a very low density and diversity of other shrubs and cacti, and a very low density of Mojave yucca. No barrel cacti were observed within the proposed access road survey corridor.

The terrain in the vicinity of the access road is flat, in general, with a slight slope in elevation from the higher west end at 2,880 feet in elevation to the lower east end at 2,700 feet. One small but well-defined ephemeral wash drainage feature runs parallel to Colosseum Road on its south side, near the water well. This narrow four-foot-deep wash may have developed or enlarged as a result of road or well construction. The wash vegetation is dominated by large creosote bush and cheesebush shrubs, with some black-banded rabbitbrush and Cooper's boxthorn.

4 Results: Non-native Invasive Plants

In 2007 and 2008, surveys for non-native invasive plants (weeds) were conducted concurrently with the floristic, protocol-level surveys for special-status plants. In 2007, conditions throughout the project site were extremely dry, and very few live weeds were found within the project area boundaries. Complete results of the 2007 weed surveys can be found in Section 5.2 of the AFC (CH2M HILL 2007). More information on noxious weeds in the project area is presented in the Weed Management Plan (CH2M HILL 2008).

In 2008, conditions throughout the project site were much wetter due to abundant winter rains, and the entire project area was re-surveyed for weeds. A description of the survey methodology and the target weed list for 2008 are provided in Section 2.3.3. In 2008, five species of weeds from the target list were found within the project area: Saharan mustard (*Brassica tournefortii*), red brome (*Bromus madritensis* ssp. *rubens*), cheat grass (*Bromus tectorum*), Russian thistle (*Salsola* sp.), and London rocket (*Sisymbrium irio*). The distribution and abundance of weeds within the project area is discussed below by weed species and by project component. Weed locations were mapped and their distribution within the project area is shown in Figure 4-1 (Appendix A). The number of weed individuals at each location was recorded by abundance category, as described in Section 2.3.3 of this report. Table 4-1 lists the number of weed locations recorded for each species, by abundance category, in 2008.

TABLE 4-1. NUMBERS OF WEED LOCATIONS FOUND WITHIN THE IVANPAH SEGS PROJECT AREA IN 2008.

Common Name (*Scientific Name*)	Project Element						
	Ivanpah 1	Ivanpah 2	Ivanpah 3	Utility Corridor	Construction Logistics Area	Access Road	Total Number of Localities
Abundance Categories							
Saharan mustard (*Brassica tournefortii*)							
1-10	0	0	0	1	0	0	**1**
11-100	0	0	1	0	0	0	**1**
Red brome (*Bromus madritensis* ssp. *rubens*)							
1-10	143	158	334	6	51	3	**695**
11-100	26	14	108	33	20	1	**202**
101-500	3	0	23	25	2	1	**54**
501-1,000	2	0	1	3	1	0	**7**
1,001-5,000	0	0	0	3	0	0	**3**

Common Name (*Scientific Name*)	Project Element						
	Ivanpah 1	Ivanpah 2	Ivanpah 3	Utility Corridor	Construction Logistics Area	Access Road	Total Number of Localities
Cheat grass (*Bromus tectorum*)							
1-10	3	1	2	0	1	0	**7**
11-100	1	0	0	0	0	0	**1**
101-500	1	0	0	0	0	0	**1**
Russian thistle (*Salsola* sp.)							
1-10	0	0	0	0	0	1	**1**
London rocket (*Sisymbrium irio*)							
1-10	0	1	0	0	0	0	**1**

In 2008, weeds within the project area were widespread but did not form a dominant element in any of the vegetation types. Red brome was by far the most abundant and widespread weed species. It was found throughout the project area, mainly growing at the bases of shrubs in small washes, where it occurs most frequently in groups of 1-10 individuals. Red brome occurs in the highest densities within the north and northwestern parts of the project area, in Ivanpah 3 and the utility corridor, where it extends beyond the shrub understory. The other weed species were each found within fewer than ten locations, in low abundance. Disturbance conditions were cataloged at each weed location. Natural disturbance in the form of small- to medium-sized active washes was the most common type of disturbance with which weeds were associated.

1 Sa aran ustard (*Brassica tournefortii*)

Saharan mustard was found in two locations, both in the northern part of the project area. One location was within Ivanpah 3, and a second location was within the utility corridor. The abundance category for the Ivanpah 3 location was between 11-100 individuals. There were no observable disturbance factors at this location. The abundance category for the location within the utility corridor was between 1-10 individuals, and this locality was associated with human-caused disturbance.

2 Red ro e (*Bromus madritensis* ss *rubens*)

Red brome was the most common and widespread weed encountered in 2008. It was found in 961 locations, scattered throughout the project area. About 72 percent of these locations consisted of 1-10 individuals, and most of these were associated with natural disturbances, mainly small- to medium-sized washes. An additional 21 percent of the

total locations consisted of 11-100 individuals, and these were also mainly associated with natural disturbance features. The highest local concentrations of red brome were found in the western half of Ivanpah 3, and the utility corridor. These sites contain the highest elevations of the project areas and are possibly somewhat less dry than the lower elevation sites. Ivanpah 3 is also the closest site to the Kern River Gas Transmission Line, where substantial disturbance has occurred.

3 C eat grass (*Bromus tectorum*)

Cheat grass was found in nine widely scattered locations, with five in Ivanpah 1, one in Ivanpah 2, two in Ivanpah 3, and one in the Construction logistics area. Seven of these locations consisted of 1-10 individuals. All of the cheat grass locations were associated with natural disturbance factors.

Russian t istle (*Salsola* s)

One location of Russian thistle, consisting of 1-10 immature individuals that could not be identified to species, was found along the access road, Colosseum Road, in an area affected by human-caused disturbance.

ondon roc et (*Sisymbrium irio*)

One location of London rocket, consisting of 1-10 individuals, was found within the southern half of Ivanpah 2, in an area affected by natural disturbance.

5 Results: Special-status Plants and Barrel Cacti

This section presents the results for special-status plants and barrel cacti found during surveys within the project area in 2008 and 2007. For special-status plants, results are provided for 2008 and 2007 separately, and combined. Eight special-status plant species were found during protocol-level surveys conducted for this project. One additional species was observed within the project area boundaries in 2007 during visits to the area that were not a part of the protocol-level surveys conducted for this project. Detailed species accounts for all nine of these special-status plants are included in Appendix G. New species accounts have been prepared for species that were found in 2008, but not in 2007. For species first detected in 2007 and covered in the AFC (CH2M HILL 2007), species accounts have been updated, as needed. Information on special-status plants observed within the one-mile buffer in 2007 can be found in Section 5.2 of the AFC (CH2M HILL 2007).

The results of censuses for barrel cacti are provided for 2007 and 2008, separately and combined.

1 S ecial-status lants A undance and istri ution it in t e ro ect Area

Eight special-status plant species have been observed within project area boundaries during protocol-level surveys in 2008 and 2007. Species observed in 2008 include: small-flowered androstephium, Mojave milkweed, desert pincushion, Utah vine milkweed, nine-awned pappus grass, Parish's club-cholla, Utah mortonia and Rusby's desert mallow. Four of these (Mojave milkweed, desert pincushion, Utah vine milkweed and Parish's club-cholla) also were detected in 2007. In 2007, individuals in the genus *Penstemon* were encountered that could not be identified to species because no flowers were present. In 2008, these were determined to be Palmer's penstemon, a common and widespread species. In addition to the eight special-status plant species found during protocol-level surveys, desert portulaca (*Portulaca halimoides*), an ephemeral summer annual, was observed within the project area boundaries in October 2007, following summer rainfall, by Jim Andre, a technical expert for this project, during independent visits that were not a part of the protocol-level survey effort for this project (Andre pers. comm. 2008). Desert portulaca was not detected during 2008 spring protocol-level surveys, likely because the skeletons are small and disintegrate rapidly after flowering (see Section 5.2). Therefore, abundance and distribution data from the project site are not available for desert portulaca.

Table 5-1 summarizes the numbers of individuals and localities found within each project element, by year. Locations of special-status plants within the project area are shown in Figures 5-1, 5-2 and 5-3 (Appendix A). Figure 5-1 (Appendix A) shows the

distribution of special-status plant locations found within the Ivanpah SEGS project area during protocol-level surveys in 2008. Figure 5-2 (Appendix A) shows the same information for 2007, and Figure 5-3 (Appendix A) shows the 2007 and 2008 data combined. A summary of the distribution and abundance for each special-status plant species is provided below. Table 5-2 summarizes the conservation status of these species.

Small-flowered androstephium: In 2008, 12 individuals were mapped in four locations (Figure 5-1, Appendix A), within Ivanpah 1 and 2, in Mojave Creosote Bush Scrub. No individuals of this species were detected during protocol-level surveys in 2007.

Mojave milkweed: In 2008, 202 individuals of Mojave milkweed were mapped in 59 locations (Figure 5-1, Appendix A), mainly in small washes in Ivanpah 1, 2 and 3, and the construction logistics area (Table 5-1). In 2007, an unknown number of plants was found at one location in Ivanpah 1.

Desert pincushion: In 2008, 477 individuals were mapped in 177 locations within Ivanpah 1, 2 and 3, the construction logistics area, and the utility corridor. In 2007, an additional 122 individuals were found in 114 locations. The combined total for 2007 and 2008 is 599 individuals in 291 locations. Most individuals were found in Mojave Creosote Bush Scrub. See Figures 5-1, 5-2 and 5-3, Appendix A; and Table 5-1.

Utah vine milkweed: In 2008, 991 individuals were found in 146 locations, mainly in Ivanpah 1 and 2. In 2007, three individuals were mapped in three locations, all within Ivanpah 1. Most individuals were found in small washes in Mojave Creosote Bush Scrub. The total for 2007 and 2008 is 994 individuals in 149 locations. See Figures 5-1, 5-2 and 5-3, Appendix A; and Table 5-1.

Nine-awned pappus grass: In 2008, 8,145 dead individuals were mapped in 182 locations in Ivanpah 1 and 3, the utility corridor and the construction logistics area (Figure 5-1, Appendix A; Table 5-1). Most were found in the utility corridor, in Mojave Creosote Bush Scrub. No live individuals were observed. In 2007, no individuals of this species were detected within the project area.

Parish's club-cholla: In 2008, 196 individuals (clones) were mapped at 47 locations within Ivanpah 1, the utility corridor, and the construction logistics area. In 2007, 143 clones were mapped within 96 locations in Ivanpah 1 and 3, and the construction logistics area. All clones were found in Mojave Creosote Bush Scrub. For 2008 and 2007 combined, 339 individuals were mapped in 143 locations. See Figures 5-1, 5-2 and 5-3, Appendix A; and Table 5-1.

Utah mortonia: In 2008, one individual was found in at the northern end of the utility corridor, within Mojave Yucca – Nevada Ephedra Scrub (Table 5-1; Figure 5-1, Appendix A).

Rusby's desert mallow: In 2008, 15 individuals were mapped in 12 locations in Mojave Creosote Bush Scrub within Ivanpah 1, 2 and 3, the construction logistics area and the utility corridor (Figure 5-1, Appendix A; Table 5-1). No individuals of this taxon were detected in 2007.

TABLE 5-1. NUMBERS OF SPECIAL-STATUS PLANT INDIVIDUALS AND LOCALITIES BY PROJECT FEATURE.

Species Name and Survey Year	Project Element			Utility Corridor	Construction Logistics Area	Access Road	Total Number of Individuals	Total Number of Localities
	Ivanpah 1	Ivanpah 2	Ivanpah 3					
Small-flowered androstephium (*Androstephium breviflorum)*								
2008	11	1	0	0	0	0	**12**	**4**
2007	0	0	0	0	0	0	**0**	**0**
2008 & 2007	11	1	0	0	0	0	**12**	**4**
Mojave milkweed (*Asclepias nyctaginifolia)*								
2008	37	16	127	5	17	0	**202**	**59**
2007	*	0	0	0	0	0	**0**	**1***
2008 & 2007	37	16	127	3	17	0	**202**	**60**
Desert pincushion (*Coryphantha chlorantha)*								
2008	19	5	64	376	13	0	**477**	**177**
2007	20	16	79	7	0	0	**122**	**114**
2008 & 2007	39	21	143	383	13	0	**599**	**291**
Utah vine milkweed (*Cynanchum utahense)*								
2008	809	125	38	1	18	0	**991**	**146**
2007	3	0	0	0	0	0	**3**	**3**
2008 & 2007	812	125	38	0	18	0	**994**	**149**
Nine-awned pappus grass (*Enneapogon desvauxii)*								
2008	552	0	855	5,910	828	0	**8,145**	**182**
2007	0	0	0	0	0	0	**0**	**0**
2008 & 2007	552	0	855	5,910	828	0	**8,145**	**182**

Species Name and Survey Year	Project Element			Utility Corridor	Construction Logistics Area	Access Road	Total Number of Individuals	Total Number of Localities
	Ivanpah 1	Ivanpah 2	Ivanpah 3					
Parish's club-cholla (*Grusonia (=Opuntia) parishii)*								
2008	19	0	0	55	122	0	**196**	**47**
2007	91	0	39	0	13	0	**143**	**96**
2008 & 2007	110	0	39	0	135	0	**339**	**143**
Utah mortonia *(Mortonia utahensis)*								
2008	0	0	0	1	0	0	**1**	**1**
2007	0	0	0	0	0	0	**0**	**0**
2008 & 2007	0	0	0	1	0	0	**1**	**1**
Rusby's desert mallow (*Sphaeralcea rusbyi* var. *eremicola)*								
2008	1	2	2	9	1	0	**15**	**12**
2007	0	0	0	0	0	0	**0**	**0**
2008 & 2007	1	2	2	9	1	0	**15**	**12**

* Mojave milkweed was observed in Ivanpah 1 in 2007; however, the exact location and number of individuals is unknown. This locality is not included on maps, or in the total number of individuals, but it is included in the total locality count.

TABLE 5-2. CONSERVATION STATUS OF SPECIAL-STATUS PLANT SPECIES KNOWN FROM THE IVANPAH SEGS PROJECT AREA.

	Conservation Status in California					Presence in Other States			
Common Name/ Scientific Name	Federal status	State status	BLM sensitive	CNPS	CNDDB	Nevada	Arizona	Utah	Other
Small-flowered androstephium *Androstephium breviflorum*	-	-	-	2.3	G5 S1.3	Present; no conservation status	Present; no conservation status	Present; no conservation status	WY, CO, NM
Mojave milkweed *Asclepias nyctaginifolia*	-	-	-	2.3	G4G5 S1.3	Present; no conservation status	Highest reporting priority	Not present	Not present
Desert pincushion *Coryphantha chlorantha*	-	-	-	2.2	G2G3 S2.2	Present; no conservation status	Present; no conservation status	Present; no conservation status	Not present
Utah vine milkweed *Cynanchum utahense*	-	-	-	4.3	G4 S3.3	Present; no conservation status	Present; no conservation status	Watch list/ S2	Not present
Nine-awned pappus grass *Enneapogon desvauxii*	-	-	-	2.3	G5 S2?	Present; no conservation status	Present; no conservation status	Present; no conservation status	CO, NM, TX, Mexico, South America.
Parish's club-cholla *Grusonia (=Opuntia) parishii*	-	-	-	2.3	G3G4 S2.3?	Present; no conservation status	Present; no conservation status	Not present	TX?
Utah mortonia *Mortonia utahensis*	-	-	-	4.3	G4G5 S3.3	Present; no conservation status	Present; no conservation status	Peripheral: rare or uncommon in Utah, more common elsewhere	NM, TX
Desert portulaca *Portulaca halimoides* *	-	-	-	4.2	G5 S3.2	Present; no conservation status	Present; no conservation status	Additional data needed - taxonomy	CO, NM, OK, TX, and other states, Baja California
Rusby's desert mallow *Sphaeralcea rusbyi* var. *eremicola*	-	-	S	1B.2 endemic to CA	G4T1 S1.3	Not present	Not present	Not present	Not present

Sources: CNDDB 2008a, BLM 2007, CNPS 2008, NNPS 2008, NNHP 2007, ANHP 2008, ANPS 2008, UDWR 2008.

* In addition to the eight special-status plant species found during protocol-level surveys, desert portulaca (*Portulaca halimoides*), an ephemeral summer annual, was observed within the project area boundaries in October 2007, following summer rainfall, by Jim Andre, a technical expert for this project, during independent visits that were not a part of the protocol-level survey effort for this project (Andre pers. comm. 2008).

2 S ecial-status lant Sur e i itations

When considered together, the 2007 and 2008 protocol-level special-status plants surveys fully satisfy the recommendations of the botanical survey guidelines of the USFWS (1996a), CDFG (2000) and CNPS (2001). The special-status plant surveys were conducted during times of the year when it was possible to detect and identify in the field the majority of special-status plants that could potentially be found within the project area. Reference site visits were conducted in 2007 and 2008 (see Section 2.3.1 and Section 5.2 of the AFC [CH2M HILL 2007]) to determine the growth stage and blooming condition of many potentially occurring special-status plants. Many of these can be identified from leaves, fruits and other characteristics, in addition to flowers. For example, the leaves and old fruits of Mojave milkweed, and the old fruits and stems of Utah vine milkweed, are distinctive and allow these plants to be recognized even when they are not in flower. (See species descriptions in Appendix G for more information.) By observing plants at reference sites, and using the expertise of project botanists, it was possible to identify a range of characters that could be used to identify special-status plants in the field. These reference site visits also confirmed that potentially occurring special-status plants are currently growing within the project vicinity, since other information sources can be out-of-date.

Fifty-five special-status plants with potential to occur within the project area are listed in Table B-1 of Appendix B. Five of these are summer annuals, meaning that they grow and flower in the fall, only after summer rains, which occur infrequently in the eastern Mojave Desert. Although no protocol-level surveys were conducted in the fall, the survey methods addressed the issue of detecting summer annuals.

During the early to late spring survey period in 2007, conditions at the project site were very dry, and no annual plants were expected or observed. In addition, few herbaceous perennials were observed. Therefore, the survey emphasis in 2007 was on detecting special-status shrubs and cacti. Late summer rains in August 2007 resulted in an abundance of summer annuals growing within the project area. This was confirmed during visits to the Ivanpah Valley in October and November, 2007, by Jim Andre, an expert on the flora of the eastern Mojave Desert. Mr. Andre was a member of the survey team for the Ivanpah SEGS project; however, these visits were made independently, not as a part of the project survey effort.

Most summer annuals can be detected after their blooming and growth periods because distinctive characters are still observable, even when the plants are dead. In 2008, the skeletons of most summer annuals that grew in late 2007 were still present, observable, and identifiable. Survey crews were taught to recognize these species by Mr. Andre and other botanical experts. During spring protocol-level surveys in 2008, a total of nine species of summer annuals were identified within the project area, including the

special-status plant, nine-awned pappus grass. The identification of these species was confirmed by Mr. Andre and other expert botanists working on this project.

Desert portulaca, a special-status summer annual, usually is not detectable outside of its fall growth period. This species was determined to be present within the project area by Jim Andre during visits to the Ivanpah Valley in October and November, 2007, that were independent of the survey effort for this project. Since survey team members were unable to detect desert portulaca during the spring 2008 protocol-level surveys, quantitative abundance and distribution data are unavailable for this species. However, its presence in the project area is noted in this report, and it is included in the tally of special-status plants found within the project area (Table 5-2).

None of the potentially occurring special-status summer annuals are federally or state-listed; therefore, no federally or state-listed summer annuals are expected to occur within the project area.

3 Barrel Cactus istri ution and A undance it in t e ro ect Area

Censuses of two species of barrel cacti, California barrel cactus and clustered barrel cactus, were conducted in 2008 and 2007. Both of these are very abundant and widely distributed at the project site. For California barrel cactus, in 2008, 701 individuals were mapped in 261 locations (Figure 5-4, Appendix A), and in 2007, 2,168 individuals were mapped in 1266 locations (Figure 5-5, Appendix A). For clustered barrel cactus, in 2008, 1,145 individuals were mapped in 459 locations (Figure 5-4, Appendix A), and in 2007, 2,356 individuals were mapped in 1,625 locations (Figure 5-5, Appendix A). The combined totals for 2008 and 2007 are 2,869 individuals of California barrel cactus in 1,527 locations, and 3,501 individuals of clustered barrel cactus in 2,084 locations (Figure 5-6, Appendix A). Table 5-4 shows the numbers of barrel cacti found within each project feature for 2007, 2008 and 2007 and 2008 combined.

TABLE 5-3. NUMBERS OF INDIVIDUALS AND LOCATIONS OF BARREL CACTI FOUND WITHIN PROPOSED PROJECT FEATURE SITES.

Common Name and Survey Year	Project Element			Utility Corridor	Construction Logistics Area	Access Road	Total Number of Individuals	Total Number of Localities
	Ivanpah 1	Ivanpah 2	Ivanpah 3					
California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*)								
2008	0	0	152	526	23	0	**701**	**261**
2007	74	389	1,615	85	5	0	**2,168**	**1,266**
2008 & 2007	74	389	1,767	611	28	0	**2,869**	**1,527**
Clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*)								
2008	0	0	160	791	194	0	**1,145**	**459**
2007	706	156	1,353	93	48	0	**2,356**	**1,625**
2008 & 2007	706	156	1,513	884	242	0	**3,501**	**2,084**

Notes:

Ivanpah 1, 2, and 3 data for 2007 include the 250-foot buffer (see AFC; CH2M HILL 2007); in 2008, the site boundaries for these project components were expanded to include the buffer.

The 2007 cactus numbers presented in the AFC (CH2M HILL 2007) are slightly different than the numbers presented in this table because the project boundary changed slightly after the AFC was submitted.

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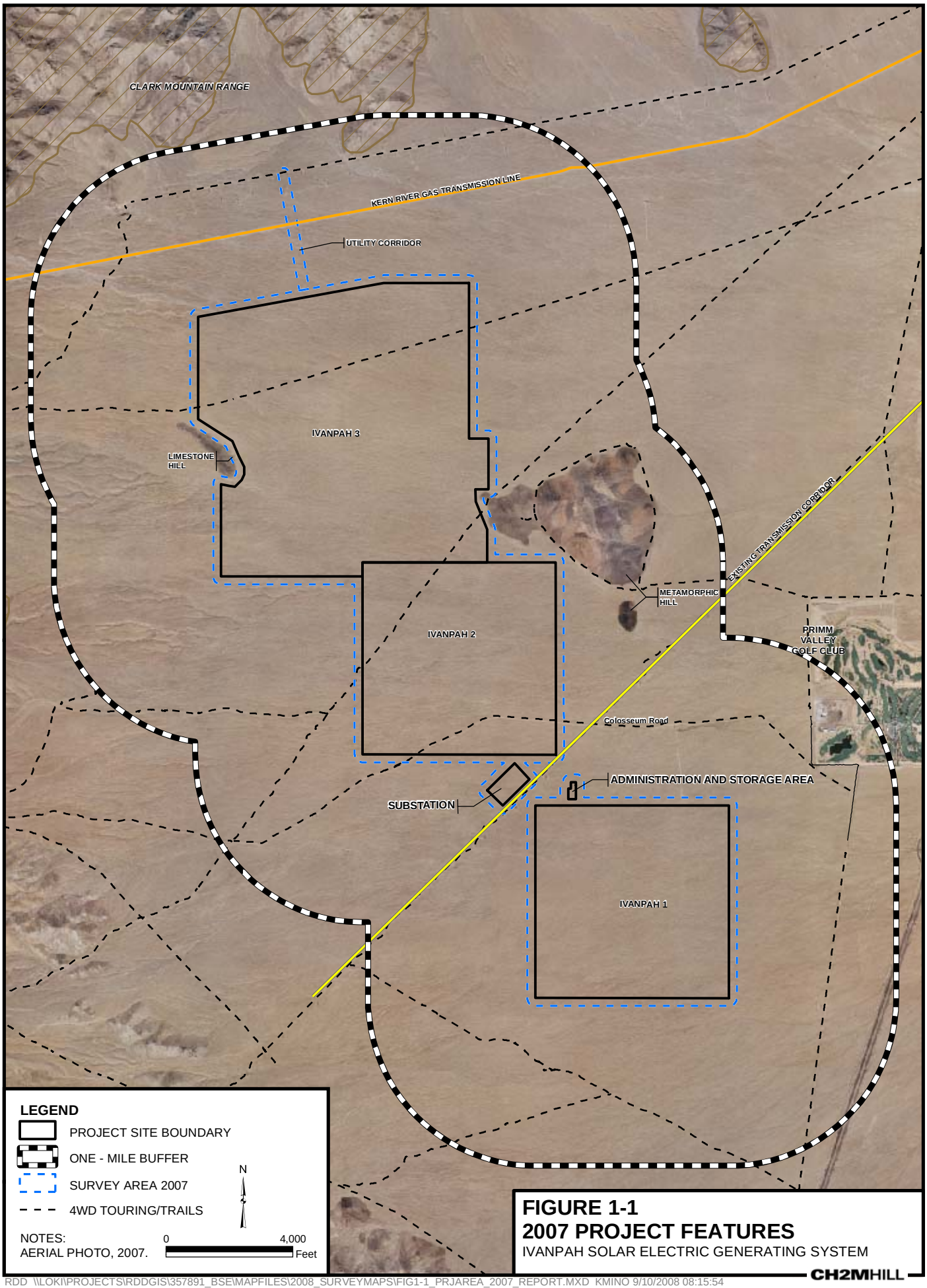

FIGURE 1-1
2007 PROJECT FEATURES
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG1-1_PRJAREA_2007_REPORT.MXD KMINO 9/10/2008 08:15:54

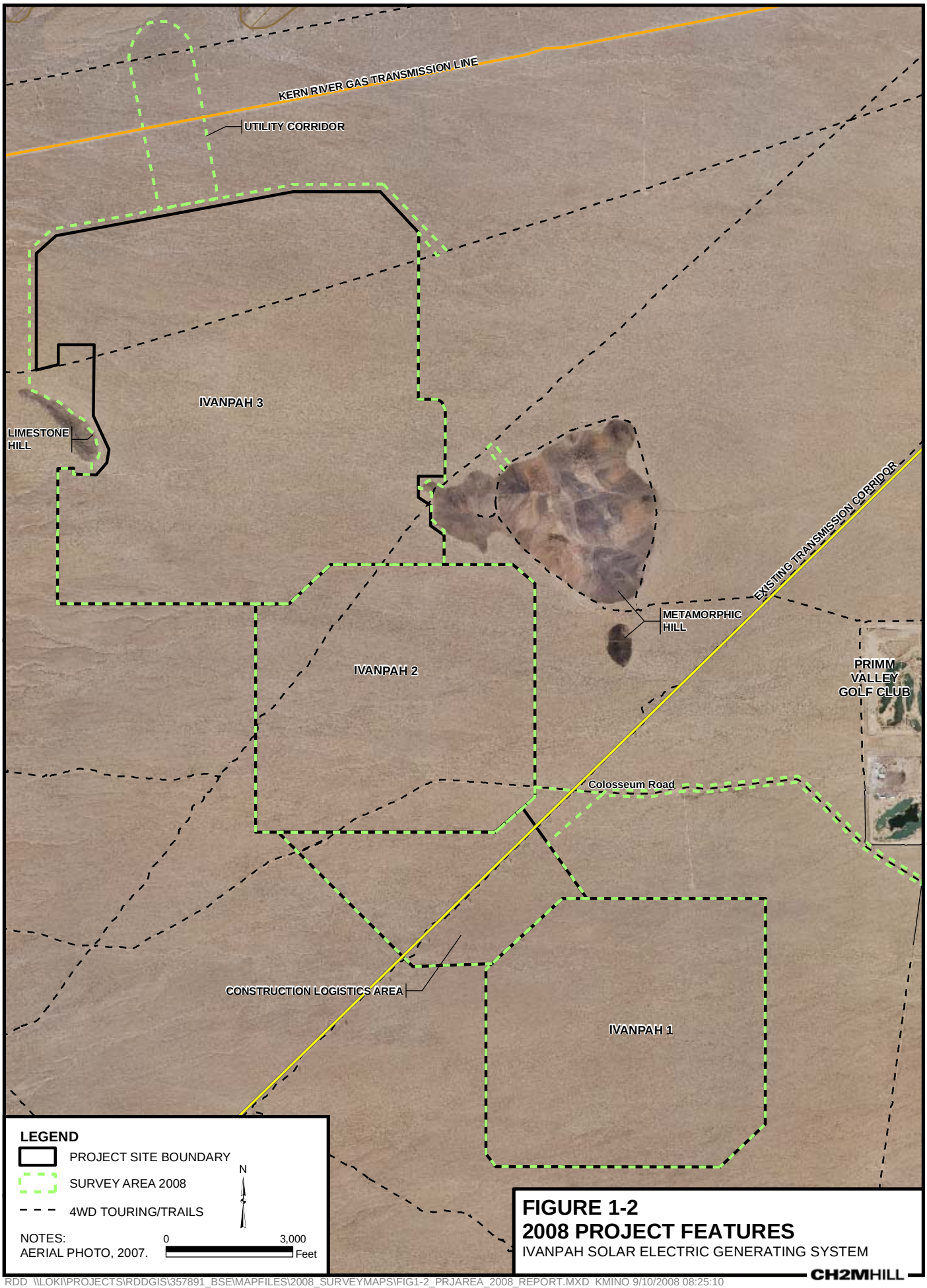

FIGURE 1-2
2008 PROJECT FEATURES
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG1-2_PRJAREA_2008_REPORT.MXD KMINO 9/10/2008 08:25:10

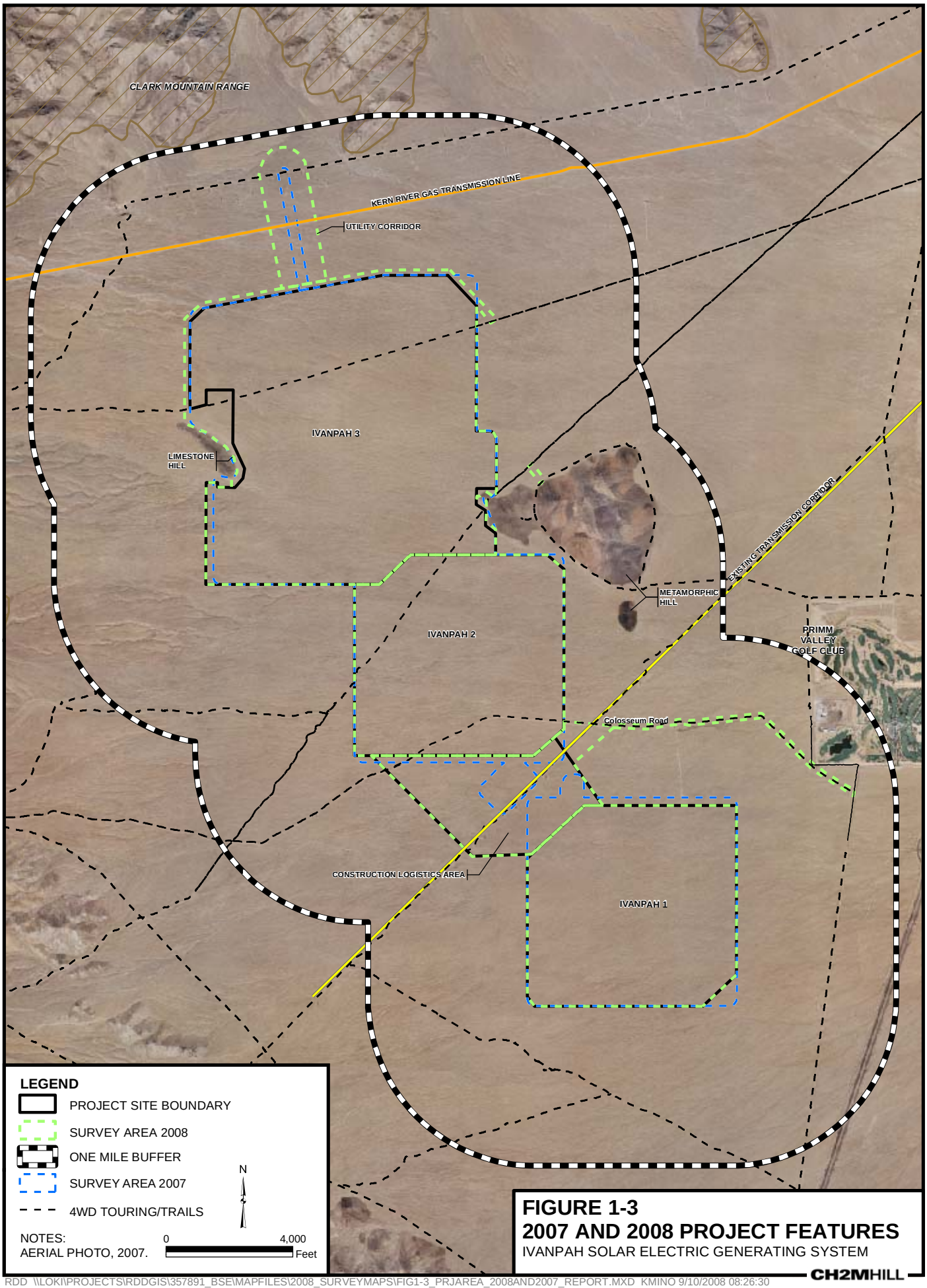

FIGURE 1-3
2007 AND 2008 PROJECT FEATURES
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG1-3_PRJAREA_2008AND2007_REPORT.MXD KMINO 9/10/2008 08:26:30

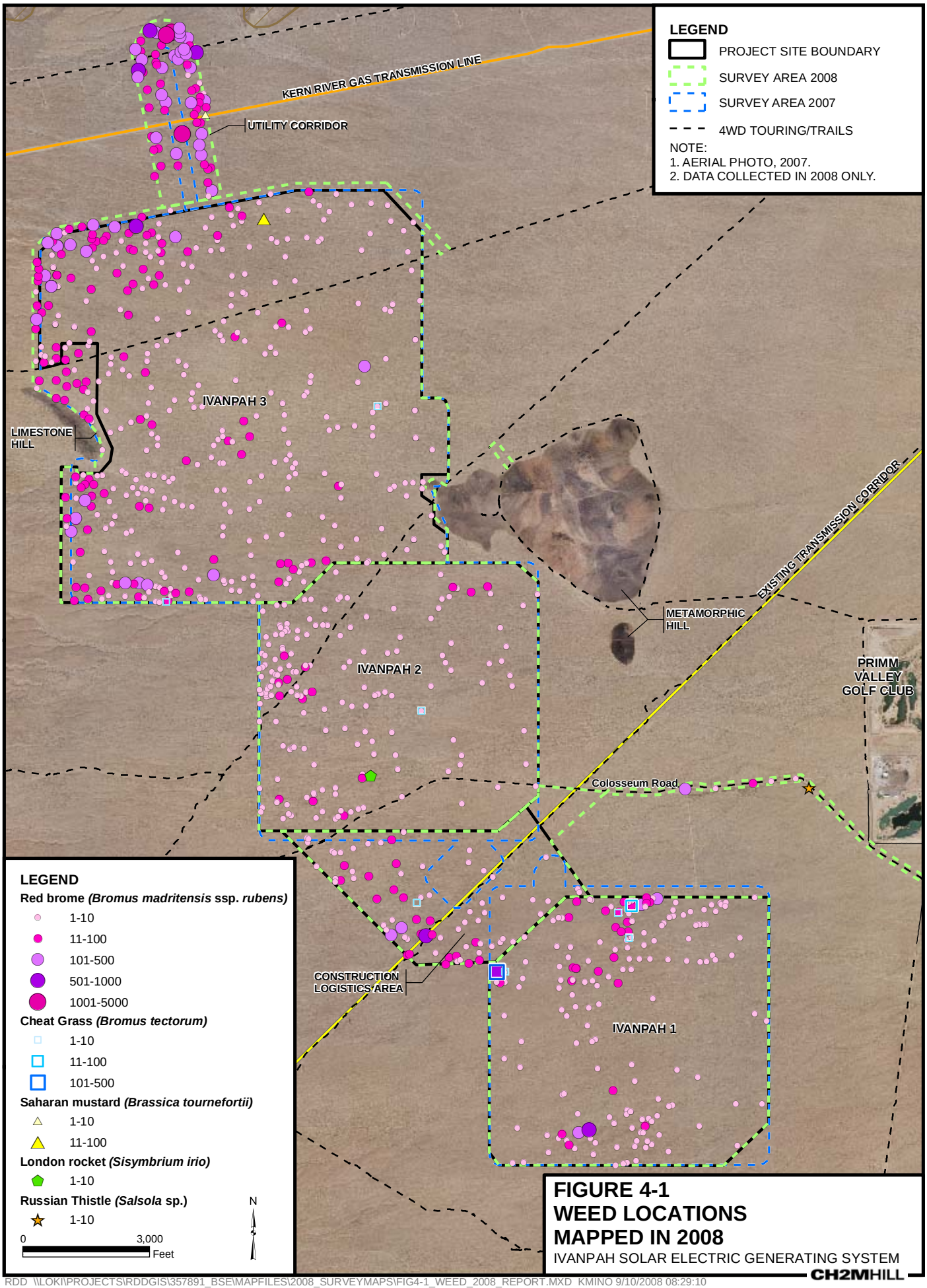

FIGURE 4-1
WEED LOCATIONS MAPPED IN 2008
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG4-1_WEED_2008_REPORT.MXD KMINO 9/10/2008 08:29:10

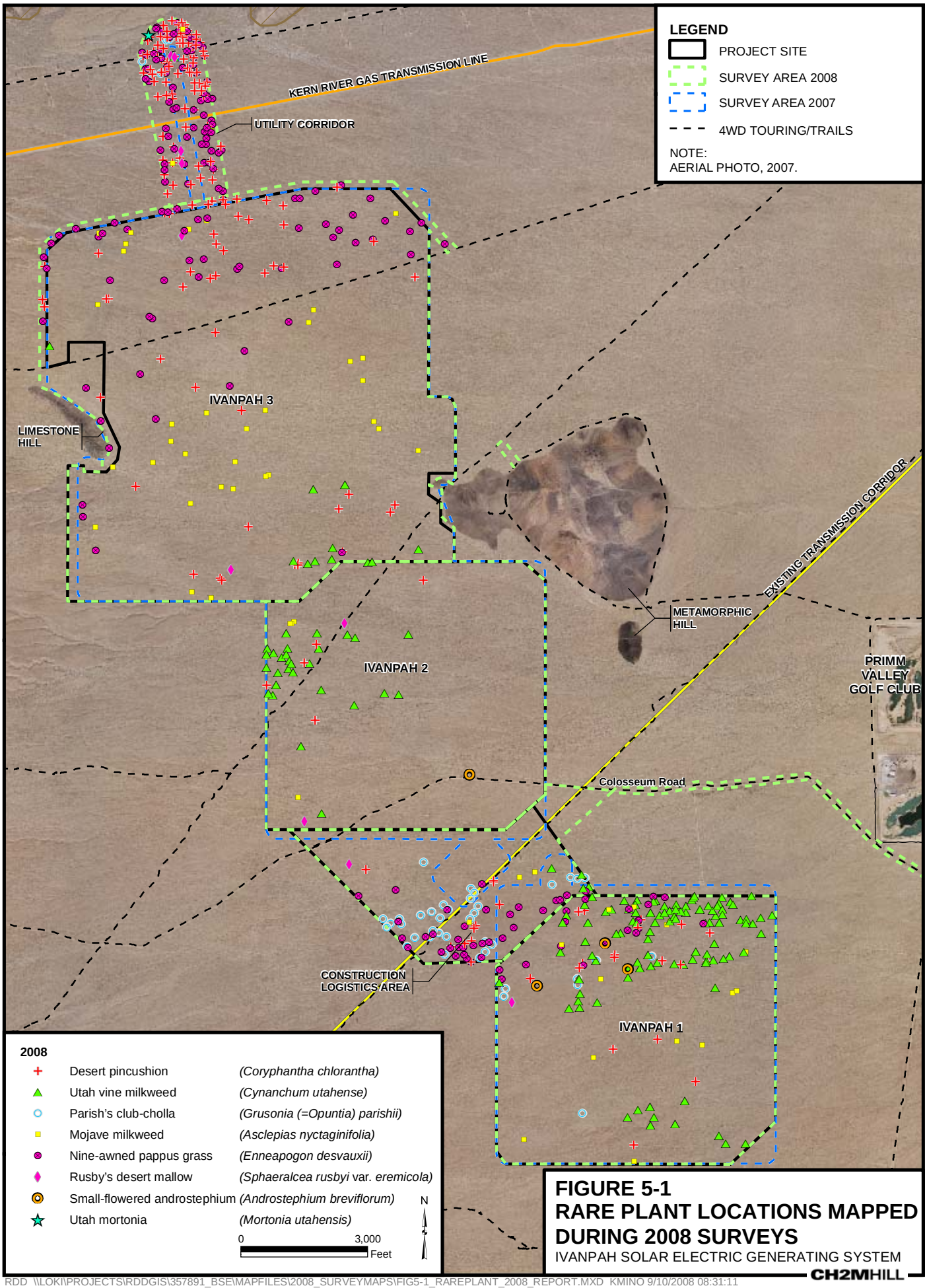

FIGURE 5-1
RARE PLANT LOCATIONS MAPPED DURING 2008 SURVEYS
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG5-1_RAREPLANT_2008_REPORT.MXD KMINO 9/10/2008 08:31:11

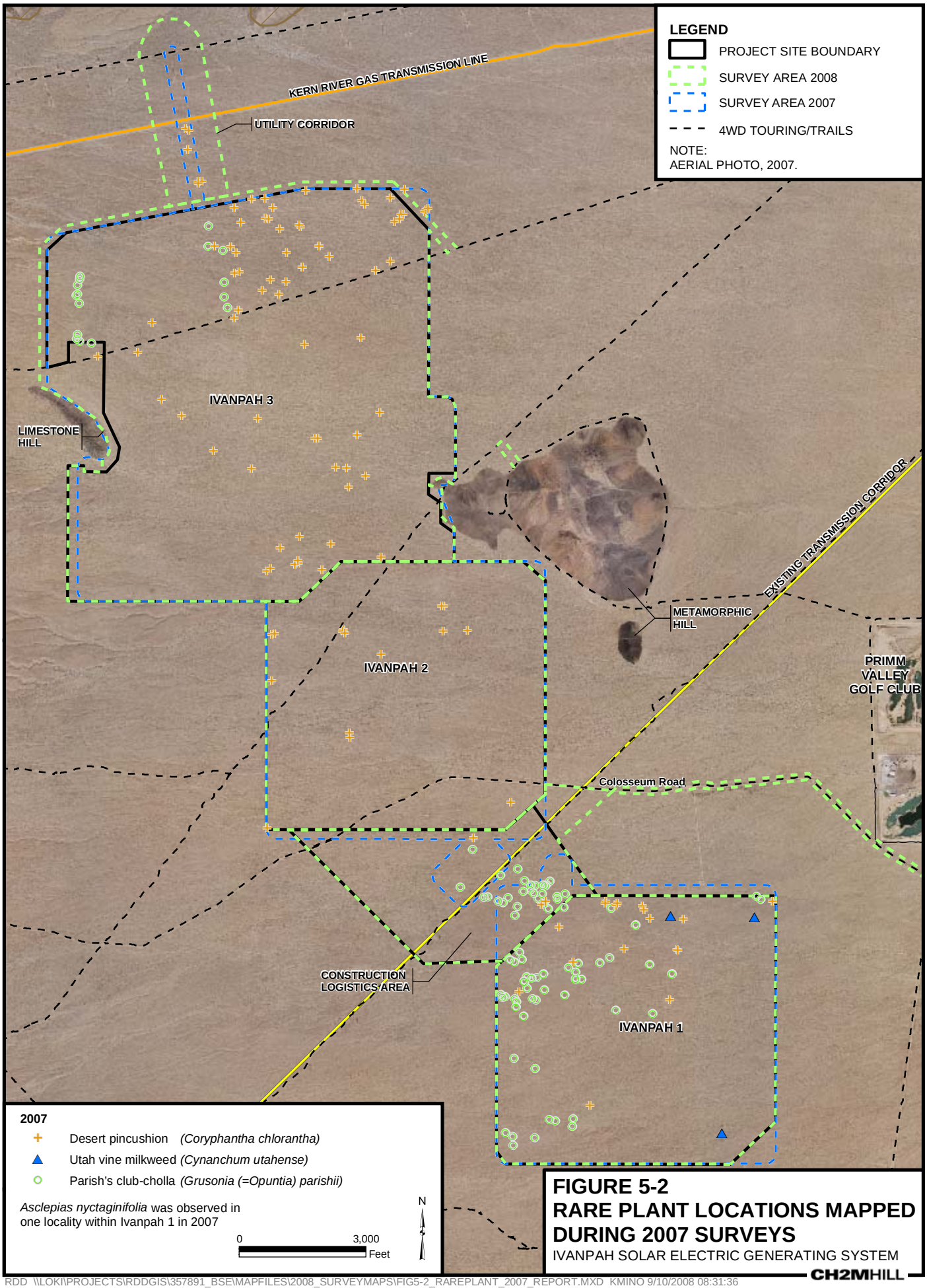

FIGURE 5-2
RARE PLANT LOCATIONS MAPPED DURING 2007 SURVEYS
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG5-2_RAREPLANT_2007_REPORT.MXD KMINO 9/10/2008 08:31:36

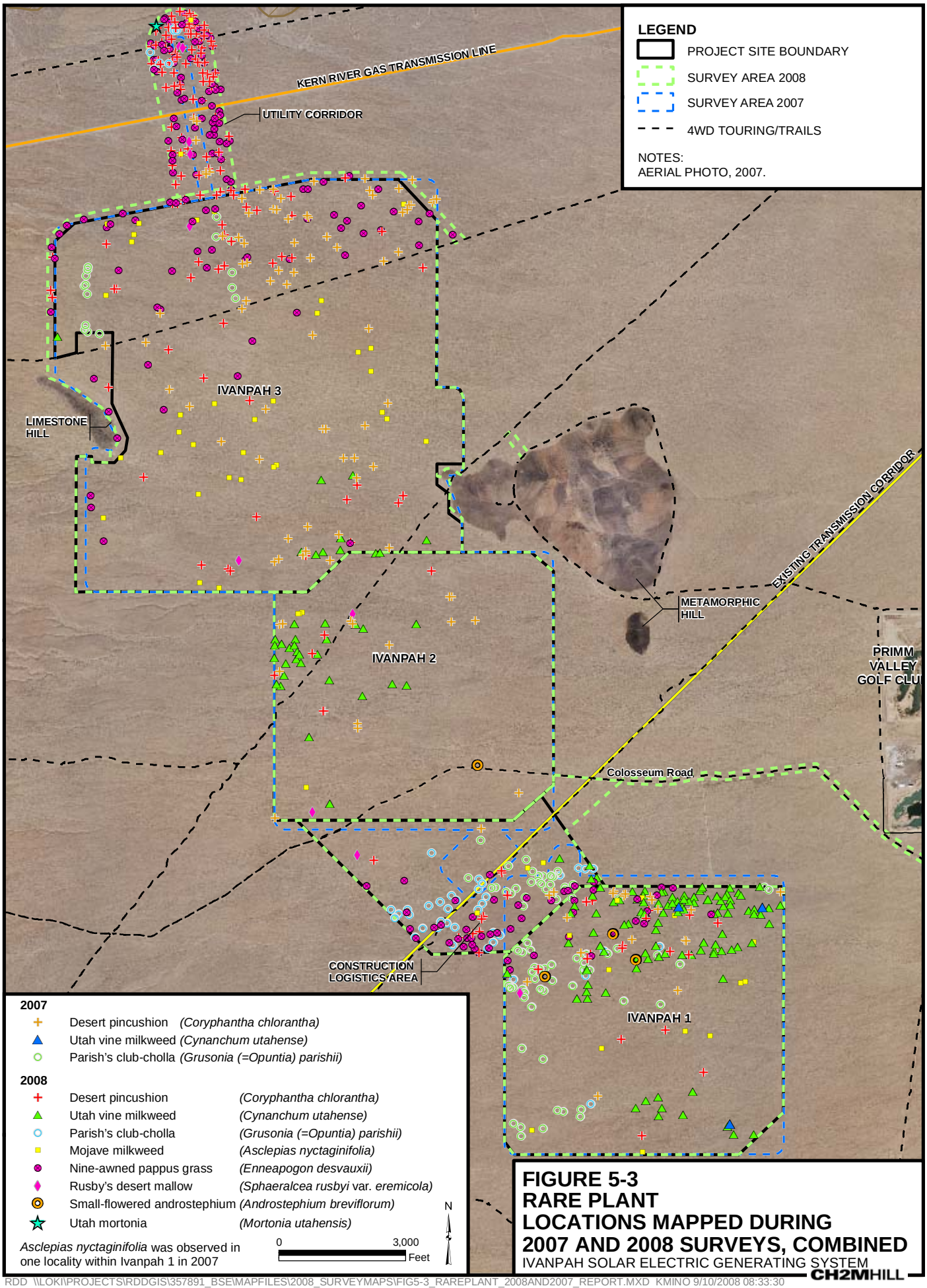

FIGURE 5-3
RARE PLANT LOCATIONS MAPPED DURING 2007 AND 2008 SURVEYS, COMBINED

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG5-3_RAREPLANT_2008AND2007_REPORT.MXD KMINO 9/10/2008 08:33:30

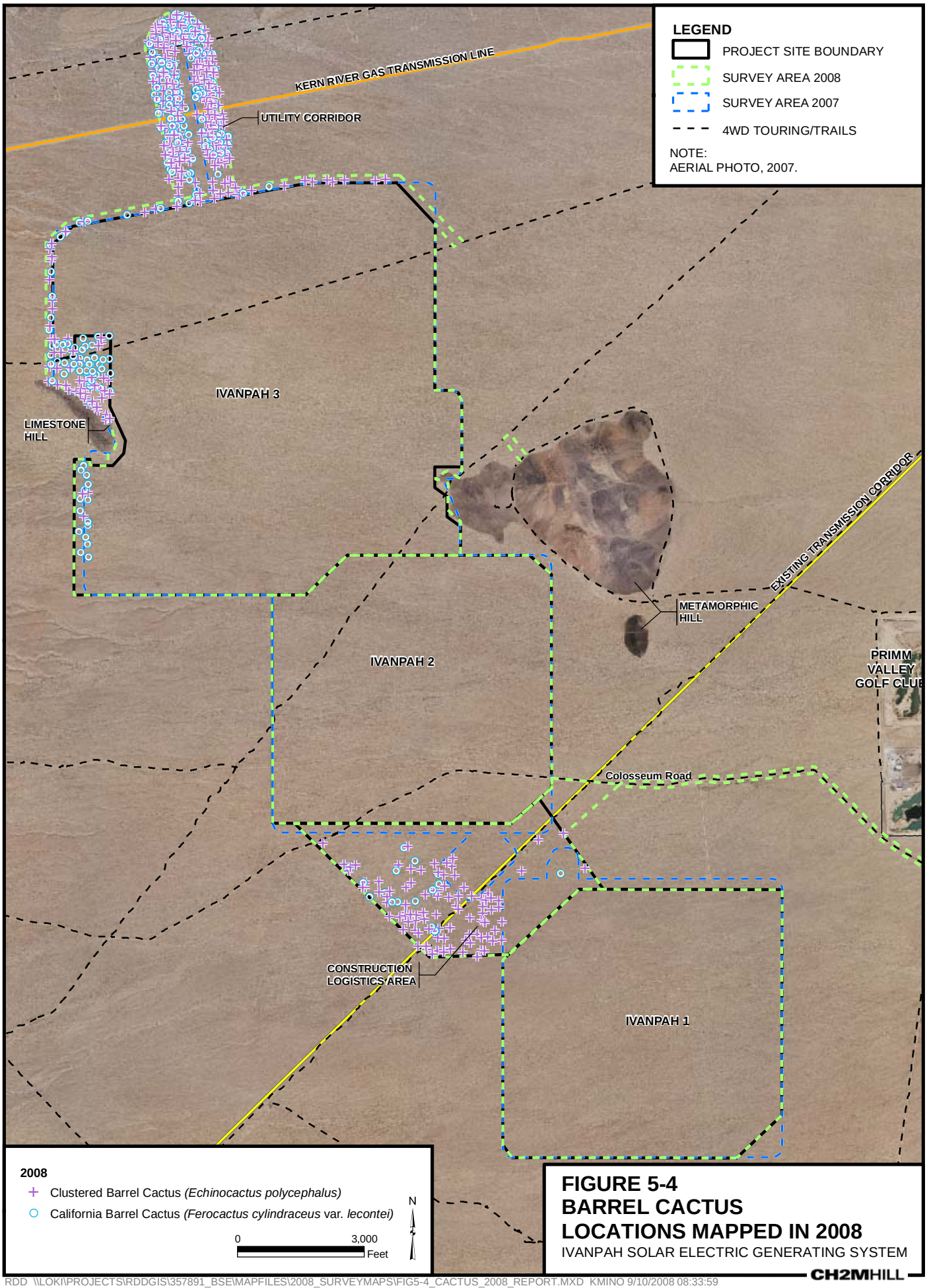

FIGURE 5-4
BARREL CACTUS LOCATIONS MAPPED IN 2008
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG5-4_CACTUS_2008_REPORT.MXD KMINO 9/10/2008 08:33:59

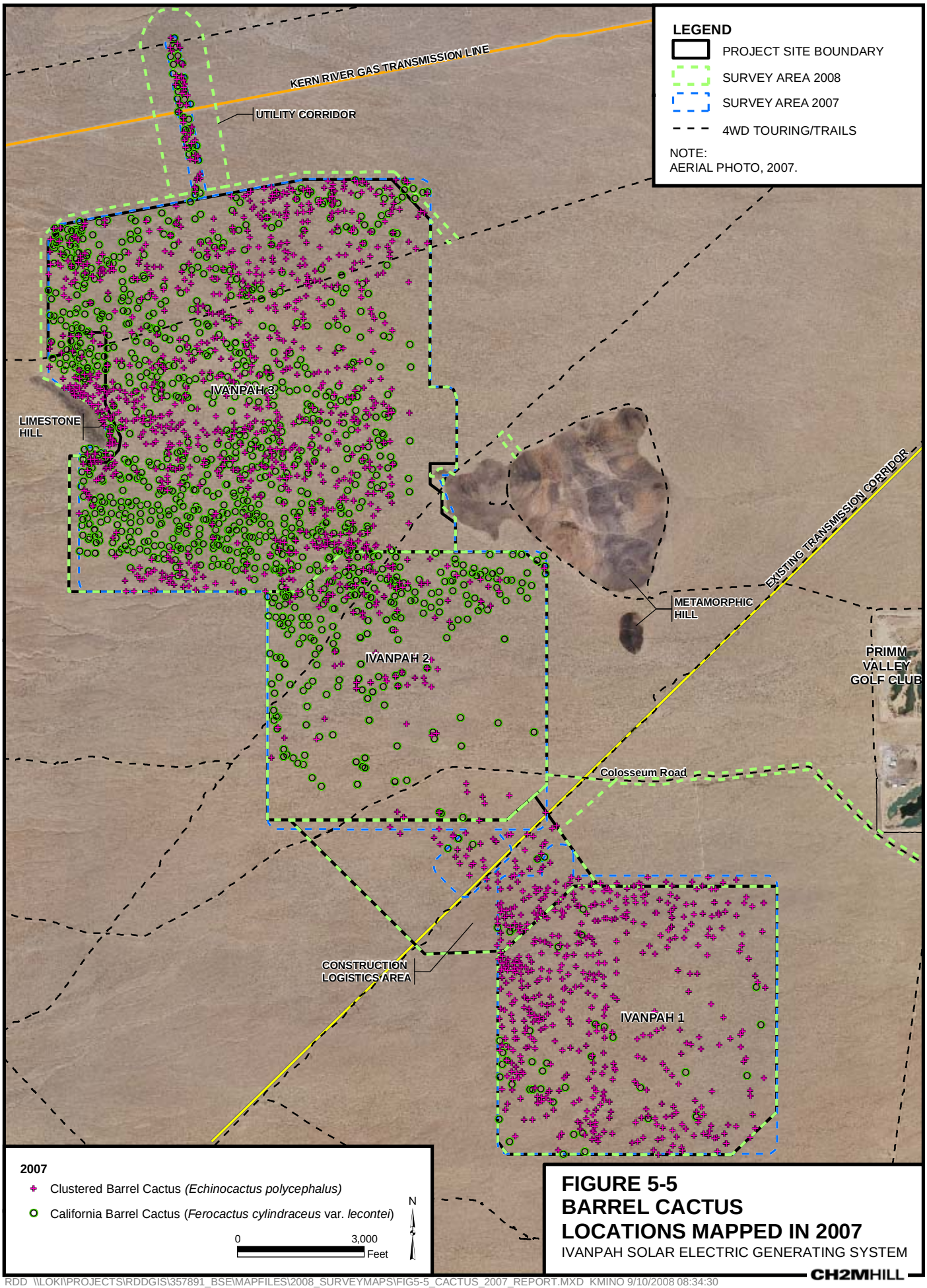

FIGURE 5-5
BARREL CACTUS LOCATIONS MAPPED IN 2007
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG5-5_CACTUS_2007_REPORT.MXD KMINO 9/10/2008 08:34:30

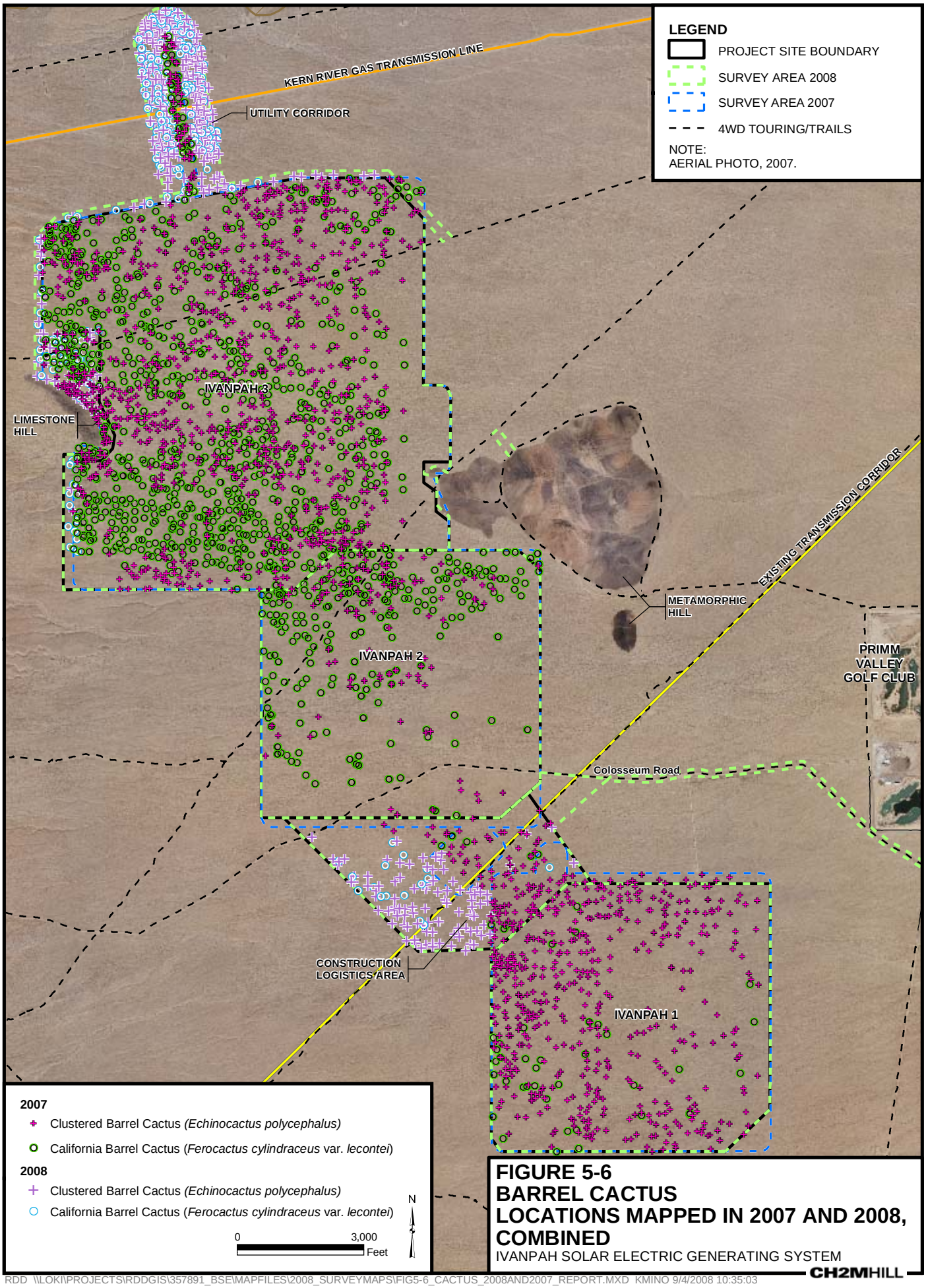

FIGURE 5-6
BARREL CACTUS LOCATIONS MAPPED IN 2007 AND 2008, COMBINED
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\357891_BSE\MAPFILES\2008_SURVEYMAPS\FIG5-6_CACTUS_2008AND2007_REPORT.MXD KMINO 9/4/2008 10:35:03

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Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
PLANTS KNOWN FROM THE PROJECT REGION WITH LOW TO MODERATE POTENTIAL TO OCCUR IN THE STUDY AREA										
Agave utahensis var. *nevadensis* Clark Mountain agave	P	-	-	-	4.2	E Mojave Desert; Clark Mtn. Range, Mescal Mtns., Ivanpah Mtns., Kingston Mtns., SBD; to NV.	JTWld, MDScr, PJWld	2,950-5,200 ft (900-1,585 m) Rocky slopes, often steep; calcareous and volcanic substrates. Occurs on limestone substrate.	May-July yellow	E edge of Clark Mtn. Range, about 2 miles WNW of Ivanpah 3 (CNDDB 2007c). Found within one-mile buffer during 2007 surveys.
Aliciella triodon Coyote gilia	A	-	-	-	2.2	E Mojave Desert; Clark Mtn. Range, Mid Hills, SBD; Nopah Range, INY; to NV, AZ, CO, NM, UT.	GBScr, PJWld	2,000-5,580 ft (610-1,700 m) Sometimes on sandy soils.	April-June purple	Clark Mtn. and Pinto Valley quads, within 3-30 miles of the project area (CNDDB 2007c).
Aloysia wrightii oreganillo	S	-	-	-	4.3	E Mojave and Colorado deserts; Clark, Providence, Whipple, and Granite mtns., SBD; to TX, NM.	JTWld, PJWld	2,700-4,800 ft (800-1600 m) Rocky slopes, often on carbonate substrates.	April-Oct white	Clark Mtn. Range, within 3 miles of project area (Jepson Online Interchange 2008).
Androstephium breviflorum small-flowered androstephium	P	-	-	-	2.3	E Mojave Desert from about Cronese Valley to Ivanpah Valley, and E of Whipple Mts., SBD; Cadiz Valley, RIV; to AZ, NV, CO, UT.	MDScr (MCBS), DeDns	720-5,260 ft (220-1,600 m) Dry loose sandy to rocky soil on sand dunes and alluvial fans.	Apr-May white	Ivanpah Valley at E edge of Clark Mtn. Range, about 2 miles WNW of Ivanpah 3 (CNDDB 2007). Found within project area during 2008 surveys.
Arctomecon merriamii white bear poppy	P	-	-	-	2.2	Death Valley region to Clark Co., NV; Last Chance Range to Resting Spring Range, INY; Silurian Vally, Clark Mtn. Range, SBD.	MDScr (MCBS, MMWS, DCS), ChScr	1,600-6,800 ft (490-2,075 m) Loose rocky slopes and flats of marine deposits: gypsum, limestone, dolomite. Occurs on limestone substrate.	Apr-May white	S edge of E Clark Mtn. Range, about 1.7 miles N of Ivanpah 3 (CNDDB 2007).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Asclepias nyctaginifolia Mohave milkweed	P	-	-	-	2.3	E Mojave Desert; known in CA only from Clark, New York and Providence mtns, Lanfair, SBD; NV, AZ.	MDScr, PJWld	3,000-5,100 ft (1,000-1,700m) Small gravelly washes.	May-June cream	Clark Mtn. Range, Shadow Valley, about 8 miles SW of the project area (CNDDB 2008). Found within the project area during 2007 and 2008 surveys.
Cordylanthus parviflorus purple bird's-beak	SA	-	-	-	2.3	E Mojave Desert; New York, Providence mtns., Mid Hills, SBD; to AZ, NV, UT, ID.	MDScr, JTWld, PJWld	2,300-7,220 ft (700-2,200m). Sandy to rocky bajadas and arroyos.	Aug-Oct pink to lavender	Mid Hills, about 30 miles S of project area (CalFlora 2007).
Coryphantha chlorantha Desert pincushion	P	-	-	-	2.2	E Mojave Desert; Clark Mtn. Range, Mescal Range, Ivanpah Mtns., SBD; Kingston Range, SBD & INY; to NV, AZ, UT.	JTWld MDScr, PJWld	3,500-5,000 ft (1,050-1,525m) Carbonate, gravelly, and rocky soils. Occurs on limestone substrate.	Apr-Sept straw colored or yellow to pink	Mescal Range and Clark Mtn. Range, about 2 miles N of Ivanpah 3 (CNDDB 2007, CalFlora 2007). Found within project area during 2007 and 2008 surveys.
Coryphantha vivipara var. *rosea* viviparous foxtail cactus	P	-	-	-	2.2	E Mojave Desert; Clark Mtn. Range, Mescal Range, New York Mtns., Mid Hills, Cima, SBD; to NV, AZ.	MDScr (BBS), JTWld, PJWld	4,000-6,000 ft (1225-1,825m) Dry stony or gravelly slopes and ridges, in bare sandy or gravelly loam; in quartz monzonite and limestone.	May-June magenta to purplish	Clark Mtn. Range and Mescal Range, within 2-5 miles of project area (Thorne et al. 1981, CalFlora 2007, CNDDB 2007). Found within one-mile buffer during 2007 surveys.

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Cymopterus gilmanii Gilman's cymopterus	P	-	-	-	2.3	Death Valley region and E Mojave Desert; Last Chance, Cottonwood, Grapevine, Funeral, Kingston and Clark mtns., INY, SBD; to western NV.	MDScr (MCBS, DCS)	3,300-6,500 ft (1000-1,975m) Dry rocky or gravelly slopes, desert canyons, rock ledges or cliffs, often on carbonates. Occurs on limestone substrate.	Mar-May purplish	Clark Mtn. Range, about 0.75 mile SE of Umberci Mine, about 2 miles N of project area (CNDDB 2007).
Cynanchum utahense Utah vine milkweed	P	-	-	-	4.3	Mojave Desert; 29 Palms region, Joshua Tree, Old Woman Springs, Ivanpah mtns., SBD; Colorado Desert; Blythe, RIV; Anza-Borrego area, SDG, Ocotillo Wells, IMP; to NV, AZ, UT.	MDScr, SDScr	1,150-4,700 ft (350-1,435m) Sandy or gravelly soils, often in washes climbing up through shrubs.	Apr-June yellow and red	Ivanpah Mtns., about 15 miles S of project area (Thorne et al. 1981, Jepson Online Interchange 2007). Found within project area during 2007 and 2008 surveys.
Enceliopsis nudicaulis ssp. *nudicaulis* naked-stemmed daisy	P	-	-	-	4.3	Death Valley region and E Mojave Desert; Inyo, Saline, Last Chance, Panamint, and Clark mtn. ranges, INY, SBD; to AZ, NV, UT, ID.	MDScr (BBS), GBScr, PJWld	2,875-6,400 ft (875-1,950m) In clayey soil, or sand and gravel, on slopes, cliffs and ridges; in calcareous or gypsicolous soils. Occurs on limestone substrate.	Apr-May (Aug) yellow	Clark Mtn. Range, about 0.75 mile SE of Umberci Mine, about 2 miles N of project area (CNDDB 2007).
Enneapogon desvauxii nine-awned pappus grass	P (SA in CA)	-	-	-	2.3	E Mojave Desert; known in CA from Providence, New York and Clark mtns, SBD Co; to CO, NM, TX, Mexico, S. America.	PJWdl	3,825-5,475 ft (1275-1825m) Rocky areas on slopes and bajadas; sometimes on carbonate substrates. Summer annual in CA.	Aug-Sept green	Clark Mtn. Range, within 1 mile of the project area (CNDDB 2008). Found within the project area during 2008 surveys.

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Grusonia (=Opuntia) parishii Parish's club-cholla	P	-	-	-	2.3	Mojave and Colorado deserts; known in CA from 11 sites, including the New York, Ivanpah and Clark mtns, SBD, RIV, IMP; to NV, AZ, TX?.	MDScr,SDScr, JTWld	980-5,000 ft (300-1,524m) Sandy or sandy-gravelly soil on flats, valleys, plains, gravelly-rocky bajadas, gentle limestone slopes.	May-June (July) red to yellow	Clark Mtn. Range, within 5 miles of the project area (Jepson Online Interchange 2007). Found within project area during 2007 and 2008 surveys.
Menodora scabra rough menodora	P	-	-	-	2.3	E Mojave and Colorado deserts; Clark, New York, Providence mtns., SBD; Vallecitos Mtns., Little Blair Valley, SDG; Inkopah Mtns., IMP; to CO, TX, northern Mexico.	JTWld, MDScr, PJWld	3,600-5,400 ft (1,200-1,800m) Canyons, rocky soils.	May-June yellow	Clark Mtn. Range, within 2 miles of project area (Jepson Online Interchange 2008).
Mentzelia pterosperma wing-seeded blazing star	A/P	-	-	-	2.2	E Mojave Desert; Clark Mtn. Range, and near Valley Wells, SBD; to AZ, NV, UT.	MDScr	3,150-3,420 ft (1,050-1,140m) Gypsum soils.	Apr-June yellow	Clark Mtn. Range, within 2 miles of project area (Jepson Online Interchange 2008).
Mortonia utahensis Utah mortonia	S	-	-	-	4.3	Death Valley region and E Mojave Desert; Nopah, Funeral, Grapevine, Kingston, Clark Mtn. ranges, INY, SBD; to S NV, AZ, UT.	MDScr, JTWld, PJWld	2,500-6,300 ft (760-2,100m) Rocky areas. Occurs on limestone substrate.	Mar-May white	Clark Mtn. Range, about 0.75 mile SE of Umberci Mine, about 2 miles N of project area (CNDDB 2007). Found within project area during 2007 surveys.
Muilla coronata crowned muilla	P	-	-	-	4.2	Owens Valley and southern Sierra south to Antelope Valley and east to the Spring Range, NV; INY, KRN, LAX, SBD, TUL.	ChScr, MDScr, JTWld, PJWld	2,300-6,620 ft (700-2,010m) Sandy or sandy-gravelly soil, or heavy soils.	Mar-Apr white with green line on outside of petals	Clark Mtn. Range, about 1 mile SW of the project area (Elliott pers. obs., field survey form 3-8-2008).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Munroa squarrosa false buffalo grass	SA	-	-	-	2.2	E Mojave Desert; known in CA only from Clark and New York mtns., SBD; AZ, NV and elsewhere.	PJWld	3,500-5,400 ft (1,500-1,800m) Gravelly or rocky soils.	October green	Clark Mtn. Range, less than 2 miles from project area (CNDDB 2008)
Oenothera cavernae cave-dwelling evening-primrose	A	-	-	-	2.2 added 8/4/08	E Mojave Desert; known in CA only from Clark Mtn. Range, SBD; NV, AZ, UT.	MDScr	3,000-3,600 ft (1,000-1,200m) Rocky soils.	April-May white	Clark Mtn. Range, less than 2 miles from project area (Andre, pers. observation, April 8, 2008). First observed in CA in 2008.
Opuntia curvospina (=O. chlorotica) Curved-spine beavertail	P	-	-	-	2.2	E Mojave Desert; known in CA from 3 sites in the vicinity of the New York Mtns., SBD; NV, AZ.	Chprl, MDScr, PJWld	3,280-4,650 ft (1,000-1,400m) A stabilized hybrid between *O. phaeacantha* and *O. chlorotica*.	Apr-June yellow	Between Nipton and Searchlight, NV, about 20 miles SE of project area (Jepson Online Interchange 2008).
Penstemon albomarginatus white-margined beardtongue	P	-	-	S	1B.2	E Mojave Desert; between Pisgah and Lavic and between Cadiz and Danby, SBD; a few widely scattered sites in NV, AZ.	MDScr (MCBS)	800-2,200 ft (250-675m) Sandy soils along washes.	Mar-May pink to purple; lvs with white margin	About 7 miles ENE of Primm, NV, in the Ivanpah Valley, E of Roach Dry Lake (NNHP 2007).
Penstemon bicolor ssp. *roseus* Rosy two-toned beardtongue	P	-	-	-	2.3	E Mojave Desert; known in CA from 3 sites, Clark Mtn. Range, Castle Mtns., and Piute Spring, SBD; to NV.	JTWld MDScr	3,000-4,900 ft (700-1,500m) Rocky or gravelly soils, sometimes in disturbed areas.	May cream to magenta; corolla gibbous, like *P. floridus*	Clark Mtn. Range, about 2 miles N of project area, 2 miles E of Keany Pass (CNDDB 2007); and about 8 miles N of project area, 4 miles W of Jean, NV (Howald, pers. obs.; field survey form 4-28-08).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Phacelia anelsonii Aven Nelson's phacelia	A	-	-	-	2.3	Mojave Desert; Clark Mtns., SBD; near Darwin, INY; NV.	JTWld, PJWld	3,600-4,500' (1,200-1,500m) Sandy or gravelly carbonate substrates.	Apr-May white	Clark Mtn. Range, near Keany Pass, about about 5 miles W of project area (Jepson Online Interchange 2008).
Portulaca halimoides desert portulaca	SA	-	-	-	4.2	Mojave Desert; Clark, New York, Providence, Granite mtns., SBD; Little San Bernardino Mtns., RIV; NV, AZ, UT, and elsewhere.	JTWld MDScr	3,000-3,600 ft (1,000-1,200m) Sandy soils of valleys and bajadas.	Aug-Oct yellow	Clark Mtn. Range, within 2 miles of project area (Jepson Online Interchange 2008). Observed within project area in October 2007 (Andre, pers. obs.).
Sclerocactus johnsonii bee-hive cactus	P	-	-	-	2.2	Death Valley region and E Mojave Desert; Funeral, Greenwater, Resting Spring and Nopah ranges, INY; Clark Mtn. Range, SBD; to Clark Co., NV, UT, AZ;	MDScr	1,640-4,000 ft (500-1,200m) Granitic soils of hills and alluvial fans.	Apr-May magenta to pink or greenish turning yellow	E edge of Clark Mtn. Range, about 2.4 miles NW of Ivanpah 3; only known SBD site, probably extirpated by pipeline construction (CNDDB 2007).
Sphaeralcea rusbyi var. eremicola Rusby's desert mallow	P	-	-	S	1B.2	Death Valley region and E Mojave Desert; Panamint Mts., Clark Mtn. Range, other locations, SBD; Emigrant Cyn., INY.	MDScr (CBS, BBS), JTWld	2,265-4,800 ft (995-1,500m) Desert slopes and gravelly sandy washes, often in carbonate. Occurs on limestone substrate.	May-June red-orange	Clark Mtn. Range at Ivanpah Springs and 0.25 mile NNW of Umberci Mine, about 2 miles N of project area (CNDDB 2007). Found within the project area during 2008 surveys.

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Tragia ramosa desert tragia	P	-	-	-	4.3	Mojave Desert; New York, Clark, Providence mtns., SBD; Santa Rosa Mtns., RIV; AZ, NV, NM, TX, UT and elsewhere.	ChScr, PJWld	2,700-5,580 ft (900-1,860m) Rocky soils.	Apr-May greenish	Clark Mtn. Range, Antimony Gulch, about 3 miles SW of project area (Jepson Online Interchange 2008).
PLANTS KNOWN FROM THE PROJECT REGION WITH VERY LOW POTENTIAL TO OCCUR IN THE STUDY AREA										
Achnatherum aridum Mormon needle grass	P	-	-	-	2.3	Death Valley region and E Mojave Desert; Last Chance, Cottonwood, Funeral, Kingston, and Clark mtn. ranges eastward; INY, SBD; to AZ, NV, TX.	MDScr (BBS, DCS), GBScr, PJWld	3,700-7,400 ft (1,125-2,250m) Dry limestone on slopes, ridges and rock outcrops. Occurs on limestone substrate.	May-June greenish	Clark Mtn. Range, within 5 miles of project area (CNDDB 2007).
Astragalus cimae var. *cimae* Cima milk-vetch	P	-	-	-	1B.2	E Mojave Desert; from mountains east of Cima; New York, Ivanpah, Clark, Mescal and Marl mtns., Mid Hills, SBD; to NV.	GBScr, JTWld, PJWld	2,900-6,000 ft (875-1,825 m) Calcareous soils, mesas and stony hillsides; also in granite sand. Occurs on limestone substrate.	Apr-May (reddish-purple, white or pale-tipped)	Clark Mtn. Range, within 5 miles of project area (CNDDB 2007).
Astragalus nutans Providence Mountain milk-vetch	P	-	-	-	4.2	E Mojave Desert in Clark, New York, Providence, Granite and Old Dad mtns.; N Colorado Desert; IMP, RIV, SBD.	MDScr (MCBS), JTWld, PJWld, SDScr	1,500-6,500 ft (450-1,975 m) Sandy to rocky washes, canyon bottoms and foothill slopes. Thorne, Prigge and Henrickson (1981) report it from 1250-1925 m in the E Mojave Desert.	Mar-June (Oct) pink-purple	Clark Mtn. Range, within 5 miles of project area (Jepson Online Interchange 2007).
Astrolepis cochisensis ssp. *cochisensis* scaly cloak fern	P	-	-	-	2.3	E Mojave Desert; Providence, Clark, Ivanpah, and Mescal mtns., SBD; to AZ, northern Mexico.	JTWld, PJWld	3,200-5,500 ft (975-1,675m) Dry limestone slopes and crevices.	Apr-Oct none	Clark, Ivanpah, and Mescal mtns. 5-30 miles from project area (CNDDB 2007).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Bouteloua eriopoda black grama grass	P	-	-	-	4.2	E Mojave Desert in CA, eastward through NV and AZ, to west TX and west OK, northern Mexico.	MDScr (MCBS), JTWld, PJWld	2,950-6,250 ft (900-1,900m) Sandy or gravelly washes, clayey flats, and rocky slopes. Thorne, Prigge and Henrickson (1981) report it from 1,220-1,830m in the Eastern Mojave.	May-Aug (Oct) greenish	Clark Mtn. Range, within 5 miles of project area (Thorne et al. 1981, Jepson Online Interchange 2007).
Bouteloua trifida red grama grass	P	-	-	-	2.3	Death Valley region and E Mojave Desert; Furnace Creek area, Kingston Range, Clark, New York and Providence mtns., INY, SBD; common from TX and northern Mexico to NM, AZ, UT and NV.	MDScr, PJWld	975-6,400 ft (300-1,950m) In CA, on rocky limestone slopes and ravines. Thorne, Prigge and Henrickson (1981) report it from 1,220-1,950m in the Eastern Mojave. Occurs on limestone substrate.	May-June (Sept) greenish	Clark Mtn. Range, within 5 miles of project area (Thorne et al. 1981, Jepson Online Interchange 2007).
Calochortus striatus alkali mariposa lily	P	-	-	S	1B.2	Southern Sierra Nevada near Weldon, KRN; Mojave Desert, Red Rock Cyn., Antelope Valley KRN, LAX; to N base San Gabriel and San Bernar-dino mtns., SBD; also TUL; and E to Ash Meadows, Las Vegas NV.	Chprl, ChScr, MDScr, Medws seeps	230-5,230 ft (70-1,595m) Alkaline meadows and springy places; low winter-wet subalkaline places in desert chenopod scrub.	Apr-Jun lavender with purple veins	Ash Meadows, Las Vegas, NV, > 40 miles N and NE of project area (CNDDB 2008).
Chamaesyce revoluta revolute spurge	SA	-	-	-	4.3	Mojave Desert, Providence, Clark, Ord, New York mtns., Mescal Range, SBD; Santa Rosa Mtns., RIV; SDG; AZ, NV, TX and elsewhere.	MDScr	3,300-9,300 ft (1,095-3,100m) Rocky sites.	Aug-Sept greenish	Clark Mtn. Range, n side Clark Mtn., about 7 miles W of project area (Jepson Online Interchange 2008).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Cryptantha holoptera winged cryptantha	A (P)	-	-	-	4.3	Very scattered in the Colorado and eastern Mojave deserts of CA; IMP, INY, RIV, SBD, SDG, to western AZ.	SDScr, MDScr (MCBS)	400-2,600 ft (125-800m) Moist washes and gravelly or rocky slopes and ridges.	Mar-Apr white	About 70 miles SW of project area near Pisgah Crater (Jepson Online Interchange 2007).
Eriogonum bifurcatum forked buckwheat	A	-	-	S	1B.2	E Mojave Desert, Pahrump, Mesquite and Stewart valleys, eastern INY to Nye Co., southern NV.	ChScr, MDScr (MCBS)	2,500-2,600 ft (750-800m) In sand; sandy loam near sand dunes.	May-June white to reddish	Known from Mesquite Valley, E San Bernardino County, about 20 miles NE of project area (Jepson Online Interchange 2007).
Erioneuron pilosum hairy erioneuron	P	-	-	-	2.3	E Mojave, Clark, New York, Providence, Mescal mtns., SBD; INY; NV and elsewhere.	PJWld	4,500-6,030 ft (1,500-2,010m) Rocky slopes, ridges, sometimes on limestone.	May-Jun greenish	Clark Mtn. Range, near Colosseum Mine, about 4 miles W of project area (Jepson Online Interchange 2008).
Galium munzii Munz's bedstraw	P	-	-	-	4.3	Mojave Desert and southern Sierra Nevada, Providence, New York, Clark, Granite mtns., SBD; Chimney Creek Cyn, TUL; Inyo Mtns., INY; to southern UT.	GBScr, LCFrs, PJWld, UCFrs	3,300-10,000 ft (1,100-3,330m) Cool, n- or e-facing slopes, shady canyon bottoms.	May-Jul greenish	Clark Mtn. Range, Colosseum Gorge, about 5 miles W of project area (Jepson Online Interchange 2008).
Juncus nodosus knotted rush	P	-	-	-	2.3	Southern Sierra Nevada, White-Inyo Range, northern desert mts., Clark Mtns.; INY, SBD, STA, TUL; scattered across US, southern Canada.	Mesic Medws, seeps, MshSw	100-6,500 ft (30-1,980m) Streambanks, lake shores, wet meadows, and seeps.	July-Sept greenish	Clark Mtn. Range, Colosseum Gorge, about 5 miles W of project area (CNDDB 2007).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Linum puberulum plains flax	P	-	-	-	2.3	E Mojave Desert, New York, Clark, Castle mtns., SBD; AZ, NV, UT and elsewhere.	GBScr, JTWld, MDScr, PJWld	3,000-7,500 ft (1,000-2.500m)	May-July yellow	Clark Mtn. Range, near Colosseum Mine, about 5 miles W of project area (Jepson Online Interchange 2008).
Matelea parvifolia spearleaf	P	-	-	-	2.3	Mojave Desert near Kelso and several locations in the Colorado Desert; RIV, SBD, SDG; to TX.	MDScr, SDScr	In CA, 1,450-3,600 ft (440-1095 m) Dry rocky ledges and slopes.	Mar-May greenish or purple	Near Kelso, about 35 miles SSW of project area (CNDDB 2007).
Mentzelia polita polished blazing star	P	-	-	-	1B.2	E Mojave Desert, in CA known only from Clark Mtn. Range, SBD; NV.	MDScr	3,600-4,500 ft (1,200-1,500m) Rocky limestone and gypsum slopes.	May-Aug white to pale yellow	Clark Mtn. Range, near Keany Pass, about 6 miles W of project area (Jepson Online Interchange 2008).
Muhlenbergia appressa apressed muhly	A	-	-	-	2.2	Mojave Desert, Channel Islands; Providence, Ord mtns., SBD; LAX, SCM; AZ, Baja CA.	CoScr, MDScr, VFGrs	60-4,800 ft (20-1,600m) Open canyon bottoms and rocky slopes.	Apr-May greenish	Providence Mtns., about 40 miles S of project area (Jepson Online Interchange 2008).
Muhlenbergia arsenei tough muhly	P	-	-	-	2.3	E. Mojave Desert, Clark and New York mtns., SBD; AZ, NV, UT and elsewhere.	PJWld	4,200-5,580 ft (1,400-1,860m) Limestone rock outcrops, slopes.	Aug-Oct greenish	Clark Mtn. Range, S of Colosseum Mine, about 5 miles W of the project acre (Jepson Online Interchange 2008).
Opuntia basilaris var. *brachyclada* short-joint beavertail	P	-	-	S	1B.2	Endemic to CA. Desert slopes of San Gabriel and San Bernardino mtns. and in the Providence Mtns.; LAX, SBD.	Chprl, MDScr, JTWld, PJWld	1,400-5,900 ft (425-1800 m) Sandy soils.	Apr-June pink	Providence Mtns., at 3,000 ft, about 40 miles S of project area (CNDDB 2007).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Pellaea truncata spiny cliff-brake	P	-	-	-	2.3	Mojave Desert, Colorado Desert, southern Sierra Nevada; Pinto Hills, New York, Mescal, Providence, Kingston Mtns., SBD; Panamint Mtns., INY; SDG; AZ, NV, UT and elsewhere.	PJWld	3,600-6,450 ft (1,200-2,150m) Volcanic or granitic rocky slopes.	No flowers (spore-bearing)	Mescal Range, about 6 miles SW of the project area (Jepson Online Interchange 2008).
Penstemon calcareus limestone beardtongue	P	-	-	-	1B.3	Death Valley region and E. Mojave Desert; Last Chance, Cottonwood, Panamint, Grapevine, and Providence mtns.; INY, SBD; to NV.	DCS in MDScr, JTWld, PJWld	3,500-7,800 ft (1060-2375m) Gravelly slopes and dry crevices in limestone; dry canyon sides. Occurs on limestone substrate.	Apr-May light rose to rose-purple	Providence Mtns., about 40 miles S of project area (CNDDB 2007).
Penstemon fruticiformis var. amargosae Death Valley beardtongue	P	-	-	S	1B.3	Death Valley region, Funeral, Argus, Avawatz, Grapevine Mtns., INY; Kingston Range, INY, SBD; to NV.	MDScr	2,800-5,335 ft (850-1,400 m) Rocky scree slopes and sandy or gravelly washes and drainages.	Apr-June purple and white	Kingston Range, about 35 miles NW of the project area (CNDDB 2007).
Penstemon stephensii Stephen's beardtongue	P	-	-	S	1B.3	E Mojave Desert, Nopah, Kingston, Providence, Old Dad, and Granite mtns., Mid Hills, INY, SBD.	MDScr, GBScr, PJWld	3,700-6,100 ft (1,125-1,850m) Gravelly to rocky slopes, crevices or cliffs; granite, limestone or dolomite. Occurs on limestone substrate.	Apr-Jun purple	Kingston Range, about 35 miles NW of project area, and Mid Hills, about 30 miles S of the project area (CNDDB 2007).
Penstemon utahensis Utah beardtongue	P	-	-	-	2.3	E Mojave Desert, New York, Providence, Kingston and Clark Mtn. ranges, INY, SBD; to AZ, UT.	ChScr, GBScr, MDScr, PJWld	3,500-8,200 ft (1,065-2,500m) Gravelly to rocky soils on slopes. Thorne, Prigge and Henrickson (1981) report it from 1,220-1,740m in the Eastern Mojave.	Apr-May pink	Clark Mtn. Range, near Colosseum Mine, about 5 miles W of the project area (CNDDB 2007).

Table B-1. Special-status plants with potential to occur within the Ivanpah SEGS project area.

Scientific/ Common Name	Ann/ Per [1]	Rank or Status [2]				Distribution [3]	Habitat Types [4]	Elevational Range and Habitat Preferences	Flowering Period/ Color	Known Locations Nearest To Project Area
		FWS	DFG	BLM	CNPS					
Phacelia parishii Parish's phacelia	A	-	-	S	1B.1	Mojave Desert, near Lucerne, Calico, and Coyote dry lakes, SBD; southern NV.	playas, MDScr (MCBS)	1,775-6,000 ft (550-1,825m) Alkaline playas and in NV also on barren alkali knolls in MDScr and JTWld.	Apr-Jul lavender with yellow tube	Coyote Dry Lake at Fort Irwin National Training Center, about 70 miles W of the project area (CNDDB 2007).
Piptatherum micranthum little-seed ricegrass	P	-	-	-	2.3	E Mojave Desert, Kingston and Clark mtn. ranges, SBD; White Mtns., INY, MNO: to Saskatchewan, North Dakota and NM.	UCFrs,DCS, PJWld	3,000-10,300 ft (900-3,150m) Rocky crevices, gravelly carbonate or granitic slopes and canyon bottoms. Occurs on limestone substrate.	Jun-Sept greenish	Curtis Canyon, 1.3 miles NE of Clark Mtn. summit, and about 7 miles W of project area (CNDDB 2007).
Selaginella leucobryoides Mojave spike-moss	P	-	-	-	4.3	Sierra Nevada, Mojave Desert, Panamint, Inyo mtns., INY; Providence Mtns., Kingston Range, SBD; Spring Mtns., NV.	MDScr, PJWld	2,000-7,500 ft (600-2,275m) Dolomite and limestone crevices and in shade among bolders. Occurs on limestone substrate.	No flowers (spore-bearing)	Kingston Range, about 25 miles W of project area (Jepson Online Interchange 2007).

Notes:

[1] A = annual, SA = summer annual, P = perennial herb, S = shrub

[2] Conservation status abbreviations:

U.S. Fish and Wildlife Service designations:

- FE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- FT Threatened: Any species likely to become endangered within the foreseeable future.

California Department of Fish and Game designations:

- SE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- ST Threatened: Any species likely to become endangered within the foreseeable future.
- SR Rare: Any species not currently threatened with extinction, but in such small numbers throughout its range that it may become endangered if its present environment worsens.

Bureau of Land Management designation:

- S Sensitive: species that are not federally or state-listed, but are designated by the BLM State Director for special management consideration.

California Native Plant Society designations:

- 1B Plants rare, threatened or endangered in California and elsewhere.
- 2 Plants rare, threatened or endangered in California, but more common elsewhere.

3 Plants for which more information is needed – a review list.
4 Plants of limited distribution – a watch list.

California Native Plant Society threat categories:
.1 Seriously endangered in California.
.2 Fairly endangered in California.
.3 Not very endangered in California.
.? Threat level not determined.

[3] Abbreviations used under distribution are: AZ=Arizona; CA=California; CO=Colorado; FRE=Fresno Co., CA; ID= Idaho; IMP=Imperial Co., CA; INY=Inyo Co., CA; KNG=Kings Co., CA; KRN=Kern Co., CA; LAS=Lassen Co., CA; LAX=Los Angeles Co., CA; MER=Merced Co., CA; MNO=Mono Co., CA; MOD - Modoc Co., CA; NM=New Mexico; NV=Nevada; OK=Oklahoma; OR=Oregon, PLU=Plumas Co., CA; RIV=Riverside Co., CA; SBD=San Bernardino Co., CA; SDG - San Diego Co., CA; SIS - Siskiyou Co., CA; SO=Sonora, Mexico; TUL=Tulare Co., CA; TX=Texas; UT=Utah; WA=Washinton; and WY=Wyoming.

[4] Habitat types reported for taxa in California. Designations largely follow the nomenclature developed by the California Natural Diversity Data Base (Holland, 1986) and abbreviations used in CNPS (2001). They include: BBS - blackbush scrub; BUFrs - broadleaf upland forests; Chprl - chaparral; ChScr - chenopod scrub; CmWld - cismontane woodland; DeDns - desert dunes; GBScr - Great Basin scrub; JTWld - Joshua tree woodland; MDScr - Mojavean Desert scrub (of which MCBS, Mojave creosote bush scrub, MMWS, Mojave mixed woody scrub, and DCS, desert calcicolous scrub are elements); Medws - meadows; MshSw - marshes and swamps; PJWld - pinyon-juniper woodland; RpFrs - riparian forest; SCFrs - subalpine conifer forest; SDScr - Sonoran desert scrub; UCFrs - upper montane coniferous forest and VFGrs - valley and foothill grasslands.

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TAB E C
Ivanpah Staffing Table

Name	4/03/2008	4/04/2008	4/05/2008	4/06/2008	4/07/2008	4/08/2008	4/09/2008	4/10/2008	4/11/2008	4/12/2008	4/13/2008	4/14/2008	4/15/2008	4/16/2008	4/17/2008	4/18/2008	4/20/2008	4/21/2008	4/22/2008
Andy Sanders	x	x/T																	
Ann Howald	x	x	x	x	x	T							T	x	x	x	T	x	
Ava Edens											T	x	x	x	x	x	T	x	x
Bill Clark	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		T	x	x
Brian Elliott	x	x	x	x	x	x	x	x	x	x	x		x	x	x/T				
Christine Halley	x	x/T				T	x	x	x	x	x	x	x	x	x	T			
Darina Roediger	x/T					T	x	x	x	x	x	x	x	x	x		T	x	x/T
Donna Ball	x	x	x	x	T														
Eliza Shepard	x/T					T	x	x	x	x	x	x	x	x	x	T			
Eve Laeger	x/T				T	x	x	x	x	x	x	x	T						
Florence Caplow							T	x	x	x	x	x	x	x					
Geof Spaulding									x	x									
Jason (Jay) Sexton							T	x	x	x	x	x	x	T					
Jason Brooks								T	x	x	x	x	x	x	x				
Jeanne Knox	x	T																	
Jeff Baubiltz	x	x	x	x	x	x	x	x	x	x	x	x	x	T					
Jeff Davis			T	x	x	x	x	x	x	T									
Jim Andre					x/T	x/T													
Josh Utter	x	x	x	x	x	x	x	x	T										
Kathryn (Katy) Beck						T	x	x	x	x	x	x	T						
Kevin Downing	x	x	x	x	x	x	x	x	x/T									T	x
Liz Bartelt					T	x	x	x	x	x	x	x	x	T					
Marc Meyer	x	x	x	x	T						T	x	x	x	x				
Mariah Moser	x/T					T	x	x	x	x	x	x	x	x	x				
Mark Bagley			T	x	x	x	x	T		T	x	x	x	x	x				
Meghan Bishop	x/T					T	x	x	x	x	x	x	x	x	x/T				
Mitch Provance	x/T																		

TAB E C
Ivanpah Staffing Table

Name	4/03/2008	4/04/2008	4/05/2008	4/06/2008	4/07/2008	4/08/2008	4/09/2008	4/10/2008	4/11/2008	4/12/2008	4/13/2008	4/14/2008	4/15/2008	4/16/2008	4/17/2008	4/18/2008	4/20/2008	4/21/2008	4/22/2008
Molly Graber	x/T					T	x	x	x	x	x	x	x	T					
Morgan King			x	x	x	x	x	x	x	x			x	x	x				
Randy Sisk	x	x	x	x	x	x	x	T			T	x	x	T					
Robert Hernandez	x	x	x	x	x	x/T						x/T	x	x	x		T	x	x
Russell Kokx						T	x	x	x	x	x	x	x	T					
Ryan Young	x	x/T				T	x	x	x	x	x	x	x	x	x	T			
Steve Ingram	x	T			T	x	x	x	x	T									
Susan Infalt				T	x	x	x	x	x	x	x	T							
Teresa Salvato	x	x/T																	
Victor Leighton III	x	x/T			x/T	x	x	x	x/T										
Virginia Dains	x	x	x	x	x	x	T												
Total	**25**	**18**	**14**	**15**	**20**	**27**	**26**	**26**	**25**	**23**	**22**	**22**	**24**	**22**	**15**	**5**	**5**	**6**	**5**
Total not incl T	**25**	**16**	**12**	**14**	**15**	**17**	**23**	**23**	**24**	**20**	**19**	**21**	**21**	**16**	**15**	**2**	**0**	**5**	**5**

Note: Total number of person-days used in report (283) includes only x (staff worked an average 10 hour workday) and x/T (full workday and travel), and does not include T (travel only).

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Photo 1: Clark Mountain agave (*Agave utahensis* var. *nevadensis*) at reference site near Umberci Mine, Clark Mountain Range, 2007.

Photo 2: Small-flowered androstephium (*Androstephium breviflorum*), in fruit, at the project site, 2008.

Photo 3: Mojave milkweed (*Asclepias nyctaginifolia*) at reference site, 2008 (photo by Jim Andre).

Photo 4: Desert pincushion (*Coryphantha chlorantha*) at the project site, 2007.

Photo 5: Utah vine milkweed (*Cynanchum utahense*) in the project area, 2007.

Photo 6: Nine-awned pappus grass (*Enneapogon desvauxii*) in the project area, 2008.

Photo 7: Utah mortonia (*Mortonia utahensis*) in the project area, 2008.

Photo 8: Cave-dwelling evening-primrose (*Oenothera cavernae*) at site in California near project area, 2007, whole plant (left), fruit (right). Photo by Jim Andre.

Photo 9: Rosy two-toned beardtongue (*Penstemon bicolor*) at reference site near Jean, Nevada, 2008.

Photo 10: Palmer's beardtongue (*Penstemon palmeri*), a common species with leaves indistinguishable from rosy two-toned beardtongue (photo by Jim Andre).

Photo 11: Rusby's desert mallow (*Sphaeralcea rusbyi* ssp. *eremicola*) at the Keany Pass reference site, 2007.

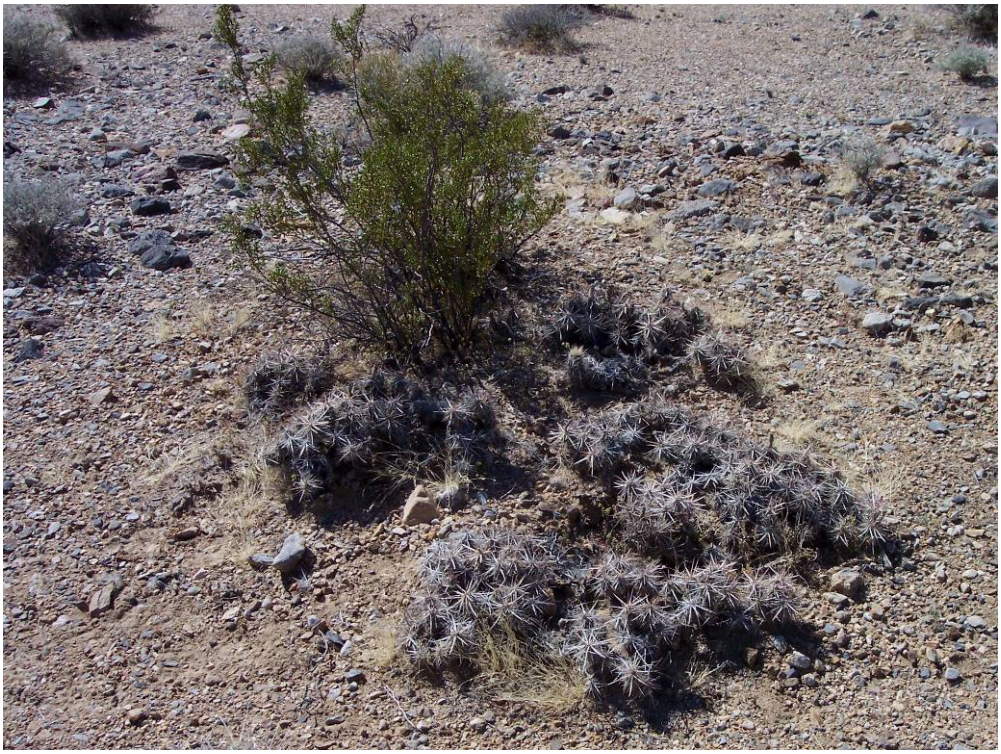

Photo 12: Parish's club cholla (*Grusonia (=Opuntia) parishii*) at the project site, 2008.

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Mo a e Creosote Bus Scru

Mojave Creosote Bush Scrub is the predominant vegetation type of the valleys, alluvial fans (bajadas) and lower mountain slopes of the Mojave Desert. This type corresponds to the Holland type of the same name (Holland 1986) and may correspond to one or more of the Creosote Bush, Creosote Bush-White Bursage, or Black Bush series of *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995). This type may include one or more of the following shrub alliances (Thomas et al. 2004): *Larrea tridentata* Shrubland Alliance, *Larrea tridentata-Ambrosia dumosa* Shrubland Alliance, *Yucca schidigera* Shrubland Alliance, *Coleogyne ramosissima* Shrubland Alliance, *Ephedra nevadensis* Shrubland Alliance, *Menodora spinescens* Shrubland Alliance, and *Mortonia utahensis* Unique Stand.

According to Holland (1986), Mojave Creosote Bush Scrub is composed of widely spaced evergreen and drought-deciduous shrubs, cacti and yucca, from 1 to 9 feet in height. Creosote bush (*Larrea tridentata*) is the dominant species and the indicator species for this vegetation type. Burrobush (*Ambrosia dumosa*, sometimes called white bursage), cheesebush (*Hymenoclea salsola*), Nevada ephedra (*Ephedra nevadensis*) and Mojave yucca (*Yucca schidigera*) are common associates throughout the range of this type. The habitat is characterized by well-drained non-alkaline and non-saline sandy to gravelly soils with very low water-holding capacity, and temperatures ranging from below 32º F in winter to above 100º F in summer (Holland 1986). Annual precipitation in most locations is less than 5-7 inches. The growing season for plants is late spring (April to early June). Perennials and shrubs grow and flower even in dry years. Wet years result in a longer growing season, with more biomass production by perennials and shrubs, and the presence of annuals that are often completely lacking in dry years. Mojave Creosote Bush Scrub extends from Death Valley (Inyo County) south throughout the Mojave Desert to the San Bernardino Mountains, and east to southern Nevada and northwestern Arizona (Holland 1986).

Within the project area, Mojave Creosote Bush Scrub occurs as four subtypes. The following three intergrade: Larrea-Ambrosia scrub, Larrea mixed scrub, and Larrea scrub. Larrea-Ambrosia scrub is widespread throughout the project area. Larrea mixed scrub is restricted mainly to the higher sections of the alluvial fan, especially in the north and west parts of the project area. Larrea scrub is restricted to a single topographic feature, the Metamorphic Hill. These subtypes differ mainly in density and species diversity of shrubs and cacti. An additional subtype, a species-rich, limestone-associated type of Larrea scrub, is restricted to limestone features.

arrea-A rosia scru

The Larrea-Ambrosia scrub subtype, which is dominated by creosote bush and burrobush, is the most widespread and abundant vegetation type within the project area. A rough estimate based on observations in the field, and visual examination of high resolution aerial photos (scale 1" = 500') indicates that about 90 to 95 percent of the project area, using 2008 boundaries and not including the one-mile buffer, is covered with Larrea-Ambrosia scrub. Within this subtype, there is considerable variation in shrub and cactus species diversity and density, and Mojave yucca density. Most of the special-status plant locations found within the project area during surveys conducted for this project in 2008 and 2007 were found within Larrea-Ambrosia scrub.

In the sites with highest species diversity, creosote bush and burrobush dominate, and common shrub associates include: Nevada ephedra, Mojave yucca, cheesebush, pima ratany (*Krameria erecta*), and Mojave Desert California buckwheat (*Eriogonum fasciculatum* ssp. *polifolium*). Cacti found in high diversity sites include: California barrel cactus (*Ferocactus cylindraceus* var. *lecontei*), clustered barrel cactus (*Echinocactus polycephalus* var. *polycephalus*), Engelmann's hedgehog cactus (*Echinocereus engelmannii*), silver cholla (*Opuntia echinocarpa*), buckhorn cholla (*Opuntia acanthocarpa* var. *coloradensis*), pencil cholla (*Opuntia ramosissima*) and beavertail cactus (*Opuntia basilaris* var. *basilaris*).

In the sites with lowest species diversity, creosote bush and burrobush dominate, with cheesebush, Nevada ephedra, pima ratany and Mojave Desert California buckwheat present in much lower abundance. Cacti in low diversity sites range from none to very low numbers of individuals, of the same species found in high diversity sites. Areas of low diversity Larrea-Ambrosia scrub are characteristic of the low elevation southern and eastern portions of the project area.

The vegetation of small washes (active channels 1-3 feet wide) is included within this subtype. These washes lack distinctive wash plant species entirely or are characterized by a higher density of cheesebush than found in adjacent areas upslope. In some small washes, Mojave Desert California buckwheat and pima ratany occur in higher densities than in adjacent uplands. Washes dominated by cheesebush are referred to as *cheesebush washes* in this report.

arrea i ed scru

The Larrea mixed scrub subtype, characterized by a high density and diversity of codominant shrubs in addition to creosote bush and burrobush, is best-developed in the western and northern, higher elevation, portions of the project area, in Ivanpah 3 and the utility corridor. A rough estimate, based on field observations and a comparison of

color signature differences in high resolution aerial photographs (scale 1" = 500') for Larrea-Ambrosia scrub and Larrea mixed scrub, suggests that 5 to 10 percent of the entire project area, using 2008 boundaries and not including the one-mile buffer, is composed of Larrea mixed scrub. Within this subtype, creosote bush and burrobush are present but not dominant, and shrub and cactus density and diversity is consistently higher than in Larrea-Ambrosia scrub. Mojave yucca density is typically moderately high to high, as high as or higher than that found within the high density and diversity form of Larrea-Ambrosia scrub.

In Larrea mixed scrub, creosote bush and especially burrobush are less important as dominants, compared with Larrea-Ambrosia scrub. Many other shrub species co-dominate in Larrea mixed scrub, including: cheesebush, Mojave yucca, Mojave Desert California buckwheat, pima ratany, Nevada ephedra, blue sage (*Salvia dorrii*), spiny menodora (*Menodora spinescens*), blackbush (*Coleogyne ramosissima*), and, to a lesser degree, Virgin River brittlebush (*Encelia virginensis*), wire-lettuce (*Stephanomeria pauciflora* var. *pauciflora*), Cooper's goldenbush (*Ericameria cooperi* var. *cooperi*), and Death Valley ephedra (*Ephedra funerea*). A few of these also are co-dominants in Mojave Wash Scrub.

arrea scru

The Larrea scrub subtype, characterized by the presence of creosote bush and the absence of or very low density of burrobush, moderately high diversity of other shrub species, and high density of some cactus species, is restricted to some sites on the Metamorphic Hill and is found only within the one-mile buffer, not within the 2008 project area boundaries. This type is found on rocky slopes with southern, northern or eastern exposures. Creosote bush is the dominant shrub in this subtype. Co-occurring shrubs and cacti include: California barrel cactus, clustered barrel cactus, California brickellbush (*Brickellia cf. californica*), and spearleaf brickellbush (*Brickellia arguta* var. *arguta*).

i estone-associated arrea scru

A distinctive species-rich form of Larrea scrub occurs on all of the limestone hills, slopes and ridges of the project area. This subtype is not found within the 2008 project area boundaries, only within the one-mile buffer. This subtype is distinct from the vegetation of the limestone pavement plain at the base of the northern foothills of the Clark Mountain Range, which is a different vegetation type: Mojave Yucca – Nevada Ephedra Scrub. Creosote bush is common in the limestone-associated Larrea scrub subtype of Mojave Creosote Bush Scrub; however, the distinctive features of this subtype are high species diversity and the presence of a number of limestone endemic and limestone-

associated plant species. Special-status plant diversity and density are higher within this subtype than for any other vegetation type within the project area. Habitat factors include steeply sloping or ridgetop terrain, a substrate composed mainly of limestone bedrock with a wind and water-eroded surface riddled with cracks, and a calcium-rich mineral composition. The vegetation is 3 to 6 feet in height, and is composed of a diverse mixture of shrubs, cacti, yucca, and herbaceous perennial forbs and grasses, with annual forbs and grasses abundant in wet years such as 2008.

In addition to creosote bush, the dominant shrubs of this subtype include: sticky snakeweed (*Gutierrezia microcephala*), catclaw acacia (*Acacia greggii*), Mojave Desert California buckwheat, pima ratany, turpentine-broom (*Thamnosma montana*), winterfat (*Krascheninnikovia lanata*), spear-leaf brickellbush, California brickellbush, blue sage, Nevada ephedra, Cooper's boxthorn (*Lycium cooperi*), and Virgin River brittlebush. Characteristic cacti include: California barrel cactus, clustered barrel cactus, Engelmann's hedgehog cactus, and the special-status cactus, desert pincushion. Limestone endemic and limestone-associated plants found here include: Panamint butterfly bush (*Buddleja utahensis*), Heermann's buckwheat (*Eriogonum heermannii* var. *sulcatum*), and the special-status shrub Utah mortonia (*Mortonia utahensis*). Other plants observed in limestone-associated Larrea scrub, but not seen elsewhere, include: Parry's cloak fern (*Cheilanthes parryi*), desert tobacco (*Nicotiana obtusifolia*), rock nettle (*Eucnide urens*), Mojave thistle (*Cirsium mojavense*), skunkbrush (*Rhus trilobata*), purple three-awn (*Aristida purpurea*), and six-weeks three-awn (*Aristida adscensionis*). Species composition within the limestone-associated Larrea scrub varies between limestone features.

Mo a e ucca Ne ada E edra Scru

Within the 2008 project area boundaries, Mojave Yucca – Nevada Ephedra Scrub extends into the northernmost part of the utility corridor. It covers less than 1 percent of the project area. It also is found in a small area of limestone-dominated pavement plain on the northern edge of the one-mile buffer. This vegetation type may correspond to the Mojave Yucca Scrub and Steppe type, which is named but not described by Holland (1986). It also may correspond to the Mojave Yucca series of Sawyer and Keeler-Wolf (1995). One or more of the following shrub alliances (Thomas et al. 2004) may be included in this type: *Ephedra nevadensis* Shrubland Alliance, *Yucca schidigera* Shrubland Alliance, and *Mortonia utahensis* Unique Stand.

The dominant plants are Mojave yucca and Nevada ephedra, which form a moderately dense plant cover from 3 to 6 feet in height. Creosote bush and burrobush are almost entirely lacking. Indicator species include gray coldenia (*Tiquilia canescens* var. *canescens*), which can occur on limestone, granite or gneiss, and Utah mortonia, a limestone endemic and special-status plant. Spiny menodora and Engelmann's hedgehog cactus are also relatively common. This vegetation type was found only on a

flat to very gradually sloping plain covered with desert pavement composed almost entirely of flat-surfaced limestone rocks. This area is located at the base of the limestone foothills of the northeastern Clark Mountain Range, which extend into the northern edge of the one-mile buffer. The limestone plain is dissected by a few small- to medium-sized ephemeral wash drainage features. Utah mortonia is especially common along the margins of these washes. The special-status cactus, desert pincushion, is found in higher densities in this type than in Mojave Creosote Bush Scrub.

Mo a e as Scru

Mojave Wash Scrub is a shrub-dominated vegetation type found in larger washes, arroyos and canyons throughout the Mojave Desert. It covers approximately 5 percent of the project area. This type corresponds to the Holland vegetation type of the same name (Holland 1986) and may correspond to the Catclaw Acacia series in *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995). One or more of the following alliances may be included in this type: *Acacia greggii* Shrubland Alliance, *Chilopsis linearis* Intermittently Flooded Shrubland Alliance, *Encelia virginensis* Shrubland Alliance, *Ericameria (=Chrysothamnus paniculatus) paniculata* Intermittently Flooded Shrubland Alliance, *Eriogonum fasciculatum* Shrubland Alliance, *Hymenoclea salsola* Shrubland Alliance, *Prunus fasciculata* Shrubland Alliance, *Salazaria mexicana* Shrubland Alliance, and *Salvia dorrii* Dwarf-shrubland Alliance (Thomas et al. 2004).

The dominant shrubs are mainly drought-deciduous and range from 1 to 12 feet in height. According to Holland, dominant species include: catclaw acacia (*Acacia greggii*), desert-willow (*Chilopsis linearis*), cheesebush, pygmy-cedar (*Peucephyllum schottii*), black-banded rabbitbrush (*Chrysothamnus paniculatus*), mesquite (*Prosopis* species), desert almond (*Prunus fasciculata*), bladder sage (*Salazaria mexicana*), and blue sage. Perennial herbs are regular components of this vegetation type. Annual herbs may be present in high density and diversity during wet years and after localized flood events.

The habitat of Mojave Wash Scrub is characterized by well-drained sandy and gravelly to cobbled or boulder-strewn substrates, highly seasonal and intermittent stream flow that includes irregular floods, and temperatures ranging from below 32º F in winter to above 100º F in summer. The growing season for plants is less dependent on annual precipitation than in upland vegetation types because many shrubs of Mojave Wash Scrub are deep-rooted and use groundwater as well as surface flow. In general, the period of active growth and flowering begins somewhat later than for upland plants. Mojave Wash Scrub extends throughout the Mojave Desert region (Holland 1986).

Within the project area, Mojave Wash Scrub occupies the larger washes, which are drainage features typically with bank-to-bank widths greater than 15 feet (often much wider), with active channels more than 5 feet wide, banks more than 3 feet high, and

sandy to gravelly bottoms. These washes usually contain catclaw acacia as an indicator species, although the size and density of this shrub varies within large washes of the project area. Other characteristic species include: cheesebush, Mojave Desert California Buckwheat, desert willow, black-banded rabbitbrush, bladder-sage, desert almond, Virgin River encelia, Anderson's boxthorn (*Lycium andersonii*), Cooper's boxthorn, sand-wash groundsel (*Senecio flaccidus* var. *monoensis*), wire-lettuce and blue sage.

A endi

l an a SE S lant s ecies o ser ed it in sites ere ro ect eatures are ro osed

Plant species observed within the Ivanpah SEGS project area during the 2007 and 2008 botanical surveys (1-mile buffer not included).
Nomenclature from Baldwin et al., Editors, 2002, The Jepson desert manual, UC Press.

Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2] MCBS	Solar Array Sites [2] MWS	Other Project Areas [3] Main Access Road	Other Project Areas [3] Utility Corridor	Other Project Areas [3] CLA	Other Project Areas [3] North BLM Acc Rd	Other Project Areas [3] Mining Claim Acc Rd	Rocky Hills [4] Lime-stone	Rocky Hills [4] Meta-morphic	Habit
Ferns											
Pteridaceae	Brake Family										
Cheilanthes parryi	Parry's cloak fern								o		fern
Gymnosperms (Conifers)											
Ephedraceae	Ephedra Family										
Ephedra nevadensis	Nevada ephedra	1,2,3	3		x	x	x	x	x o	x	shrub
Ephedra funerea	Death Valley ephedra	1,2,3			x				x o		shrub
Dicot Angiosperms (Flowering Plants)											
Amaranthaceae	Amaranth Family										
d Amaranthus fimbriatus	fringed amaranth	1,2,3	3	x	x	x	x				annual
Apocynaceae	Dogbane Family										
Amsonia tomentosa	woolly amsonia	1, 3	3		x	x	x				per
Asclepiadaceae	Milkweed Family										
Asclepias nyctaginifolia	Mojave milkweed	1,2,3	3		x	x					per
Cynanchum utahense	Utah vine milkweed	1,2,3	3								per
Asteraceae	Sunflower Family										
Acamptopappus sphaerocephalus	goldenhead	1,2,3			x	x	x				shrub
Adenophyllum cooperi	Cooper's dyssodia	1,2,3			x	x	x				per
Ambrosia dumosa	burrobush	1,2,3	3	x	x	x	x	x	x o	xo	shrub
Ambrosia eriocentra	woolly bursage	3	3		x		x				shrub
Amphipappus fremontii var. *spinosus*	Fremont's chaff-bush	1									shrub
Anisocoma acaulis	scale bud	2									annual
Baccharis brachyphylla	short-leaved baccharis	3									shrub
Baileya multiradiata var. *m.*	desert marigold	1, 3			x		x				annual
Bailey pleniradiata	woolly marigold	1,2,3		x		x					annual
Bebbia juncea var. *aspera*	sweetbush	1,2	3								shrub
Brickellia arguta var. *a.*	spearleaf brickellbush	3							o	o	shrub
Brickellia cf. *californica*	California brickellbush	3							o	o	shrub
Brickellia incana	woolly brickellbush	1, 2		x			x				shrub
Calycoseris parryi	yellow tack-stem	2									annual
Chaenactis carphoclinia	pebble pincushion	1,2,3			x	x	x				annual
Chaenactis fremontii	desert pincushion	1,2,3		x	x	x	x				annual
Chaenactis macrantha	Mojave pincushion	3									annual
Chaenactis stevioides	gray-leaved pincushion	2,3			x	x	x				annual
Chrysothamnus paniculatus	black-banded rabbitbrush	1,2,3	3	x	x		x				shrub

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Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2]		Other Project Areas [3]					Rocky Hills [4]		
		MCBS	MWS	Main Access Road	Utility Corridor	CLA	North BLM Acc Rd	Mining Claim Acc Rd	Lime-stone	Meta-morphic	Habit
Cirsium cf. mohavense	Mojave thistle	1,2									annual
Coleogyne ramosissima	blackbush	3			x		x				shrub
# *Encelia farinosa*	brittlebush	3			x						shrub
Encelia frutescens	rayless encelia	2									shrub
Encelia virginensis	Virgin River brittlebush	1,2,3	3		x	x	x		x o		shrub
Ericameria cooperi var. *c.*	Cooper's goldenbush	1,2,3		x	x				x		shrub
Eriophyllum wallacei	Wallace's woolly daisy	1,2,3		x	x	x	x	x			annual
Filago depressa	spreading filago	1,2,3					x				annual
Glyptopleura marginata	holly dandelion	2									annual
Gutierrezia microcephala	sticky snakeweed	2,3							x o		shrub
Hymenoclea salsola	cheesebush	1,2,3	3	x	x	x	x	x	x		shrub
Layia glandulosa	white tidy-tips	2,3			x						annual
Malacothrix glabrata	desert dandelion	1,2,3		x	x	x					annual
Monoptilon bellidiforme	small desert star	1,2,3									annual
Monoptilon bellioides	desert star	1,2,3			x		x				annual
d *Pectis papposa*	chinch-weed	1,2,3				x					annual
Porophyllum gracile	slender poreleaf	1,2,3	3		x	x	x	x	x	x	per
Psilostrophe cooperi	paper-daisy	1,3	3		x		x				sub-shrub
Rafinesquia neomexicana	desert chicory	1,2,3			x	x	x				annual
Senecio flaccidus var. *monoensis*	sand-wash groundsel	1,2,3	3		x	x	x				sub-shrub
Sonchus sp.	sow thistle	2									
Stephanomeria exigua	small wirelettuce	1,2,3									annual
Stephanomeria pauciflora var. *p.*	wire-lettuce	1,2,3	3	x	x	x	x		o	x	per
Stylocline micropoides	desert nest-straw	1,2,3			x		x				annual
Thymophylla pentachaeta	thymophylla	1,2,3	3		x	x	x				per
Uropappus lindleyi	silver puffs	3			x						annual
Viguiera parishii	Parish's golden-eye	1,2,3			x						shrub
Xylorhiza tortifolia	Mojave aster	3			x		x			x	per
Bignoniaceae	Bignonia Family										
Chilopsis linearis	desert-willow		3		x		x				shrub/ tree
Boraginaceae	Borage Family										
Amsinckia tessellata	checker fiddleneck	1,2,3			x	x	x				annual
Cryptantha angustifolia	narrow-leaved cryptantha	1,2,3		x	x	x	x				annual
d *Cryptantha* sp.	cryptantha	1,2,3							o	o	annual
Cryptantha sp. 1	cryptantha									o	annual
Cryptantha barbigera	fuzzy cryptantha	2,3									annual
Cryptantha circumscissa	capped cryptantha	1,2,3					x				annual

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Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2]		Other Project Areas [3]					Rocky Hills [4]		
		MCBS	MWS	Main Access Road	Utility Corridor	CLA	North BLM Acc Rd	Mining Claim Acc Rd	Lime-stone	Meta-morphic	Habit
Cryptantha decipiens	gravel cryptantha	1									annual
Cryptantha dumetorum	flexuous cryptantha	1,2,3	2		x	x					annual
Cryptantha micrantha ssp. *m.*	purple-rooted cryptantha	1,2,3		x		x					annual
Cryptantha nevadensis	Nevada cryptantha	1,2,3		x	x	x	x				annual
Cryptantha pterocarya	wing-nut cryptantha	1,2,3			x	x	x				annual
Cryptantha recurvata	curved cryptantha	1,3									annual
Cryptantha utahensis	Utah cryptantha	1,2,3			x		x				annual
Pectocarya heterocarpa	wing-nutted combseed	1,2,3		x	x	x	x				annual
Pectocarya platycarpa	broad-fruited combseed	1,2,3		x		x	x				annual
Pectocarya recurvata	curved combseed	3									annual
Pectocarya setosa	round combseed	1,3									annual
Plagiobothrys arizonicus	Arizona popcorn-flower	3									annual
Plagiobothrys jonesii	Jones's popcorn-flower	2		x							annual
Tiquilia canescens var. *c.*	gray coldenia	3			x	x	x				sub-shrub
Brassicaceae	Mustard Family										
* *Brassica tournefortii*	Saharan mustard	3			x						annual
Caulanthus cooperi	Cooper's jewelflower	1,2,3			x	x	x				annual
Descurainia pinnata ssp. *glabra*	tansy mustard	1,2,3		x	x	x	x				annual
Dithyrea californica	spectacle-pod	1,2,3		x		x					annual
Draba cuneifolia	desert draba	1,2									annual
Guillenia lasiophylla	California mustard	1,2,3		x		x					annual
Lepidium fremontii	desert alyssum	1,2,3	3	x	x	x	x				sub-shrub
Lepidium lasiocarpum var. *l.*	modest peppergrass	1,2,3		x	x	x	x				annual
* *Sisymbrium irio*	London rocket	2		x							annual
Streptanthella longirostris	long-beaked twist flower	1,2,3		x		x					annual
Thysanocarpus curvipes	fringe-pod	3				x					annual
Buddlejaceae	Buddleja Family										
Buddleja utahensis	Panamint butterfly bush								o		shrub
Cactaceae	Cactus Family										
Coryphantha chlorantha	desert pincushion	1, 2, 3			x	x	x	x			shrub
Echinocactus polycephalus var. *p.*	clustered barrel cactus	1, 2, 3			x	x	x		x o	o	shrub
Echinocereus engelmannii	hedgehog cactus	1, 2, 3			x	x	x		x o	xo	shrub
Ferocactus cylindraceus var. *lecontei*	California barrel cactus	1, 2, 3	3		x	x	x		o	xo	shrub
Grusonia (=Opuntia) parishii	Parish's club cholla	1, 3				x					shrub

Plant species observed within the Ivanpah SEGS project area during the 2007 and 2008 botanical surveys (1-mile buffer not included). Nomenclature from Baldwin et al., Editors, 2002, The Jepson desert manual, UC Press.

Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2]		Other Project Areas [3]					Rocky Hills [4]		
		MCBS	MWS	Main Access Road	Utility Corridor	CLA	North BLM Acc Rd	Mining Claim Acc Rd	Lime-stone	Meta-morphic	Habit
Mammillaria tetrancistra	fish-hook cactus	1, 2, 3			x	x	x				shrub
Opuntia acanthocarpa var. *coloradensis*	buckhorn cholla	1, 2, 3	3	x	x	x	x		x o	xo	shrub
Opuntia basilaris var. *b.*	beavertail cactus	1, 2, 3		x	x	x	x		x		shrub
Opuntia chlorotica	pancake prickly-pear	3					x				shrub
Opuntia echinocarpa	silver cholla	1, 2, 3		x	x	x	x		x	xo	shrub
Opuntia echinocarpa X *O. ramosissima*	hybrid silver X pencil cholla	3									shrub
Opuntia erinacea	Mojave prickly-pear	2, 3			x						shrub
Opuntia ramosissima	pencil cholla	1, 2, 3	3	x	x	x	x		x o		shrub
Campanulaceae	Bellflower Family										
Nemacladus glanduliferus	glandular thread-plant	1,2,3									annual
Nemacladus cf. gracilis	slender thread-plant	3									annual
Nemacladus cf. rubescens	yellow-flowered thread-plant	2									annual
Nemacladus sp. nov.	thread-plant	3									annual
Nemacladus sp.	thread-plant				x						annual
Celastraceae	Staff-tree Family										
Mortonia utahensis	Utah mortonia				x						shrub
Chenopodiaceae	Goosefoot Family										
Atriplex canescens ssp. *c.*	fourwing saltbush	3									shrub
Atriplex polycarpa	cattle spinach	2									shrub
Grayia spinosa	hop-sage	1,2									shrub
Krascheninnikovia lanata	winterfat	3									shrub
* *Salsola* sp.	Russian thistle			x							annual
Cuscutaceae	Dodder Family										
Cuscuta cf. californica	California dodder	1,2				x					parasitic
Euphorbiaceae	Spurge Family										
Chamaesyce albomarginata	rattlesnake weed	1,2,3	3	x	x	x	x				per
Chamaesyce micromera	Sonoran sand-mat	1,2				x					annual
d *Chamaesyce polycarpa*	golondrina	1,2									annual
Chamaesyce setiloba	Yuma spurge	1,2			x		x				annual
Fabaceae	Legume Family										
Acacia greggii	catclaw acacia	1,2,3	3		x	x	x		o		shrub
Astragalus acutirostris	keel-beak milk-vetch	3									annual
Astragalus lentiginosus var. *fremontii*	freckled milk-vetch	1,2,3				x					per
Astragalus nuttallianus var. *imperfectus*	Nuttall's milk-vetch	1,2,3									annual
Dalea mollisima	silk dalea	1,2,3		x	x	x	x				annual

Plant species observed within the Ivanpah SEGS project area during the 2007 and 2008 botanical surveys (1-mile buffer not included). Nomenclature from Baldwin et al., Editors, 2002, The Jepson desert manual, UC Press.

Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2]		Other Project Areas [3]					Rocky Hills [4]		
		MCBS	MWS	Main Access Road	Utility Corridor	CLA	North BLM Acc Rd	Mining Claim Acc Rd	Lime-stone	Meta-morphic	Habit
Lotus strigosus var. *tomentellus*	stiff-haired lotus	1,2,3				x					annual
Lupinus brevicaulis	short-stemmed blue lupine	3					x				annual
Lupinus concinnus	bajada lupine	1,2,3				x					annual
Lupinus flavoculatus	yellow-eyed lupine	2									annual
Lupinus odoratus	royal desert lupine	3									annual
Geraniaceae	Geranium Family										
* *Erodium cicutarium*	red-stemmed filaree	1,2,3		x	x	x	x				annual
Hydrophyllaceae	Waterleaf Family										
Eucrypta micrantha	desert eucrypta	1,2,3				x					annual
Nama demissum	purple mat	1,2,3									annual
Phacelia crenulata var. *ambigua*	purple phacelia	1,2,3		x	x	x	x				annual
Phacelia distans	common phacelia	2,3									annual
Phacelia fremontii	yellow-throats	1,2,3		x	x	x	x				annual
Phacelia perityloides	cliff phacelia								o		per
Phacelia rotundifolia	round-leaved phacelia								o		annual
Phacelia vallis-mortae	Death Valley phacelia	3			x		x				annual
Krameriaceae	Rhatany Family										
Krameria erecta	pima ratany	1,2,3		x	x	x	x		x o	xo	shrub
Lamiaceae	Mint Family										
Salvia columbariae	chia	1,2,3	3		x	x	x				annual
Salazaria mexicana	Mexican bladder sage	1,2,3	3		x	x	x		x o		shrub
Salvia dorrii	blue sage	1,2,3	3		x	x	x		x o		shrub
Loasaceae	Sandpaper-plant Family										
Eucnide urens	rock nettle								o		shrub
Mentzelia cf albicaulis	little blazing star	1,2,3		x	x	x	x				annual
Petalonyx thurberi ssp. *t.*	Thurber's sandpaper plant	2, 3	3				x				shrub
Malvaceae	Mallow Family										
Sphaeralcea ambigua	apricot mallow	1,2,3		x	x		x				per
Sphaeralcea rusbyi var. *eremicola*	Rusby's desert mallow	1,2,3			x						per
Molluginaceae	Carpet-weed Family										
d *Mollugo cerviana*	carpet-weed	1,2									annual
Nyctaginaceae	Four O'clock Family										
Allionia incarnata	windmills	1,2,3			x	x	x				per
d *Boerhavia triquetra*	slender spiderling	2									annual
d *Boerhavia wrightii*	Wright's spiderling	2,3		x	x	x	x				annual
Mirabilis bigelovii	wishbone bush	1,2,3					x				per

Plant species observed within the Ivanpah SEGS project area during the 2007 and 2008 botanical surveys (1-mile buffer not included).
Nomenclature from Baldwin et al., Editors, 2002, The Jepson desert manual, UC Press.

Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2]		Other Project Areas [3]					Rocky Hills [4]		
		MCBS	MWS	Main Access Road	Utility Corridor	CLA	North BLM Acc Rd	Mining Claim Acc Rd	Lime-stone	Meta-morphic	Habit
Mirabilis multiflora	giant four-o'clock	1,2,3				x	x				per
Oleaceae	Olive Family										
Menodora spinescens	spiny menodora	1,2,3			x		x		x o		shrub
Onagraceae	Evening Primrose Family										
Camissonia boothii ssp. *condensata*	woody bottle-washer	1,2,3		x	x	x	x			x	annual
Camissonia brevipes	yellow cups	2,3			x		x				annual
Camissonia cf. campestris	Inyo suncups				x						annual
Camissonia chamaenerioides	modest primrose	1,2,3									annual
Camissonia claviformis ssp. *aurantiaca*	brown-eyed primrose	1,2,3		x		x	x				annual
Camissonia refracta	narrow-leaved primrose	1,2									annual
Oenothera deltoides	birdcage	1									per
Oenothera primiveris ssp. *bufonis*	large yellow evening-primrose	1,2,3									per
Orobanchaceae	Broom-rape Family										
Orobanche cooperi	Cooper's broom-rape	1,2,3				x	x				parasitic
Papaveraceae	Poppy Family										
Eschscholzia glyptosperma	desert gold-poppy	1,2,3			x	x	x				annual
Eschscholzia minutiflora	little gold-poppy	1,2,3									annual
Plantaginaceae	Plantain Family										
Plantago ovata	woolly plantain	1,2,3			x		x				annual
Plantago patagonica	Patagonia plantain	1,2,3									annual
Polemoniaceae	Phlox Family										
Eriastrum diffusum	diffuse woolly star	2									annual
Eriastrum eremicum ssp. *e.*	desert woolly star	1,2,3		x		x	x				annual
Eriastrum sparsiflorum	few-flowered woolly star	3			x	x					annual
Gilia cana ssp. *speciformis*	showy gilia	2,3			x		x				annual
Gilia ophthalmoides	pinyon gilia	3									annual
Gilia sinuata	cinder gilia	1,2,3			x	x					annual
Gilia stellata	dotted-throat gilia	1,2,3									annual
Gilia transmontana	star gilia	1,2,3									annual
Gilia sp.	gilia				x						annual
Ipomopsis polycladon	spreading gilia	2,3									annual
Langloisia setosissima ssp. *punctata*	lilac sunbonnet	1,2,3			x		x				annual
Linanthus aureus	golden linanthus	1									annual
Linanthus bigelovii	Bigelow's linanthus	2									annual
Linanthus demissus	desert snow	1,2,3					x				annual

Plant species observed within the Ivanpah SEGS project area during the 2007 and 2008 botanical surveys (1-mile buffer not included). Nomenclature from Baldwin et al., Editors, 2002, The Jepson desert manual, UC Press.

Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2] MCBS	Solar Array Sites [2] MWS	Other Project Areas [3] Main Access Road	Other Project Areas [3] Utility Corridor	Other Project Areas [3] CLA	Other Project Areas [3] North BLM Acc Rd	Other Project Areas [3] Mining Claim Acc Rd	Rocky Hills [4] Lime-stone	Rocky Hills [4] Meta-morphic	Habit
Linanthus jonesii	Jones's linanthus	1,2,3			x	x					annual
Loeseliastrum matthewsii	desert calico	2									annual
Loeseliastrum schottii	little sunbonnets	1,2,3			x						annual
Phlox stansburyi	cold-desert phlox	1									
Polygonaceae	Buckwheat Family										annual
Chorizanthe brevicornu	brittle spineflower	1,2,3		x	x	x	x				annual
Chorizanthe rigida	rigid spiny-herb	1,2,3		x	x	x	x		x	x	annual
Eriogonum brachypodium	glandular skeleton-weed	2,3			x		x				annual
Eriogonum deflexum	flat-topped buckwheat	3									annual
Eriogonum fasciculatum ssp. *polifolium*	Mojave Desert California buckwheat	1,2,3	3		x	x	x		x o	xo	shrub
Eriogonum inflatum var. *i.*	desert trumpet	1,2,3			x	x	x		x o	xo	per
Eriogonum maculatum	spotted buckwheat	1,2,3									annual
Eriogonum nidularium	birdnest buckwheat	2,3				x	x				annual
Eriogonum palmerianum	Palmer's buckwheat	2									annual
Eriogonum pusillum	yellow turbans	1,2,3				x					annual
Eriogonum thomasii	Thomas's buckwheat	1									annual
d Eriogonum sp.	annual buckwheat	3		x							annual
Eriogonum trichopes	little desert trumpet	1,2,3			x						annual
Portulacaceae	Portulaca Family										
Calyptridium monandrum	sand cress	2									annual
Rosaceae	Rose Family										
Coleogyne ramosissima	blackbush	1, 3			x		x		o		shrub
Prunus fasciculata	desert almond	1,2,3	3				x		x o		shrub
Rutaceae	Rue Family										
Thamnosma montana	turpentine-broom	3							o		shrub
Scrophulariaceae	Figwort Family										
Antirrhinum filipes	twining snapdragon	1,2,3					x				annual
Castilleja angustifolia	desert paintbrush	3			x						per
Mimulus bigelovii	Bigelow's monkeyflower	2,3			x		x				annual
Penstemon palmeri	Palmer's penstemon	1,3	3		x	x					per
Solanaceae	Nightshade Family										
Lycium andersonii	Anderson's box-thorn	1,2,3	3	x	x	x	x		x o	xo	shrub
Lycium cooperi	Cooper's box-thorn	1,2,3		x	x	x			x o		shrub
Nicotiana obtusifolia	desert tobacco	1,2,3					x		o	o	per
Physalis crassifolia	thickleaf ground-cherry	3					x			o	per
Viscaceae	Mistletoe Family										
Phoradendron californicum	desert mistletoe	1,2,3	3		x	x	x				parasitic

Plant species observed within the Ivanpah SEGS project area during the 2007 and 2008 botanical surveys (1-mile buffer not included).
Nomenclature from Baldwin et al., Editors, 2002, The Jepson desert manual, UC Press.

Plant Group / Family / Species [1]	Common Name	Solar Array Sites [2]		Other Project Areas [3]					Rocky Hills [4]		
		MCBS	MWS	Main Access Road	Utility Corridor	CLA	North BLM Acc Rd	Mining Claim Acc Rd	Lime-stone	Meta-morphic	Habit
Zygophyllaceae	Caltrop Family										
d Kallstroemia californica	California caltrop	1,2				x					annual
* *Kallstroemia cf. parviflora*	few-flowered caltrop	1,2									annual
Larrea tridentata	creosote bush	1,2,3	3	x	x	x	x	x	x o	xo	shrub
Monocot Angiosperms (Flowering Plants)											
Liliaceae	Lily Family										
Androstephium breviflorum	small-flowered androstephium	1,2									per
Yucca schidigera	Mojave yucca	1,2,3	3	x	x	x	x	x	x o		shrub
Poaceae	Grass Family										
Achnatherum speciosum	desert needlegrass	1,2,3			x	x	x				per
Aristida adscensionis	six-weeks three-awn	1,2,3			x	x	x		o	o	annual
Aristida purpurea	purple three-awn	1,2,3			x	x	x		o		per
d Bouteloua aristidoides var. *a.*	needle grama	2									annual
d Bouteloua barbata	six-weeks grama	1,2,3		x	x	x	x				annual
* *Bromus madritensis* ssp. *rubens*	red brome	1,2,3	x	x	x	x	x	x	x o	xo	annual
* *Bromus tectorum*	cheat grass	1,2,3				x					annual
d Enneapogon desvauxii	nine-awned pappus grass	1,2,3			x	x	x				annual
Erioneuron pulchellum	fluff grass	1,2,3		x	x	x	x		x o	o	per
Muhlenbergia microsperma	little-seed muhly	2			x						per
Muhlenbergia porteri	Porter's muhly	1,2,3			x	x	x				per
Pleuraphis rigida	big galleta	1,2,3		x	x	x	x		x	xo	per
* *Schismus* sp.	Mediterranean grass	1,2,3	x	x	x	x	x	x	x	xo	annual
Vulpia octoflora var. *hirtella*	six-weeks fescue	1,2,3			x	x	x				annual

Footnotes:

[1] * = introduced species (not native to California)

\# = California native species not native to area; probably planted during restoration work on Kern River Pipeline

d = annual species observed only as dead plants from previous year (noted for annual species only)

[2] Species observed in proposed solar array sites were recorded by plant community and by site:

MCBS = Mojave creosote bush scrub plant community
MWS = Mojave wash scrub plant community
1 = species present in the southern site, Ivanpah 1
2 = species present in the middle site, Ivanpah 2
3 = species present in the northern site, Ivanpah 3

Plant species observed within the Ivanpah SEGS project area during the 2007 and 2008 botanical surveys (1-mile buffer not included).
Nomenclature from Baldwin et al., Editors, 2002, The Jepson desert manual, UC Press.

Plant Group			Solar Array Sites [2]		Other Project Areas [3]					Rocky Hills [4]		
Family	Species [1]	Common Name	MCBS	MWS	Main Access Road	Utility Corridor	CLA	North BLM Acc Rd	Mining Claim Acc Rd	Lime-stone	Meta-morphic	Habit

[3] Other proposed project areas surveyed outside of the solar array sites include:

Access Road = unpaved access road, along Colosseum Road west from the paved golf course road to the junction with the electrical transmission line access road east of the middle site

Utility Corridor = proposed utility corridor extending north from Ivanpah 3

CLA (Construction Logistics Area) = This area will include up to 10 single-wide full-length trailer offices or equivalent, chemical toilets, and parking for 200 vehicles. Additionally, it will be used during construction as a laydown area, equipment storage, and materials fabrication.

x = species present in the survey area

[4] Two rocky hills occur near the middle and northern solar array sites:

Limestone hill = hill of gray limestone located on the west edge of the northern site; an intensive survey was conducted over most of the limestone hill outside of the buffer zone in 2007

Metamorphic hill = large hills of red and black metamorphic rock located at the southeastern edge of the northern site and just north and northeast of the middle site; no intensive survey was conducted of the metamorphic hill outside the buffer zone

x = species present on hill within the northern site 250-foot buffer zone (2007)

o = species present on hill outside of the northern site 250-foot buffer zone, and out of the project area (2007)

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S all- lo ered androste iu (*Androstephium breviflorum*)

Small-flowered androstephium is a bulb-forming perennial with white to pale violet flowers in the Lily Family (Liliaceae). The erect stem is typically 12 inches or less in height, and bears an umbel of 3-12 flowers, each with 6 floral parts (Baldwin et al. 2002, Flora of North America 2007). The leaves are up to 12 inches in length, channeled, and appear before the flowering stalk. In California, small-flowered androstephium flowers in March to April. The fruit is a 3-lobed capsule (see Photo 2, Appendix D) that splits open at maturity to reveal rows of large black seeds. Line drawings of this species are found in Baldwin and others (2002) and Cronquist (1977).

Small-flowered androstephium grows in open desert scrub in California (Baldwin et al. 2002). The CNDDB (2008b) describes its habitat in California as desert dunes, and on bajadas in Mojavean desert scrub, from about 700 to 4,800 feet.

Distribution

In California, small-flowered androstephium is known from the Mojave Desert in San Bernardino County and the Colorado Desert in Riverside County. It is also found in Nevada, Arizona, Utah, Wyoming, Colorado and New Mexico (USDA 2008, Cronquist 1977). The CNDDB (2008b) lists 20 occurrences, all from San Bernardino County. Many are in the vicinity of Cronese Lake, Baker or Fort Irwin. The Consortium of California Herbaria (Jepson On-line Interchange 2008) lists nine specimens of small-flowered androstephium. Eight are from San Bernardino County locations near Cronese Lake, several areas near Baker, the Cady Mountains, the Whipple Mountains, and the Pizgah Lava Flow; and one location is from Riverside County, in the Cadiz Valley of the Colorado Desert, near the San Bernardino County line.

In 2008, 12 individuals of small-flowered androstephium were mapped in four locations during protocol-level surveys at the Ivanpah SEGS project area (Table 5-1; Figure 5-1, Appendix A), within Ivanpah 1 and 2, in Mojave Creosote Bush Scrub dominated by creosote bush and burrobush. No individuals of this species were detected during protocol-level surveys in 2007.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of small-flowered androstephium. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). The CNPS places it on List 2, meaning that it is considered rare, threatened or endangered in California, but is more common elsewhere (CNPS 2008). Its CNPS threat extension code is .3, meaning that it is

not very endangered in California. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), has assigned small-flowered androstephium a global rank of G5 and a state rank of S1.3 (CNDDB 2008a). A global rank of G5 means that, considering its entire (worldwide) range, small-flowered androstephium is common enough to be demonstrably secure to ineradicable. A state rank of 1.3 means that within California this species is known from less than six occurrences[1], or fewer than 1000 individuals, or less than 2000 acres, and the threat extension of .3 means that it is not very threatened in California.

In Nevada, neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program includes small-flowered androstephium on any of its conservation status lists (NNPS 2008, NNHP 2007). The Arizona Natural Heritage Program does not include small-flowered androstephium on its tracking list for at-risk plant species (ANHP 2008). The Arizona Native Plant Society does not include this species on its list of rare plants (ANPS 2008). The Utah Division of Wildlife Resources' Inventory of Sensitive Species and Ecosystems in Utah (UDWR 1998) does not include small-flowered androstephium on any of its lists.

Mo a e il eed (*Asclepias nyctaginifolia*)

Mojave milkweed is a perennial herb with pale green to ivory flowers in the Milkweed Family (Asclepiadaceae) (see Photo 3, Appendix D). The stems are branched, prostrate to decumbent, and reach about 1 foot in height. The leaves are broadly ovate to lanceolate, opposite, and vary from green to deep purple when young. In California, Mojave milkweed blooms from May to June. The fruit is a pod about 1.5 inches in length. Based on observations made during surveys for this project, Mojave milkweed is much more likely to appear above-ground in wetter years. There are very few illustrations of this species available in published sources or on the web. A rough line drawing is found in Jaeger (1941). No photos of Mojave milkweed are currently accessible through CalFlora (2008).

The habitat of Mojave milkweed in California includes washes and dry slopes from about 3,000 to 5,100 feet in elevation (Baldwin et al. 2002), in Mojavean desert scrub and pinyon and juniper woodland (CNPS 2008).

[1] *Occurrence* is a location where a plant is found; an occurrence can consist of a single individual or a group of individuals, which may include sub-groups. Occurrences are, by definition, separated from the nearest occurrence(s) by ¼ mile or more (NatureServe 2008, CNDDB 2008a). An occurrence may or may not be equivalent to a biological population.

Distribution

In California, Mojave milkweed is known only from a few locations in the eastern Mojave Desert in San Bernardino County (CNDDB 2008b, Jepson Online Interchange 2008). It also occurs in Nevada and Arizona. The CNDDB (2008b) lists locations in the New York Mountains, the Providence Mountains, Lanfair Valley, and Shadow Valley (west of the Clark Mountain Range). The Consortium of California Herbaria (Jepson Online Interchange 2008) lists six specimens of Mojave milkweed from four locations, including: Shadow Valley; the New York Mountains; Lanfair Valley; and Cajon Pass. The Shadow Valley specimens were collected in 1977. All of the others were collected prior to 1920.

In 2008, 202 individuals of Mojave milkweed were mapped in 59 locations during protocol-level surveys at the Ivanpah SEGS project area (Figure 5-1, Appendix A). Most locations supported ten or fewer individuals, with a range of 1-35 individuals per location. Mojave milkweed was found within these project components: Ivanpah 1, 2 and 3, the construction logistics area, and the utility corridor (Table 5-1). In 2007, a single locality was located in Ivanpah 1, with an unspecified number of individuals. The combined total for 2007 and 2008 is 202 individuals in 60 locations. As shown in Figure 5-1, Mojave milkweed is widely scattered throughout the project area, although most locations are within Ivanpah 1 and 3.

Within the project area Mojave milkweed typically grows in small- to medium-sized washes with sandy to gravelly substrates. Some individuals were found growing beneath larger shrubs. Common associated species include: creosote bush, burrobush, cheesebush, Mojave Desert California buckwheat, Nevada ephedra and slender poreleaf (*Porophyllum gracile*).

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of Mojave milkweed. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). The CNPS places it on List 2, meaning that it is considered rare, threatened or endangered in California, but is more common elsewhere (CNPS 2008). Its threat extension code is .3, meaning that it is not very endangered in California. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), has assigned Mojave milkweed a global rank of G4G5 and a state rank of S1.3 (CNDDB 2008a). This global rank means that, considering its entire range, Mojave milkweed is apparently to demonstrably secure to ineradicable. A state rank of 1.3 means that within California this species is known from less than 6 occurrences, or fewer than 1000 individuals, or less than 2000 acres, and the threat extension of .3 means that it is not very threatened in California.

In Nevada, neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program includes Mojave milkweed on any of its conservation status lists (NNPS 2008, NNHP 2007). The Nevada Natural Heritage Program assigns its conservation priorities based on rarity and endangerment on a global, not a statewide basis, and Mojave milkweed is not globally rare. However, the Arizona Natural Heritage Program places Mojave milkweed on its tracking list for at-risk plant species, giving it a "highest reporting priority" designation (ANHP 2008).

esert incus ion (*Coryphantha chlorantha*)

Desert pincushion is a small yellow-green-flowered stem succulent in the Cactus Family (Cactaceae) (see Photo 4, Appendix D). The stems are typically solitary or few (up to 5 is typical, occasionally up to 15 or more), 3-3.5 inches in diameter and 3-6 inches tall (Benson 1969, 1982; Flora of North America 2007). The flowers are straw-yellow, yellow-green, or rarely pink, with narrowly lanceolate, mucronate petals 0.5-1.0 inch long and about 0.25 inch wide (Benson 1982). The blooming time is stated as April to September (CNPS 2008), although at the project area flowering took place between mid-April and mid-May. The fruit is about 1.0 inch long. The fruiting time is unknown. A color photograph of this species (as *Coryphantha vivipara* var. *desertii*) is found in Benson (1969). No photos of this species are accessible through CalFlora (2008).

The Jepson Desert Manual (Baldwin et al. 2002) gives the habitat of desert pincushion in California as limestone soils from about 3,000 to 7,000 feet in elevation. The CNPS on-line Inventory (2008) describes its habitat in California as Joshua tree woodland, Mojavean desert scrub and pinyon and juniper woodland, on gravelly or rocky carbonate substrates, from 150 to 4,500 feet. (The lower elevation limit is not substantiated by other sources and is probably in error.)

Distribution

In California, desert pincushion is known from the Mojave Desert, in San Bernardino and Inyo counties (CNDDB 2008b); it also occurs in Nevada, Arizona and Utah (Flora of North America 2007). Although earlier publications reported it from Riverside and Imperial counties (Benson 1969), these records were based on misidentifications (Zimmerman 1985). *The Jepson Desert Manual* (Baldwin et al. 2002) describes its range in California (as *Escobaria vivipara* var. *deserti*) as limited to the mountains of eastern San Bernardino County. DeDecker (1984) and York (CNDDB 2007c) report it from the Kingston Range in southeastern Inyo County.

Details of the distribution of desert pincushion in California are imperfectly known, likely due to survey limitations, difficulty in separating this species from other taxa in the genus *Coryphantha,* and incomplete reporting. Based on available information,

desert pincushion's distribution in California is restricted to a few mountain ranges in the eastern Mojave Desert, in eastern San Bernardino County and southeastern Inyo County. The Consortium of California Herbaria (Jepson Online Interchange 2008) lists 11 specimens of desert pincushion from California. These are all from locations in the eastern Mojave Desert, in eastern San Bernardino County. Five are from Clark Mountain or the Clark Mountain Range, one is from the Mescal Range, two are from the Ivanpah Mountains, two are from the valley between the Mescal Range and the Ivanpah Mountains, and one is from the Kingston Range (Jepson Online Interchange 2008). It has also been reported from the Kingston Range in southeastern Inyo County (DeDecker 1984, CNDDB 2007c). Clark Mountain and the Clark Mountain Range lie immediately to the west and north of the project area. The Mescal Range and the Ivanpah Mountains are south of I-15, and about 5 to 10 miles south of the project area. The Kingston Range is about 30 miles northwest of the project area, along the border between Inyo and San Bernardino counties.

Desert pincushion is widely scattered throughout the Ivanpah SEGS project area. In 2008, 477 individuals of this species were mapped in 177 locations during protocol-level surveys, within Ivanpah 1, 2 and 3, the construction logistics area, and the utility corridor (Table 5-1; Figure 5-1, Appendix A). In 2007, an additional 122 individuals were found in 114 locations (Figure 5-2, Appendix A). The combined total for 2007 and 2008 is 599 individuals in 291 locations (Figure 5-3, Appendix A). Most locations include a single individual of desert pincushion, with a range of 1 to 6.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of desert pincushion. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). The CNPS places desert pincushion on List 2, meaning it is rare and endangered in California, but more common elsewhere, with a threat extension code of .2, meaning that it is fairly endangered in California (CNPS 2008). The CNDDB has assigned desert pincushion a global rank of G2G3 and a state rank of S2.2 (CNDDB 2008a). A global rank of G2G3 means that throughout its entire (worldwide) range, this species is known from 6 to 80 occurrences, 1,000 to 10,000 individuals, or 2,000 to 50,000 acres. A state rank of 2 means that within California this species is known from 6 to 20 occurrences, or 1,000 to 3,000 individuals, or 2,000 to 10,000 acres. The threat extension of .2 means that it is considered threatened in California.

In Nevada, neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program has included desert pincushion on any of its conservation status lists (NNPS 2008, NNHP 2007). In compiling its at-risk plant lists, the Nevada Natural Heritage Program has based its conservation priorities on species that are globally rare and endangered, and has not focused on plants that are rare only within the state. According to Dr. James Morefield, Natural Heritage Program Botanist, desert

pincushion may merit reconsideration, now that it has been recognized as a species separate from *Coryphantha vivipara* and its global range has been ranked as G2 or G3. Its distinctive features probably make it more vulnerable to poaching than many other cacti, which could qualify it for at-risk status according to Dr. Morefield. Although it has been frequently encountered in southern Nevada, more fieldwork in Nevada is needed to clarify its statewide abundance and distribution (Morefield pers. comm. 2007).

In Arizona, the Arizona Natural Heritage Program does not include desert pincushion on its tracking list for at-risk plant species (ANHP 2008). Marc Baker reports that he has seen it in many locations in Arizona, and that it is probably under-represented in herbaria (CNDDB 2007c). The Arizona Native Plant Society does not include it on its list of rare plants (ANPS 2008). The Utah Division of Wildlife Resource's Inventory of Sensitive Species and Ecosystems in Utah (1998) does not include desert pincushion on any of its lists.

ta ine il eed (*Cynanchum utahense*)

Utah vine milkweed is a yellow- to red-flowered perennial herbaceous vine in the Milkweed Family (Asclepiadaceae) (see Photo 5, Appendix D). The plants have thread-like, bright green stems and small red and yellow flowers clustered in umbellate heads about 1 inch wide (Baldwin et al. 2002). The fruit is a pod (follicle) about 2 inches long (Cronquist et al. 1984). These small vines grow up through and entwine themselves within woody shrubs. The blooming time in California is April to June. Based on the results of surveys conducted for this project, Utah vine milkweed is much more likely to be detected in wetter years than in drier years. Line drawings of Utah vine milkweed are found in Baldwin and others (2002) and Cronquist and others (1984), and photos are accessible through CalFlora (2008).

The Jepson Desert Manual (Baldwin et al. 2002) describes the habitat as dry, sandy or gravelly areas below 3000 feet elevation. The CNPS online Inventory (2008) says that Utah vine milkweed occurs in Mojavean desert scrub and Sonoran desert scrub at approximately 450 to 4500 feet elevation.

Distribution

Utah vine milkweed is known from the Mojave and Colorado deserts and elsewhere in southern California, where it has been recorded in San Bernardino, Riverside, San Diego and Imperial counties (CalFlora 2008, Jepson Online Interchange 2008, CNDDB 2007c). It is also found in southern Nevada, northwestern Arizona and southwestern Utah (Cronquist et al. 1984, Shreve and Wiggins 1964).

According to the available records, Utah vine milkweed is widely scattered within the Mojave and Colorado deserts of California. The Consortium of California Herbaria (Jepson Online Interchange 2008) lists 53 specimens, including 15 specimens from the vicinity of 29 Palms, and several specimens from other locations in San Bernardino County, including the Ivanpah Mountains, Joshua Tree National Monument, and Old Woman Springs. None of the specimens listed in the on-line records of the Consortium is from the vicinity of the Ivanpah SEGS project area. In Riverside County it has been reported from two locations, near Blythe (CalFlora 2008) and near Rancho Mirage, along the Pines to Palms Highway (CNDDB 2007c). In San Diego County, it is reported from the Sentenac Canyon, San Felipe, Blair Valley, Dolomite Mine, Earthquake Valley and Coyote Mountain regions of the Colorado (Sonoran) Desert of Anza-Borrego Desert State Park (Beauchamp 1986, Reiser 1994, Jepson Online Interchange 2008, CNDDB 2007c). The CNPS on-line Inventory (2008) reports it from Imperial County, where Reiser (1994) cites a location from near Coyote Wells, and there is a specimen from near Ocotillo Wells (CNDDB 2007c).

Utah vine milkweed is abundant and widely distributed within the Ivanpah SEGS project area. In 2008, 991 individuals of Utah vine milkweed were found in 146 widely scattered locations during protocol-level surveys (Table 1; Figure 5-1, Appendix A). Most individuals were found in Ivanpah 1 and 2; a few were found in Ivanpah 3 and the construction logistics area. In 2007, three individuals of this species were mapped in three locations, all within Ivanpah 1 (Figure 5-2, Appendix A). Most locations found in 2008 supported five or more individuals, with a range of 1 to 53. The combined total for 2007 and 2008 is 994 individuals in 149 locations (Figure 5-3, Appendix A).

The typical habitat for Utah vine milkweed at the Ivanpah SEGS project area is within small washes, where it grows within several species of shrubs, including: burrobush, cheesebush, and slender poreleaf.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of Utah vine milkweed. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). In California, the CNPS Inventory (2008) places it on List 4, a "watch" list, meaning that it is a plant of limited distribution. Its CNPS threat extension code is .3, meaning that it is not very endangered in California. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), has assigned Utah vine milkweed a global rank of G4 and a state rank of S3.3 (CNDDB 2007c, 2008a). A global rank of G4 means that throughout its entire (worldwide) range, this species is apparently secure but factors exist that cause concern, such as threats or somewhat narrowly limited habitat. A state rank of 3 means that within California this species is known from 21 to 80 occurrences, or 3,000 to 10,000 individuals, or 10,000 to 50,000 acres, and the threat extension of .3 means that it is not very endangered in California.

According to Reiser (1994), Utah vine milkweed populations in San Diego County are probably stable, based on historically low levels of impact to its habitat, but those on the western edge of the Colorado desert are uncommon and should be protected.

In Nevada, neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program has included Utah vine milkweed on any of its conservation status lists (NNPS 2008, NNHP 2007). The Arizona Natural Heritage Program does not include Utah vine milkweed on its tracking list for at-risk plant species (ANHP 2008). The Arizona Native Plant Society does not include this species on its list of rare plants (ANPS 2008). The Utah Division of Wildlife Resources' Inventory of Sensitive Species and Ecosystems in Utah (1998) includes Utah vine milkweed on its "watch" list. Within Utah, it is known only from Washington County, in southwestern Utah (UDWR 1998).

Nine-awned pappus grass (*Enneapogon desvauxii*)

Nine-awned pappus grass is a small bunch grass in the Grass Family (Poaceae) (see Photo 6, Appendix D). Although published sources describe it as a perennial (Baldwin et al. 2002, USDA 2008, Hitchcock 1950, Cronquist et al. 1977), in California it behaves as a summer annual (see further discussion, below). The stems are ascending to erect, from 0.3 to 1.3 feet in height. This grass's most characteristic feature is the lemma (a sterile flower part), which has an awn at the tip that is divided into 9 parts, each of which is plumose (feathery) (Baldwin et al. 2002). These distinctive awns are visible even when the plants are dried and dead. The flowering time in California is given as August to September (Baldwin et al. 2002). Line drawings of this species are found in Baldwin and others (2002), Hitchcock (1950) and Cronquist and others (1977), and photos are accessible through CalFlora (2008).

The Jepson Desert Manual (Baldwin et al. 2002) describes the habitat of nine-awned pappus grass in California as rocky slopes, crevices, calcareous soils, in desert woodland, from 3,825 to 5,475 feet in elevation. The CNPS on-line Inventory (2008) decribes its habitat as rocky, carbonate soils in pinyon and juniper woodland. In the Ivanpah Valley, this species grows within the Ivanpah Valley alluvial fan, on the often north-facing sides of medium-sized to large washes, and on cobble mounds within and outside of washes that include some calcareous rocks, from 2,900 to 3,400 feet, in Mojave Creosote Bush Scrub.

Although nine-awned pappus grass is described as a perennial (Baldwin et al. 2002, USDA 2008, Hitchcock 1950), it appears to behave in California strictly as a summer annual (Andre pers. comm. 2008, Sanders pers. comm. 2008). In 2007 and 2008 in the Ivanpah Valley, during surveys conducted for this project, the growth pattern of this species was that of a *summer annual*. Summer annuals are plants that germinate and grow only following summer rain. No plants of nine-awned pappus grass, including

dead skeletons, were observed during protocol-level surveys in spring of 2007, following a very dry year. However, in October 2007, many live individuals of this grass were scattered throughout the Ivanpah Valley and on the lower slopes of the Clark Mountains following August rains. These plants were observed by Jim Andre, a technical expert and survey team member for this project, during independent visits not a part of the survey effort for this project (Andre pers. comm. 2008). During spring of 2008, all of the thousands of plants of this species mapped during protocol-level surveys for the Ivanpah SEGS project were the dead skeletal remains of plants that likely had grown and flowered during the late summer and fall of 2007. In spite of above-average rainfall in winter of 2007-2008, no living plants of this species were observed during surveys conducted in April 2008.

Distribution

Nine-awned pappus grass is a widespread species of the southwestern U.S., Mexico and South America (Baldwin et al. 2002, Cronquist et al. 1977). In California, nine-awned pappus grass is known only from the eastern Mojave Desert, in San Bernardino County (CNDDB 2008b). The CNDDB (2008b) lists seven occurrences from the Providence, New York and Clark mountains. The Consortium of California Herbaria (Jepson Online Interchange 2008) lists 12 specimens from the Striped, Providence, Clark, and New York mountains; six of these are from the Clark Mountain Range. All of these collections were made between August and October, in either 1950 or 1977. Within the U.S., nine-awned pappus grass also occurs in Nevada, Arizona, Utah, Colorado, New Mexico, and Texas (USDA 2008, Cronquist et al. 1977).

In 2008, dead individuals of nine-awned pappus grass were very abundant, and were widely scattered throughout the Ivanpah SEGS project area. No live individuals were observed during protocol-level surveys in 2008. In 2008, 8,145 dead individuals of this species were mapped in 182 locations during protocol-level surveys, within Ivanpah 1, 2 and 3, the construction logistics area, and the utility corridor (Table 5-1; Figure 5-1, Appendix A). Most locations included ten or more individuals, with a range of 1-300. In 2007, no individuals of this species were detected within the Ivanpah SEGS project area.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of nine-awned pappus grass. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). The CNPS places it on List 2, meaning that it is considered rare, threatened or endangered in California, but is more common elsewhere (CNPS 2008). Its threat extension code is .3, meaning that it is not very endangered in California. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), has assigned it a global rank of G5 and a state rank of S2? (CNDDB 2008a). A global rank of G5 means that, considering its worldwide distribution, nine-

awned pappus grass is demonstrably secure to ineradicable. A state rank of 2? means that within California the status of this species is uncertain, but is estimated to consist of 6 to 20 occurrences, or 1,000 to 3,000 individuals, or 2,000 to 10,000 acres. No threat extension is given, so its threat status is likely unknown.

Neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program includes nine-awned pappus grass on any of its conservation status lists (NNPS 2008, NNHP 2007). The Nevada Natural Heritage Program assigns its conservation priorities based on rarity and endangerment on a global, not a statewide basis, and nine-awned pappus grass is not globally rare. The Arizona Natural Heritage Program does not include this species on its tracking list for at-risk plant species (ANHP 2008). The Arizona Native Plant Society does not include this species on its list of rare plants (ANPS 2008). The Utah Division of Wildlife Resources' *Inventory of Sensitive Species and Ecosystems in Utah* (1998) does not include nine-awned pappus grass on any of its lists.

aris s clu -c olla (*Grusonia* (*Opuntia*) *parishii*)

Parish's club-cholla is a red- to yellow-flowered clonal stem succulent in the Cactus Family (Cactaceae). Its stem joints are 2-3 inches long and obovoid, with separate tubercles. The major spines are distinctly flattened, with rough papillae on the largest spine (Baldwin et al. 2002). The fruits are usually not spiny, or only weakly so. The plants form spreading mats, with the ascending stems usually no more than about 8 inches in height (see Photo 12, Appendix D). The blooming time is May to June or July. A line drawing of this species (as *Opuntia stanlyi* var. *parishii*) is found in Benson (1969), and photos of this species are accessible through CalFlora (2008).

The Jepson Desert Manual (Baldwin et al. 2002) describes the habitat of Parish's club-cholla (as *Opuntia parishii*) as sandy flats from 2,950 to 3,935 feet elevation. The CNPS online Inventory (2008) says that it occurs in Mojavean desert scrub, Sonoran desert scrub, and Joshua tree woodland, in sandy areas, at approximately 985 to 5,000 feet elevation. *A Flora of the Higher Ranges and the Kelso Dunes of the Eastern Mojave Desert in California* (Thorne et al. 1981) give its habitat as sandy-gravelly flats, gravelly-rocky bajadas, and gentle limestone slopes.

Parish's club-cholla has undergone several taxonomic revisions in recent years. Benson (1982) classified it as *Opuntia stanlyi* var. *parishii*. *The Jepson Desert Manual* (Baldwin et al. 2002) refers to it as *Opuntia parishii*. In the *Flora of North America*, Volume 4 (2008), Zimmerman and Parfitt use the name *Grusonia parishii*. This treatment will be followed in the second edition of *The Jepson Manual* (Parfitt, in preparation), and is used in the CNPS Inventory (2008) and by the CNDDB (2008a).

Distribution

In California, Parish's club-cholla is known from the Mojave and Colorado deserts in San Bernardino, Riverside and Imperial counties (Jepson Online Interchange 2008). It is also known from Nevada and Arizona (USDA 2008). The Consortium of California Herbaria (Jepson Online Interchange 2008) lists 11 specimens of Parish's club-cholla from California (five as *Opuntia stanlyi* var. *parishii*). Of four specimens from eastern San Bernardino County, three are from the New York Mountains and the Clark Mountain Range. Five specimens are from north-central Riverside County, including three from the Colorado Desert, in the Little San Bernardino Mountains. One specimen is from Imperial County, from the western Salton Basin in the Colorado Desert, near Westmorland. Thorne et al. (1981) note Parish's club-cholla (as *Opuntia stanlyi* var. *parishii*) as infrequent in the New York, Ivanpah and Clark mountains of eastern San Bernardino County.

Parish's club-cholla is abundant within the Ivanpah SEGS project area, where it is discontinuously distributed, with most locations found in Ivanpah 1 and 3, and the construction logistics area. This species grows in clones consisting of spreading mats that may form separate patches over time. In areas that contain many closely spaced mats, it is impossible to determine in the field how many and which of these mats constitute one genetic individual. For this project, one individual was defined as all mats growing together, of which none are separated by more than 10 feet. Using this definition, many individuals consisted of five to ten or more mats in close proximity. In 2008, 196 individuals of Parish's club-cholla were mapped at 47 locations within Ivanpah 1, the construction logistics area, and the utility corridor (Table 5-1; Figure 5-1, Appendix A). In 2007, 143 clones of this species were mapped within 96 locations in Ivanpah 1 and 3, and the construction logistics area (Figure 5-2, Appendix A). For 2008 and 2007 combined, 339 individuals were mapped in 143 locations (Figure 5-3, Appendix A).

The habitat of Parish's club-cholla within the project area consists of sandy to somewhat gravelly uplands in the Larrea-Ambrosia sub-type of Mojave Creosote Bush Scrub.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of Parish's club cholla. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). In 2007 the conservation status of Parish's club-cholla was evaluated by the CNPS and the CNDDB. In March 2007 the CNPS added Parish's club-cholla to List 2 and the CNDDB added it to its Special Plants, Lichens and Bryophytes List. The CNPS assigned Parish's club-cholla a threat extension of .3, meaning that it is not very endangered in California. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), assigned it a global rank of G3G4 and

a state rank of S2.3? (CNDDB 2008a). A global rank of G3G4 means that, considering its entire (worldwide) range, this species is intermediate between ranks G3 and G4 (see Table B-1, notes, Appendix B, for further explanation). A state rank of 2 means that within California this species is known from six to 20 occurrences, or 1,000 to 3,000 individuals, or 2,000 to 10,000 acres, and the threat extension of .3? means that it is probably not threatened in California, but more information on threat is needed.

In Nevada, neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program has included Parish's club-cholla on any of its conservation status lists (NNPS 2008, NNHP 2007). In Arizona, the Arizona Natural Heritage Program does not include Parish's club-cholla on its tracking list for at-risk plant species (ANHP 2008). The Arizona Native Plant Society does not include this species on its list of rare plants (ANPS 2008).

ta ortonia (*Mortonia utahensis*)

Utah mortonia is a white-flowered evergreen shrub in the Staff-tree Family (Celastraceae) (see Photo 7, Appendix D). The clusters of five-parted white flowers and sand-papery, ascending leaves (Baldwin et al. 2002) are distinctive. The blooming time for Utah mortonia in California is March to May (CNPS 2008). A line drawing of this plant is in *The Jepson Desert Manual* (Baldwin et al. 2002), and photos of flowering plants are accessible through CalFlora (2008).

The Jepson Desert Manual (Baldwin et al. 2002) describes the habitat of Utah mortonia as limestone slopes and canyon bottoms from 2,700 to 6,300 feet elevation. The CNPS online Inventory (2008) says that it occurs in Mojavean desert scrub, Joshua tree woodland, and pinyon-juniper woodland, on carbonate substrates, at approximately 2,300 to 6,300 feet elevation.

During surveys for the Ivanpah SEGS project in 2007, Utah mortonia was observed to be fairly common on the limestone hills of the northeastern extension of the Clark Mountain Range, within the one-mile buffer; however, no plants of this species were found within the project area. In 2008, the boundaries of the utility corridor were revised slightly, and one individual was found in a single location, at the northern end of the utility corridor, within Mojave Yucca – Nevada Ephedra Scrub (Table 5-1; Figure 5-1, Appendix A).

Distribution

In California, Utah mortonia is known only from the eastern Mojave Desert in San Bernardino County and the Death Valley region in Inyo County. It has been collected in the Nopah, Funeral, Grapevine, Kingston, Mesquite and Clark mountains (Jepson Online Interchange 2008). The Consortium of California Herbaria (Jepson Online

Interchange 2008) lists 61 specimens of Utah mortonia. Most of these are from the eastern Mojave Desert, including 29 from the Clark Mountain Range.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of Utah mortonia. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). The CNPS places it on List 4, a "watch" list, meaning that it is a plant of limited distribution. Its CNPS threat extension code is .3, meaning that it is not very endangered in California. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), has assigned Utah mortonia a global rank of G4G5 and a state rank of S3.3 (CNDDB 2008a). A global rank of G4G5 means that, considering its entire range, Utah mortonia is apparently to demonstrably secure to ineradicable. A state rank of 3 means that within California this species is known from 21 to 80 occurrences, or 3,000 to 10,000 individuals, or 10,000 to 50,000 acres, and the threat extension of .3 means that it is not very endangered in California.

Neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program includes Utah mortonia on any of its conservation status lists (NNPS 2008, NNHP 2007). The Nevada Natural Heritage Program assigns its conservation priorities based on rarity and endangerment on a global, not a statewide basis, and Utah mortonia is not globally rare. The Arizona Natural Heritage Program does not include this species on its tracking list for at-risk plant species (ANHP 2008). The Arizona Native Plant Society does not include this species on its list of rare plants (ANPS 2008). The Utah Division of Wildlife Resources' *Inventory of Sensitive Species and Ecosystems in Utah* (1998) includes Utah mortonia in its *Peripheral* category; species in this category are rare or uncommon in Utah, but more common and widespread elsewhere. Within Utah, Utah mortonia occurs only in Washington County, in southwest Utah.

nidenti ied *Penstemon* indi iduals ro 2

In 2007, 12 individual plants in the genus *Penstemon* were mapped within the Ivanpah SEGS project area. None of these were in flowering condition. The leaf characteristics of these plants indicated that they were either rosy two-toned beardtongue (*Penstemon bicolor*) (see Photo 9, Appendix D), a special-status plant known from only three locations in California (CNDDB 2007b, 2008b), or Palmer's beardtongue (*Penstemon palmeri*) (see Photo 10, Appendix D), a common species. Flowers are required to distinguish between these two taxa. In 2008, all of the *Penstemon* individuals that were mapped in 2007 were located in the field. Most were found in flowering condition and all of these were identified as Palmer's beardtongue. The remaining plants were dead, so these could not be identified to species. Photos of both species of beardtongue are accessible on CalFlora (2008).

esert ortulaca (*Portulaca halimoides*)

Desert portulaca is a diminutive, yellow-flowered, fleshy summer annual herb in the Purslane Family (Portulacaceae). The spreading to ascending stems are about 0.5-2.5 inches long. The flowers are in clusters of 2-10, with 2 reddish sepals and 5 yellow petals that turn red as they dry out (Baldwin et al. 2002). The latter character was responsible for the apparent prior misidentification of this species in California as *Portulaca mundula* or *P. parvula*. Kelley (1989) examined specimens from California previously identified as *P. mundula* or *P. parvula* and determined that these are all *P. halimoides*. Baldwin and others (2002) note that additional study is needed. Desert portulaca is a summer annual that flowers in California from August to October (Jepson Online Interchange 2008). A line drawing of this species is found in Baldwin and others (2002), and photos of this species are accessible on CalFlora (2008).

The Jepson Desert Manual (Baldwin et al. 2002) describes the habitat of desert portulaca as sandy washes and flats, from about 3,000 to 3,600 feet in elevation. The CNPS on-line Inventory (2008) says that it grows in sandy soil in Joshua tree woodland.

Distribution

In California, desert portulaca is found in the Mojave Desert in San Bernardino and Riverside counties, and possibly in San Diego County (Jepson Online Interchange 2008). It is also known from Nevada, Arizona, Utah, Colorado, New Mexico, Oklahoma, Texas and other states, and Baja California (USDA 2008). The Consortium of California Herbaria lists 25 specimens of desert portulaca, including locations in the vicinity of the New York, Providence, Granite, Van Winkle and Clark mountains in San Bernardino County, and in Joshua Tree National Monument and the Little San Bernardino Mountains in Riverside County. There is one specimen from the vicinity of the Clark Mountains.

At the Ivanpah SEGS project area, no individuals of desert portulaca were detected during protocol-level surveys conducted in April, May and June of 2007, or in April of 2008. However, desert portulaca was observed within the Ivanpah SEGS project area in October of 2007, following rains in August 2007, by Jim Andre, a technical expert and survey team member for this project, during independent visits to the Ivanpah Valley that were not a part of the survey effort for this project (Andre pers. comm. 2008). Although other species of summer annuals were found in abundance, desert portulaca could not be detected within the project area during protocol-level surveys conducted for this project in April 2008, likely because the dead skeletons do not persist for long in identifiable condition. Therefore, quantitative data on the distribution and abundance of desert portulaca within the Ivanpah SEGS project area is not available.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of desert portulaca. It is not federally or state-listed, nor is it included on the list of California BLM Special Status Plants (BLM 2007). In California, the CNPS (2008) places it on List 4, a "watch" list, meaning that it is a plant of limited distribution. Its CNPS threat extension code is .2, meaning that it is endangered in California. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), has assigned desert portulaca a global rank of G5 and a state rank of S3.2 (CNDDB 2008a). A global rank of G5 means that throughout its entire (worldwide) range, this species is apparently secure. A state rank of 3 means that within California this species is known from 21 to 80 occurrences, or 3,000 to 10,000 individuals, or 10,000 to 50,000 acres, and the threat extension of .2 means that it is endangered in California.

In Nevada, neither the Nevada Native Plant Society nor the Nevada Natural Heritage Program has included desert portulaca on any of its conservation status lists (NNPS 2008, NNHP 2007). The Arizona Natural Heritage Program does not include it on its tracking list for at-risk plant species (ANHP 2008). The Arizona Native Plant Society does not include this species on its list of rare plants (ANPS 2008). The Utah Division of Wildlife Resources's Inventory of Sensitive Species and Ecosystems in Utah (1998) does not include desert portulaca on any of its lists.

Rus s desert allo (*Sphaeralcea rusbyi var. eremicola*)

Rusby's desert mallow is a small, soft-woody shrub with dark apricot-colored flowers, in the Mallow Family (Malvaceae) (see Photo 11, Appendix D). The erect stems grow to about 1 foot in height. The leaves are ovate, about 1 inch long, and are palmately compound (deeply divided to the midrib) (Baldwin et al. 2002). The compound leaves are one important characteristic that distinguishes this taxon from desert mallow (*Sphaeralcea ambigua*), a similar species that is widespread in the western U.S. and consists of many varieties. Desert mallow has lobed leaves that are not cut to the midrib. The flowers of Rusby's desert mallow are dark apricot-colored. The flowering time is May to June.

The Jepson Desert Manual (Baldwin et al. 2002) describes the habitat of Rusby's desert mallow as desert scrub from 3,900 to 4,500 feet in elevation. The CNPS on-line Inventory (2008) says that it grows in Mojavean desert scrub and Joshua tree woodland from 2,925 to 4,500 feet.

Distribution

Rusby's desert mallow is endemic to California, where it is found only in the eastern Mojave Desert in San Bernardino County and in the Death Valley region in Inyo County (Baldwin et al. 2002, CNPS 2008). The Consortium of California Herbaria (Jepson Online Interchange 2008) lists 24 specimens of this taxon, including 22 from San Bernardino County. Most of these are from the Clark Mountain Range. One is from the Kingston Range and several are from Cima Dome. The Consortium lists two specimens from Inyo County, both from the Panamint Mountains, west of Death Valley. The CNDDB (2008b) lists 19 locations for Rusby's desert mallow; most of these are in the vicinity of the Clark Mountain Range.

Rusby's desert mallow is widely distributed within the Ivanpah SEGS project area, where it occurs in very low numbers. In 2008, 15 individuals of Rusby's desert mallow were mapped in 12 locations within the Ivanpah SEGS project area, within Ivanpah 1, 2 and 3, the construction logistics area and the utility corridor (Table 5-1; Figure 5-1, Appendix A). All of these locations consisted of one or two individuals. No individuals of this taxon were detected in 2007, likely because most *Sphaeralcea* shrubs were nearly leafless due to drought at the time of the field surveys, so it would not have been possible to distinguish Rusby's desert mallow from the much more common desert mallow.

Conservation status

Table 5-2 (see Section 5.1) summarizes the conservation status of Rusby's desert mallow. It is not federally or state-listed. Rusby's desert mallow is identified as Sensitive on the list of California BLM Special Status Plants (BLM 2007). *Sensitive* plants are defined as those that are not federally or state-listed, but are designated by the BLM State Director for special management consideration. The CNPS Inventory (2008) includes Rusby's desert mallow on List 1B, meaning that it is rare and endangered throughout its range. The CNDDB, using the natural heritage methodology ranking system (NatureServe 2008), has assigned Rusby's desert mallow to a global rank of G4T1 and a state rank of S1.3. A global rank of G4T1 means that the variety *eremicola* of *Sphaeralcea rusbyi*, known as Rusby's desert mallow, is limited to fewer than 6 occurrences, or fewer than 1000 individuals, or less than 2000 acres, throughout its range; whereas, all varieties of *Sphaeralcea rusbyi* considered together have a global rank of 4, meaning that the species as a whole is apparently secure, although there are some reasons for concern. The state ranking of S1.3 means that Rusby's desert mallow (*S. rusbyi* var. *eremicola*) is limited to fewer than 6 occurrences, or fewer than 1000 individuals, or less than 2000 acres, and the threat extension of .3 means that it is not very threatened in California.

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